MITSUBISHI MATERIALS

TURNING TOOLS / MILLING TOOLS / DRILLING TOOLS

2018-2019 | C008B

USING THIS CATALOGUE

1. This catalogue is as of April 2017.

2. Please note that products in this catalogue are continuously reviewed and updated. The products therefore may be changed in the future and thus become different from the catalogue.

3. Stock status is mentioned for the products in this catalogue. However, please note that the products here may be replaced by new grades and products in the future.

   (Note) Please contact us regarding order numbers and grades that are not mentioned in this catalogue.

4. Stock status indication

   ● : Inventory maintained.

   ▲: Inventory maintained. To be replaced by new products.

   □ : Non stock, produced to order only.

HOW TO USE THIS CATALOGUE

In this catalog, our company's cutting tools are broadly divided into two types: turning tools and rotating tools, with separate respective sections for each machining method. Please select the search method that matches your requirements when using the catalog.

1. **Search for tool types from the INDEX at the beginning of the catalog.**
   - Turning tools are classified by a green colour.
   - Milling tools are classified by a blue colour.
     (Drilling tools are classified by a red colour.)

2. **To find the series of products from the contents of the inside title**.
   Contents of each block are listed on each inside title.

3. **To find the product according to application.**
   The classification page of each block provides the series of products to be selected according to applications and purposes.

4. **Search using the index of symbol designations at the end of the catalog.**
   All tools are listed in the alphabetical index at the front of the catalogue.

OTHER WAYS TO USE THE CATALOG

The following PR materials are also available in addition to this catalog, for use as necessary.

1. **Catalogs for individual products**
   - Access the following URL and download "Tools News" for the applicable cutting tool.
     Information about tool features and examples of cutting applications are available in greater detail.

   http://www.carbide.mht.co.th/download/tools_news

2. **Online catalog (electronic catalog with search functions)**
   - Access the following URL to search for applicable cutting tools and view detailed information.
     CAD data, tooling sheets, and other resources are also available for download.

   http://www.mitsubishicarbide.net/mht/enuk/

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YOUR GLOBAL CRAFTSMAN STUDIO

Mitsubishi Materials is not just a tool manufacturer.
We are committed to promptly responding to customers' challenges with the dedication of a professional craftsman and doing our best to actively contribute to their success.
We strive to become the only tool manufacturer globally offering "your personal craftsman studio", a unique service for our customers.

It is the place where you can:

Find state-of-the-art technologies and products.
Find solutions, anytime, anywhere in the world.
Share our excitement on the latest technology trends and product innovation.

It is the studio where we think, share, create and develop together with our customers exciting solutions to meet their specific needs.

YOUR GLOBAL CRAFTSMAN STUDIO
MITSUBISHI MATERIALS

[The meaning of our logo] ▶▶▶
Our logo shows people, standing on a circle, holding hands. The circle represents the earth. Holding hands reflect our commitment to grow and succeed "hand in hand" with our customers and closely work with them improving performance across the globe.
The shape of the logo embodies a variety of ideas. It captures the image of "cutting tools" combined with the dominant letter "M" of the Mitsubishi Materials brand name. It also depicts a flame that symbolizes our passion for craftsmanship.

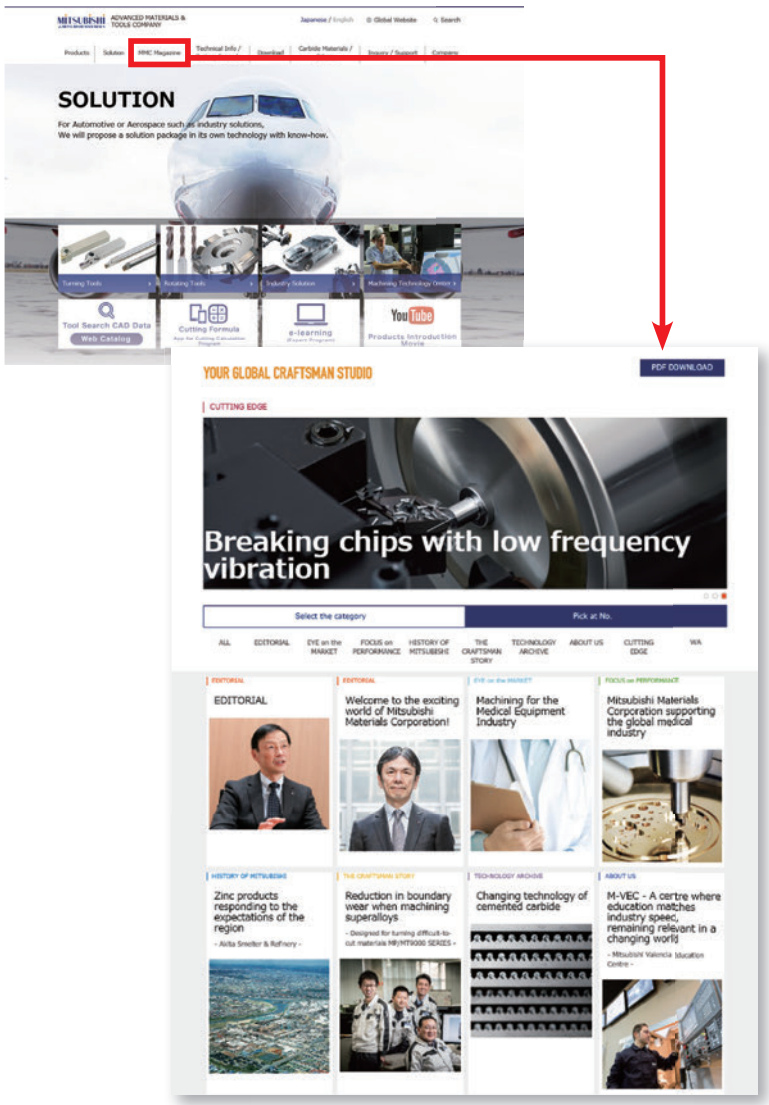
Now available!

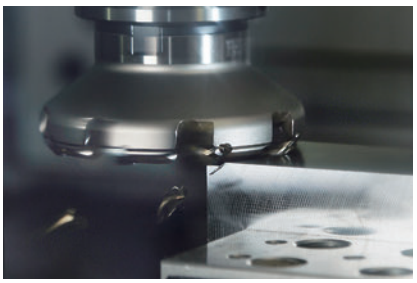
A magazine for communication to encourage excitement about manufacturing

YOUR GLOBAL CRAFTSMAN STUDIO

Access the MMC Magazine here

http://www.carbide.mht.co.th/magazine





Machining Technology Center

RESPONSIVE, ATTRACTIVE, PROACTIVE

Mitsubishi Materials Corporation, Advanced Materials & Tools Company, offers a "Comprehensive Craftsman Studio" which addresses the individual needs and requirements of our customers' in order to make their business successful. Here the Machining Technology Center is the front-line base. It is fully equipped with advanced machines, measuring instruments, extensive cutting data, knowledge, technologies as well as having a team of highly-experienced technical staff members. All of which allows Mitsubishi Materials Corporation to offer the best solution and services for our valued customers.

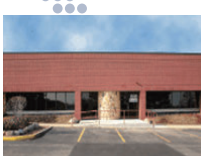
East Japan Technical Center (Saitama, JAPAN)

Central Japan Technical Center (Gifu, Japan)

MTEC Valencia (Espana)

MTEC Bangkok (Thailand)

MTEC TianJin (China)

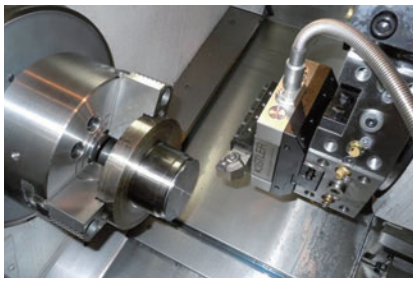


MTEC Chicago (USA)

We try answering any questions and demands from customers around the world and providing detailed solutions as well as meeting customers' expectations along with a sustainable growth of technical skills and services.

We identify the potential needs of customers and develop innovation tools to cultivate new markets for widening future business possibilities.

Showing and demonstration, Attractive events and practical seminars present the new possibilities in machining which evoke a feeling of curiosity.



1

Practical "Hands-on" training with real demonstration

TRAINING

- **Cutting Academy**
- **e-learning**
- Regional seminar
- Requested Seminar

2

Visualizing your machining

CUTTING TEST

- Test Cutting
- Selection of optimal machining conditions
- Improvements in tool life and machining quality
- Predictive tests before line input
- High-speed camera/ Cutting force/ 3D measuring device etc.

3

"RESPONSIVE", with the provision of technical services

TECHNICAL SUPPORT

- Production line diagnosis/ Process improvement
- Tooling
- Cutting Simulation
- Telephone Technical counseling

http://www.carbide.mht.co.th/solution/purpose

For details, please contact your nearest sales office. (Refer to "Domestic Sales Offices" at the end of the catalog)

We have enhanced our cutting tool data provision compliant with ISO13399.

1. What is ISO 13399?

International standard with Cutting tool data representation and exchange.
Cutting tools are required to have parameters up to the world standards like in the regulation of the database and CAD data. Another purpose of ISO 13399 is to establish smooth data communication between systems.

2. Purpose

Troublesome conversion with the manufacturers is unnecessary when you have cutting tool data that complies with ISO 13399. This can then be imported to PLM, CAM, CAM, CNC, or even as a tool management system.
Mitsubishi Materials offers cutting tool data based on ISO 13399 to support effectively improved quality and cost reduction efficiency in your improved threading and new products creation.

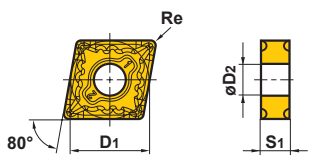
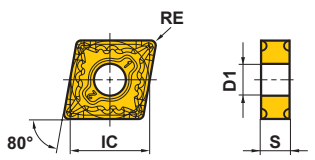
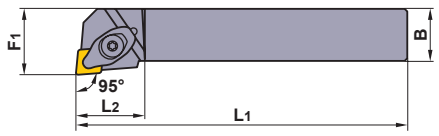
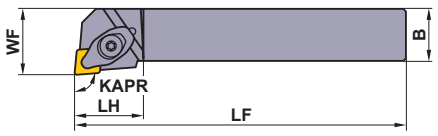
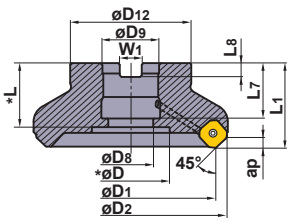
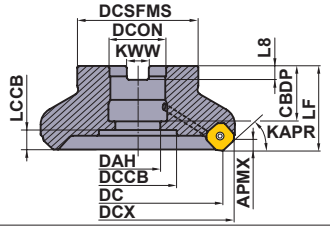
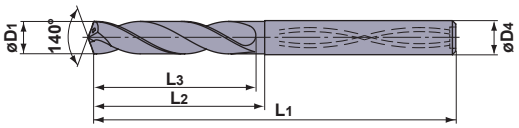
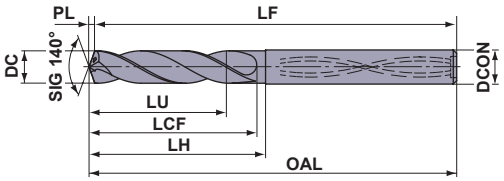
3. Dimension symbols conforming to ISO 13399

As shown below, the transition to dimension symbols complying with ISO13399 has begun.

4. Posting of ISO13399 Articles on the Web

We have added articles to the Mitsubishi Materials: Advanced Materials & Tools Company website. Please check these out.
URL: http://www.mitsubishicarbide.com/en/iso

Examples of change in dimensions

	Previous	New
① Inserts		
② Holder		
③ Milling Cutter		
④ Solid Drills		

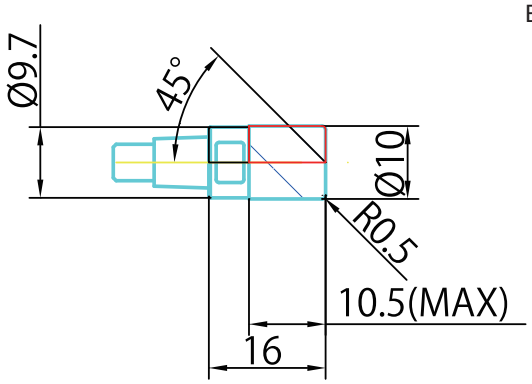
5. CAD (ISO13399 compliance)

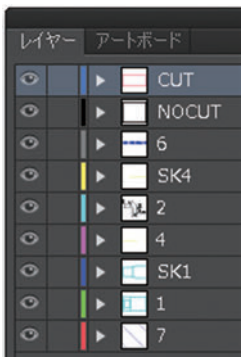
As shown below, DXF (2 dimensions) and STEP (3 dimensions) data complying with ISO 13399 are updated regularly to the Web CATALOG.

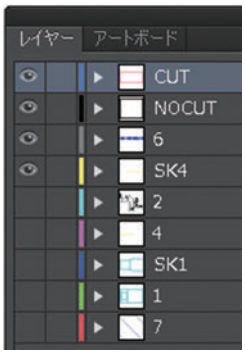
①DXF
(Full layer)

②DXF
(CUT/NO CUT layer)

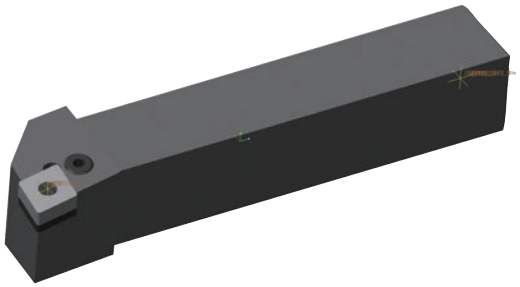
Ex. IMX10C4HV100R05010

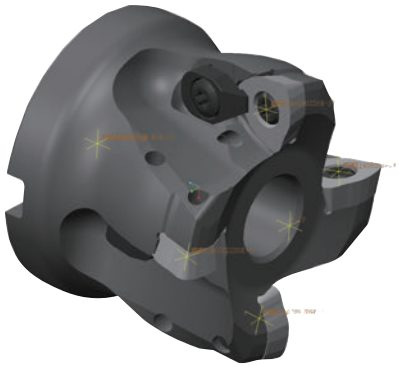




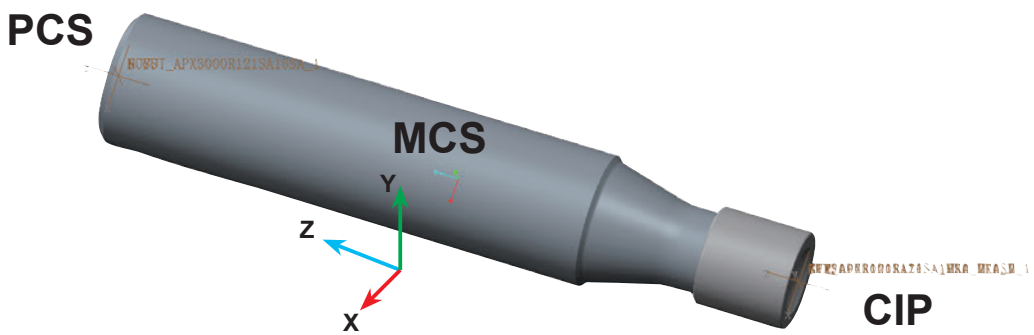


③STEP data (details, insert assembled model)





④STEP data (simple model)



*Note 1 Refer to the following URL for more information.
http://www.mitsubishicarbide.net/contents/mht/enuk/manual/manual.pdf

*Note 2 CAD is updated regularly. However, in rare cases, it may not be possible to provide the desired product. Please consult us.

Dimensions and symbols (ISO 13399 compliance)

Alphabetical

① Inserts

Symbol	Content
AN	Clearance angle major
AS	Clearance angle wiper edge
BCH	Corner chamfer length
BS	Wiper edge length
CDI	Insert cutting diameter
CDX	Cutting depth maximum
CECC	Cutting edge condition code
CEDC	Cutting edge count
CF	Spot chamfer
CNC	Corner count
CW	Cutting width
D1	Fixing hole diameter
EPSR	Insert included angle
GAN	Insert rake angle
HAND	Hand
IC	Inscribed circle diameter
INSL	Insert length
KRINS	Cutting edge angle major
L	Cutting edge length
LBB	Chip breaker width
LE	Cutting edge effective length
LF	Functional length
M	m-dimension
NT	Tooth count
PAL	Rrofile angle left hand
PAR	Rrofile angle right hand
PDPT	Profile depth insert
PDX	Profile distance ex
PDY	Profile distance ey
PNA	Profile included angle
PSIRL	Cutting edge angle major left hand
PSIRR	Cutting edge angle major right hand
RAL	Relief angle left hand
RAR	Relief angle right hand
RE	Corner radius
REL	Corner radius left hand
RER	Corner radius right hand
S	Insert thickness
SC	Insert shape code
SIG	Point angle
TC	Tolerance class insert
THFT	Thread form type
THL	Threading length
TP	Thread pitch
TPI	Threads per inch
TPT	Thread profile type
TTP	Thread type
W1	Insert width

② Turning

Symbol	Content
B	Shank width
CDX	Cutting depth maximum
CSP	Coolant supply property
CUTDIA	Work piece parting diameter maximum
CW	Cutting width
DAXN	Axial groove outside diameter minimum
DAXX	Axial groove outside diameter maximum
DCON	Connection diameter
DMIN	Minimum bore diameter
DMM	Shank diameter
ECA	End chamfer angle
ECD	End chamfer distance
GAMF	Rake angle radial
GAMN	Rake angle normal
GAMO	Rake angle orthogonal
GAMP	Rake angle axial
H	Shank height
HAND	Hand
HBH	Head bottom offset height
HBKW	Head back offset width
HBL	Head bottom offset length
HF	Functional height
HTB	Body height
KAPR	Tool cutting edge angle
LAMS	Inclination angle
LB	Body length
LDRED	Reduced body diameter length
LF	Functional length
LH	Head length
LPR	Protruding length
LS	Shank length
LTA	LTA length (length from MCS to CRP)
LU	Usable length
OAH	Overall height
OAL	Overall length
OAW	Overall width
PSIR	Tool lead angle
TQ	Torque
WF	Functional width

*Note 1 This symbol complies with TS standard or DTS standard of ISO 13399.
*Note 2 The above does not include the unset symbols or original Mitsubishi Materials symbols of ISO 13399.
*Note 3 Changes and additions may be made because the table above also includes symbols under deliberation.

③ Milling

Symbol	Content
APMX	Depth of cut maximum
AZ	Plunge depth maximum
BD	Body diameter
BDX	Body diameter maximum
BHTA	Body half taper angle
BMC	Body material code
CBDP	Connection bore depth
CCMS	Connection code machine side
CCWS	Connection code workpiece side
CICT	Cutting item count
CRKS	Connection retention knob thread size
CSP	Coolant supply property
CW	Cutting width
DAH	Diameter access hole
DBC	Diameter bolt circle
DC	Cutting diameter
DCB	Connection bore diameter
DCCB	Counterbore diameter connection bore
DCIN	Cutting diameter internal
DCINN	Cutting diameter internal minimum
DCINX	Cutting diameter internal maximum
DCN	Cutting diameter minimum
DCON	Connection diameter
DCONMS	Connection diameter machine side
DCONWS	Connection diameter workpiece side
DCX	Cutting diameter maximum
DCSFMS	Contact surface diameter machine side
DMM	Shank diameter
DN	Neck diameter
HAND	Hand
GAMF	Rake angle radial
GAMP	Rake angle axial
KAPR	Tool cutting edge angle
KWW	Keyway width
LAMS	Inclination angle
LCCB	Counterbore depth connection bore
LE	Cutting edge effective length
LF	Functional length
LH	Head length
LPR	Protruding length
LTA	LTA length (length from MCS to CRP)
LU	Usable length
LUX	Usable length maximum
MTP	Clamping type code
OAL	Overall length
PSIR	Tool lead angle
RE	Corner radius
RMPX	Ramping angle maximum
RPMX	Rotational speed maximum
TQ	Torque
WT	Weight of item
ZEFF	Face effective cutting edge count
ZEFP	Peripheral effective cutting edge count

④ Drilling

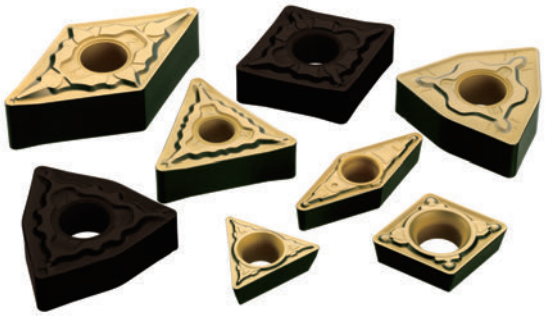
Symbol	Content
BD	Body diameter
CDI	Insert cutting diameter
CND	Coolant entry diameter
CNT	Coolant entry thread size
CRKS	Connection retention knob thread size
CSP	Coolant supply property
CXD	Coolant exit diameter
CZC	Connection size code
DC	Cutting diameter
DCON	Connection diameter
DCSFMS	Contact surface diameter machine side
DMM	Shank diameter
FHA	Flute helix angle
HAND	Hand
LBX	Body length maximum
LCF	Length chip flute
LF	Functional length
LH	Head length
LPR	Protruding length
LU	Usable length
NOF	Flute count
OAL	Overall length
PL	Point length
RPMX	Rotational speed maximum
SDL	Step diameter length
SIG	Point angle
ULDR	Usable length diameter ratio
ZEFF	Face effective cutting edge count
ZEFP	Peripheral effective cutting edge count

⑤ Others

Symbol	Content
ASP	Adjusting screw protrusion
BD	Body diameter
CBDP	Connection bore depth
CRKS	Connection retention knob thread size
CZC	Connection size code
DBC	Diameter bolt circle
DC	Cutting diameter
DCB	Connection bore diameter
DCON	Connection diameter
DCONMS	Connection diameter machine side
DCONWS	Connection diameter workpiece side
DF	Flange diameter
DMM	Shank diameter
FLGT	Flange thickness
HF	Functional height
KWL	Keyway length
KWW	Keyway width
LB	Body length
LF	Functional length
LPR	Protruding length
LS	Shank length
LSCX	Clamping length maximum
LU	Usable length
MHA	Mounting hole angle
MHD	Mounting hole distance
MHH	Mounting hole height
OAL	Overall length
WF	Functional width

NEW PRODUCTS

>>>62

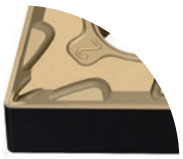


ISO Insert Series for Steel Turning

MC6015 MC6025 MC6035 + NEW FP/LP MP/RP

NEW

Pushing the boundaries of steel machining.



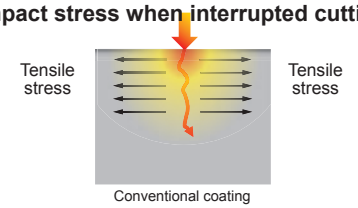
NEW **FP** Breaker

for high speed cutting
MC6015

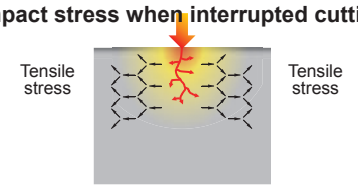
the standard grade for steels
MC6025

for interrupted cutting, medium to low speed cutting
NEW **MC6035**

Impact stress when interrupted cutting

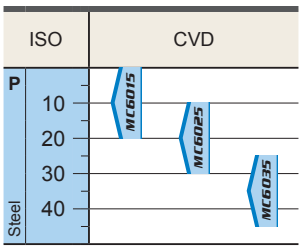


Impact stress when interrupted cutting



MC6035

Application Range



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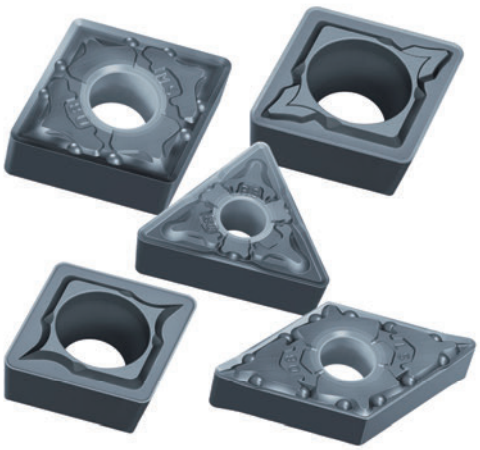
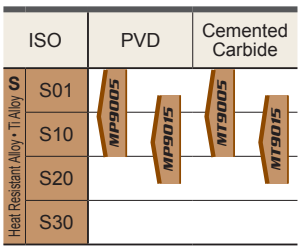


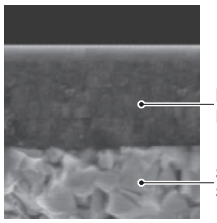
ISO Turning Inserts for Difficult to Cut Materials

MP9005 MP9015 NEW MT9005 MT9015 + LS MS RS

The new high Al-rich (Al,Ti)N single layer coating significantly reduces edge fracturing.

NEW **Positive inserts**

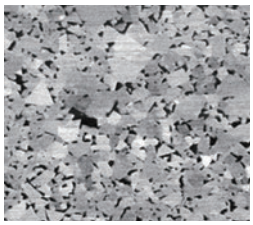




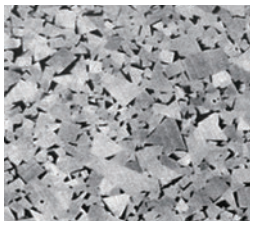
MP9005/MP9015

NEW

Carbide Grade (Non Coated)



MT9005

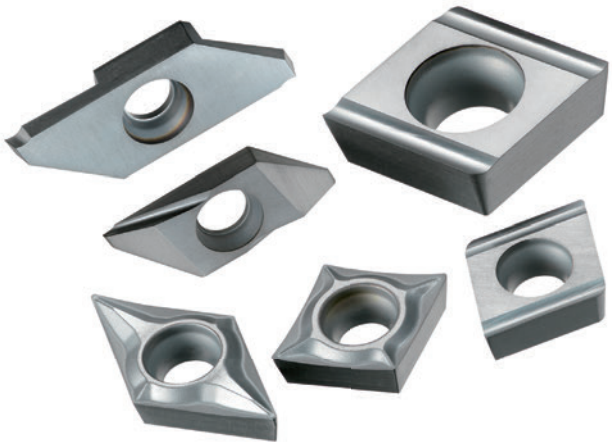


MT9015

NEW PRODUCTS

PVD Coated Cemented Carbide Grade for Carbon Steel

MS6015

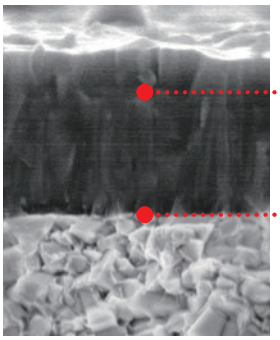


Skilled at pure iron, carbon steel and free cutting steel turning and achieving implemented stable finished surfaces and excellent dimensional accuracy.

A fine compatible collaboration of a special carbide substrate and a new PVD coating that greatly improves wear resistance.

	MS6015	Conventional
Coating	TiCN multilayer	TiAlN
Hardness (HV)	3,000	2,800
Wear Coefficient (Carbon Steel)	Low	High
Base Material Hardness (HRA)	92.0	92.0
T.R.S (GPa)	2.0	2.0

Ti-C-N Multilayer Coating



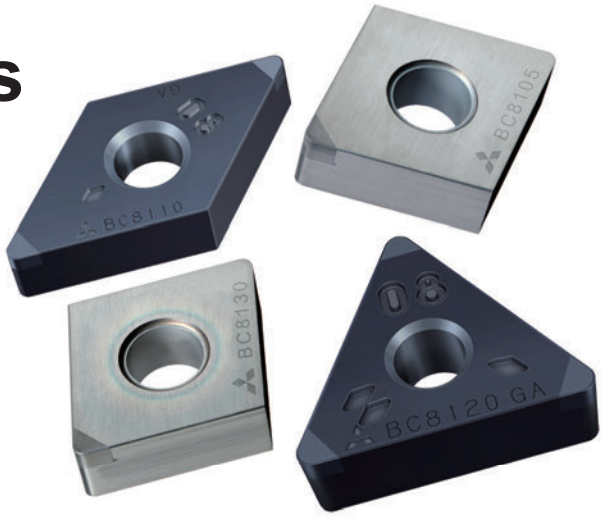
Superior wear and welding resistance and demonstrating the best possible results for carbon steel.

Minute multilayers remarkably improve welding.

>>>200

Coated CBN-Series for Hardened Steel Turning

BC8100 Series



New Generation Coated CBN Grades

Wear and fracture resistance greatly improved for a wide range of continuous and interrupted applications.

BC8105

Highest Accuracy

BC8110

High Speed Turning

For Continous Cutting

BC8120

General Applications

For Continuous to Medium Interrupted Cutting

BC8130

Tough Machining

For Unstable Applications and Heavy Interrupted Cutting

NEW PRODUCTS

>>>1364

Low Cutting Resistance, Double Sided Insert Face Mill for General Machining

WSX445 Series

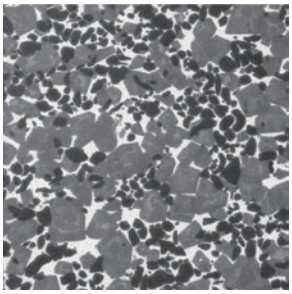
Unique geometry minimizes chatter and vibration!

NEW

Cermet Grade

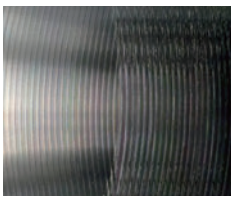
MX3030

Excellent welding and fracture resistance provides a coated finish.

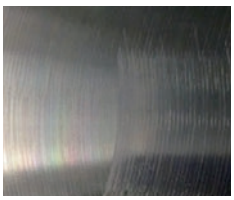


— Cutting Edge

Double sided Z Geometry



Conventional



MX3030

<Cutting Conditions>
Work Material: ASTM A36M
Cutter Dia. : ø125mm
Cutting Speed : 200m/min
Feed per Tooth : 0.1mm/t.
Depth of Cut : ap=2.0mm
ae=100mm
Cutting Mode : Dry Cutting
Center Cut
After 8m Cutting Work
8 Inserts

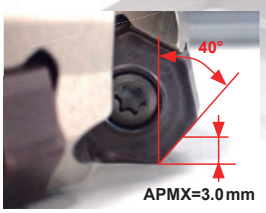
>>>1382

General Purpose Multi Corner Insert Type Face Milling Cutter

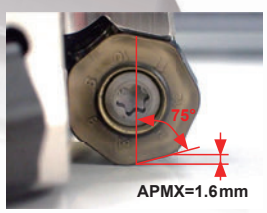
AHX Series

Heptagonal double sided insert. Economical 14 cutting edge inserts.

Unique 14 Cornered Insert



AHX440S



AHX475S

NEW

AHX440S

General Cutting

NEW

AHX475S

For High Feed Machining

NEW PRODUCTS

>>>1412

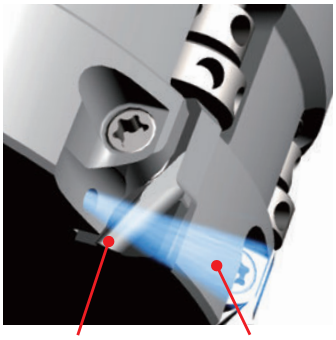
High Feed Finish Milling Cutter

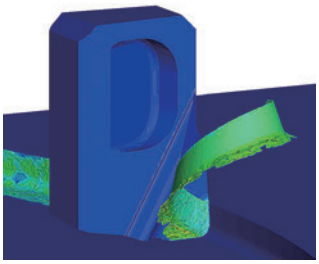
FMAX

Feed Maximum (FMAX) milling cutter for ultra efficient and accurate finishing.

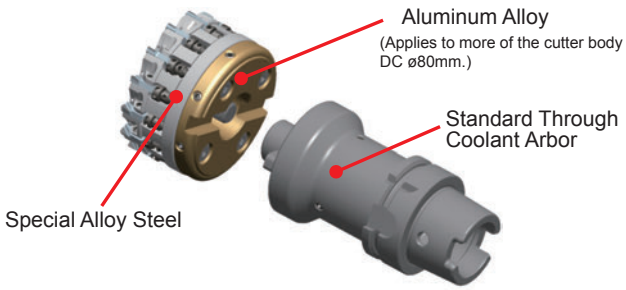
Internal coolant and a special chip breaker wall (Body protector) provides ideal chip discharge performance.

A special alloy steel and aluminum body combine to provide rigidity and light weight.





*Graphical Representation.

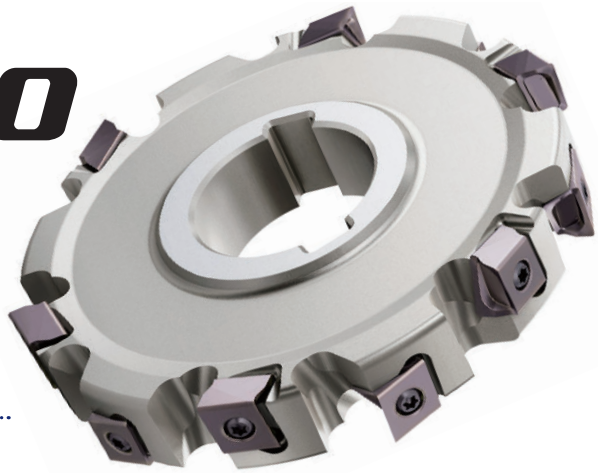


>>>1436

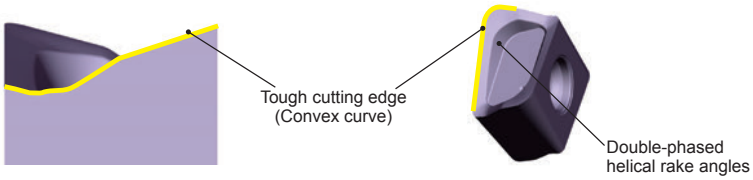
Exchangeable Inserts Side Cutter

VAS400/500

Non-chattering Side Cutter
Vertical blade double-sided insert VAS400

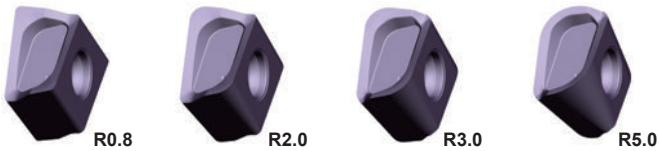


Low cutting resistance insert → Preferred sharpness



Various corner R development

R0.4, R0.8, R1.2, R1.6, R2.0, R2.4, R3.0, R4.0, R5.0, R6.0, R7.0 are inventory maintained.



Insert for VAS400

NEW PRODUCTS

>>>924

For Machining of Hardened Steels

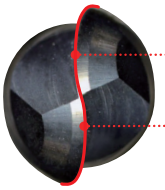
IMPACT MIRACLE REVOLUTION

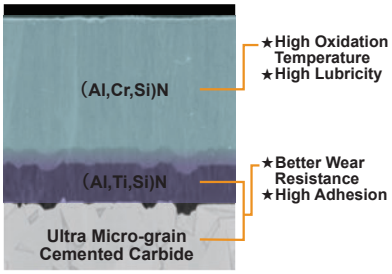
VFR2SB / VFR2SBF

Revolutionary Hardened Steel
New coating provides amazingly long life

VFR2SB

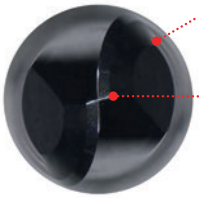
2 Flute Ball Nose End Mill





VFR2SBF

2 Flute Ball Nose End Mill for Mirror Finish Cutting



Selection According to Work Material Hardness

>>>993

Carbide End Mills

MSplus Series

Tough applications require "Plus" performance.

NEW MPXLRB

Suitable for high precision and high efficient machining of die & mold.

Seamless Cutting Edge

Radius tolerance R±0.005mm

MPJHV

Suitable for high precision and high efficient machining of die & mold.

MPMHVRB

A high-efficiency 4-flute radius end mill with irregular helix flutes and a wide range of application.

MPMHV

Improved Geometry

NEW PRODUCTS

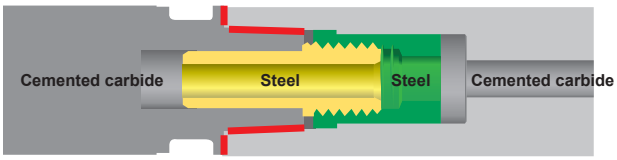
>>>690

Exchangeable Head End Mills

iMX Endmill Series

Carbide + Carbide Double face contact with head type expands the application possibilities.

Rigidity near that of a solid tool secured by ultra-hardening of all head and holder clamping surfaces.
Varied head replacement is associated with high efficiency.



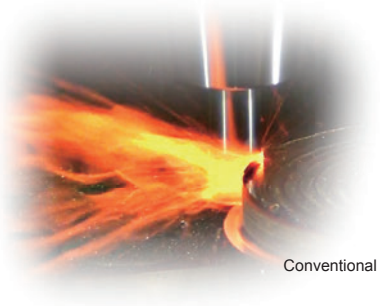
>>>1216

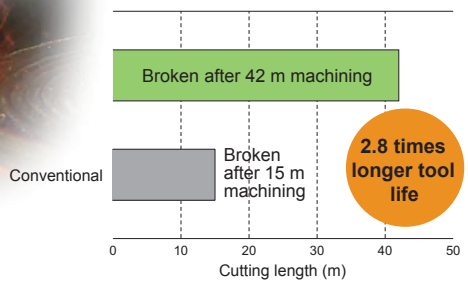
Ceramic End Mills

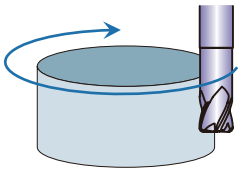
CERAMIC Corner Radius End Mills

Ultra high productivity for nickel based heat resistant alloys

Tool life comparison-Inconel®718 (HRC 45)







<Cutting condition>
Tool : ø12xR1.5
Revolution : 18,568 min^{-1} (700 m/min)
Feed rate : 6,684 mm/min (0.06 mm/tooth)
Depth of cut : ae = 2.4 mm
ap = 9.0 mm
(Down cut)
Overhang : 24 mm
Cutting mode : Dry (No air blow)

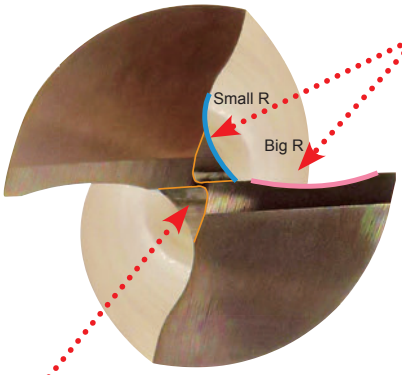
NEW PRODUCTS

>>>1768

Solid Carbide Flat Bottom Drills

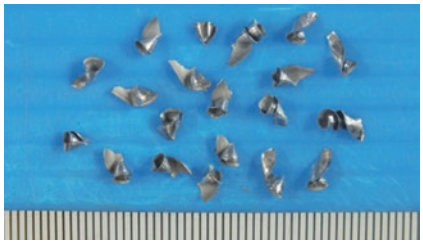
MFE Series

Shorter processes for many types of machining
High Efficiency Drilling in Various Types of Machining



Excellent Chip Control

Combination of different radius sizes provides strong cutting edge and excellent chip control.



New "Z" Thinning with Lower Thrust Force

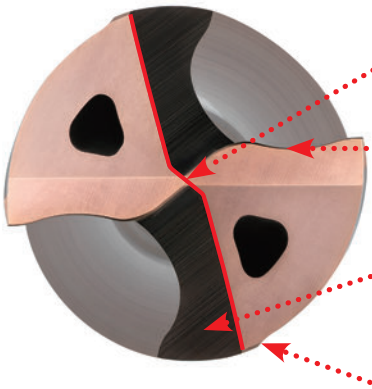
New thinning provides excellent chip evacuation.

>>>1647

Solid Carbide Drills

MVE/MVS Series

New Generation Solid Carbide Drills
With New TRI-cooling Technology



New Type Thinning

New Wavy Cutting Edge

New Flute Shape

Double Margin

NEW **Long Type**
DCx10, 15, 20, 25, 30, 35, 40

NEW **Pilot Type**
DCx2

NEW PRODUCTS

>>>1909

Indexable Drill

MVX Series

High rigidity body produced by utilising the latest technology

Lengths
L/D=2–6
Now Available

Key Technology that Enabled L/D=6 Machining

NEW
Insert with Reinforced Edge
UH Breaker

NEW
Insert for Aluminum
UN Breaker

>>>1774

CFRP DRILL

MC Drill Series

MCC
CFRP

MCA
CFRP/Al Stack Materials

MCT
CFRP/Ti Stack Materials

MCW
For CFRP/CFRTP, CFRP/Al Stack Materials and High Precision Holes

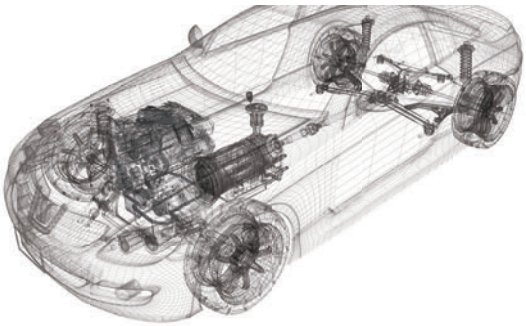
MCAH
CFRP/Al Stack Materials and Hand Tools

MCW
CFRP/Ti Stack Materials and High Precision Holes

MCCH
Hand Tool (CFRP)

AUTOMOTIVE

http://www.carbide.mht.co.th/solution/industry/automotive



ENGINE

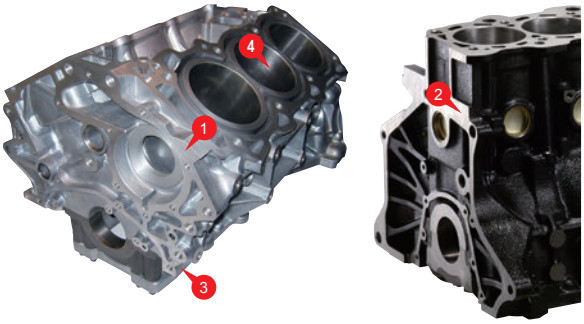
Cylinder Block

1 FMAX
Face Milling Cutter for High Efficiency Finish Cutting of Nonferrous Metals

2 AHX640W
Face Milling Cutter for High Efficiency Machining of Cast Irons

3 VAS400 / VAS500
Exchangeable Inserts Side Cutter Series

4 BMR
Boring Cutter



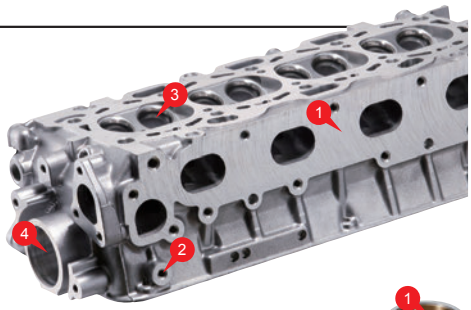
Cylinder Head

1 FMAX
Face Milling Cutter for High Efficiency Finish Cutting of Nonferrous Metals

2 MAE / MAS
Carbide Solid Drill for High Efficiency Machining of Aluminum and Cast Irons

3 HVF
Hydro Clamp Valve Finisher

4 Cam Holes Reamer
High Precision Drilling Reamer with Guide Pad



Connecting Rod

1 MVX
High Rigidity Exchangeable Cutting Edge Drill

2 MVS Long Drill
Carbide Solid Drill for Deep Drilling

Crank Shaft / Cam Shaft

1 DOUBLE CLAMP HOLDER
One Action High Rigidity General Purpose Tool Bit

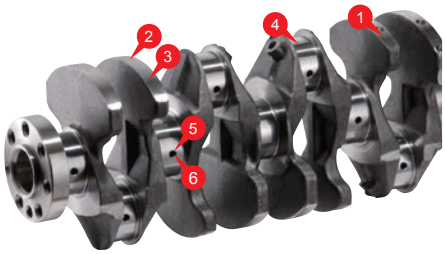
2 MC6015 / MC6025
ISO Insert Series for Steel Turning

3 MC5005 / MC5015
Insert Series for Machining Ordinary Cast Irons and Ductile Cast Irons

4 iMX
Exchangeable Head End Mills

5 MFE
Solid Carbide Flat Bottom Drills

6 MVS Long Drill
Carbide Solid Drill for Deep Drilling



AXLE / BRAKE

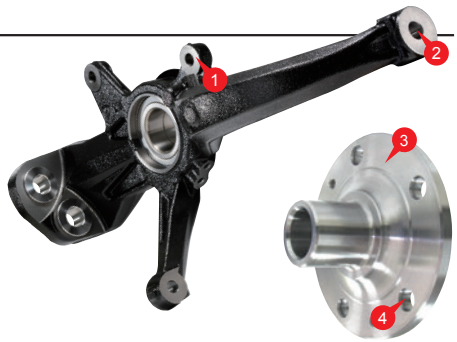
Steering Knuckle / Hub

1 VAS400 / VAS500
Exchangeable Inserts Side Cutter Series

2 MVS
Carbide Solid Drill with Oil Hole

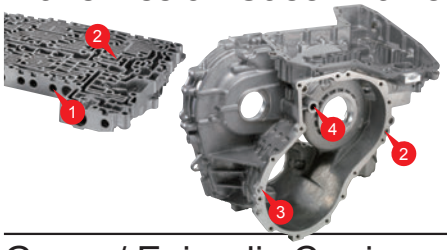
3 MC6015 / MC6025
ISO Insert Series for Steel Turning

4 MHE
Carbide Solid Drill for Hub



TRANSMISSION

Transmission Case / Valve Body



1 AXD
Face Milling Cutter for High Efficiency Finish Cutting of Aluminum Alloys

2 FMAX
Face Milling Cutter for High Efficiency Finish Cutting of Nonferrous Metals

3 MAS
Solid Carbide Drill for High-Efficiency Machining of Aluminum Alloys

4 Straight Flute Drill
Carbide Solid Drill for Precision Machining of Core Holes

Gears / Epicyclic Carriers

1 MC6015 / MC6025
ISO Insert Series for Steel Turning

2 BC81 Series
Coated CBN-Series for Hardened Steel Turning

3 Integrated Helical Broach

4 Hob Cutter

Shaft / CVT Pulley

1 MC6015 / MC6025
ISO Insert Series for Steel Turning

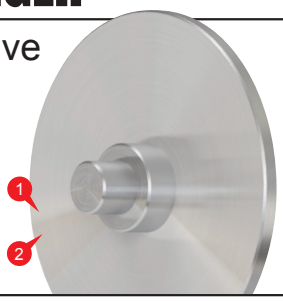
2 BC81 Series
Coated CBN-Series for Hardened Steel Turning

3 GY Series
Tool Bit for Grooving

4 MMT Series
New Threading Tools

TURBO CHARGER

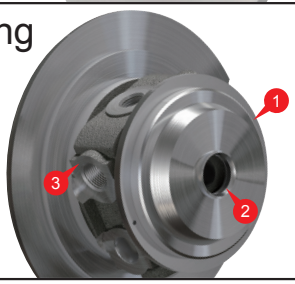
Waste Gate Valve



1 MP90 Series
ISO Turning Inserts for Difficult-to-cut Materials

2 DOUBLE CLAMP HOLDER
One Action High Rigidity General Purpose Tool Bit

Bearing Housing

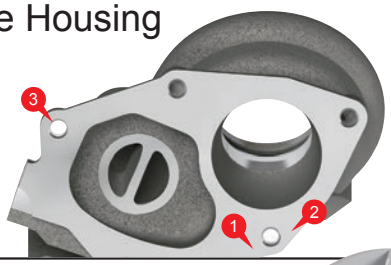


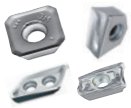
1 MC5005 / MC5015
Insert Series for Machining Ordinary Cast Irons and Ductile Cast Irons

2 MQS
Solid Carbide Drill for Steel and Cast Iron

3 APX3000/APX4000
Multifunctional Indexable End Mill

Turbine Housing



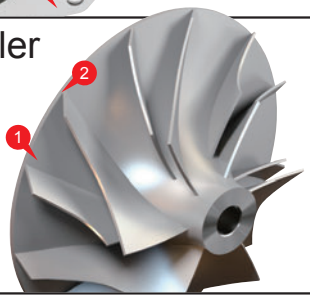


1 MP91 Series
Insert for Titanium Alloys and Heat Resistant Alloys

2 ASX445 / WSX445
Face Milling Cutter for High Efficiency Machining of Level Parts

3 MVS
Carbide Solid Drill with Oil Hole

Compressor Impeller

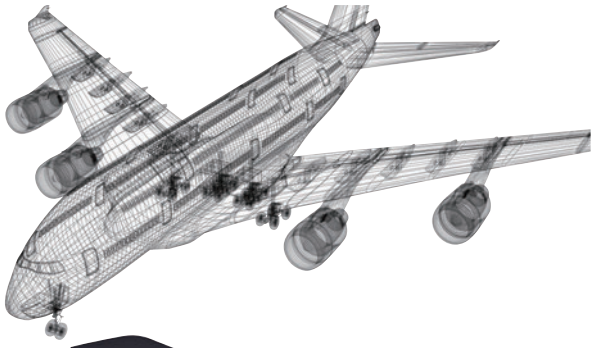


1 C4LATB
Taper Ball End Mill for Aluminum Impellers

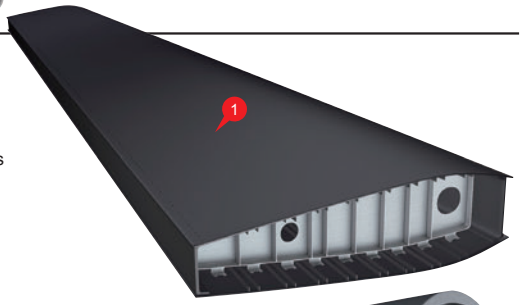
2 AZ Breaker
Breakers for Aluminum Alloy Turning

AEROSPACE

http://www.carbide.mht.co.th/solution/industry/aerospace



AIR FRAME



1 MCC
Drill for CFRP machining

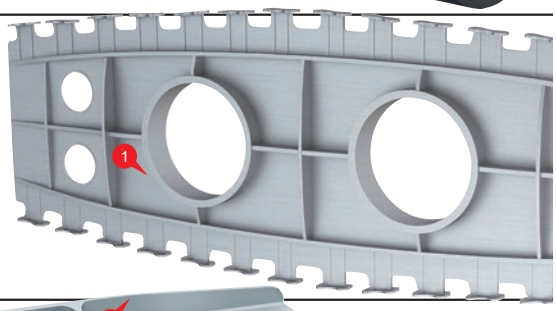
1 MCCH
Hand Tool
(Standalone CFRP)

1 MCAH
CFRP/Al Stack Materials
and Hand Tools

1 DFC4JC
4-Flute End Mill for
CFRP Finishing

1 DFC6JC
6-Flute End Mill for
CFRP Finishing

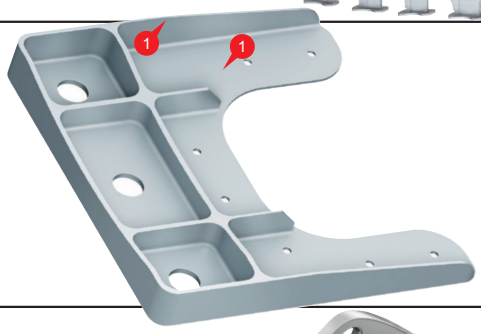
1 DFCJRT
End Mill for CFRP
Rough Machining



1 AXD
For Machining of
Aluminium and
Titanium Alloys

1 iMX
Exchangeable Head
End Mills

1 ALIMASTER
High efficiency
machining for
aluminium alloys



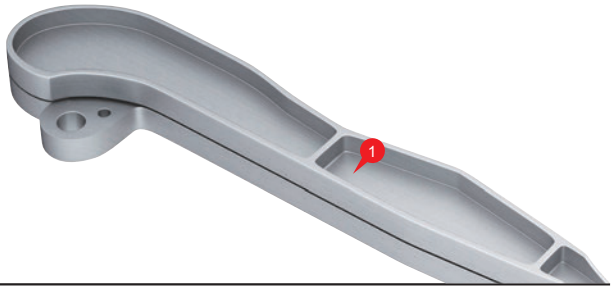
1 VFX
For Titanium Alloy
Milling

1 iMX
Exchangeable Head
End Mills

1 AJX
High Feed Radius
Milling Cutter

2 MMS
Solid Carbide Drill for
Stainless Steel

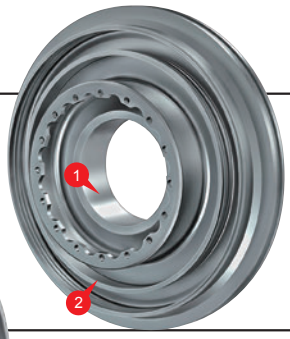
3 APX
Multi-functional
Indexable Cutter

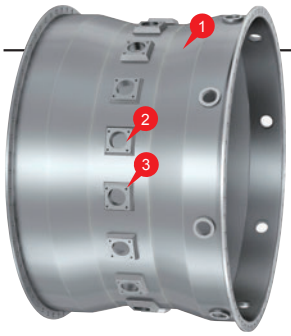


1 Coolstar
Multi-coolant Hole End Mill

1 ARP
Round insert cutter for
diffi cult-to-cut materials

ENGINE





1 HSK-T
For Turning Mills

1 LS/MS/RS MP9005/MP9015
ISO Turning Inserts for Difficult-to-cut Materials

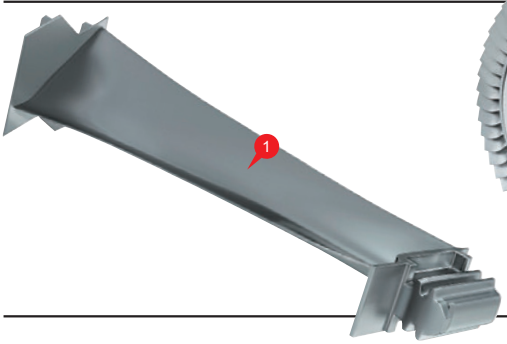
2 GY
Grooving System

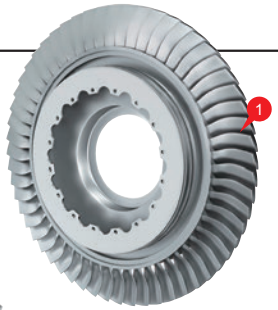
1 ARP
Round Insert Cutter for Difficult-to-cut Materials

2 APX
Multi-functional Indexable Cutter

3 MMS
Solid Carbide Drill for Stainless Steel

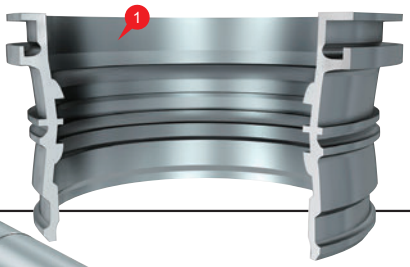
2 CERAMIC Corner Radius End Mills
Ceramic End Mills



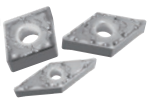


1 SMART MIRACLE End Mill Series
Vibration Control End Mills for Machining Difficult-to-cut Materials

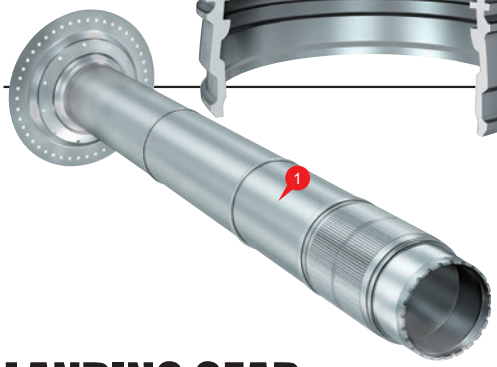
1 SMART MIRACLE Vibration Control Ball Nose End Mill
Vibration Control End Mills for Machining Difficult-to-cut Materials



1 JT Holder
Internal Lubrication Bite Holder



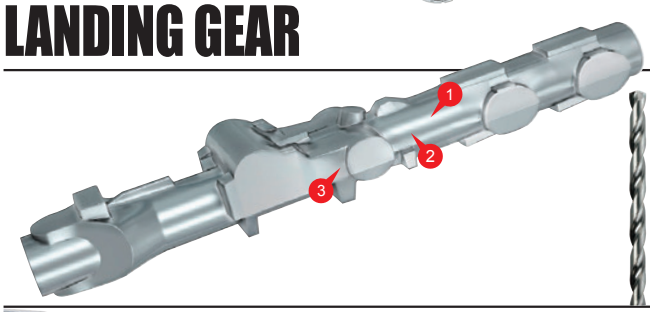
1 LS/MS/RS MT9015
ISO Turning Inserts for Difficult-to-cut Materials



1 HSK-T
For Turning Mills

2 FJ/MS/GJ VP05RT/VP10RT
Special Breakers for Difficult-to-cut Materials

LANDING GEAR



1 MNS
Solid Carbide Drill for High Efficiency Machining of Aluminium Alloys

2 SMART MIRACLE Vibration Control Ball Nose End Mill
Vibration Control End Mills for Machining Difficult-to-cut Materials

3 VFX Series
For Titanium Alloy Milling

1 APX
Multi-functional Indexable Cutter

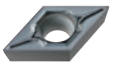
2 iMX End Mill Series
Exchangeable Head End Mills

MEDICAL

http://www.carbide.mht.co.th/solution/industry/medical

HIP-SYSTEM

1 VQMHVRB
Vibration Control End Mills for Machining Diffi cult-to-Cut Materials



3 MT9015 LS/MS breaker
Insert for Machining of Titanium

4 MP2SB
Solid Carbide End Mill Series

2 MMS
Solid Carbide Drill for Stainless Steel

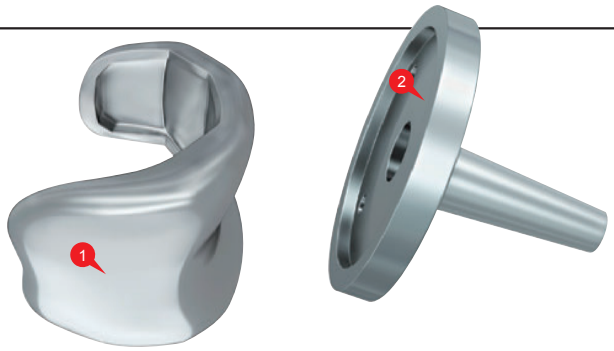
3 MP9005/MP9015 LS/MS breaker
ISO Turning Inserts for Difficult to Cut Materials

4 MP2XLB
Solid Carbide End Mill Series

KNEE-SYSTEM

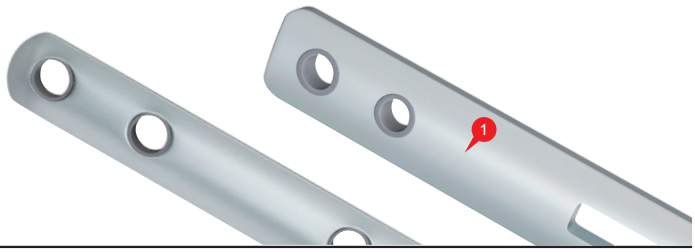
1 VQ4SVB
4-Flute Vibration Control Ball End Mil

2 VQMHVRB
Vibration Control End Mills for Machining Diffi cult-to-Cut Materials



BONE PLATES

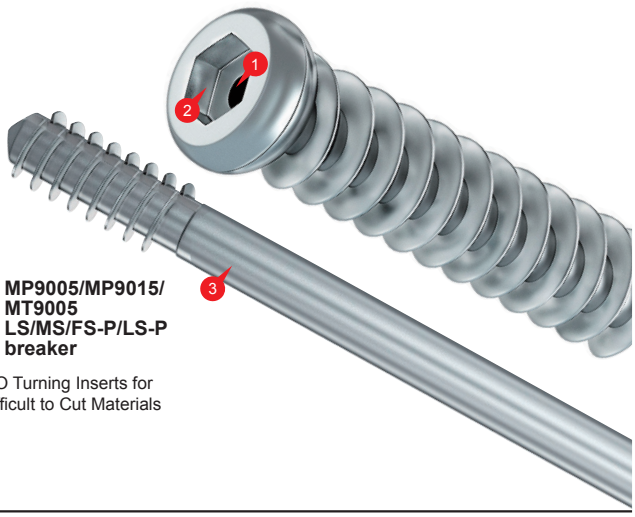
1 VF2WB
2-Flute Wide Ball End Mill



SCREWS

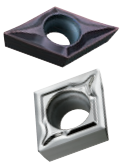
1 MVS Long Drill
Carbide Solid Drill for Deep Drilling

2 MPXLRB
2-Flute Long Neck Radius End Mill



2 VQXL
4-Flute Long Neck End Mill

3 Small Tools VP15TF
Tools for Small Automatic Lathes

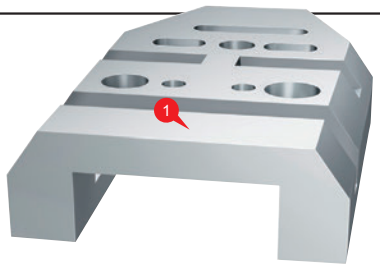


3 MP9005/MP9015/ MT9005 LS/MS/FS-P/LS-P breaker
ISO Turning Inserts for Difficult to Cut Materials

SPINE

❶ **SMART MIRACLE End Mill Series**
Vibration Control End Mills for Machining Difficult-to-cut Materials

INSTRUMENT



❶ **AJX**
High Feed Radius Milling Cutter

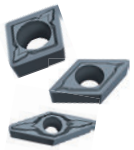
MP9120/MP9130/VP15TF

❷ **MVS Long Drill**
Carbide Solid Drill for Deep Drilling

SMALL PARTS

COLLAR/SLEEVE for TURBO CHARGER

❶ **MMS**
Solid Carbide Drill for Stainless Steel

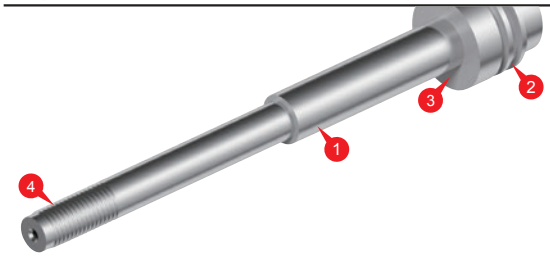


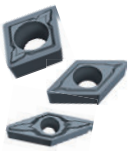
❷ **MP90 Series**
ISO Turning Inserts for Difficult-to-cut Materials

❸ **MICRO-MINI TWIN**
Tool for Ultra-small Bore Turning

❹ **GY Series**
Grooving Tool Bit for Automatic Lathes

TURBINE IMPELLER SHAFT





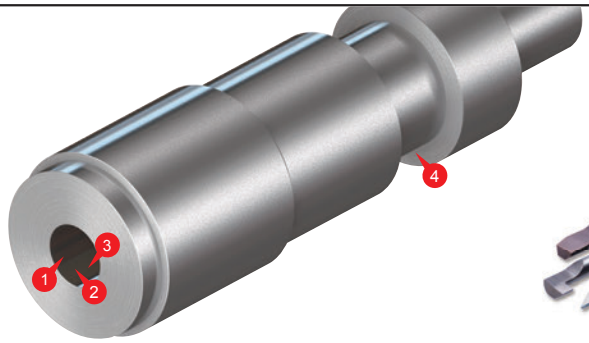
❶ **MP90 Series**
ISO Turning Inserts for Difficult-to-cut Materials

❷ **GT Series**
Grooving Insert for Automatic Lathes

❸ **BTAT**
Post-grinding Tool Bit

❹ **MMT Series**
New Threading Tools

SLEEVE for INJECTOR



❶ **MMS**
Solid Carbide Drill for Stainless Steel

❷ **MFE**
Solid Carbide Flat Bottom Drills

❸ **MICRO-MINI TWIN**
Tool for Ultra-small Bore Turning

❹ **GY Series**
Grooving Tool Bit for Automatic Lathes

SAFETY OF CUTTING TOOL PRODUCTS

1. Use of Cutting Tool Products

Packages of Mitsubishi products carry a safety warning label. However, tools are not labeled with detailed warning indications. Please read the "Safety of Cutting Tool Products" in this catalogue before handling cutting tool products and cemented carbide materials. Moreover, as a part of your workers' safety education, please notify the contents of the "Safety of Cutting Tool Products" to all workers.

2. Basic Characteristics of Hard Tool Materials

In Terms of "Safety of Cutting Tool Products"

Hard Tool Materials : General term for tool materials like cemented carbide alloy, cermet, ceramics, sintered CBN, sintered diamond, high speed steel and alloy steel, etc.

Physical Characteristics

Appearance : Varies depending on the type of material. Eg. grey, black, gold, etc.
Smell : None
Hardness, Specific Gravity :

Hard Tool Materials	Hardness (HV)	Specific Gravity	Hard Tool Materials	Hardness (HV)	Specific Gravity
High Speed Steel (HSS)	200—1200kg/mm²	7—9	Sintered CBN	2000—5000kg/mm²	3—5
Cemented Carbide	500—3000kg/mm²	9—16	Sintered Diamond	8000—12000kg/mm²	3—5
Cermet	500—3000kg/mm²	5—9	Alloy Steel	200—1200kg/mm²	7—9
Ceramics	1000—4000kg/mm²	2—7	Diamond Electroforming Product	8000—12000kg/mm²	3—5

Constituents

Carbide, nitride, carbon nitride, oxide, such as W, Ti, Al, Si, Ta, B, V and metals such as Fe, Co, Ni, Cr, Mo.

3. Safety of Cutting Tool Products

○Hard tool materials have a large specific gravity. Thus, they require special attention as heavy materials when the size or quantity is large.

○Cutting tool products generate dust and mist during grinding operations or heating. This dust and mist can be harmful when coming in contact with the eyes or skin, or if substantial quantities are swallowed. When grinding and machining, it is recommended to use local exhaust ventilation and respirators, a dust protective mask, glasses, gloves etc. If dust makes contact with the hands, thoroughly wash the affected area with soap and water. Don't eat in the exposed area, and wash hands thoroughly before eating. Remove dust from the clothing by a cleaning or washing, but don't shake off.

○Cobalt and nickel contained in carbide or other cutting tool materials are reported as possibly carcinogenic to humans. It is also reported that cobalt and nickel dust and mist can affect the skin, respiratory organs and heart through repeated or prolonged contact.

○For further information, please refer to **SDS** (Safety Data Sheet).
SDS=Safety Data Sheet
Home page: http://www.carbide.mht.co.th/download/safety

4. Handling Cutting Tool Products

○Surface conditions affect toughness of cutting tools. Therefore, use a diamond grinding wheel for finishing.

○Hard tool materials are extremely hard and brittle at the same time. Thus, they may be broken by shocks and tightening with excess force.

○Hard tool materials and ferrous materials have different thermal expansion ratios. Shrinkage or swell fit products may suffer from cracks when applied temperature is higher or lower than the appropriate temperature for the tool.

○Pay special attention on storing hard tool materials. Toughness of hard tool materials is lowered when they corrode due to coolant and other liquid.

○When brazing hard tool materials, if the temperature is too high or too low from the melting point of the brazing material, loosening and breakage may occur.

○After regrinding cutting tools, make sure that there are no cracks.

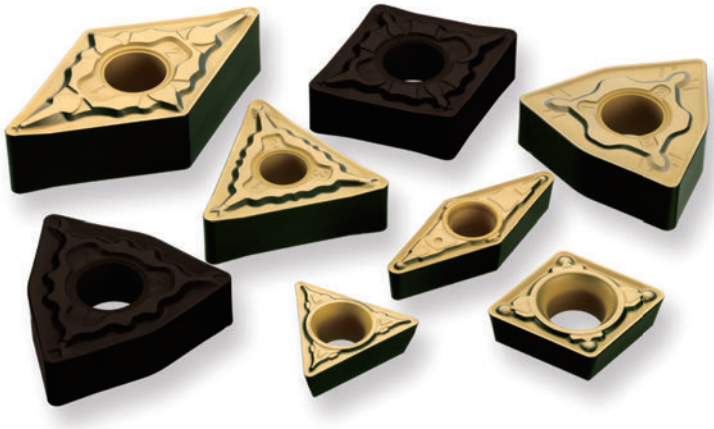
○Machining hard tool materials on EDM may cause cracks on the surface due to electrons remaining after the EDM operation, resulting in lowering of the toughness. Eliminate these cracks by grinding, etc.

SUGGESTIONS ON HOW TO USE CUTTING TOOLS

Products	Hazard	Countermeasure
All Cutting Tools	◎Cutting tools have sharp cutting edges. Handling them with bare hands may cause injuries.	★Take precautions such as wearing gloves especially when handling tools and during installation.
	◎Improper use of tools and application of inappropriate cutting conditions may cause the tool to break and be expelled from the machine providing risk of injury.	★Ensure safety guards and goggles are used. ★Refer to handling explanatory notes and catalogues. Use tools under recommended cutting conditions.
	◎Impact load and rapid increase of cutting resistance due to excessive wear may cause the tool to break and be expelled from the machine providing risk of injury.	★Ensure safety guards and goggles are used. ★Exchange tools before excessive wear occurs.
	◎Cutting tools and workpieces become extremely hot during cutting. Touching them with bare hands may cause burns.	★Take precautions such as wearing gloves.
	◎Expelled hot chips produced in cutting produces risk of injuries and burns.	★Ensure safety guards and goggles are used. ★During swarf removal and machine cleaning ensure the machine is stopped and wear gloves. Please use tools, such as cutting nippers and cutting clippers.
	◎In cutting, sparks, hot chips and heat generation caused by tool breakage provides a risk of igniting a fire.	★Avoid using cutting tools in places where there is a possibility of igniting a fire. ★In case of using non-water soluble oil, make sure to have a fire prevention countermeasure.
	◎Using machines, chucks, and tools with poor balance at high revolutions may cause tools to break providing risk of injuries.	★Ensure safety guards and goggles are used. ★Check the machine for vibration, chattering, and abnormal noise.
	◎Handling machined parts with burrs using bare hands may cause injuries.	★Wear gloves.
Indexable Inserts Type Tools	◎If inserts and spare parts are not held securely, they may become loose and be expelled producing risk of injuries.	★Clean insert locating seat and spare parts before setting inserts. ★Use the tool provided for setting inserts, and ensure the inserts and spare parts are clamped securely. Do not use the tool provided for things other than prescribed inserts and spare parts.
	◎Clamping inserts and spare parts too tightly by using tools such as extension pipes may cause them to break and be expelled.	★Do not use extra tools for more leverage. Only use the tool provided.
	◎When applying high cutting speed, spare parts and inserts may be expelled due to centrifugal force. Pay special attention on each safety guidline.	★Refer to the handling explanatory notes and catalogues. Use tools under recommended cutting conditions.
Cutters and Other Rotating Tools	◎Milling cutters have sharp edges. Handling them with bare hands may cause injuries.	★Take precautions such as wearing gloves.
	◎Poor balance or off center revolving of tools may cause vibration and chattering which could cause the tool to break and be expelled.	★Apply cutting speed within the range of recommended cutting conditions. ★Adjust accuracy and balance of spindles and bearings periodically to prevent off center revolving and chattering caused by wear on these parts.
Drilling Tools	◎Through cutting in cases when the workpiece revolves may produce a disk shaped peice with sharp edges when the cutting tool breaks through.	★Ensure safety guards and goggles are used. Also install a cover on the chuck.
	◎Drills with an extremely small diameter have a very sharp point which may puncture the skin if not handled carefully. If the drill breaks during cutting, the broken pieces may be expelled.	★Handle with care. Take precautions such as wearing gloves and goggles.
Brazed Tools	◎Weakening of the braze and breakage of inserts may cause injury.	★Before using them, ensure they are brazed securely. ★Do not use them under conditions which produce very high temperature.
Others	◎Machine and tools may be damaged if they are used for purposes other than the prescribed application.	★Use them strictly for the prescribed application.

INFORMATION

This catalogue completes the basic precautions for safety use of our company's products.
For further information, please refer to the guideline, catalogs or contact us. We are not responsible for any accidents causing by modifying tools without our permission.



TURNING TOOLS

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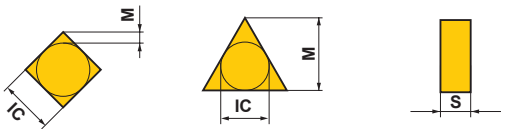
IDENTIFICATION

Symbol	Insert Shape
H	Hexagonal
O	Octagonal
P	Pentagonal
S	Square
T	Triangular
C	Rhombic 80°
D	Rhombic 55°
E	Rhombic 75°
F	Rhombic 50°
M	Rhombic 86°
V	Rhombic 35°
W	Trigon
L	Rectangular
A	Parallelogram 85°
B	Parallelogram 82°
K	Parallelogram 55°
R	Round
X	Special Design

① Insert Shape



Triangular insert with a facet (Secondary Cutting Edge)

③ Tolerance Class

Symbol	Tolerance of Nose Height **M** (mm)	Tolerance of Inscribed Circle **IC** (mm)	Tolerance of Thickness **S** (mm)
A	±0.005	±0.025	±0.025
F	±0.005	±0.013	±0.025
C	±0.013	±0.025	±0.025
H	±0.013	±0.013	±0.025
E	±0.025	±0.025	±0.025
G	±0.025	±0.025	±0.13
J	±0.005	±0.05−±0.15	±0.025
K*	±0.013	±0.05−±0.15	±0.025
L*	±0.025	±0.05−±0.15	±0.025
M*	±0.08−±0.18	±0.05−±0.15	±0.13
N*	±0.08−±0.18	±0.05−±0.15	±0.025
U*	±0.13−±0.38	±0.08−±0.25	±0.13

The surface of insert with * mark is sintered.

Detail of M Class Insert Tolerance

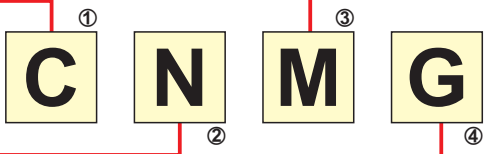
●Tolerance of Nose Height **M** (mm)

D.I.C.	Triangular	Square	Rhombic 80°	Rhombic 55°	Rhombic 35°	Round
6.35	±0.08	±0.08	±0.08	±0.11	±0.16	–
9.525	±0.08	±0.08	±0.08	±0.11	±0.16	–
12.70	±0.13	±0.13	±0.13	±0.15	–	–
15.875	±0.15	±0.15	±0.15	±0.18	–	–
19.05	±0.15	±0.15	±0.15	±0.18	–	–
25.40	–	±0.18	–	–	–	–
31.75	–	±0.20	–	–	–	–

●Tolerance of Inscribed Circle **IC** (mm)

D.I.C.	Triangular	Square	Rhombic 80°	Rhombic 55°	Rhombic 35°	Round
6.35	±0.05	±0.05	±0.05	±0.05	±0.05	–
9.525	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05
12.70	±0.08	±0.08	±0.08	±0.08	–	±0.08
15.875	±0.10	±0.10	±0.10	±0.10	–	±0.10
19.05	±0.10	±0.10	±0.10	±0.10	–	±0.10
25.40	–	±0.13	–	–	–	±0.13
31.75	–	±0.15	–	–	–	±0.15

③ Tolerance Class



② Normal Clearance

Symbol	Normal Clearance
A	3°
B	5°
C	7°
D	15°
E	20°
F	25°
G	30°
N	0°
P	11°
O	Other Normal Clearance

Major Normal Clearance

④ Fixing and/or for Chip Breaker

Metric

Symbol	Hole	Hole Configuration	Chip Breaker	Figure	Symbol	Hole	Hole Configuration	Chip Breaker	Figure
W	With Hole	Cylindrical Hole + One Countersink (40−60°)	No		A	With Hole	Cylindrical Hole	No	
T	With Hole		One Sided		M	With Hole	Cylindrical Hole	Single Sided	
Q	With Hole	Cylindrical Hole + Double Countersink (40−60°)	No		G	With Hole	Cylindrical Hole	Double Sided	
U	With Hole		Double Sided		N	Without Hole	–	No	
B	With Hole	Cylindrical Hole + One Countersink (70−90°)	No		R	Without Hole	–	Single Sided	
H	With Hole		One Sided		F	Without Hole	–	Double Sided	
C	With Hole	Cylindrical Hole + Double Countersink (70−90°)	No		X	–	–	–	Special Design
J	With Hole		Double Sided						

Symbol							Diameter of Inscribed Circle (mm)
R	W	V	D	C	S	T	
	02		04	03	03	06	3.97
	L3	08	05	04	04	08	4.76
	03	09	06	05	05	09	5.56
06							6.00
	04	11	07	06	06	11	6.35
	05	13	09	08	07	13	7.94
08							8.00
09	06	16	11	09	09	16	9.525
10							10.00
12							12.00
12	08	22	15	12	12	22	12.70
15	10		19	16	15	27	15.875
16							16.00
19	13		23	19	19	33	19.05
20							20.00
			27	22	22	38	22.225
25							25.00
25			31	25	25	44	25.40
31			38	32	31	54	31.75
32							32.00

⑤ Insert Size

*Thickness is from the bottom of the insert to the top of the cutting edge.

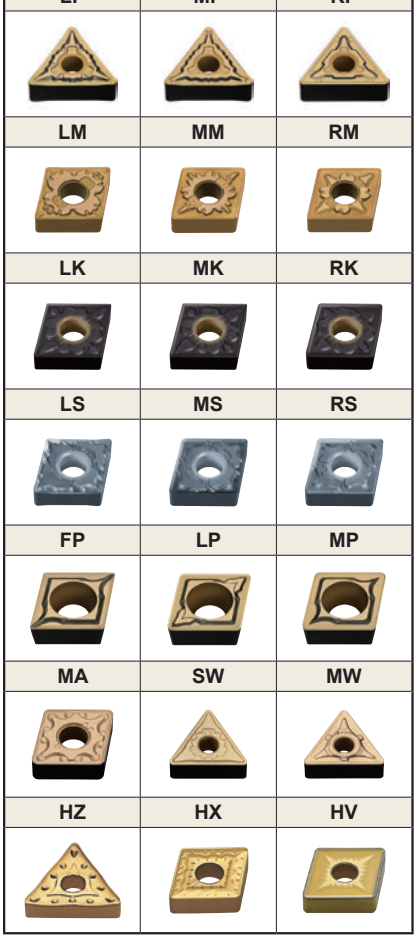
Symbol	Thickness (mm)
S1	1.39
01	1.59
T0	1.79
02	2.38
T2	2.78
03	3.18
T3	3.97
04	4.76
06	6.35
07	7.94
09	9.52

⑥ Insert Thickness

⑤ ⑥ ⑦ ⑧ ⑨ ⑩

12 04 08 (E) (N)-MP

⑩ Chip Breaker



⑦ Insert Corner Configuration

Symbol	Corner Radius (mm)
00	Sharp Nose
V3	0.03
V5	0.05
01	0.1
02	0.2
04	0.4
08	0.8
12	1.2
16	1.6
20	2.0
24	2.4
28	2.8
32	3.2
00 : Inch M0 : Metric	Round Insert

⑧ Cutting Edge Condition

Figure	Cutting Edge	Symbol
	Sharp Cutting Edges	F
	Round Cutting Edges	E
	Chamfered Cutting Edges	T
	Chamfered and Rounded Cutting Edges	S

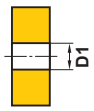
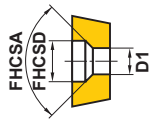
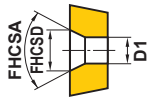
Mitsubishi Materials omit the honing symbol.

⑨ Cutting Direction

Figure	Hand	Symbol
	Right	R
	Left	L
	Neutral	N

(Refer to JIS-B4120-1998)

HOLE GEOMETRY

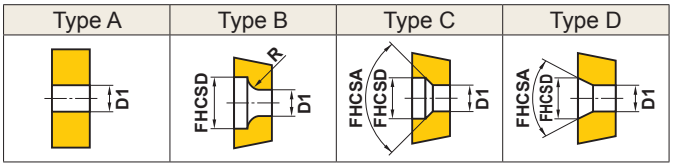
Type A	Type B	Type C	Type D
			

NEGATIVE

Insert Number		Dimensions (mm) D1	Hole Type
CNGA CNGG CNMA CNMG CNMM CNMP	0903○○	3.81	A
	0904○○	3.81	A
	1204○○	5.16	A
	1606○○	6.35	A
	1906○○	7.93	A
	2509○○	9.12	A
DNGA DNGG DNGM DNMA DNMG DNMM DNMX	1104○○	3.81	A
	1504○○	5.16	A
	1506○○	5.16	A
SNGA SNGG SNMA SNMG SNMM	0903○○	3.81	A
	1204○○	5.16	A
	1506○○	6.35	A
	1906○○	7.93	A
	2507○○	9.12	A
	2509○○	9.12	A
TNGA TNGG TNMA TNMG TNMM TNMX	1103○○	2.26	A
	1603○○	3.81	A
	1604○○	3.81	A
	2204○○	5.16	A
	2706○○	6.35	A
	3309○○	7.93	A
VNGA VNGM VNGG VNMG VNMM	1604○○	3.81	A
WNMA WNMG	0603○○	3.81	A
	06T3○○	3.81	A
	0604○○	3.81	A
	0804○○	5.16	A
RNMG RNMA	090300	3.81	A
	120400	5.16	A
	150600	6.35	A
	190600	7.93	A
	250900	9.12	A
	310900	12.7	A

POSITIVE

Insert Number		Dimensions (mm) D1	FHCSD	FHCSA (°)	Hole Type
CCET	0602○○	2.8	3.8	R	B
	09T3○○	4.4	6.0	R	B
CCGB CCMB CCGH CCMH	0602○○	2.8	3.9	R	B
CCGT	03S1○○	2.0	2.9	R	B
	04T0○○	2.4	3.5	R	B
	0602○○	2.8	3.8	R	B
	09T3○○	4.4	6.0	R	B
	1204○○	5.5	7.5	R	B
CCMT	0602○○	2.8	3.8	R	B
	0803○○	3.4	4.5	R	B
	09T3○○	4.4	6.0	R	B
	1204○○	5.5	7.5	R	B
CCGW CCMW	03S1○○	2.0	2.9	R	B
	04T0○○	2.4	3.5	R	B
	0602○○	2.8	3.8	R	B
	09T3○○	4.4	6.0	R	B
	1204○○	5.5	7.5	R	B
CPGT	0802○○	3.4	4.5	R	B
	0903○○	4.4	6.0	R	B
CPGB CPMB CPMH	0802○○	3.5	5.3	78°	D
	0903○○	4.5	6.3	78°	D
CPMX	0802○○	3.5	5.6	78°	D
	0903○○	4.6	6.6	80°	D
DCET DCGT	0702○○	2.8	3.8	R	B
	11T3○○	4.4	6.0	R	B
DCGW DCMW DCMT	0702○○	2.8	3.8	R	B
	11T3○○	4.4	6.0	R	B
	1504○○	5.5	7.5	R	B
DEGX	1504○○	5.1	7.0	85°	C
RCMX	1003M0	3.6	4.6	21°	D
	1204M0	4.2	5.4	21°	D
	1606M0	5.2	6.7	21°	D
	2006M0	6.5	8.0	21°	D
	2507M0	7.2	9.1	21°	D
	3209M0	9.5	11.7	21°	D



POSITIVE

Insert Number		Dimensions (mm)			Hole Type
		D1	FHCSD	FHCSA (°)	
RCGT RCMT	0602M0	2.8	3.8	R	B
	0803M0	3.4	4.5	R	B
	10T3M0	4.4	6.0	R	B
SCMT SCMW	09T3○○	4.4	6.0	R	B
	1204○○	5.5	7.5	R	B
SPMW	0903○○	4.6	6.0	R	B
	1203○○	5.7	7.5	R	B
SPMT	0903○○	4.4	6.0	R	B
	1203○○	5.5	7.5	R	B
SPGX	0903○○	4.8	6.4	58°	D
	1203○○	5.9	7.7	58°	D
TCGT TCMT TCGW TCMW	0601○○	2.3	3.2	R	B
	0802○○	2.3	3.0	R	B
	0902○○	2.5	3.3	R	B
	1102○○	2.8	3.8	R	B
	1303○○	3.4	4.5	R	B
	16T3○○	4.4	6.0	R	B
TEGX	1603○○	4.4	6.1	88°	D
TPGX	0802○○	2.5	3.8	88°	C
	0902○○	3.0	4.3	88°	C
	1103○○	3.5	4.8	88°	C
	1603○○	4.8	6.5	58°	D
TPMX	0802○○	2.7	3.8	88°	C
	0902○○	3.2	4.3	88°	C
	1103○○	3.7	4.8	88°	C
	1603○○	4.8	6.4	58°	D
TPGB TPMB TPGH TPMH	0802○○	2.4	4.0	78°	D
	0902○○	2.9	4.3	78°	D
	1103○○	3.4	4.8	78°	D
	1603○○	4.4	6.5	78°	D
TPGT	1603○○	4.4	6.0	R	B
TPGV	0902○○	2.8	3.8	R	B
	1103○○	3.4	4.5	R	B

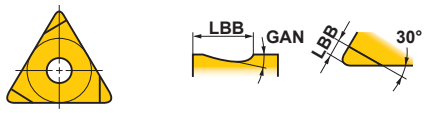
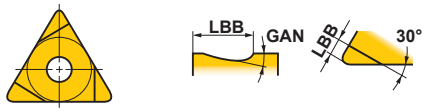
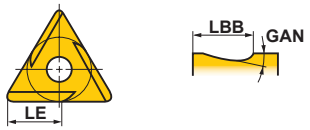
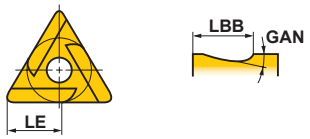
Insert Number		Dimensions (mm)			Hole Type
		D1	FHCSD	FHCSA (°)	
VBET VBGT VBMT VBGW	1103○○	2.9	3.8	R	B
	1604○○	4.4	6.0	R	B
VCGT VCMT VCGW VCMW	0802○○	2.4	3.2	R	B
	1103○○	2.8	3.8	R	B
	1303○○	3.4	4.5	R	B
	1604○○	4.4	6.0	R	B
	2205○○	7.5	5.5	R	B
VDGX	1603○○	4.5	6.1	88°	D
WBGT WBMT	0201○○	2.3	3.2	R	B
	L302○○	2.3	3.2	R	B
WCGT WCMT WCGW WCMW	0201○○	2.3	3.0	R	B
	L302○○	2.3	3.0	R	B
	0402○○	2.8	3.8	R	B
	06T3○○	4.4	6.0	R	B
WPGT WPMT	0402○○	2.8	3.8	R	B
	0603○○	4.4	6.0	R	B
XCMT	1503○○	2.8	3.8	R	B

PRECISION BREAKER SYSTEM

STANDARD OF INSERTS WITH HAND OF TOOL

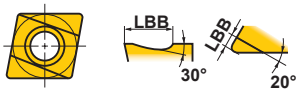
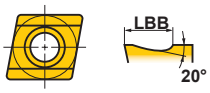
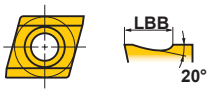
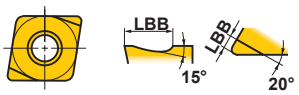
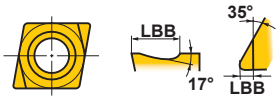
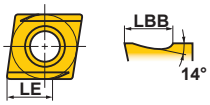
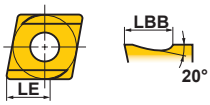
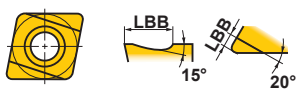
NEGATIVE INSERTS

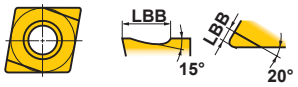
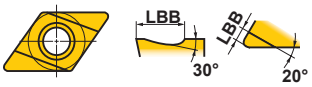
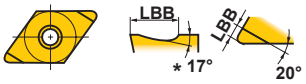
Unit : mm

Geometry	Insert Number	LBB	LE	GAN
Right hand insert shown.	DNGG150404R/L	2.8	–	15
	DNGG150408R/L	2.8	–	15
Right hand insert shown.	SNGG090304R/L	1.8	1.6	15
	SNGG090308R/L	1.8	1.6	15
	SNGG120404R/L	2.3	3.7	15
	SNGG120408R/L	2.3	3.7	15
 Right hand insert shown.	TNGG160402R/L-FS	1.3	–	15
	TNGG160404R/L-FS	1.3	–	15
	TNGG160408R/L-FS	1.3	–	15
 Right hand insert shown.	TNGG160402R/L-F	2.5	–	15
	TNGG160404R/L-F	2.5	–	15
	TNGG160408R/L-F	2.5	–	15
 Right hand insert shown.	TNGG160402R/L-K	1.5	7.1	15
	TNGG160404R/L-K	1.5	5.4	15
 Right hand insert shown.	TNGG110302R/L	1.3	3.2	15
	TNGG110304R/L	1.3	3.0	15
	TNGG110308R/L	1.3	2.7	15
	TNGG160304R/L	2.3	5.4	15
	TNGG160402R/L	1.3	8.7	15
	TNGG160404R/L	2.3	5.4	15
	TNGG160408R/L	2.3	5.1	15
	TNGG220404R/L	2.8	9.4	15
	TNGG220408R/L	2.8	9.1	15
Right hand insert shown.	VNGG160404R/L	1.8	–	15
	VNGG160408R	1.8	–	15

POSITIVE INSERTS

Unit : mm

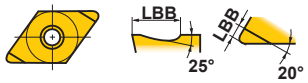
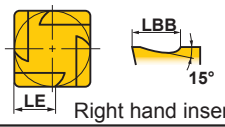
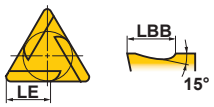
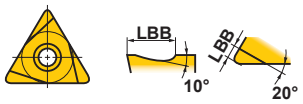
Geometry	Insert Number	LBB	LE
 Right hand insert shown.	CCET0602V3R/L-SR	2.2	—
	CCET060201R/L-SR	2.2	—
	CCET060202R/L-SR	2.2	—
	CCET060204R/L-SR	2.2	—
	CCET09T3V3R/L-SR	3.2	—
	CCET09T301R/L-SR	3.2	—
	CCET09T302R/L-SR	3.2	—
	CCET09T304R/L-SR	3.2	—
 Right hand insert shown.	CCET060200R/L-SN	1.0	—
	CCET0602V3R/L-SN	1.0	—
	CCET060201R/L-SN	1.0	—
	CCET060202R/L-SN	1.0	—
	CCET060204R/L-SN	1.0	—
	CCET09T300R/L-SN	1.5	—
	CCET09T3V3R/L-SN	1.5	—
	CCET09T301R/L-SN	1.5	—
	CCET09T302R/L-SN	1.5	—
	CCET09T304R/L-SN	1.5	—
 Right hand insert shown.	CCET0602V3R/LW-SN	1.0	—
	CCET09T3V3R/LW-SN	1.5	—
 Right hand insert shown.	CCGH060202R/L-F	1.2	—
	CCGH060204R/L-F	1.4	—
 Left hand insert shown.	CCGT03S1V3L-F	0.8	—
	CCGT03S101L-F	0.8	—
	CCGT03S102L-F	0.8	—
	CCGT03S104L-F	0.8	—
	CCGT04T0V3L-F	1.0	—
	CCGT04T001L-F	1.0	—
	CCGT04T002L-F	1.0	—
	CCGT04T004L-F	1.0	—
 Right hand insert shown.	CCGT0602V3R/L-SS	1.0	3.0
	CCGT060201R/L-SS	1.0	3.0
	CCGT060202R/L-SS	1.0	3.0
	CCGT09T3V3R/L-SS	1.0	5.0
	CCGT09T301R/L-SS	1.0	5.0
	CCGT09T302R/L-SS	1.0	5.0
 Right hand insert shown.	CCGT0602V3R-SN	1.0	3.0
	CCGT060201R/L-SN	1.0	3.0
	CCGT060202R/L-SN	1.0	3.0
	CCGT09T3V3R/L-SN	1.5	5.0
	CCGT09T301R/L-SN	1.5	5.0
	CCGT09T302R/L-SN	1.5	5.0
	CCGT09T304R/L-SN	1.5	5.0
 Right hand insert shown.	CPGT080204R/L-F	0.6	—
	CPGT090302R/L-F	0.8	—
	CPGT090304R/L-F	0.8	—

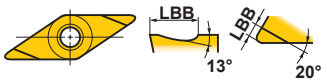
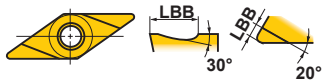
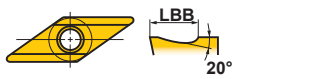
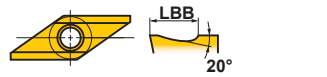
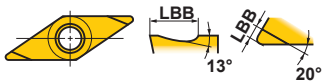
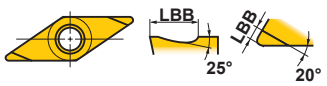
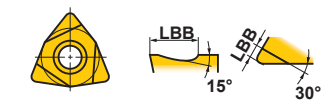
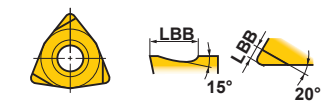
Geometry	Insert Number	LBB	LE
 Right hand insert shown.	CPMH080204R/L-F	1.0	—
	CPMH090304R/L-F	1.4	—
 Right hand insert shown.	DCET0702V3R/L-SR	2.5	—
	DCET070201R/L-SR	2.5	—
	DCET070202R/L-SR	2.5	—
	DCET070204R/L-SR	2.5	—
	DCET11T3V3R/L-SR	3.7	—
	DCET11T301R/L-SR	3.7	—
	DCET11T302R/L-SR	3.7	—
	DCET11T304R/L-SR	3.7	—
Right hand insert shown.	DCET070200R/L-SN	1.0	—
	DCET0702V3R/L-SN	1.0	—
	DCET070201R/L-SN	1.0	—
	DCET070202R/L-SN	1.0	—
	DCET070204R/L-SN	1.0	—
	DCET11T300R/L-SN	1.5	—
	DCET11T3V3R/L-SN	1.5	—
	DCET11T301R/L-SN	1.5	—
	DCET11T302R/L-SN	1.5	—
	DCET11T304R/L-SN	1.5	—
Right hand insert shown.	DCET0702V3R/LW-SN	1.0	—
	DCET11T3V3R/LW-SN	1.5	—
 *DCGT11T3□□type : 14° Right hand insert shown.	DCGT070202R/L-F	1.0	—
	DCGT070204R/L-F	1.0	—
	DCGT11T302R/L-F	1.0	—
	DCGT11T304R/L-F	1.0	—
Right hand insert shown.	DCGT0702V3R/L-SS	1.0	3.5
	DCGT070201R/L-SS	1.0	3.5
	DCGT070202R/L-SS	1.0	3.5
	DCGT11T3V3R-SS	1.0	6.5
	DCGT11T301R-SS	1.0	6.5
	DCGT11T302R-SS	1.0	6.5
Right hand insert shown.	DCGT0702V3R-SN	1.0	3.5
	DCGT070201R-SN	1.0	3.5
	DCGT070202R/L-SN	1.0	3.5
	DCGT11T3V3R/L-SN	1.5	6.5
	DCGT11T301R/L-SN	1.5	6.5
	DCGT11T302R/L-SN	1.5	6.5
	DCGT11T304R/L-SN	1.5	6.5
Right hand insert shown.	DEGX150402R/L	2.8	—
	DEGX150404R/L	2.8	—

STANDARD OF INSERTS WITH HAND OF TOOL

POSITIVE INSERTS

Unit : mm

Geometry	Insert Number	LBB	LE
 Right hand insert shown.	DEGX150402R/L-F	2.5	—
	DEGX150404R/L-F	2.5	—
 Right hand insert shown.	SPGR090304R	1.8	1.6
Left hand insert shown.	TCGT0601V3L-F	1.0	—
	TCGT060101L-F	1.0	—
	TCGT060102R/L-F	1.0	—
	TCGT060104R/L-F	1.0	—
Right hand insert shown.	TEGX160302R/L	2.0	6.0
	TEGX160304R/L	2.0	6.0
*TPGH1603□□type : 14° Right hand insert shown.	TPGH080202R/L-FS	0.9	—
	TPGH080204R/L-FS	0.9	—
	TPGH090202R/L-FS	1.0	—
	TPGH090204R/L-FS	1.0	—
	TPGH110302R/L-FS	1.4	—
	TPGH110304R/L-FS	1.4	—
	TPGH160304R/L-FS	2.0	—
	TPGH160308R/L-FS	2.0	—
 Right hand insert shown.	TPGR110304R/L	1.3	3.0
	TPGR160304R/L	2.3	5.4
	TPGR160308R/L	2.3	5.1
 Right hand insert shown.	TPGX080202R/L	1.3	—
	TPGX080204R/L	1.3	—
	TPGX090202R/L	1.6	—
	TPGX090204R/L	1.6	—
	TPGX090208R/L	1.4	—
	TPGX110302L	1.8	—
	TPGX110304R/L	1.8	—
	TPGX110308R/L	1.8	—

Geometry	Insert Number	LBB	LE
 Right hand insert shown.	VBGT110302R/L-F	1.0	—
	VBGT110304R/L-F	1.0	—
	VBGT160402R/L-F	1.5	—
	VBGT160404R/L-F	1.5	—
 Right hand insert shown.	VBET1103V3R/L-SR	2.5	—
	VBET110301R/L-SR	2.5	—
	VBET110302R/L-SR	2.5	—
	VBET110304R/L-SR	2.5	—
 Right hand insert shown.	VBET110300R/L-SN	1.0	—
	VBET1103V3R/L-SN	1.0	—
	VBET110301R/L-SN	1.0	—
	VBET110302R/L-SN	1.0	—
	VBET110304R/L-SN	1.0	
 Right hand insert shown.	VBET1103V3R/LW-SN	1.0	—
 Right hand insert shown.	VCGT080202R/L-F	0.8	—
	VCGT080204R/L-F	0.8	—
 Right hand insert shown.	VDGX160302R/L	2.0	—
	VDGX160304R/L	2.0	—
Right hand insert shown.	WBGT0201V3L-F	1.0	—
	WBGT020101L-F	1.0	—
	WBGT020102L-F	1.0	—
	WBGT020104L-F	1.0	—
	WBGTL302V3L-F	1.0	—
	WBGTL30201L-F	1.0	—
	WBGTL30202R/L-F	1.0	—
	WBGTL30204R/L-F	1.0	—
 Right hand insert shown.	WCGT020102R/L	1.0	—
	WCGT020104R/L	1.0	—
	WCGTL30202L	1.0	—
	WCGTL30204L	1.0	—
 Right hand insert shown.	WPGT040204R/L-FS	1.0	—
	WPGT060304R/L-FS	1.0	—

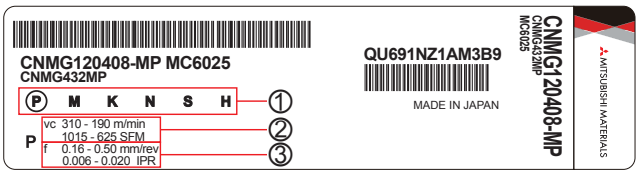
TOOL NAVI

TOOL NAVI

OUTLINE

TOOL NAVI supports our customers with information and suitable cutting conditions for each work material by selecting an optimal indexable insert together with the optional tool.

LABEL INDICATION



*1 The above is an example. There may be inserts recommended for multiple work materials.
*2 Please contact us for recommended cutting conditions using coefficient values other than the above.

①Work materials

P : Steel (Material reference : Carbon steel, alloy steel 180HB)
M : Stainless steel (Material reference : Austenitic stainless steel 180HB)
K : Cast iron (Material reference : Gray cast iron, ductile cast iron 180HB)
N : Aluminium alloy, non-ferrous metal
S : Material reference : Titanium alloy 320HB, Ni, Co-Based Alloy 400HB
H : Hardened steel 60HRC

②CUTTING SPEED STANDARDS

Work Material	Tool Life		Work Material	Hardness
	Life	Performance		
P	90min	15min	Carbon steel, alloy steel	180HB
M	90min	15min	Stainless steel	180HB
K	90min	15min	Cast iron	180HB
S	25min	5min	Titanium alloy	320HB
			Ni, Co-Based alloy	400HB
H	80min	10min	Hardened steel	HRC60

*3. N :Life based on each grade. For stable choose the performance cutting speed and for unstable choose the tool life feed rate.
*4. The tool life is based on the following (VB wear). Some materials include elements other than this.
PMKS ··· VB=0.3mm
H ··· VB=0.1mm

③Feed rate

Minimum and maximum feed rate settings are based on the chip control range of the chip breaker.

TOOL LIFE

Cutting speed has a large affect on tool life. TOOL NAVI is based on Taylor's equation (relationship vc T^n=C between tool grade, cutting conditions, and tool life). Therefore, performance speed and tool life is found for each work material. When the customer requires a different tool life, obtain coefficient values of the grade you use from the charts below. Multiply the coefficient values by the cutting speed to calculate a new cutting speed.

P Grade (Steel) cutting speed coefficient values.

Grade \ Tool life	15min	30min	45min	60min	90min
UE6105	1.00	0.79	0.69	0.63	0.55
MC6015	1.00	0.82	0.72	0.67	0.59
MC6025	1.00	0.83	0.75	0.69	0.62
MC6035	1.00	0.88	0.82	0.78	0.73
MP3025	1.00	0.85	0.77	0.72	0.65
NX2525	1.00	0.87	0.80	0.76	0.70

M Grade (Stainless Steel) cutting speed coefficient values.

Grade \ Tool life	15min	30min	45min	60min	90min
MC7015	1.00	0.83	0.75	0.70	0.63
MC7025	1.00	0.90	0.84	0.80	0.75
MP7035	1.00	0.84	0.76	0.71	0.62
US735	1.00	0.78	0.68	0.61	0.53

K Grade (Cast Iron) cutting speed coefficient values.

Grade \ Tool life	15min	30min	45min	60min	90min
MC5005	1.00	0.83	0.75	0.70	0.63
MC5015	1.00	0.83	0.75	0.69	0.62

(ex.) Medium cutting of steel
The 1st recommendation : MC6025
Indexable inserts : CNMG120408-MP
Recommended cutting speed : vc=310m/min
(Tool life : 15min.)

↓

Tool life required by the customer : 30min.

310×0.83≒257m/min

HARDNESS OF THE WORK MATERIAL

Hardness of the work material also affects tool life. Mitsubishi's TOOL NAVI suggests cutting speed variations when hardness differs. Obtain the suitable coefficient value for each type of work material from the chart below. Multiply the coefficient value by the recommended cutting speed of the grade you use to calculate a new cutting speed.

Work material	Soft ← (Hardness of workpiece) → Hard											
	120HB	140HB	160HB	180HB	200HB	220HB	240HB	260HB	280HB	300HB	320HB	340HB
P	1.34	1.19	1.08	1.00	0.92	0.85	0.80	0.75	0.71	0.68	0.64	0.61
M	1.41	1.23	1.10	1.00	0.91	0.85	0.78	0.72	0.68	0.64	0.61	0.58
K	1.27	1.19	1.09	1.00	0.97	0.91	0.88	0.85	0.81	0.78	0.75	0.72

OPTIMUM GRADES AND CHIP BREAKERS FOR EXTERNAL TURNING

Selection of optimum inserts for turning

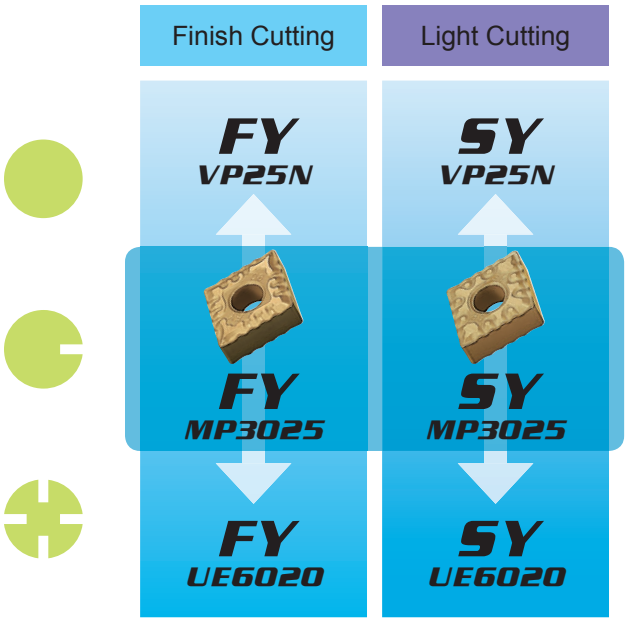
The following diagrams show for each type of work material, the optimal combination of suitable grades and chip breakers for each application area in turning.

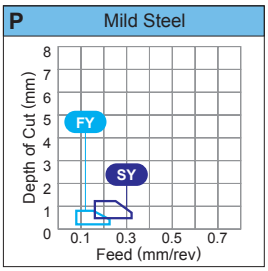
CUTTING CONDITIONS

- **Stable Cutting** — Continuous Cutting, Constant Depth of Cut, Pre-Machined, Securely Clamped Component Cutting
- **General Cutting**
- **Unstable Cutting** — Heavy Interrupted Cutting, Irregular Depth of Cut, Low Clamping Rigidity Cutting

CUTTING AREA

- **F** Finish Cutting
- **L** Light Cutting
- **M** Medium Cutting
- **R** Rough Cutting
- **H** Heavy Cutting



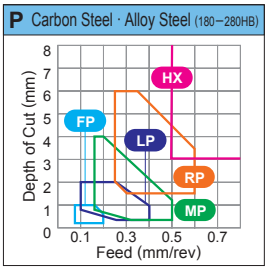


P Mild Steel (Ex : SS400, S10C)

NEGATIVE INSERTS

vc : Cutting Speed
f : Feed
ap : Depth of Cut

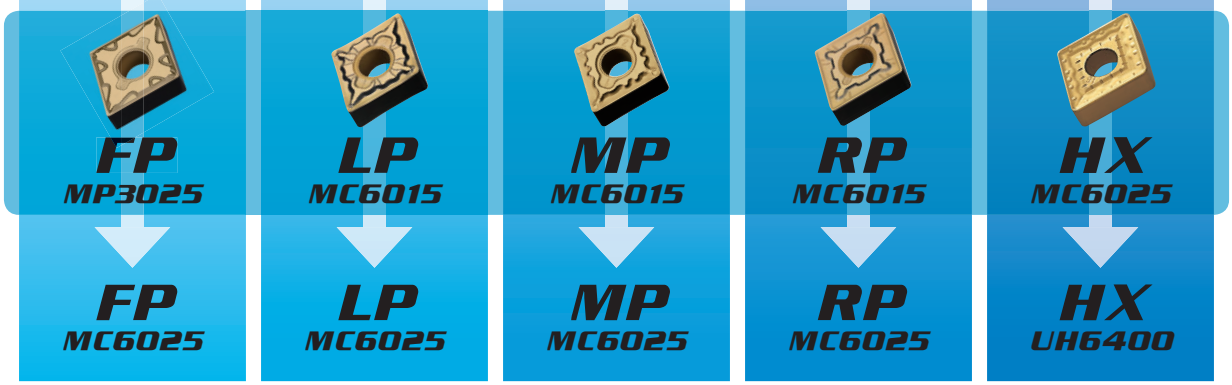
	Cutting Area	Chip Breaker	Grade	1st Recommendation vc (m/min)	f (mm/rev)	ap (mm)
Stable Cutting	F	FY	VP25N	285—445	0.09—0.23	0.20—0.80
	L	SY	VP25N	260—405	0.16—0.33	0.50—1.20
General Cutting	F	FY	MP3025	275—420	0.09—0.23	0.20—0.80
	L	SY	MP3025	250—385	0.16—0.33	0.50—1.20
Unstable Cutting	F	FY	UE6020	285—460	0.09—0.23	0.20—0.80
	L	SY	UE6020	260—420	0.16—0.33	0.50—1.20



Stable Cutting	
General Cutting	
Unstable Cutting	

F	Finish Cutting
L	Light Cutting
M	Medium Cutting
R	Rough Cutting
H	Heavy Cutting

	Finish Cutting	Light Cutting	Medium Cutting	Rough Cutting	Heavy Cutting
Stable Cutting	FP NX2525	LP UE6105	MP UE6105	RP UE6105	HX UE6110
General Cutting	FP MP3025	LP MC6015	MP MC6015	RP MC6015	HX MC6025
Unstable Cutting	FP MC6025	LP MC6025	MP MC6025	RP MC6025	HX UH6400



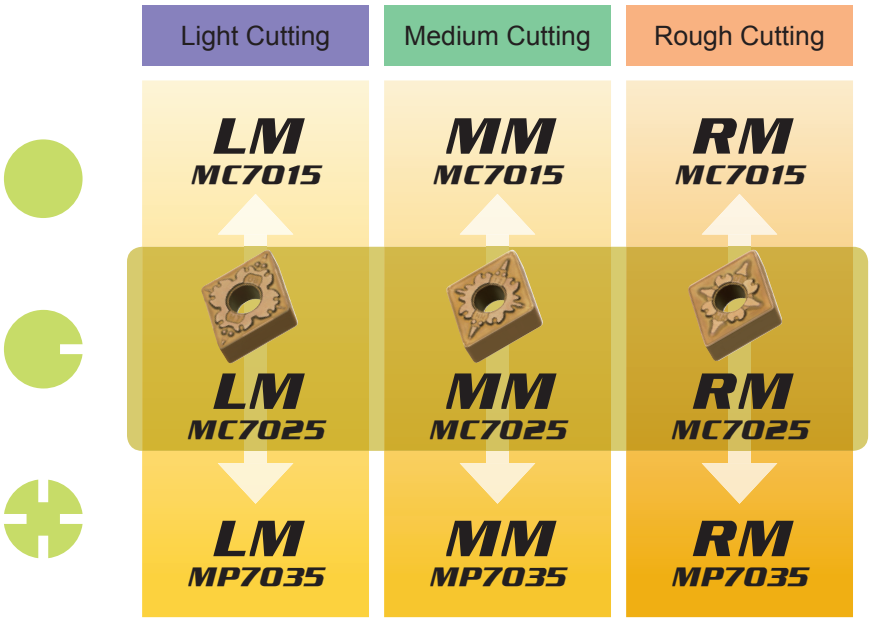
P Carbon Steel • Alloy Steel (Ex : S45C, SCM440)

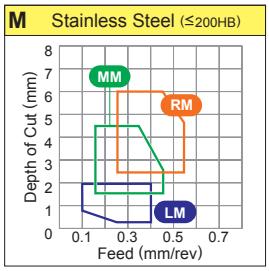
NEGATIVE INSERTS

vc : Cutting Speed
f : Feed
ap : Depth of Cut

	Cutting Area	Chip Breaker	Grade	1st Recommendation vc (m/min)	f (mm/rev)	ap (mm)
Stable Cutting	F	FP	NX2525	210–300	0.08–0.25	0.10–1.00
	L	LP	UE6105	220–405	0.10–0.40	0.30–2.00
	M	MP	UE6105	200–370	0.16–0.50	0.30–4.00
	R	RP	UE6105	190–350	0.25–0.60	1.50–6.00
	H	HX	UE6110	160–275	0.50–1.26	3.00–11.00
General Cutting	F	FP	MP3025	215–330	0.08–0.25	0.10–1.00
	L	LP	MC6015	210–355	0.10–0.40	0.30–2.00
	M	MP	MC6015	190–325	0.16–0.50	0.30–4.00
	R	RP	MC6015	180–310	0.25–0.60	1.50–6.00
	H	HX	MC6025	155–250	0.50–1.26	3.00–11.00
Unstable Cutting	F	FP	MC6025	230–375	0.08–0.25	0.10–1.00
	L	LP	MC6025	210–340	0.10–0.40	0.30–2.00
	M	MP	MC6025	190–310	0.16–0.50	0.30–4.00
	R	RP	MC6025	180–295	0.25–0.60	1.50–6.00
	H	HX	UH6400	135–195	0.50–1.26	3.00–11.00

●	Stable Cutting	L	Light Cutting
◐	General Cutting	M	Medium Cutting
✚	Unstable Cutting	R	Rough Cutting



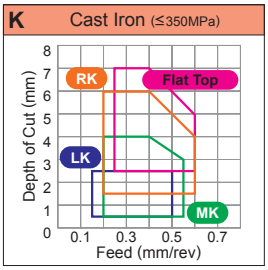


M Stainless Steel (Ex : SUS304, SUS316)

NEGATIVE INSERTS

vc : Cutting Speed
f : Feed
ap : Depth of Cut

	Cutting Area	Chip Breaker	Grade	1st Recommendation vc (m/min)	f (mm/rev)	ap (mm)
● Stable Cutting	L	LM	MC7015	180—285	0.10—0.30	0.30—2.00
	M	MM	MC7015	160—255	0.15—0.45	0.70—5.00
	R	RM	MC7015	155—245	0.25—0.55	1.50—6.00
◐ General Cutting	L	LM	MC7025	160—215	0.10—0.30	0.30—2.00
	M	MM	MC7025	145—195	0.15—0.45	0.70—5.00
	R	RM	MC7025	140—185	0.25—0.55	1.50—6.00
✚ Unstable Cutting	L	LM	MP7035	95—155	0.10—0.30	0.30—2.00
	M	MM	MP7035	85—140	0.15—0.45	0.70—5.00
	R	RM	MP7035	85—135	0.25—0.55	1.50—6.00



Stable Cutting	L Light Cutting
General Cutting	M Medium Cutting
Unstable Cutting	R Rough Cutting
	H Heavy Cutting

K Cast Iron • Ductile Cast Iron (Ex : FC300)

NEGATIVE INSERTS

vc : Cutting Speed
f : Feed
ap : Depth of Cut

	Cutting Area	Chip Breaker	Grade	1st Recommendation vc (m/min)	f (mm/rev)	ap (mm)
Stable Cutting	L	**LK**	**MC5005**	235—375	0.10—0.40	0.30—2.00
	M	**MK**	**MC5005**	210—335	0.20—0.55	1.00—4.00
	R	**RK**	**MC5005**	195—315	0.25—0.60	1.50—6.00
	H	**Flat Top**	**MC5005**	195—315	0.20—0.60	2.50—6.00
General Cutting	L	**LK**	**MC5015**	205—335	0.10—0.40	0.30—2.00
	M	**MK**	**MC5015**	190—305	0.20—0.55	1.00—4.00
	R	**RK**	**MC5015**	180—285	0.25—0.60	1.50—6.00
	H	**Flat Top**	**MC5015**	180—285	0.20—0.60	2.50—6.00
Unstable Cutting	L	**LK**	**MC5015**	205—335	0.10—0.40	0.30—2.00
	M	**MK**	**MC5015**	190—305	0.20—0.55	1.50—4.00
	R	**RK**	**MC5015**	180—285	0.25—0.60	1.50—6.00
	H	**Flat Top**	**MC5015**	180—285	0.20—0.60	2.50—6.00

Stable Cutting	F Finish Cutting
General Cutting	L Light Cutting
Unstable Cutting	M Medium Cutting
	R Rough Cutting

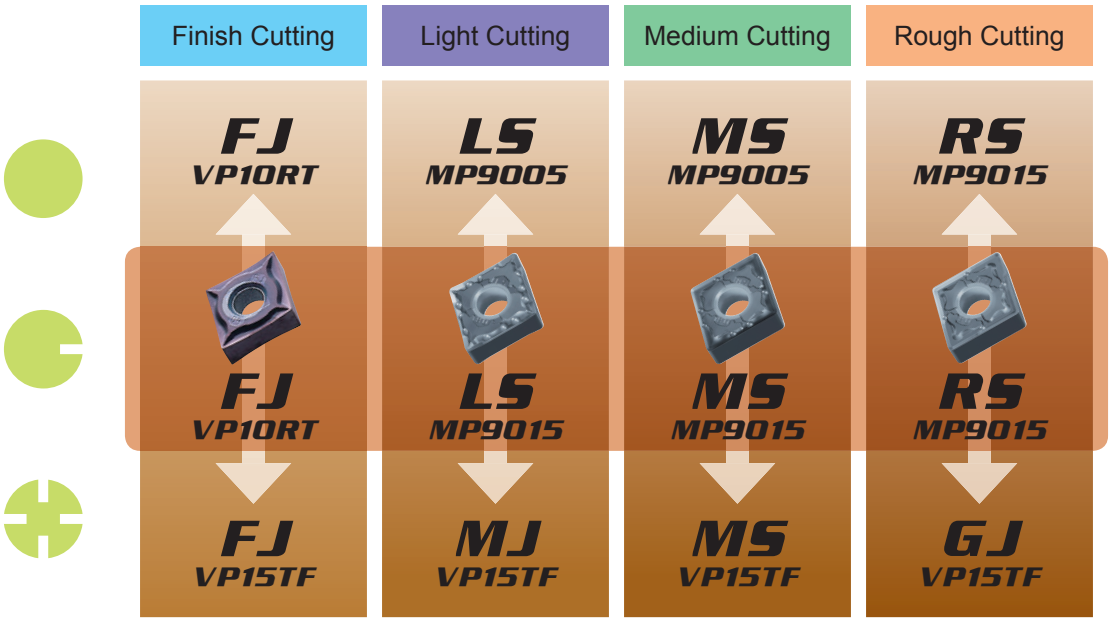
S Titanium Alloy (Ex : Ti-6Al-4V)

NEGATIVE INSERTS

vc : Cutting Speed
f : Feed
ap : Depth of Cut

	Cutting Area	Chip Breaker	1st Recommendation Grade	vc (m/min)	f (mm/rev)	ap (mm)
Stable Cutting	F	FJ	RT9010	45—95	0.07—0.20	0.10—1.00
	L	LS	MT9015	40—85	0.10—0.25	0.20—0.80
	M	MS	MT9015	40—80	0.10—0.25	0.50—4.00
	R	RS	MT9015	35—75	0.20—0.35	1.00—4.00
General Cutting	F	FJ	RT9010	45—95	0.07—0.20	0.10—1.00
	L	LS	MT9015	40—85	0.10—0.25	0.20—0.80
	M	MS	MT9015	40—80	0.10—0.25	0.50—4.00
	R	RS	MT9015	35—75	0.20—0.35	1.00—4.00
Unstable Cutting	F	FJ	RT9010	45—95	0.07—0.20	0.10—1.00
	L	MJ	RT9010	40—80	0.07—0.25	0.40—1.50
	M	MS	RT9010	40—80	0.10—0.25	0.50—4.00
	R	GJ	RT9010	35—75	0.16—0.35	1.00—3.00

Stable Cutting	F Finish Cutting
General Cutting	L Light Cutting
Unstable Cutting	M Medium Cutting
	R Rough Cutting

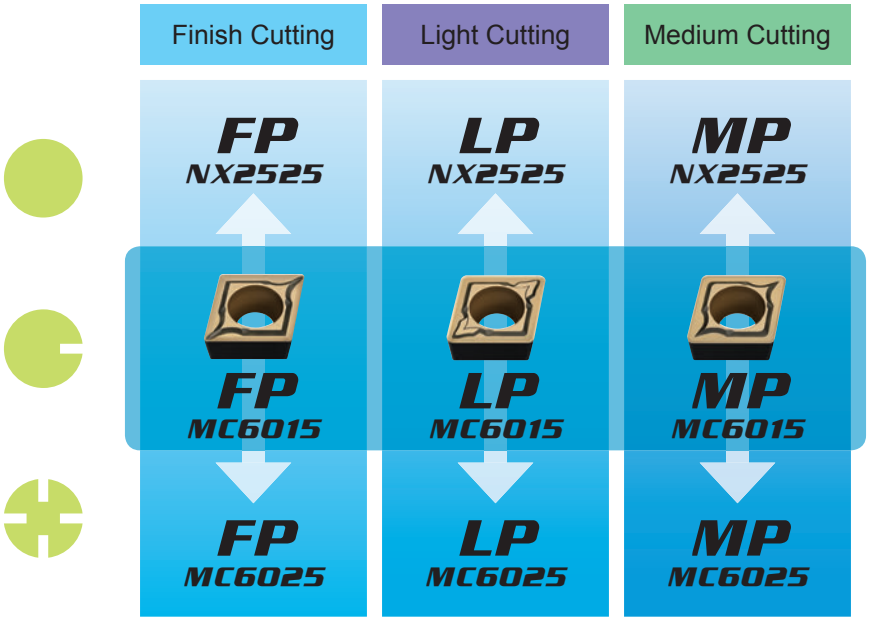


S Ni, Co-Based Alloy (Ex : Inconel®718)

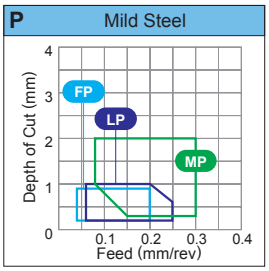
NEGATIVE INSERTS

vc : Cutting Speed
f : Feed
ap : Depth of Cut

	Cutting Area	Chip Breaker	Grade	1st Recommendation vc (m/min)	f (mm/rev)	ap (mm)
Stable Cutting	F	FJ	VP10RT	30—60	0.07—0.20	0.10—1.00
	L	LS	MP9005	30—110	0.10—0.25	0.20—0.80
	M	MS	MP9005	30—100	0.10—0.25	0.50—4.00
	R	RS	MP9015	20—75	0.20—0.35	1.00—4.00
General Cutting	F	FJ	VP10RT	30—60	0.07—0.20	0.10—1.00
	L	LS	MP9015	25—85	0.10—0.25	0.20—0.80
	M	MS	MP9015	25—80	0.10—0.25	0.50—4.00
	R	RS	MP9015	20—75	0.20—0.35	1.00—4.00
Unstable Cutting	F	FJ	VP15TF	20—40	0.07—0.20	0.10—1.00
	L	MJ	VP15TF	20—35	0.07—0.25	0.40—1.50
	M	MS	VP15TF	20—35	0.10—0.25	0.50—4.00
	R	GJ	VP15TF	15—30	0.16—0.35	1.00—3.00



- Stable Cutting
- General Cutting
- Unstable Cutting
- F Finish Cutting
- L Light Cutting
- M Medium Cutting

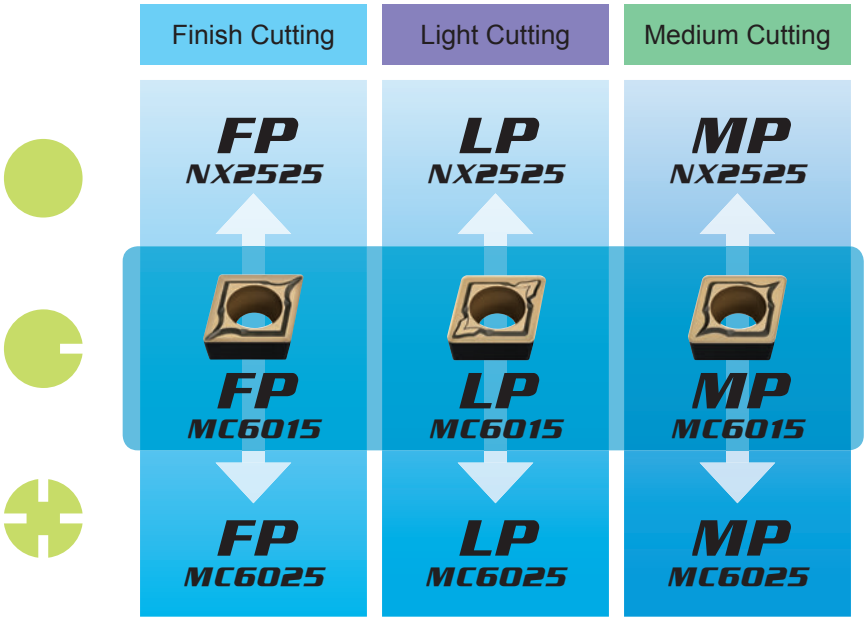


P Mild Steel (Ex : SS400, S10C)

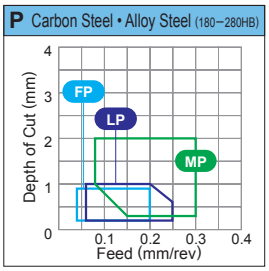
7°POSITIVE INSERTS WITH HOLE

vc : Cutting Speed
f : Feed
ap : Depth of Cut

	Cutting Area	Chip Breaker	Grade	1st Recommendation vc (m/min)	f (mm/rev)	ap (mm)
Stable Cutting	F	**FP**	**NX2525**	225—320	0.04—0.20	0.20—0.90
	L	**LP**	**NX2525**	225—320	0.06—0.25	0.20—1.00
	M	**MP**	**NX2525**	185—265	0.08—0.30	0.30—2.00
General Cutting	F	**FP**	**MC6015**	250—425	0.04—0.20	0.20—0.90
	L	**LP**	**MC6015**	250—425	0.06—0.25	0.20—1.00
	M	**MP**	**MC6015**	205—350	0.08—0.30	0.30—2.00
Unstable Cutting	F	**FP**	**MC6025**	250—405	0.04—0.20	0.20—0.90
	L	**LP**	**MC6025**	250—405	0.06—0.25	0.20—1.00
	M	**MP**	**MC6025**	205—335	0.08—0.30	0.30—2.00



- Stable Cutting
- General Cutting
- Unstable Cutting
- F Finish Cutting
- L Light Cutting
- M Medium Cutting

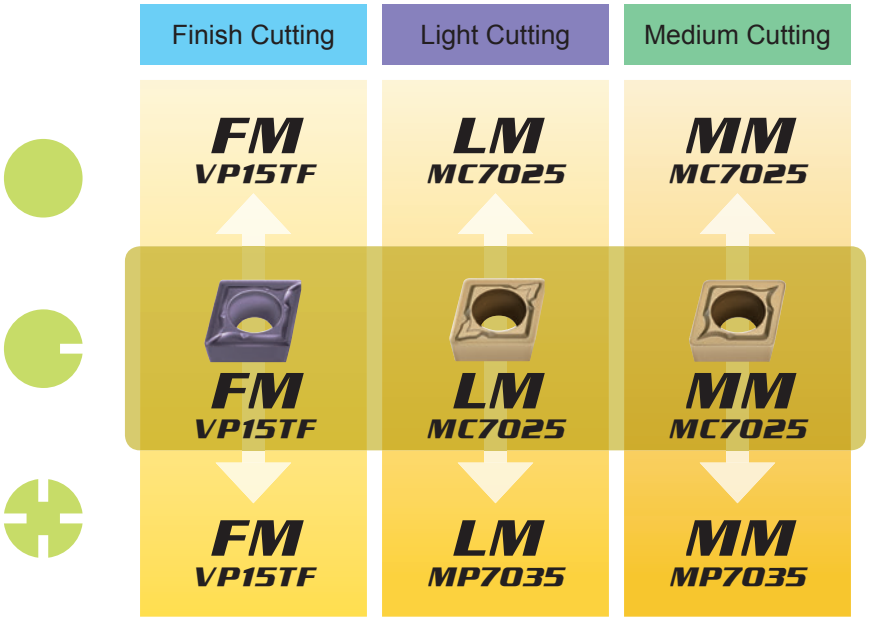


P Carbon Steel • Alloy Steel (Ex : S45C, SCM440)

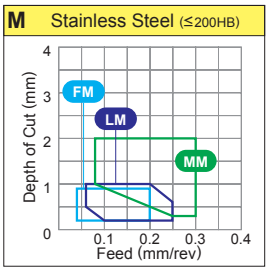
7°POSITIVE INSERTS WITH HOLE

vc : Cutting Speed
f : Feed
ap : Depth of Cut

	Cutting Area	Chip Breaker	Grade	1st Recommendation vc (m/min)	f (mm/rev)	ap (mm)
Stable Cutting	F	**FP**	**NX2525**	165—235	0.04—0.20	0.20—0.90
	L	**LP**	**NX2525**	165—235	0.06—0.25	0.20—1.00
	M	**MP**	**NX2525**	135—195	0.08—0.30	0.30—2.00
General Cutting	F	**FP**	**MC6015**	185—310	0.04—0.20	0.20—0.90
	L	**LP**	**MC6015**	185—310	0.06—0.25	0.20—1.00
	M	**MP**	**MC6015**	150—260	0.08—0.30	0.30—2.00
Unstable Cutting	F	**FP**	**MC6025**	185—295	0.04—0.20	0.20—0.90
	L	**LP**	**MC6025**	185—295	0.06—0.25	0.20—1.00
	M	**MP**	**MC6025**	150—245	0.08—0.30	0.30—2.00



- Stable Cutting
- General Cutting
- Unstable Cutting
- F Finish Cutting
- L Light Cutting
- M Medium Cutting

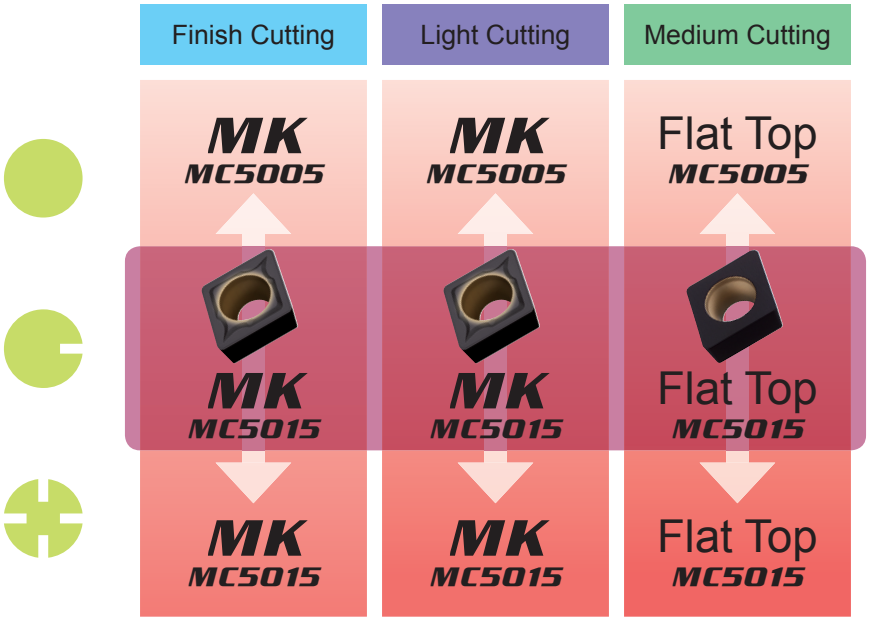


M Stainless Steel (Ex : SUS304, SUS316)

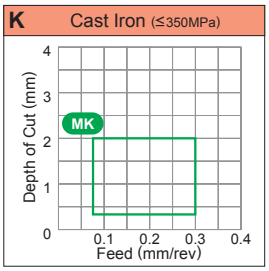
7°POSITIVE INSERTS WITH HOLE

vc : Cutting Speed
f : Feed
ap : Depth of Cut

	Cutting Area	Chip Breaker	Grade	1st Recommendation vc (m/min)	f (mm/rev)	ap (mm)
Stable Cutting	F	FM	VP15TF	75—125	0.04—0.20	0.20—0.90
	L	LM	MC7025	140—190	0.06—0.25	0.20—1.00
	M	MM	MC7025	115—155	0.08—0.30	0.30—2.00
General Cutting	F	FM	VP15TF	75—125	0.04—0.20	0.20—0.90
	L	LM	MC7025	140—190	0.06—0.25	0.20—1.00
	M	MM	MC7025	115—155	0.08—0.30	0.30—2.00
Unstable Cutting	F	FM	VP15TF	75—125	0.04—0.20	0.20—0.90
	L	LM	MP7035	85—135	0.06—0.25	0.20—1.00
	M	MM	MP7035	70—115	0.08—0.30	0.30—2.00



- Stable Cutting
- General Cutting
- Unstable Cutting
- F Finish Cutting
- L Light Cutting
- M Medium Cutting

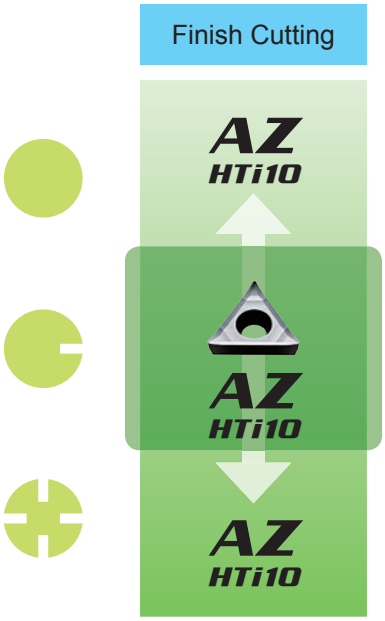


K Cast Iron • Ductile Cast Iron (Ex : FC300)

7°POSITIVE INSERTS WITH HOLE

vc : Cutting Speed
f : Feed
ap : Depth of Cut

	Cutting Area	Chip Breaker	Grade	1st Recommendation vc (m/min)	f (mm/rev)	ap (mm)
Stable Cutting	F	**MK**	**MC5005**	170—270	0.08—0.30	0.30—2.00
	L	**MK**	**MC5005**	170—270	0.08—0.30	0.30—2.00
	M	**Flat Top**	**MC5005**	170—270	0.08—0.30	0.30—2.00
General Cutting	F	**MK**	**MC5015**	155—245	0.08—0.30	0.30—2.00
	L	**MK**	**MC5015**	155—245	0.08—0.30	0.30—2.00
	M	**Flat Top**	**MC5015**	155—245	0.08—0.30	0.30—2.00
Unstable Cutting	F	**MK**	**MC5015**	155—245	0.08—0.30	0.30—2.00
	L	**MK**	**MC5015**	155—245	0.08—0.30	0.30—2.00
	M	**Flat Top**	**MC5015**	155—245	0.08—0.30	0.30—2.00



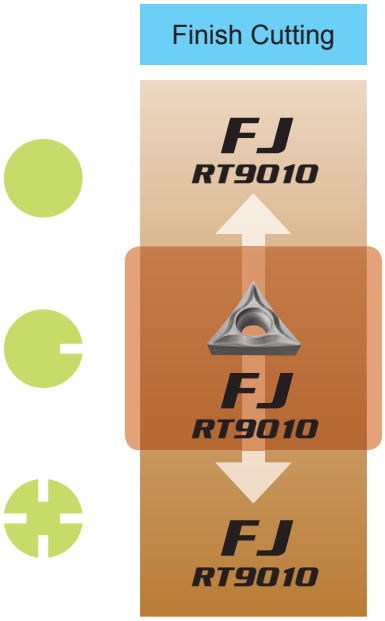
- Stable Cutting
- General Cutting
- Unstable Cutting
- F Finish Cutting

N Aluminium Alloy (Ex : A6061, A7075)

7°POSITIVE INSERTS WITH HOLE

vc : Cutting Speed
f : Feed
ap : Depth of Cut

	Cutting Area	Chip Breaker	Grade	1st Recommendation vc (m/min)	f (mm/rev)	ap (mm)
Stable Cutting	F	**AZ**	**HTi10**	300—700	0.10—0.40	0.20—3.00
General Cutting	F	**AZ**	**HTi10**	300—700	0.10—0.40	0.20—3.00
Unstable Cutting	F	**AZ**	**HTi10**	300—700	0.10—0.40	0.20—3.00



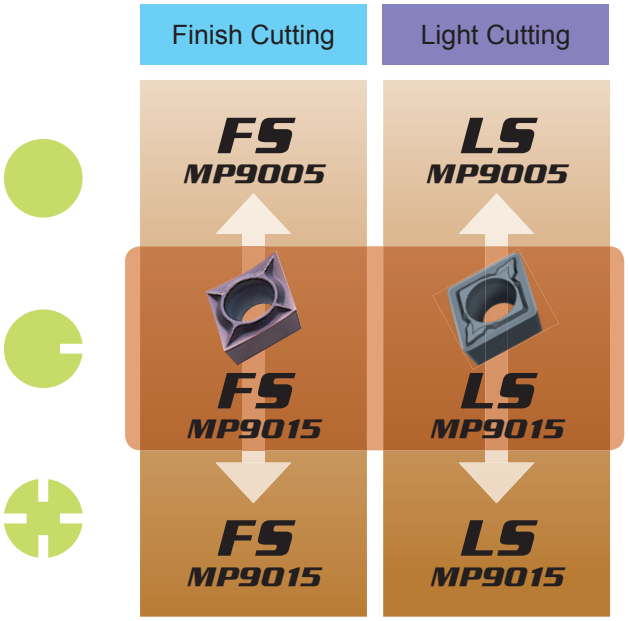
- Stable Cutting
- General Cutting
- Unstable Cutting
- F Finish Cutting

S Titanium Alloy (Ex : Ti-6Al-4V)

7°POSITIVE INSERTS WITH HOLE

vc : Cutting Speed
f : Feed
ap : Depth of Cut

	Cutting Area	Chip Breaker	1st Recommendation Grade	vc (m/min)	f (mm/rev)	ap (mm)
Stable Cutting	F	**FJ**	**RT9010**	30—75	0.04—0.12	0.20—1.40
General Cutting	F	**FJ**	**RT9010**	30—75	0.04—0.12	0.20—1.40
Unstable Cutting	F	**FJ**	**RT9010**	30—75	0.04—0.12	0.20—1.40



- Stable Cutting
- General Cutting
- Unstable Cutting
- F Finish Cutting
- L Light Cutting

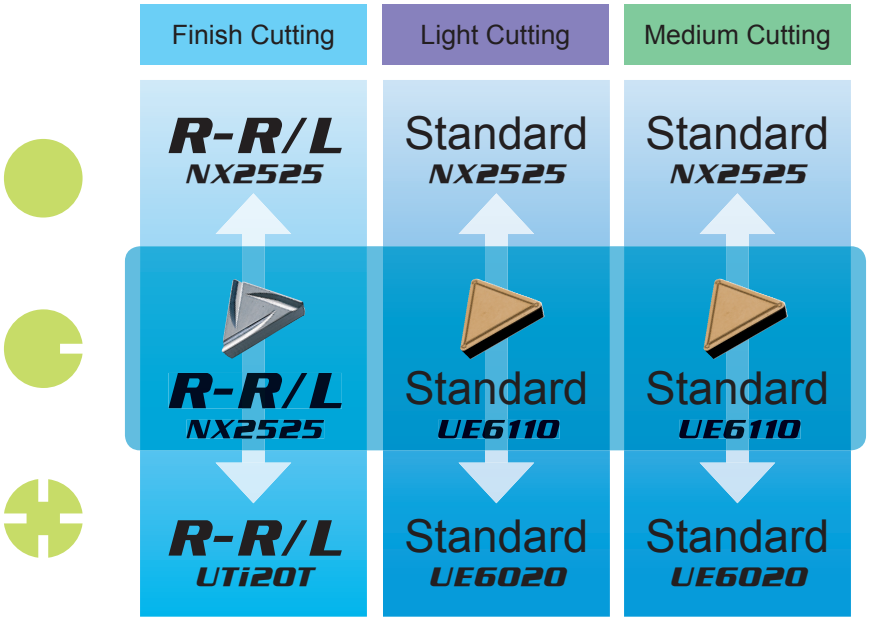
S Ni, Co-Based Alloy (Ex : Inconel®718)

7°POSITIVE INSERTS WITH HOLE

vc : Cutting Speed
f : Feed
ap : Depth of Cut

	Cutting Area	Chip Breaker	Grade	1st Recommendation vc (m/min)	f (mm/rev)	ap (mm)
Stable Cutting	F	FS	MP9005	25—95	0.04—0.12	0.20—1.40
	L	LS	MP9005	25—95	0.06—0.20	0.30—3.00
General Cutting	F	FS	MP9015	20—75	0.04—0.12	0.20—1.40
	L	LS	MP9015	20—75	0.06—0.20	0.30—3.00
Unstable Cutting	F	FS	MP9015	20—75	0.04—0.12	0.20—1.40
	L	LS	MP9015	20—75	0.06—0.20	0.30—3.00

* G-class is recommended for all of the above FS/LS breakers.



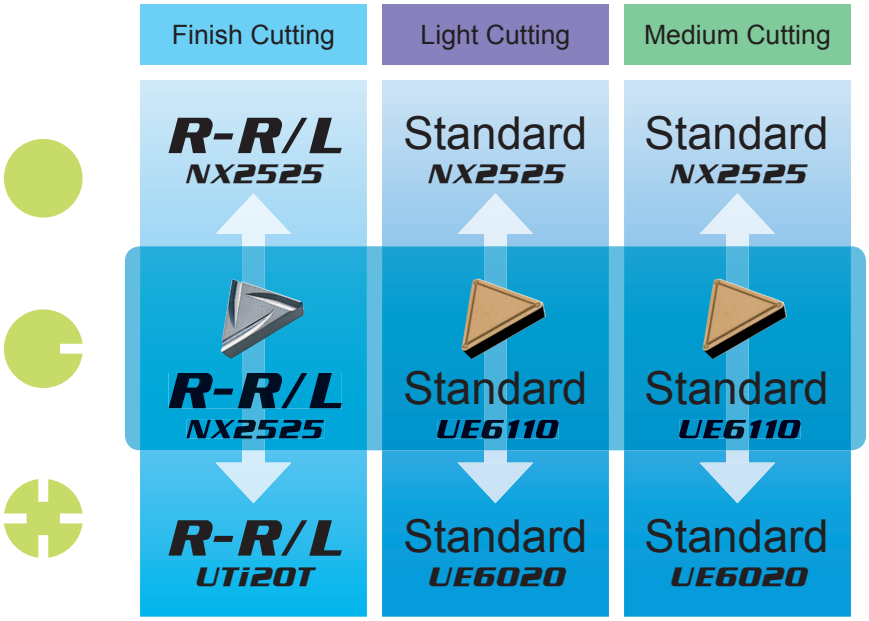
	Stable Cutting
	General Cutting
	Unstable Cutting
F	Finish Cutting
L	Light Cutting
M	Medium Cutting

P Mild Steel (Ex : SS400, S10C)

11°POSITIVE INSERTS WITHOUT HOLE

vc : Cutting Speed
f : Feed
ap : Depth of Cut

	Cutting Area	Chip Breaker	Grade	1st Recommendation vc (m/min)	f (mm/rev)	ap (mm)
Stable Cutting	F	**R-R/L**	**NX2525**	225—320	0.05—0.12	0.20—0.60
	L	**Standard**	**NX2525**	185—265	0.08—0.30	0.30—2.00
	M	**Standard**	**NX2525**	185—265	0.08—0.30	0.30—2.00
General Cutting	F	**R-R/L**	**NX2525**	225—320	0.05—0.12	0.20—0.60
	L	**Standard**	**UE6110**	205—350	0.08—0.30	0.30—2.00
	M	**Standard**	**UE6110**	205—350	0.08—0.30	0.30—2.00
Unstable Cutting	F	**R-R/L**	**UTi20T**	115—165	0.05—0.12	0.20—0.60
	L	**Standard**	**UE6020**	195—320	0.08—0.30	0.30—2.00
	M	**Standard**	**UE6020**	195—320	0.08—0.30	0.30—2.00



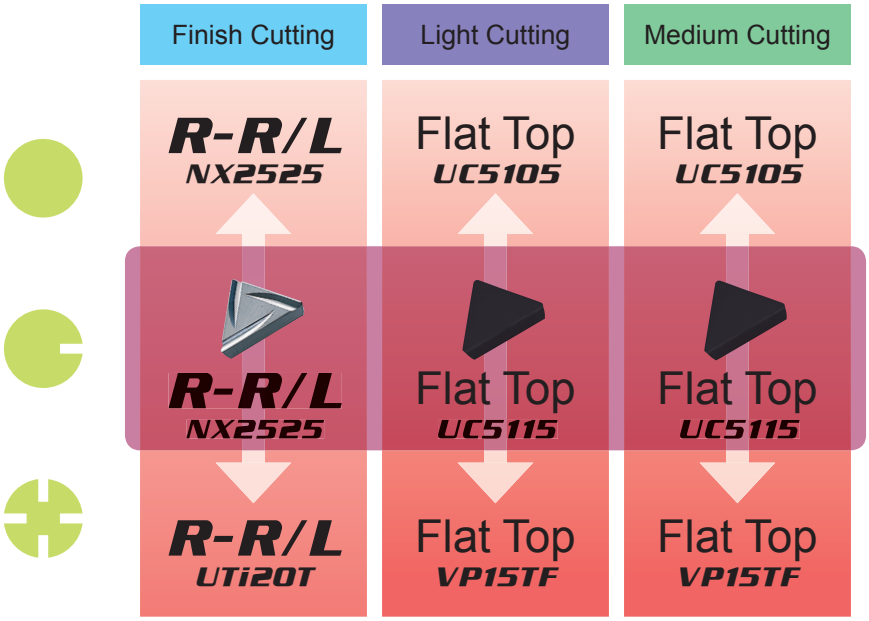
- Stable Cutting
- General Cutting
- Unstable Cutting
- F Finish Cutting
- L Light Cutting
- M Medium Cutting

P Carbon Steel • Alloy Steel (Ex : S45C, SCM440)

11°POSITIVE INSERTS WITHOUT HOLE

vc : Cutting Speed
f : Feed
ap : Depth of Cut

	Cutting Area	Chip Breaker	1st Recommendation Grade	vc (m/min)	f (mm/rev)	ap (mm)
Stable Cutting	F	**R-R/L**	**NX2525**	165—235	0.05—0.12	0.20—0.60
	L	**Standard**	**NX2525**	135—195	0.08—0.30	0.30—2.00
	M	**Standard**	**NX2525**	135—195	0.08—0.30	0.30—2.00
General Cutting	F	**R-R/L**	**NX2525**	165—235	0.05—0.12	0.20—0.60
	L	**Standard**	**UE6110**	150—260	0.08—0.30	0.30—2.00
	M	**Standard**	**UE6110**	150—260	0.08—0.30	0.30—2.00
Unstable Cutting	F	**R-R/L**	**UTi20T**	85—120	0.05—0.12	0.20—0.60
	L	**Standard**	**UE6020**	145—235	0.08—0.30	0.30—2.00
	M	**Standard**	**UE6020**	145—235	0.08—0.30	0.30—2.00



- Stable Cutting
- General Cutting
- Unstable Cutting
- F Finish Cutting
- L Light Cutting
- M Medium Cutting

K Cast Iron • Ductile Cast Iron (Ex : FC300)

11°POSITIVE INSERTS WITHOUT HOLE

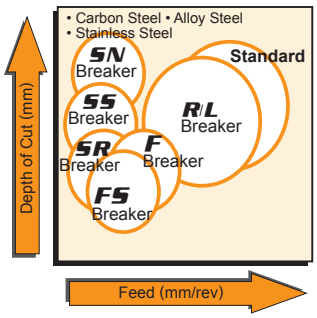
vc : Cutting Speed
f : Feed
ap : Depth of Cut

	Cutting Area	Chip Breaker	Grade	1st Recommendation vc (m/min)	f (mm/rev)	ap (mm)
Stable Cutting	F	**R-R/L**	**NX2525**	150—205	0.05—0.12	0.20—0.60
	L	**Flat Top**	**UC5105**	135—250	0.08—0.30	0.30—2.00
	M	**Flat Top**	**UC5105**	135—250	0.08—0.30	0.30—2.00
General Cutting	F	**R-R/L**	**NX2525**	150—205	0.05—0.12	0.20—0.60
	L	**Flat Top**	**UC5115**	130—245	0.08—0.30	0.30—2.00
	M	**Flat Top**	**UC5115**	130—245	0.08—0.30	0.30—2.00
Unstable Cutting	F	**R-R/L**	**UTi20T**	80—115	0.05—0.12	0.20—0.60
	L	**Flat Top**	**VP15TF**	115—160	0.08—0.30	0.30—2.00
	M	**Flat Top**	**VP15TF**	115—160	0.08—0.30	0.30—2.00

PRECISION BREAKER SYSTEM

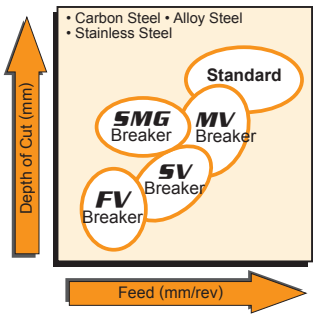
ANGULAR AND PARALLEL CHIP BREAKER

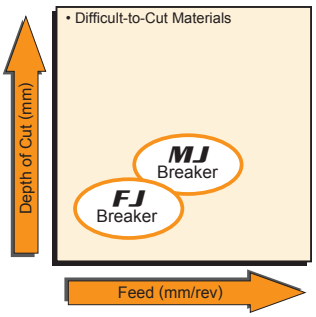
CHIP CONTROL RANGE



3-D CHIP BREAKER

CHIP CONTROL RANGE

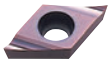
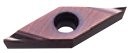
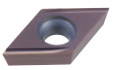
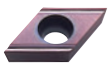
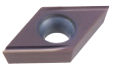
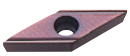




FEATURES OF CHIP BREAKER

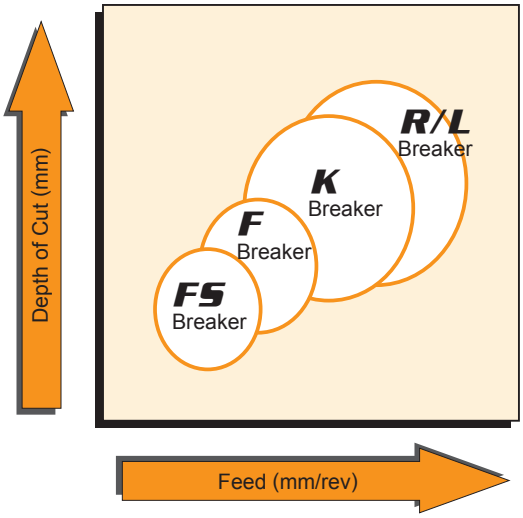
Breaker	Features	CCGH/CCGT Type	CCMH/CCMT CPMH/CPMT Type	DCMT Type	DCGT Type	TCGT/TCMT Type	TPMH Type	VBGT/VBMT Type	VCMT Type	WBMT/WCGT Type
SMG (G class)	● For medium cutting. ● 3D moulded chipbreaker provides good chip control. ● G class insert gives sharp cutting action, allowing high precision machining.		—	—		—	—	—	—	—
FV (M class)	● Sharp cutting edge and low resistance design achieves excellent cutting performance. ● Suitable for low depths of cut and low feed rates.	—			—					—
SV (M class)	● For light cutting. ● A peninsular dot ensures chip control at depths of cut under 1mm.	—			—	—				—
MV (M class)	● A positive insert and the large rake angle achieve sharp cutting edge performance. ● The double breakers and round-shaped dots in the rake face achieve a wide range of chip discharge.	—			—	—				
Standard (M class)	● For medium cutting. ● Balance of edge strength and sharpness due to a combination of a flat land and large rake angle.	—			—		—			—
FJ	● The curved edge allows smooth chip discharge. ● The large rake angle highly suitable for finishing difficult-to-cut materials.		—	—			—	—	—	
MJ	● The curved edge allows smooth chip discharge. ● Large rake angle highly suitable for finish-light cutting difficult-to-cut materials.		—	—			—	—	—	

Breaker	Features	CCGH/CCGT Type	CPGT Type	DCGT Type	TPGH Type	TPGV/TPGT Type	TCGT Type	VBGT/VCGT Type	WBGT Type	WCGT Type	WPGT Type
FS	● For precision finishing. ● Small width lead breaker for excellent chip control. ● Sharp cutting edge gives a good surface finish.	—	—	—		—	—	—	—	—	
F	● For finish cutting. ● Lead breaker controls chip flow. ● Sharp cutting edge gives a good surface finish.				—					—	—
R/L	● Lead breaker for light cutting. ● Good chip control for low to medium feed rates.	—	—	—	—	—	—	—	—		—
Standard	● For light cutting. ● Good chip control for low to medium feed rates.	—		—	—	—	—	—	—	—	

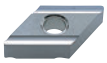
Breaker	Features	CCET Type	CCGT Type	DCET Type	DCGT Type	VBET Type
SR	● The wide lead breaker for medium cutting is suitable for automatic lathe machining. ● The insert design for low resistance controls chip flow.		—		—	
SS	● The parallel breaker for light cutting is suitable for automatic lathe machining. ● Excellent chip control at low feed rates.	—		—		—
SN	● The parallel breaker for general purpose is suitable for automatic lathe machining. ● Excellent chip control for low to medium feed rates.					

ANGULAR AND PARALLEL CHIP BREAKERS (NEGATIVE INSERTS)

CHIP CONTROL RANGE



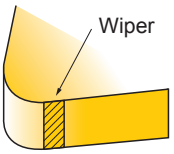
FEATURES OF CHIP BREAKER

Breaker	Features	DNGG Type	SNGG Type	TNGG Type	VNGG Type
FS	● For precision finishing. ● Small width lead breaker for good chip control. ● Sharp cutting edge gives a good surface finish.	—	—		—
F	● For finish cutting. ● Lead breaker controls chip flow. ● Sharp cutting edge gives a good surface finish.	—	—		—
K	● Parallel breaker for light cutting. ● Excellent chip control for low to medium feed rates.	—	—		—
R/L	● Parallel breaker for medium cutting. ● Good chip control for medium feed rates.				

WIPER INSERT

What is a Wiper Insert?

- The wiper insert is designed with a wiper edge that is situated where the straight edge meets the corner radius.
- In comparison to conventional breakers, the surface finish does not deteriorate even if the feed rate is doubled.
- Machining at high feed rates improves cutting efficiency.



●Improving Surface Finish

Under the same machining conditions as conventional breakers, but with the feed rate increased, the surface finish of the workpiece can be improved.

●Improving Efficiency

High feed rates not only shortened machining times but also make it possible to combine roughing and finishing operations.

●Increased Tool Life

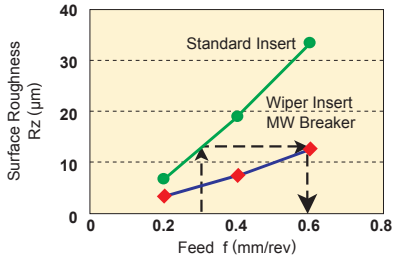
When a change to high feed conditions, the time required to cut one component is decreased, thus more parts can be machined with each insert. In addition, the high feed rate prevents rubbing, therefore, delaying the progression of wear and increasing the tool life of the insert.

●Improving Chip Control

Under high feed conditions, the chips generated become thicker and are more easily broken, thus, chip control is improved.

Wiper insert + High feed (The feed rate is doubled.) — Finished surface Same surface roughness — **Standard insert + The conventional feed condition**

*Please use a wiper insert at high feed rate.



<Cutting Conditions>
Workpiece : JIS S45C
Insert : CNMG120408-○○
Cutting Speed=200m/min
Depth of Cut=1.5mm
Feed Speed=0.2−0.6mm/rev
Wet Outer Diameter Cutting

<Ex>The surface roughness does not deteriorate even if the feed rate is doubled (0.3→0.6)!

■A wiper insert + machining at high feed rate

- Reduced machining time (per workpieces)
- Increased number of workpieces (per definitive time period)
- Improving chip control

■A wiper insert + machining at conventional feed rate

- Eliminating the finishing step by roughing and finishing together (Separate roughing and finishing steps → Single-step machining)

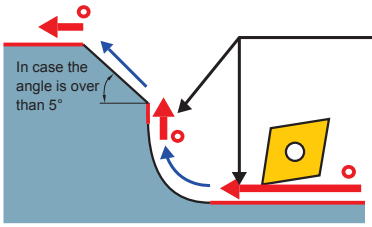
- Reducing cycle times
- Increased productivity
- Avoiding Line-Stoppage

<The realization of Reduced Costs!!>

The estimate of finished surface roughness when using a wiper insert

The effects of wiper inserts on external machining, boring and facing.

*The surface roughness when machining at corner R or taper angle over 5°, is the same as machining with standard inserts.



Rz(W)=Rz×0.5

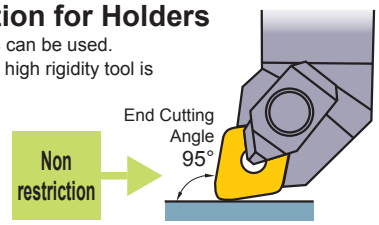
Rz(W) = Finished surface roughness when using a wiper insert.
Rz : Finished surface roughness from conventional conditions. (When using a standard insert)

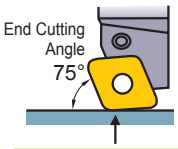
Effective uses of a wiper insert
Non effective uses of a wiper insert

Special attention is not necessary when using CNMG • WNMG • CCMT types

■No Restriction for Holders

A standard holders can be used.
(*A double clamp, high rigidity tool is recommended.)

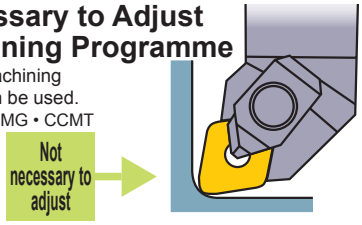




The CNMG type can be used as a wiper at the 100°corner.

■Not Necessary to Adjust the Machining Programme

Conventional machining programmes can be used.
(The CNMG • WNMG • CCMT types are based on the ISO/ANSI.)

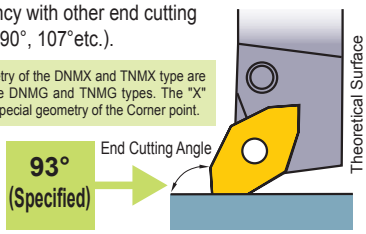


Special attention is necessary when using the DNMX • TNMX types due to the special top face geometry

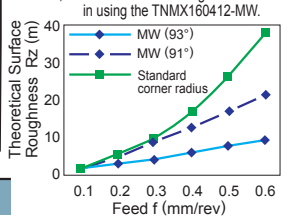
■Restriction for Holders

Use a holder with end cutting angle 93° for improving wiper efficiency. A holder with end cutting angle 91° can improve wiper efficiency (see the following figure), however, there is no wiper efficiency with other end cutting angles (60°, 90°, 107°etc.).

The hole geometry of the DNMX and TNMX type are the same as the DNMG and TNMG types. The "X" represents the special geometry of the Corner point.

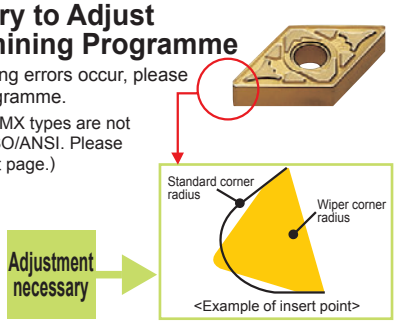


Ex):Theoretical surface roughness of holders in using the TNMX160412-MW.



■Necessary to Adjust the Machining Programme

When machining errors occur, please adjust the programme.
(The DNMX•TNMX types are not based on the ISO/ANSI. Please refer to the next page.)

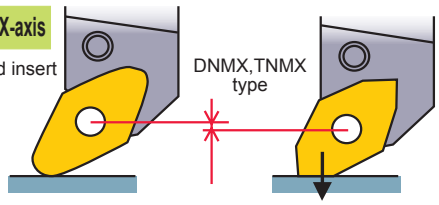


Adjustment of machining programmes for DNMX • TNMX types

Basic Process) Adjusting Toward X-axis and Z-axis

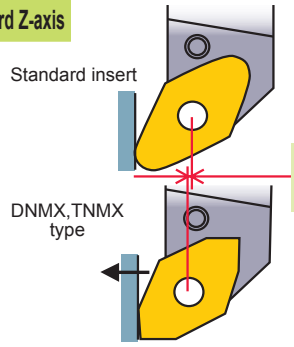
Adjusting the differential between a standard insert and Z-axis / X-axis.

Adjustment toward X-axis



Corner radius 0.4,0.8: **0.04 mm**
Corner radius 1.2 : **0.05 mm**

Adjustment toward Z-axis



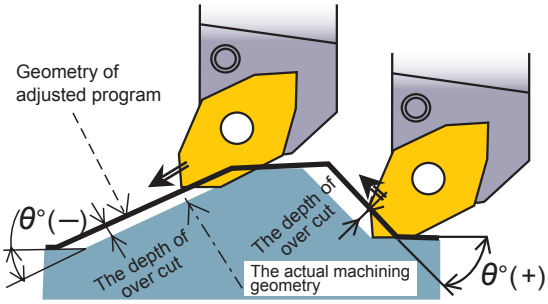
(Not closed to Corner R)
0.01mm

A) Adjusting a Taper

*Necessary to maintain a correct taper.

Adjust the relief angle toward the normal line.

Note) Adjust the angle toward the normal line in the case where the adjustment number is minus (θ =60°—70°) and is not machined completely.



Classification

Corner radius	Taper Angle θ°															
	-25—-15	-10	-5	**0**	5	10	15	20—35	40	45	50	55	60—65	70	75—85	**90**
1.2	0.04	0.03	0.01	**0**	0.02	0.03	0.04	0.05	0.04	0.04	0.02	0.01	-0.01	0	0.01	**0**
0.8	0.03	0.02	0.01	**0**	0.01	0.02	0.03	0.04	0.03	0.03	0.02	0	-0.01	0	0.01	**0**
0.4	0.02	0.01	0.01	**0**	0.01	0.01	0.02	0.02	0.02	0.01	0.01	0	-0.01	-0.01	0	**0**

The number→+numbers:adjustment of relief angle, -numbers:adjustment of drive-in angle (mm)

B) Adjusting a Corner R

*Necessary to maintain a correct corner radius.

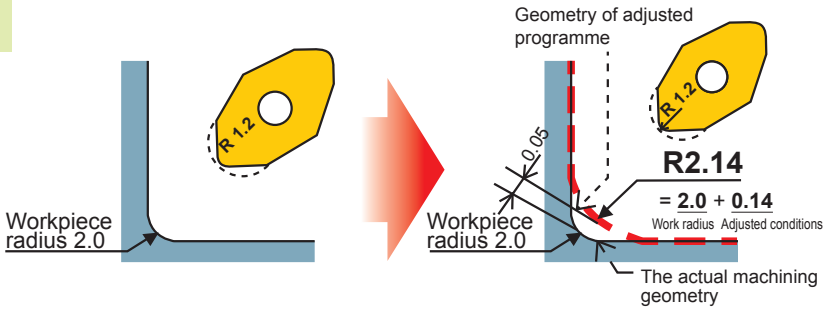
Adjust the work diameter same as the taper to prevent cut-over.

The value of adjustment to work R = Work R + the adjustment value

*No adjusting the corner radius in this case.

The corner radius of the insert	The adjustment amount on the workpiece radius.
Corner Radius 0.4 →	Work Radius**+0.05**(mm)
Corner Radius 0.8 →	Work Radius**+0.11**(mm)
Corner Radius 1.2 →	Work Radius**+0.14**(mm)

Ex) : In case of machining R 2.0 when using a corner R 1.2 type insert.



The Easy-to-correct Method

In correcting corner radius:
It is not necessary to adjust the machining programme, however, machining errors can occur within max. ±0.03mm due to correcting by an approximate number.

Corner Radius Correction

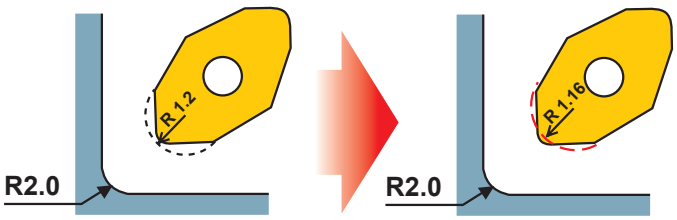
Input the correction number of each corner radius.

The value of corrected corner radius = approximation

*No adjusting the machining the programme in this case.

The corner radius of a insert	The value of corrected corner radius = approximation
Corner Radius 0.4 →	**R0.36**(mm)
Corner Radius 0.8 →	**R0.76**(mm)
Corner Radius 1.2 →	**R1.16**(mm)

Ex):In the case of machining a corner with a radius R 2.0 when using an insert with a corner radius R 1.2.



Others) The value of correction is same for both DNMX and TNMX. Discriminate them by the size of corner radius.

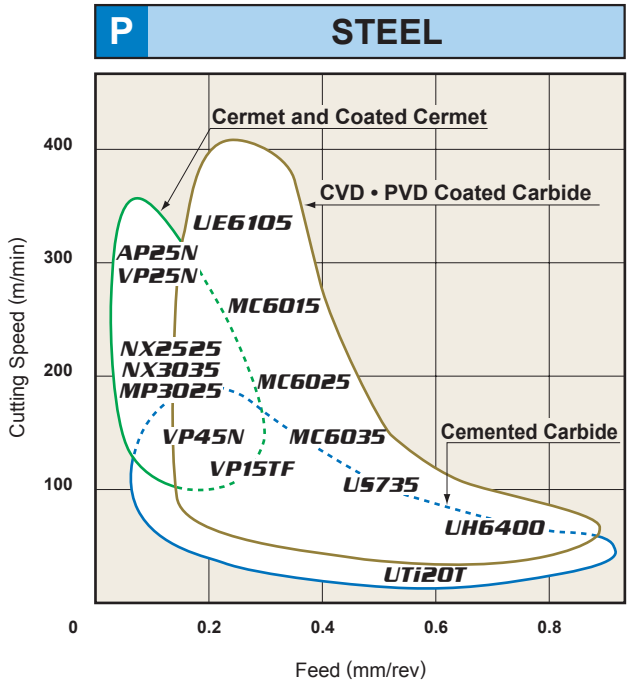
GRADES FOR TURNING

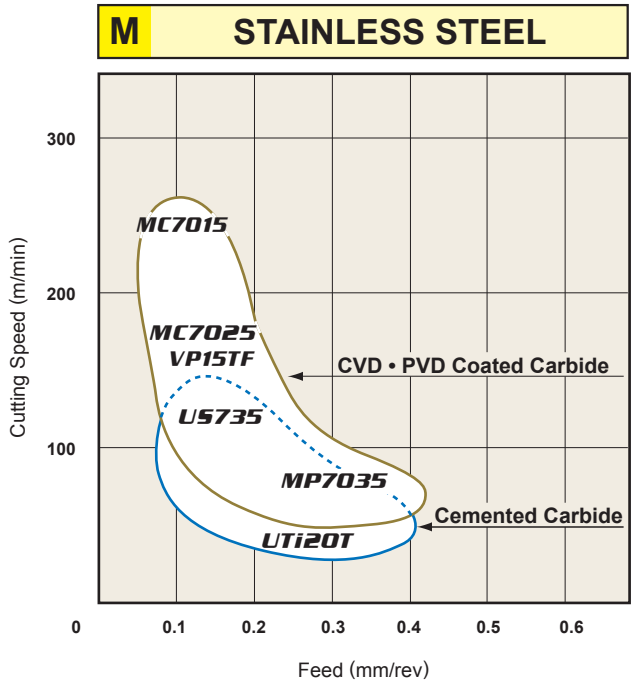
●INDEXABLE INSERT GRADES FOR TURNING

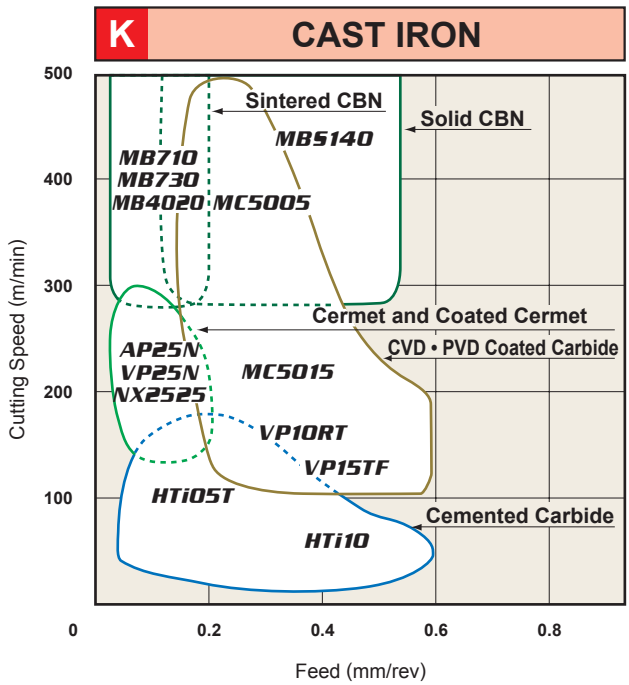
ISO		Coated Carbide CVD	Coated Carbide PVD	Cermet	Coated Cermet	Cemented Carbide	Coated CBN	CBN	PCD (Sintered Diamond)
P Steel	P01	UE6105, MC6015							
	P10	UE6110, MY5015	VP10RT	NX2525	AP25N, VP25N				
	P20	MC6025, UE6020	VP15TF, VP20MF, VP20RT, UP20M	NX3035	MP3025, VP45N	UT120T			
	P30	MC6035							
	P40	UH6400							
M Stainless Steel	M01	MC7015							
	M10	US7020	VP10RT	NX2525	AP25N, VP25N				
	M20	MC7025	VP15TF, VP20MF, VP20RT, UP20M			UT120T			
	M30	US735	MP7035						
	M40								
K Cast Iron	K01	MC5005				HT105T		MB710	
	K10	UC5105, MC5015, UC5115, MY5015	VP10RT	NX2525	AP25N, VP25N	HT110		MB730, MB4020	
	K20		VP15TF, VP20RT			UT120T		MB5140	
	K30								
N Non-Ferrous Metal	N01								MD205, MD220, MD230
	N10					HT110			
	N20								
	N30								
S Heat Resistant Alloy • Ti Alloy	S01	US905	VP05RT, MP9005			MT9005		MB730	
	S10		VP10RT, MP9015			MT9015			
	S20		VP15TF, VP20RT			TF15			
	S30								
H Hardened Steel	H01						BC8105/BC8110 (NEW), BC8120, MBC010 (NEW), MBC020	MB8025, MB810	
	H10							MB825	
	H20						MBC030		
	H30							MB835	

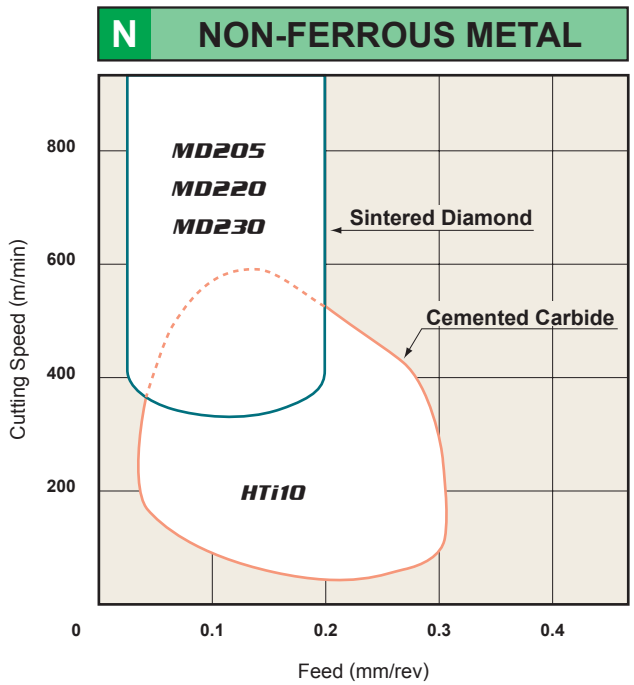
■ = MIRACLE SIGMA

TURNING APPLICATION RANGE



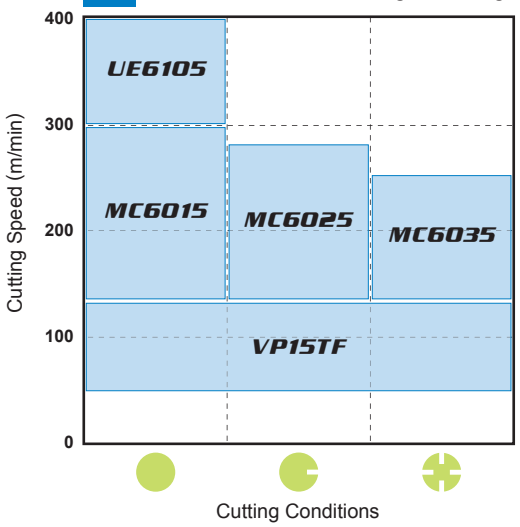




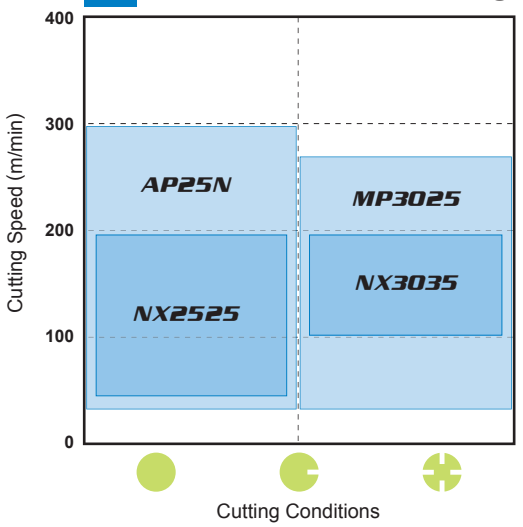


●Recommendation of the insert grade based on cutting speed and conditions for each workpiece.

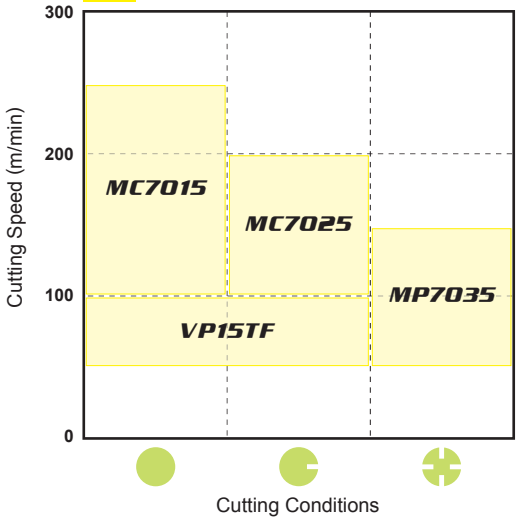
P STEEL (Medium to Rough Cutting)



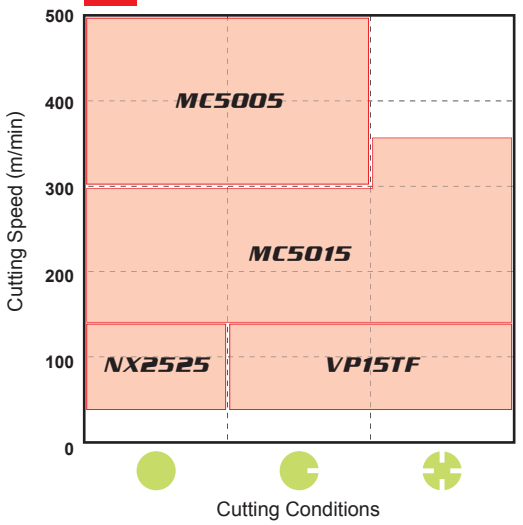
P STEEL (Finish Cutting)



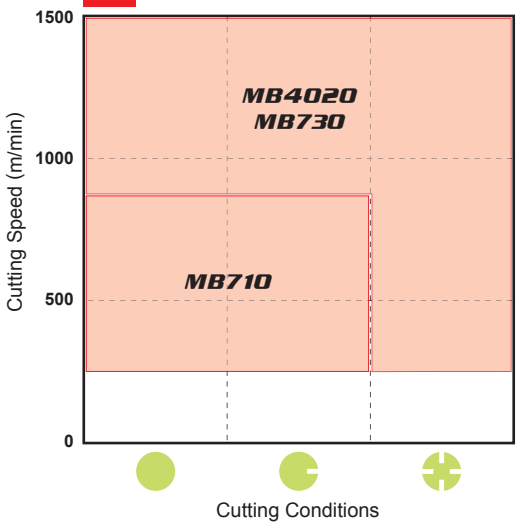
M STAINLESS STEEL



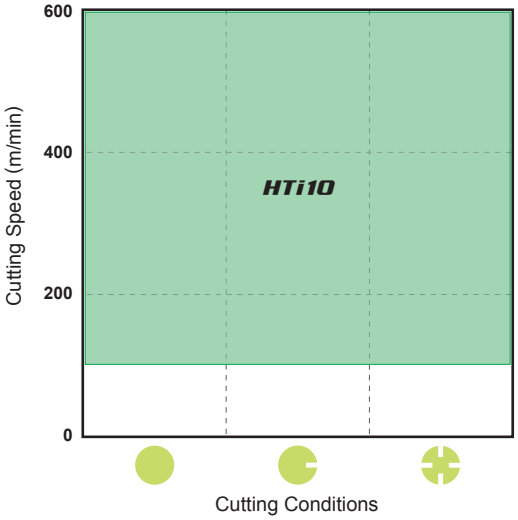
K CAST IRON



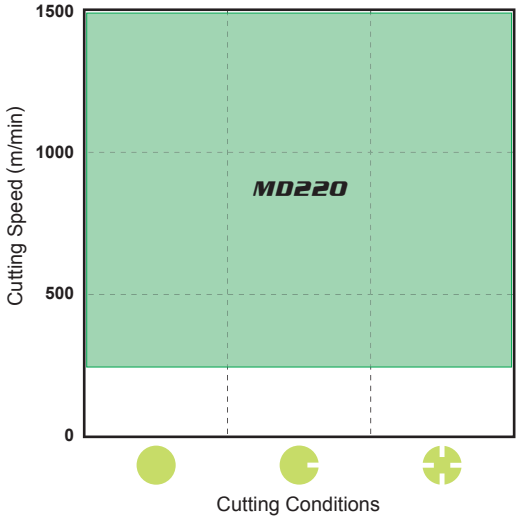
K CAST IRON (CBN)



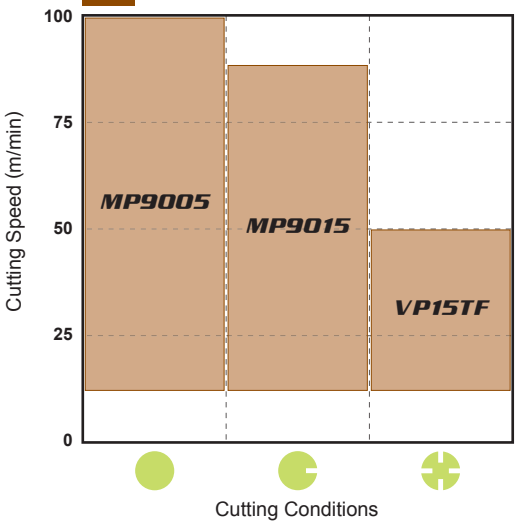
N NON-FERROUS METAL



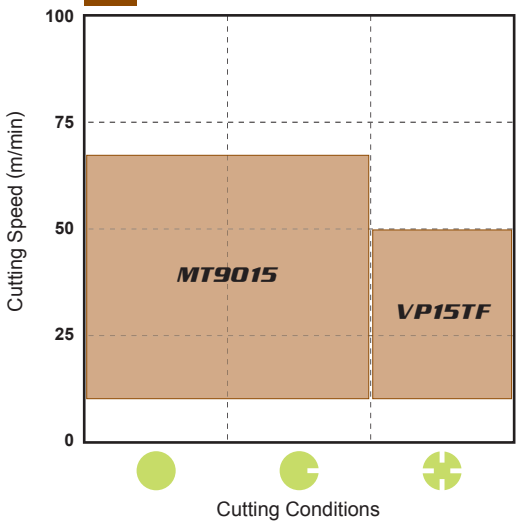
N NON-FERROUS METAL (PCD)



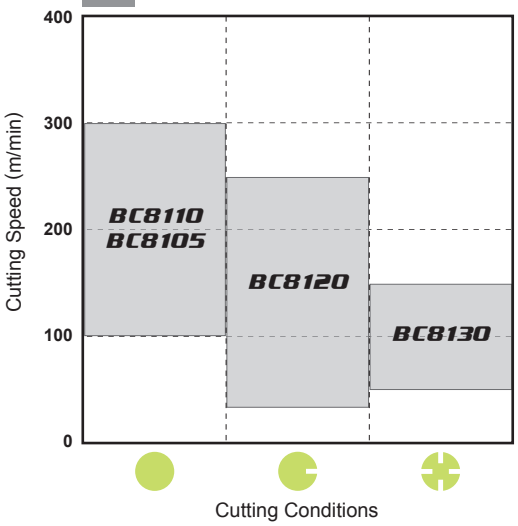
S HEAT RESISTANT ALLOY



S TITANIUM ALLOY



H HARDENED MATERIALS (CBN)



CUTTING CONDITIONS

●	Stable Cutting	Continuous Cutting Constant Depth of Cut Pre-Machined Securely Clamped Component Cutting
◐	General Cutting	
✚	Unstable Cutting	Heavy Interrupted Cutting Irregular Depth of Cut Low Clamping Rigidity Cutting

COATED CARBIDE(CVD)

- Special tough fibrous structure improves wear and fracture resistance.
- It covers a wide application range and thus reduces the number of tools required.

SELECTION STANDARD

●TURNING

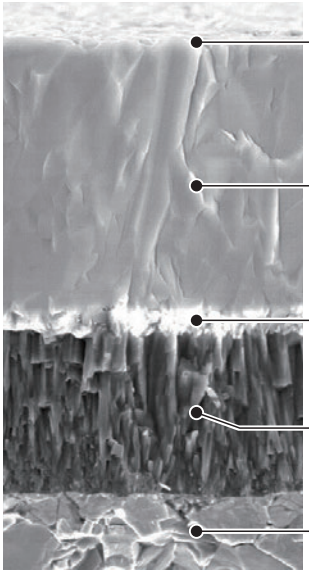
Work Material		Cutting Mode	Recommended Grade	Recommended Cutting Speed (m/min)	ISO	Application Range
P	Steel	Continuous Cutting	**UE6105**	300 (200 — 400)	P01	UE6105
			MC6015	250 (150 — 400)	P10	MC6015, UE6110, MY5015
			MC6025	200 (100 — 280)	P20	MC6025, UE6020
		Interrupted Cutting			P30	MC6035, UH6400
			MC6035	150 (80 — 200)	P40	
M	Stainless Steel	Continuous Cutting	**MC7015**	200 (160 — 250)	M01	MC7015
					M10	US7020
			MC7025	150 (120 — 200)	M20	MC7025
		Continuous and Interrupted Cutting			M30	US735
			US735	100 (80 — 120)	M40	
K	Cast Iron Ductile Cast Iron	Continuous Cutting	**MC5005**	300 (200 — 400)	K01	MC5005, UC5105
					K10	MC5015, UC5115, MY5015
		Interrupted Cutting	**MC5015**	250 (150 — 300)	K20	
					K30	
S	Heat Resistant Alloy	Continuous and Interrupted Cutting	**US905**	80 (50 — 100)	S01	US905

High reliability for a wide range of steel machining.

MC6015

Nano-Texture Technology
The optimised crystal growth, Nano-Texture coating technology gives outstanding wear and chipping resistance.

TOUGH-Grip Technology
The interface between the layers is controlled at the nano level, allowing the TOUGH GRIP layer extremely high levels of adhesion to prevent delamination.



Smooth coating surface
Prevents abnormal damage, welding and chipping

Ultra thick layer Nano-texture Al_2O_3
Delivers outstanding wear resistance even at high temperature

TOUGH-Grip
Prevents delamination of a coating

Nano-texture TiCN
Provides superior wear resistance and chipping resistance

Special carbide substrate
Prevents crack development
Stable tool life

GRADE CHARACTERISTICS

Grade	Substrate			Coating Layer	
	Hardness (HRA)	T.R.S (GPa)	Surface	Composition	Thickness
UC5105	92.2	2.0	–	TiCN-Al_2O_3	Thick
MC5005	91.0	2.2	–	TiCN-Al_2O_3	Thick
UC5115	91.0	2.2	–	TiCN-Al_2O_3	Thick
MC5015	91.0	2.2	–	TiCN-Al_2O_3	Thick
UE6105	90.8	1.8	Tough	Accumulated TiCN-Al_2O_3-Ti Compound	Thick
UE6110	90.3	2.0	Tough	Accumulated TiCN-Al_2O_3-Ti Compound	Thick
UE6020	90.0	2.2	Tough	Accumulated TiCN-Al_2O_3-Ti Compound	Thick
MC6015	90.2	2.2	Tough	Accumulated TiCN-Al_2O_3-Ti Compound	Thick
MC6025	90.2	2.2	Tough	Accumulated TiCN-Al_2O_3-Ti Compound	Thick
MC6035	89.5	2.2	Tough	Accumulated TiCN-Al_2O_3-Ti Compound	Thick
UE6035	89.5	2.3	Tough	TiCN-Al_2O_3-TiN	Thick
UH6400	89.5	2.3	Tough	Accumulated TiCN-Al_2O_3-Ti Compound	Thick
MC7015	90.7	2.0	Tough	TiCN-Al_2O_3-TiN	Thin
US7020	90.5	2.0	Tough	TiCN-Al_2O_3-TiN	Thin
MC7025	89.4	2.4	–	TiCN-Al_2O_3-TiN	Thin
US735	89.0	2.6	–	Ti Compound	Thin
US905	92.2	2.0	–	TiCN-Al_2O_3-TiN	Thin
MY5015	91.2	2.4	–	TiCN-Al_2O_3-TiN	Thin

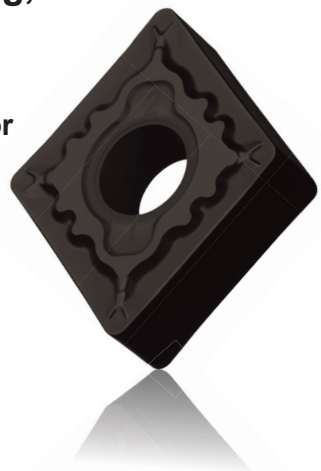
* 1GPa=102kg/mm^2

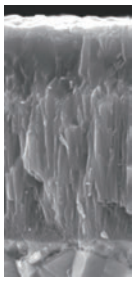
For interrupted cutting, medium to low surface speeds

MC6035

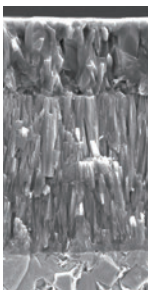
Prevents severe damage for increased stability

The smooth coating surface provides excellent welding resistance.
With the thickened TiCN, MC6035 also achieves superior wear resistance for increased stability.





MC6035



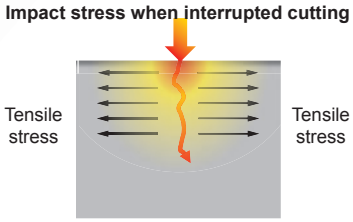
MC6025

The smooth coating surface provides excellent welding resistance.
With the thickened TiCN, MC6035 also achieves superior wear resistance for increased stability.

Reducing the effect of severe fracturing

By reducing the tensile stress in the coating layer during interrupted cutting, crack development caused by impact stress is prevented.

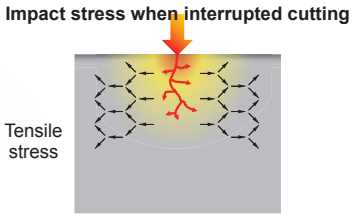
Impact stress when interrupted cutting



Conventional coating

Conventional products tend to result in fracturing because impact stress is transmitted deep into the coating layer during interrupted cutting.

Impact stress when interrupted cutting



MC6035

MC6035 has succeeded in alleviating tensile stress in the coating layer therefore, cracks that can develop by impact stress can be prevented when interrupted cutting.

COATED CARBIDE(PVD)

- PVD coating prolongs tool life under the same cutting conditions compared to uncoated carbide.
- Coating of tools with sharp edges is possible without softening or changing the edge quality of the substrate.

SELECTION STANDARD

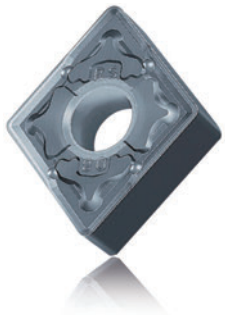
●TURNING

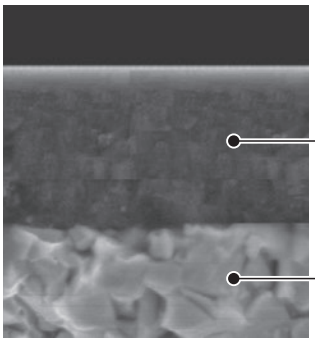
	Work Material	Recommended Grade	Recommended CuttingSpeed (m/min)	ISO	Application Range
P	Steel	**VP10RT**	120 (100 — 150)	P01	
		VP15TF	120 (100 — 150)	P10	VP10RT
		VP20MF	120 (100 — 150)	P20	VP15TF, VP20MF, VP20RT, UP20M
		VP20RT	120 (100 — 150)	P30	
		UP20M	120 (100 — 150)	P40	
M	Stainless Steel	**VP10RT**	120 (100 — 150)	M01	
		VP15TF	120 (100 — 150)	M10	VP10RT
		VP20MF	120 (100 — 150)	M20	VP15TF, VP20MF, VP20RT, UP20M
		VP20RT	120 (100 — 150)	M30	MP7035
		UP20M	120 (100 — 150)	M40	
K	Cast Iron	**VP10RT**	120 (100 — 150)	K01	
		VP15TF	120 (100 — 150)	K10	VP10RT
				K20	VP15TF, VP20RT
		VP20RT	120 (100 — 150)	K30	
S	Heat Resistant Alloy	**MP9005**	60 (30 — 100)	S01	MP9005, VP05RT
		MP9015	50 (25 — 80)	S10	MP9015, VP10RT
		VP15TF	40 (20 — 50)	S20	VP15TF, VP20RT
		VP20RT	40 (20 — 50)	S30	

■ = MIRACLE SIGMA

ISO Turning Inserts for Difficult to Cut Materials

MP9005/MP9015





MIRACLE SIGMA

ISO Grade	Grade	Concept	Application
S01	**MP9005**	Top-quality grade focusing on wear resistance	Heat Resistant Alloy Finish-Medium Cutting
S10	**MP9015**	First recommendation for general applications	Heat Resistant Alloy Medium-Rough Cutting

CERMET

- The optimized alloy structure and special alloy binder improves both wear and fracture resistance.
- It covers a wide application range and reduces the number of tools required.
- NX3035 for wet cutting.
- NX2525 for dry cutting.

SELECTION STANDARD

●TURNING

	Work Material	Cutting Mode	Recommended Grade	Recommended Cutting Speed (m/min)	ISO	Application Range
P	Steel	Continuous Cutting	**NX2525**	220 (180 — 250)	P01	
					P10	NX2525
		Interrupted Cutting	**NX3035**	200 (190 — 260)	P20	NX3035
K	Cast Iron Ductile Cast Iron	Finishing	**NX2525**	180 (150 — 210)	K01	
					K10	NX2525
					K20	

GRADE CHARACTERISTICS

Grade	Hardness (HRA)	T.R.S (GPa)	Thermal Conductivity (W/m • K) *	Thermal Expansion ($\times 10^{-6}$/K)
NX2525	92.2	2.0	33	7.8
NX3035	91.5	2.1	35	7.8

* 1GPa=102kg/mm^2, 1W/m•K=2.39×10^{-3}cal/cm•sec•℃

COATED CERMET

●Coated cermet (PVD coating) has superior wear and fracture resistance, and therefore provides a stable cutting performance.

SELECTION STANDARD

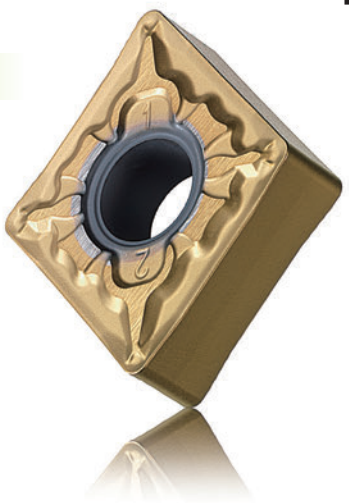
●TURNING

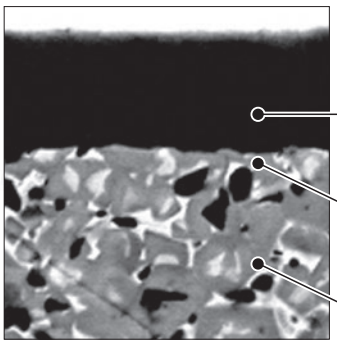
	Work Material	Cutting Mode	Recommended Grade	Recommended CuttingSpeed (m/min)	ISO	Application Range
P	Steel	Continuous Cutting	**VP25N** **AP25N**	240 (190 — 290)	P01 P10	VP25N, AP25N
		Interrupted Cutting	**MP3025**	230 (180 — 280)	P20 P30	MP3025, VP45N, AP25N
K	Cast Iron Ductile Cast Iron	Finishing	**VP25N** **AP25N**	160 (110 — 230)	K01 K10 K20	VP25N, AP25N

Effective for production of small parts.

MP3025

MP3025 provides improved adhesion for coating layer due to the newly-developed special substrate. Uniform flank wear allows prolonged machining that maintains excellent surface finish.





Ti-compound PVD coating provides excellent wear and welding resistance.

Substrate surface provides excellent adhesion strength for coating layer.

Substrate with superior fracture resistance and thermal shock resistance.

CEMENTED CARBIDE

●UTi grades are available for steel and cast iron. HTi grades are available for non-ferrous and non-metal materials and are also suitable for cast iron.

SELECTION STANDARD

●TURNING

Work Material		Recommended Grade	Recommended Cutting Speed (m/min)	ISO	Application Range
P	Steel	UTi20T	100 (60 — 130)	P10	
				P20	UTi20T
				P30	UTi20T
M	Stainless Steel	UTi20T	100 (60 — 130)	M10	
				M20	UTi20T
				M30	UTi20T
K	Cast Iron	HTi05T	120 (80 — 150)	K01	HTi05T
				K10	HTi05T, HTi10
		HTi10	100 (50 — 150)	K20	HTi10, UTi20T
		UTi20T	100 (50 — 150)	K30	UTi20T
N	Non-Ferrous Metal	HTi10	600 (400 — 800)	N01	
				N10	HTi10
				N20	HTi10
				N30	
S	Heat-resistant Alloy Ti Alloy	MT9005 RT9005	70 (50 — 100)	S01	MT9005, RT9005
		MT9015 RT9010	60 (40 — 80)	S10	MT9005, RT9005, MT9015, RT9010
				S20	MT9015, RT9010, TF15
		TF15	50 (40 — 70)	S30	TF15

MAIN COMPONENT AND APPLICATION

ISO	Main Component	Characteristics	Work Material
P M	WC-TiC-TaC-Co	Heat / deformation resistance.	Carbon steel, alloy steel, stainless steel and cast iron
K N	WC-Co	High rigidity and wear resistance.	Cast iron, non-ferrous metals, and non-metal
S	WC-Co	High heat resistance and wear resistance.	Heat-resistant alloy, Ti alloy

GRADE CHARACTERISTICS

ISO	Grade	Hardness (HRA)	Thermal Conductivity (W/m•K)*	Thermal Expansion ($\times 10^{-6}$/K)	Young's Modulus (GPa)*	T.R.S(GPa)*
P M	UTi20T	90.5	38	5.5	520	2.0
K N	HTi05T	92.5	79	4.5	600	1.5
	HTi10	92.0	79	4.6	630	2.0
S	MT9005/RT9005	92.2	79	4.5	600	2.0
	MT9015/RT9010	92.0	79	4.6	630	2.2
	TF15	91.5	71	5.3	580	2.5

* 1GPa=102kg/mm^2, 1W/m•K=2.39×10^{-3}cal/cm•sec•℃

MICRO-GRAIN CEMENTED CARBIDE (SOLID TOOLS)

●Compared to normal cemented carbide, micro-grain types have higher wear resistance and toughness.

SELECTION STANDARD

Cutting Tool	Recommended Grade	Work Material
PCB Miniature Drill	**SF10** **MF10** **MF20**	Non-Metal
Solid Carbide Drill Turning Inserts Milling Inserts	**TF15**	Steel • Cast Iron
Solid End Mill	**HTi10** **TF15** **MF10**	Steel • Cast Iron
Gear Hob Reamer Tap etc.	**TF15** **MF20** **MF30**	Steel • Cast Iron, etc.

GRADE CHARACTERISTICS

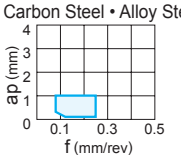
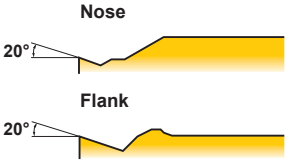
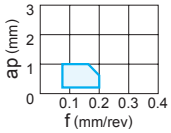
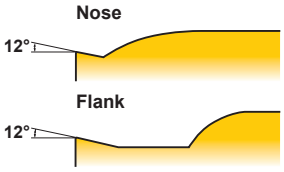
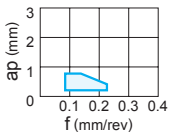
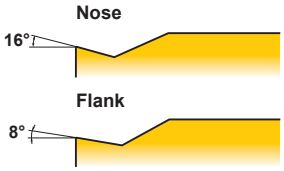
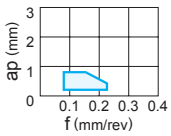
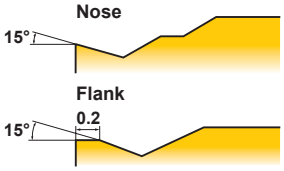
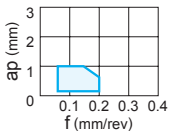
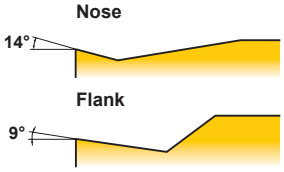
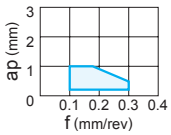
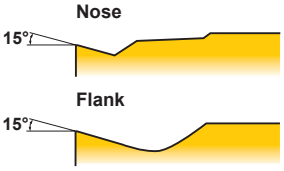
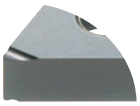
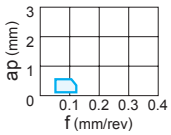
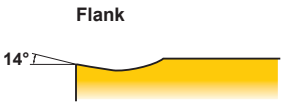
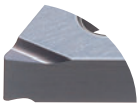
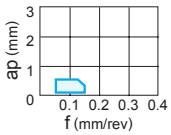
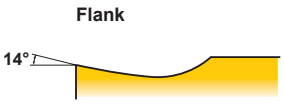
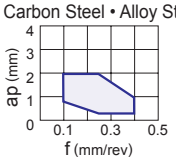
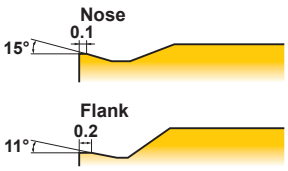
Grade	Grade Characteristics **			ISO	Wear Resistance	Fracture Resistance	Corrosion Resistance
	Specific Gravity	Hardness (HRA)	T.R.S (GPa)*				
HTi10	**14.9**	92.0	3.2	K10	◎	○	○
TF15	**14.5**	91.0	4.0	K20	◎	○	◎
SF10	**14.9**	92.7	3.8	K01	◎	○	◎
MF10	**14.6**	93.0	4.0	K01	◎	○	◎
MF20	**14.2**	92.0	4.4	K10	○	◎	◎
MF30	**13.7**	90.7	4.3	K20	○	◎	◎

* 1GPa=102kg/mm^2
** After HIP

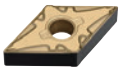
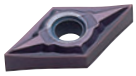
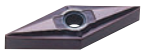
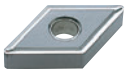
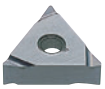
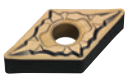
Memo

CLASSIFICATION

NEGATIVE INSERTS WITH HOLE

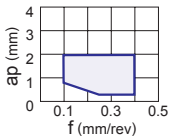
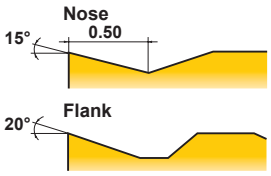
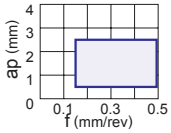
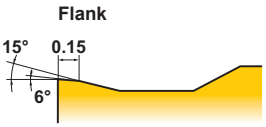
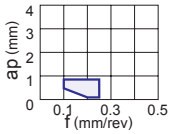
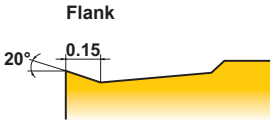
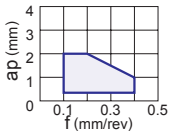
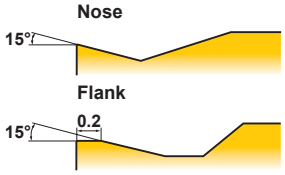
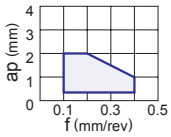
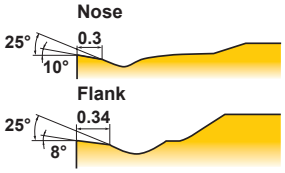
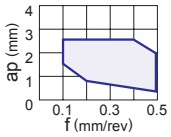
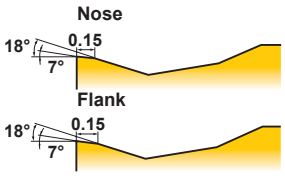
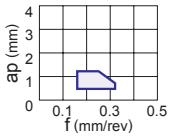
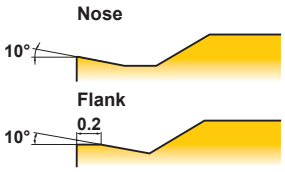
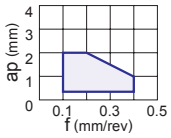
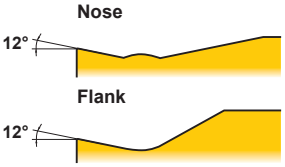
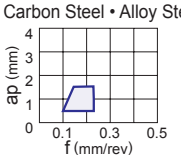
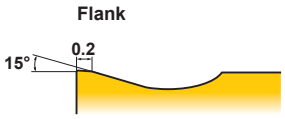
Application	Tolerance	Breaker Name and Picture	Features	Cross Section Geometry
Finish Cutting	M	NEW **FP**	**First recommendation for finishing carbon steel and alloy steel** Controls chip clogging during high-feed cutting and prevents chips of soft work materials from running onto their surfaces. Large rake angle controls vibrations and work deformation when machining low-rigidity workpieces.	Carbon Steel • Alloy Steel  
		FH	**First recommendation for finishing carbon steel, alloy steel and stainless steel** Double sided chipbreaker. Stable chip control even at small depth of cut.	Carbon Steel • Alloy Steel  
		FS	**Alternative chipbreaker for finishing mild steel** Double sided chipbreaker. Stable chip control even at small depth of cut. Sharp edge gives best performance.	Mild Steel  
		FY	**First recommendation for finishing mild steel** Double sided chipbreaker. Effectively controls adhesive chips. Suitable for mild steel finishing.	Mild Steel  
	G	**FJ**	**First recommendation for finishing difficult-to-cut materials** Double sided chipbreaker. Ideal for heat-resistant alloy and titanium alloy. The sharp edge produces good cutting surface. The curved edge allows smooth chip discharge.	Difficult-to-Cut Materials  
		PK	**Alternative chipbreaker for finishing carbon steel and alloy steel** Double sided chipbreaker. G class insert tolerance is suitable for workpieces requiring close dimensional tolerances. Stable chip control even at small depth of cut.	Carbon Steel • Alloy Steel  
		R/L-FS 	**Precise finishing** Double sided chipbreaker. A narrow lead chipbreaker for good chip control. The sharp edge produces a good surface finish.	Carbon Steel • Alloy Steel  
		R/L-F 	**Finishing** Double sided chipbreaker. Lead chipbreaker controls chip flow. The sharp edge produces a good surface finish.	Carbon Steel • Alloy Steel  
Light Cutting	M	**LP**	**First recommendation for light cutting of carbon steel and alloy steel** Double sided chipbreaker. Stable chip control at light cutting range. The curved edge allows smooth chip discharge.	Carbon Steel • Alloy Steel  

CLASSIFICATION

Rhombic 80°	Rhombic 55°	Square 90°	Triangular 60°	Rhombic 35°	Trigon 80°	Round	Breaker Name and Cross Section
CNMG_FP NEW 102	DNMG_FP NEW  108	SNMG_FP NEW 115	TNMG_FP NEW 121	VNMG_FP NEW 128	WNMG_FP NEW 130		NEW FP
CNMG_FH 102	DNMG_FH 108	SNMG_FH 115	TNMG_FH 121	VNMG_FH 128	WNMG_FH 130		FH
CNMG_FS 102	DNMG_FS 108	SNMG_FS 115	TNMG_FS 121	VNMG_FS 128	WNMG_FS 130		FS
CNMG_FY 102	DNMG_FY 108		TNMG_FY 121		WNMG_FY 130		FY
CNGG_FJ 102	DNGG_FJ  108			VNGG_FJ  128			FJ
CNGG_PK 102	DNGG_PK  108		TNGG_PK 121				PK
			TNGG_R/L-FS 122				R/L-FS
			TNGG_R/L-F  121	VNGG_R/L-F 128			R/L-F
CNMG_LP 102	DNMG_LP  108	SNMG_LP 115	TNMG_LP 121	VNMG_LP 128	WNMG_LP 130		LP

CLASSIFICATION

NEGATIVE INSERTS WITH HOLE

Application	Tolerance	Breaker Name and Picture	Features	Cross Section Geometry
Light Cutting	M	**LM**	**First recommendation for light cutting of stainless steel** M class double sided chip breaker. Stable chip control at light cutting range. Breaker with high rake angle provides excellent burr control.	Stainless Steel  
		LK	**First recommendation for light cutting of cast iron** Narrow positive land provides low cutting resistance and excellent finish.	Cast Iron  
		LS	**First recommendation for light cutting of difficult-to-cut materials** Enhanced chip disposal for depth of cut smaller than the corner R.	 
		SH	**Alternative chipbreaker for light cutting of carbon steel and alloy steel** Double sided chipbreaker. Can be used at low depth of cuts and high feed rates. The curved edge allows smooth chip discharge. Recommended for workpieces in the 160−250HB range.	Carbon Steel • Alloy Steel  
		SA	**Alternative chipbreaker for light cutting of carbon steel and alloy steel** Double sided chipbreaker. Superior chip control at small depth of cuts. Covers copying and back turning with wavy edge. Recommended for workpieces in the 200−300HB range.	Carbon Steel • Alloy Steel  
		SW	**Wiper insert for light cutting of carbon steel and alloy steel** Double sided chipbreaker. The wiper allows up to two times higher feed. Wiper design for increased productivity and improved surface finish.	Carbon Steel • Alloy Steel  
		SY	**First recommendation for light cutting of mild steel** Double sided chipbreaker. Effectively controls adhesive chips. Suitable for mild steel light cutting.	Mild Steel  
		C	**Alternative chipbreaker for light cutting of carbon steel and alloy steel** Double sided chipbreaker. Suitable for light cutting. The curved edge allows smooth chip discharge.	Carbon Steel • Alloy Steel  
		R/L-1G	**Alternative chipbreaker for light cutting of carbon steel and alloy steel** Double sided chipbreaker. Parallel chipbreaker controls chip flow. Suitable for finish-light cutting. Precision chipbreaker.	Carbon Steel • Alloy Steel  

CLASSIFICATION

Rhombic 80°	Rhombic 55°	Square 90°	Triangular 60°	Rhombic 35°	Trigon 80°	Round	Breaker Name and Cross Section
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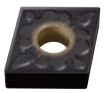
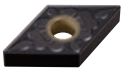
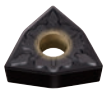
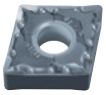
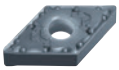
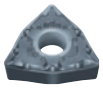
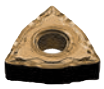
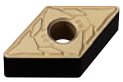
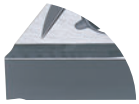
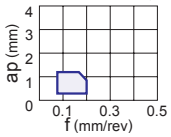
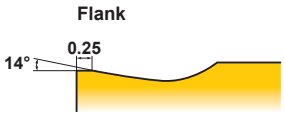
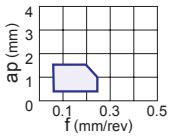
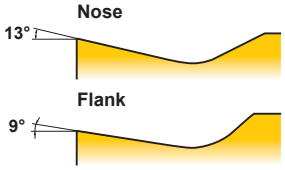
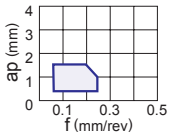
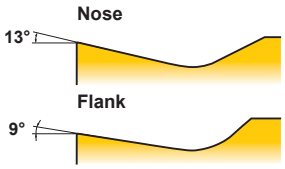
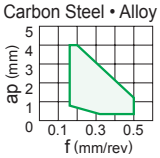
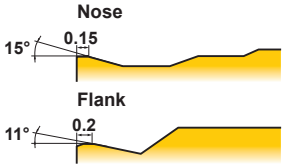
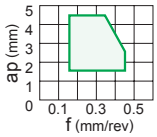
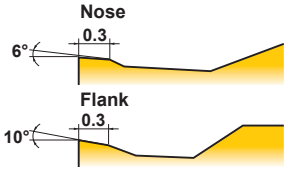
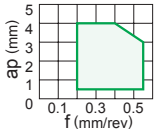
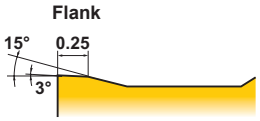
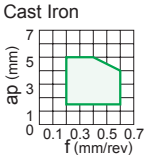
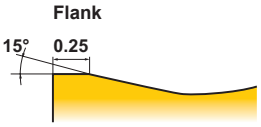
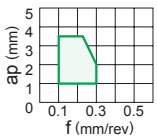
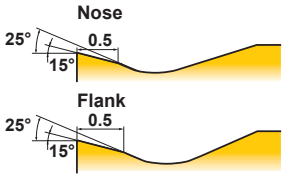
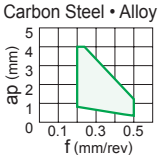
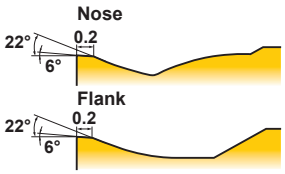
CNMG_LK  102	DNMG_LK  109	SNMG_LK 115	TNMG_LK 122	VNMG_LK 128	WNMG_LK  130		LK
CNMG_LS  103	DNMG_LS  109		TNMG_LS 122	VNMG_LS 128	WNMG_LS  130		LS
CNMG_SH 103	DNMG_SH 109	SNMG_SH 115	TNMG_SH 122	VNMG_SH 128	WNMG_SH 130		SH
CNMG_SA 103	DNMG_SA 109	SNMG_SA 115	TNMG_SA 122	VNMG_SA 128	WNMG_SA  131		SA
CNMG_SW 103	DNMX_SW  109		TNMX_SW 122		WNMG_SW 131		SW
CNMG_SY 103	DNMG_SY 109	SNMG_SY 115	TNMG_SY 122		WNMG_SY 131		SY
CNMG_C 103	DNMG_C 109	SNMG_C 116	TNMG_C 122		WNMG_C 131		C
		SNMG_R/L-1G 116	TNMG_R/L-1G 122				R/L-1G

CLASSIFICATION

NEGATIVE INSERTS WITH HOLE

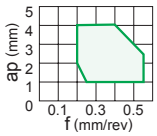
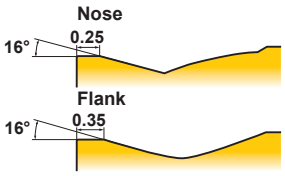
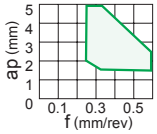
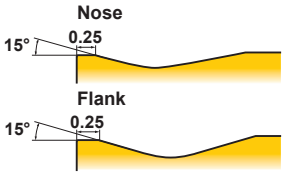
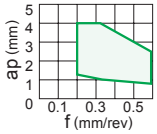
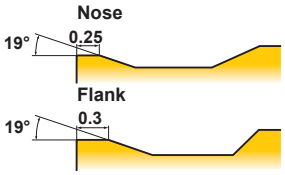
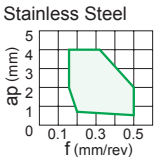
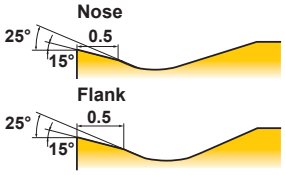
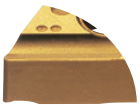
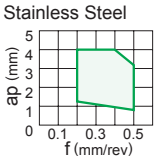
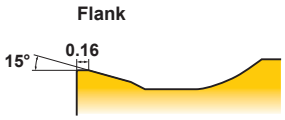
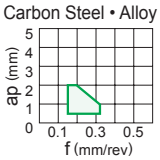
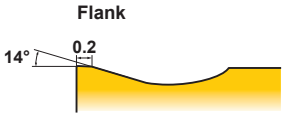
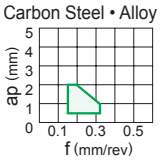
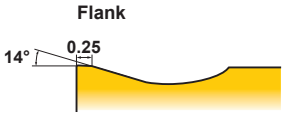
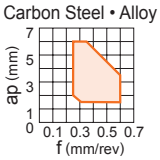
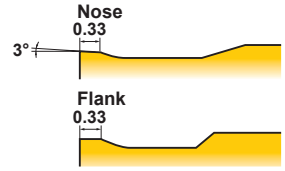
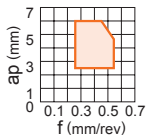
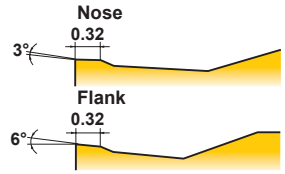
Application	Tolerance	Breaker Name and Picture	Features	Cross Section Geometry
Light Cutting	G	**R/L-K** 	**Light cutting** Double sided chipbreaker. Parallel chipbreaker. Excellent chip control at low to medium feed rates.	Carbon Steel • Alloy Steel  
	M	**MJ**	**First recommendation for light cutting of difficult-to-cut materials** Double sided chipbreaker. Ideal for heat-resistant alloy and titanium alloy. The sharp edge produces a good surface finish. The curved edge allows smooth chip discharge.	Difficult-to-Cut Materials  
	G	**MJ**	**First recommendation for light cutting of difficult-to-cut materials** Double sided chipbreaker, Single sided chipbreaker (D type, V type). The sharp edge produces a good surface finish. Ideal for heat-resistant alloy and titanium alloy. The curved edge allows smooth chip discharge.	Difficult-to-Cut Materials  
Medium Cutting	M	**MP**	**First recommendation for medium cutting of carbon steel and alloy steel** Double sided chipbreaker. Suitable for medium to light cutting. Breaker geometry appropriate for copying and back turning. Cutting edge geometry for an optimum balance of sharpness and fracture resistance.	Carbon Steel • Alloy Steel  
		MM	**First recommendation for medium cutting of stainless steel** M class double sided chip breaker. Optimized land geometry by simulation analysis technology controls the plastic deformation of the corner and achieves the long tool life.	Stainless Steel  
		MK	**First recommendation for medium cutting of cast iron** Optimum balance between sharpness and high edge strength for general use.	Cast Iron  
		GK	**Alternative chip breaker for medium cutting for cast iron** Breakers are suitable for a wide range of applications. Maintenance of high stability by the flat-land.	Cast Iron  
		GM	**Alternative chip breaker for light to medium cutting of stainless steel** M class double sided chip breaker. Alternative chip breaker of main chip breaker LM and MM. Excellent notch wear resistance for light to medium cutting.	Stainless Steel  
		MA	**First recommendation for medium cutting of carbon steel and alloy steel** **Alternative chipbreaker for finishing and light cutting of cast iron** Double sided chipbreaker. Positive land provides sharp cutting action.	Carbon Steel • Alloy Steel  

CLASSIFICATION

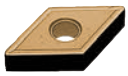
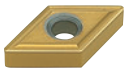
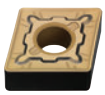
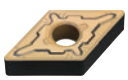
Rhombic 80°	Rhombic 55°	Square 90°	Triangular 60°	Rhombic 35°	Trigon 80°	Round	Breaker Name and Cross Section
			TNGG_R/L-K 127				R/L-K
CNMG_MJ 103	DNMG_MJ 110		TNMG_MJ 123	VNMG_MJ 128	WNMG_MJ 131		MJ(M)
CNGG_MJ 103	DNGM_MJ 109			VNGM_MJ 128			MJ(G)
CNMG_MP 103	DNMG_MP 110	SNMG_MP 116	TNMG_MP 123	VNMG_MP 128	WNMG_MP 131		MP
CNMG_MM 103	DNMG_MM 110	SNMG_MM 116	TNMG_MM 123	VNMG_MM 129	WNMG_MM 131		MM
CNMG_MK 104	DNMG_MK 110	SNMG_MK 116	TNMG_MK 123	VNMG_MK 129	WNMG_MK 131		MK
CNMG_GK 104	DNMG_GK 110	SNMG_GK 116	TNMG_GK 123	VNMG_GK 129	WNMG_GK 132		GK
CNMG_GM 104	DNMG_GM 110	SNMG_GM 116	TNMG_GM 123	VNMG_GM 129	WNMG_GM 132		GM
CNMG_MA 104	DNMG_MA 110	SNMG_MA 116	TNMG_MA 123	VNMG_MA 129	WNMG_MA 132		MA

CLASSIFICATION

NEGATIVE INSERTS WITH HOLE

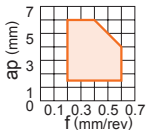
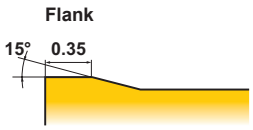
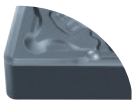
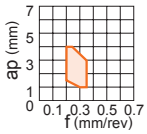
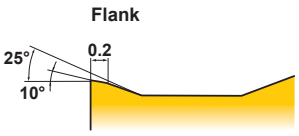
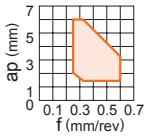
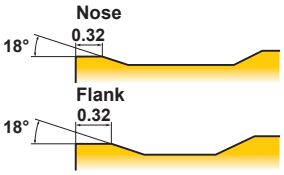
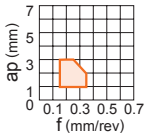
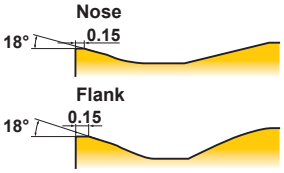
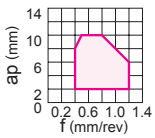
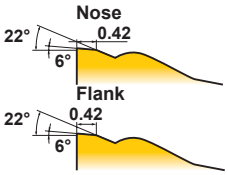
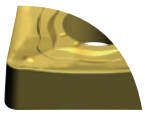
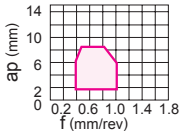
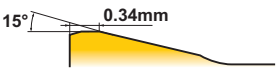
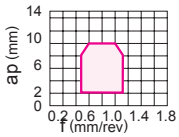
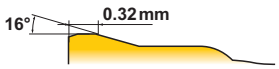
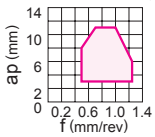
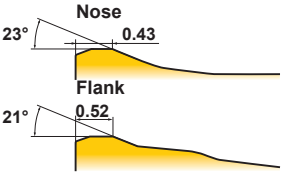
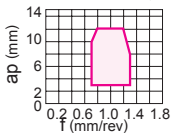
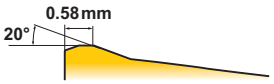
Application	Tolerance	Breaker Name and Picture	Features	Cross Section Geometry
Medium Cutting	M	MH	**First recommendation for rough cutting of mild steel Alternative chipbreaker for medium cutting of carbon steel and alloy steel** Double sided chipbreaker. Flat land offers high edge strength.	Carbon Steel • Alloy Steel  
		Standard	**First recommendation for medium cutting of cast iron Alternative chipbreaker for medium cutting of carbon steel and alloy steel** Double sided chipbreaker. Flat land offers high edge strength.	Carbon Steel • Alloy Steel  
		MW	**Wiper insert for medium cutting carbon steel and alloy steel** Double sided chipbreaker. The wiper allows up to two times higher feed. A wide chip pocket prevents chip jamming.	Carbon Steel • Alloy Steel  
		MS	**First recommendation for medium cutting of stainless steel, mild steel and difficult-to-cut materials** Double sided chipbreaker. The sharp edge gives best performance.	Stainless Steel  
		R/L-ES 	**Alternative chipbreaker for medium cutting of stainless steel** Double sided chipbreaker. Good balance of edge strength and sharpness. Right- or left-hand breaker for unidirectional chip control.	Stainless Steel  
		R/L-2G	**Alternative chipbreaker for medium cutting of carbon steel and alloy steel** Double sided chipbreaker. Parallel chipbreaker controls chip flow. Suitable for light to medium cutting.	Carbon Steel • Alloy Steel  
	G	R/L	**Medium cutting** Double sided chipbreaker. Parallel chipbreaker. Good chip control for medium feed rates.	Carbon Steel • Alloy Steel  
Rough Cutting	M	RP	**First recommendation for rough cutting of carbon steel and alloy steel** Double sided chip breaker. For interrupted cuts and removing scale. Good balance of cutting edge strength and low cutting resistance because of suitable rake angle.	Carbon Steel • Alloy Steel  
		RM	**First recommendation for rough cutting of stainless steel** M class double sided chip breaker. Excellent fracture resistance at interrupted cutting due to the optimum land angle and honing geometry.	Stainless Steel  

CLASSIFICATION

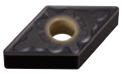
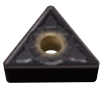
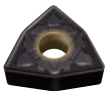
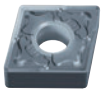
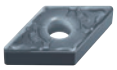
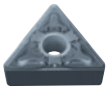
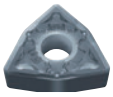
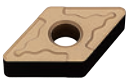
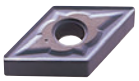
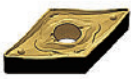
Rhombic 80°	Rhombic 55°	Square 90°	Triangular 60°	Rhombic 35°	Trigon 80°	Round	Breaker Name and Cross Section
CNMG_MH 104	DNMG_MH 111	SNMG_MH 117	TNMG_MH 124	VNMG_MH 129	WNMG_MH 132		MH
CNMG 104	DNMG  111	SNMG 117	TNMG 124	VNMG 129	WNMG 132	RNMG 114	Standard
CNMG_MW 105	DNMX_MW 111		TNMX_MW 124		WNMG_MW 132		MW
CNMG_MS 105	DNMG_MS  111	SNMG_MS 117	TNMG_MS 124	VNMG_MS 129	WNMG_MS 132		MS
			TNMG_R/L-ES 126				R/L-ES
			TNMG_R/L-2G 122				R/L-2G
	DNGG_R/L 112	SNGG_R/L 118	TNGG_R/L 125	VNGG_R/L 129			R/L
CNMG_RP  105	DNMG_RP  111	SNMG_RP 117	TNMG_RP 124		WNMG_RP 133		RP
CNMG_RM 105	DNMG_RM 112	SNMG_RM 118	TNMG_RM 125		WNMG_RM 133		RM

CLASSIFICATION

NEGATIVE INSERTS WITH HOLE

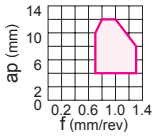
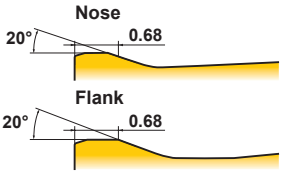
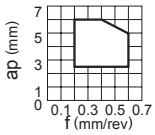
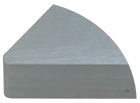
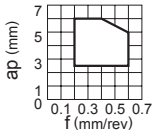
Application	Tolerance	Breaker Name and Picture	Features	Cross Section Geometry
Rough Cutting	M	RK	**For rough cutting of carbon steel, alloy steel and stainless steel** Seating surface and wide land 3 or more times that of conventional products and provide high cutting stability for interrupted machining and scale removal.	Cast Iron  
		RS 	**First recommendation for rough cutting of difficult-to-cut materials** Positive land increases welding resistance and suppresses chip welding and abrasion at low speed cutting.	 
		GH	**For rough cutting of carbon steel, alloy steel and stainless steel** Double sided chipbreaker. For interrupted cuts and removing scale. A combination of wide land and a large chip pocket allows high feed rates.	Carbon Steel • Alloy Steel  
		GJ	**First recommendation for rough cutting of difficult-to-cut materials** Double sided chipbreaker. Excellent balance of edge sharpness and strength. Edge geometry with high face wear resistance.	Difficult-to-Cut Materials  
Heavy Cutting	M	HZ	**First recommendation for heavy cutting of mild steel and stainless steel** Single sided chipbreaker. Covers the lower end of the heavy cutting region. Low cutting resistance due to positive land and curved edge. Teardrop dots improve chip control without increasing cutting resistance.	Mild Steel  
		NEW HL 	**First recommendation for mild steel and stainless steel** Low resistance due to narrow flat land. Achieves high chip breaking ability.	Mild Steel  
		NEW HM	**Assist breaker for mild steel and stainless steel** Flat land provides outstanding balance between cutting edge strength and sharpness.	Mild Steel  
		HX	**First recommendation for heavy cutting of carbon steel and alloy steel** Single sided chipbreaker. Covers the medium range of the heavy cutting region. Owing to the straight edge and chamfer, it gives a balance of sharpness and strength. Variable land and a wavy chipbreaker for good chip control.	Carbon Steel • Alloy Steel  
		NEW HR	**Assist breaker for general steel and alloy steel** High cutting edge strength. Excellent chip discharge even with high feed and high depth of cut.	Carbon Steel • Alloy Steel  

CLASSIFICATION

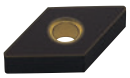
Rhombic 80°	Rhombic 55°	Square 90°	Triangular 60°	Rhombic 35°	Trigon 80°	Round	Breaker Name and Cross Section
CNMG_RK 106	DNMG_RK  112	SNMG_RK 118	TNMG_RK  125		WNMG_RK  133		RK
CNMG_RS  106	DNMG_RS  112	SNMG_RS 118	TNMG_RS  125		WNMG_RS  133		RS
CNMG_GH 106	DNMG_GH  112	SNMG_GH 118	TNMG_GH 126		WNMG_GH 133		GH
CNMG_GJ 106	DNMG_GJ  112				WNMG_GJ 133		GJ
CNMM_HZ 106	DNMM_HZ 112	SNMM_HZ 119	TNMM_HZ 126				HZ
CNMM_HL NEW 107	DNMM_HL NEW  113	SNMM_HL NEW 119	TNMM_HL NEW 126				HL
CNMM_HM NEW 107		SNMM_HM NEW 120					HM
CNMM_HX 106		SNMM_HX 119					HX
CNMM_HR NEW 107		SNMM_HR NEW 120					HR

CLASSIFICATION

NEGATIVE INSERTS WITH HOLE

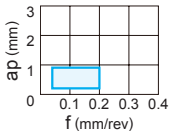
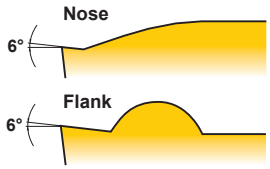
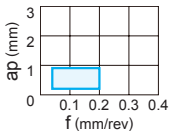
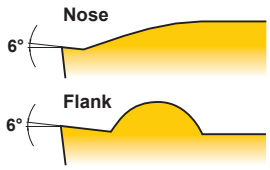
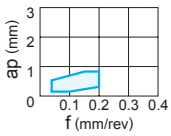
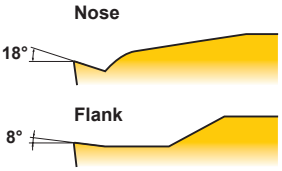
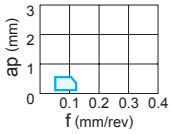
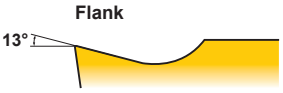
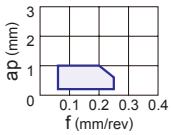
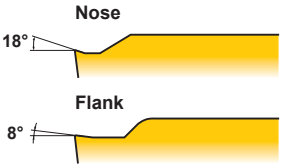
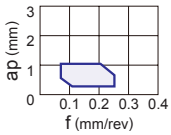
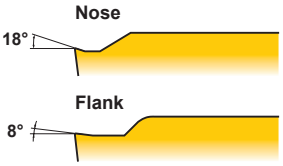
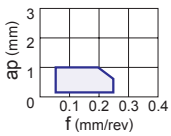
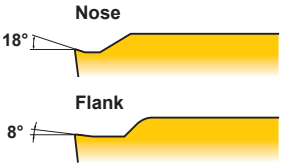
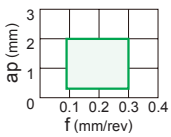
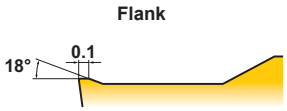
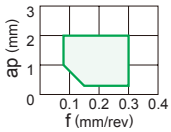
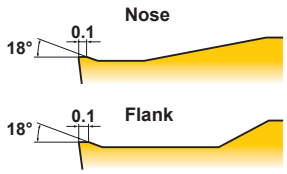
Application	Tolerance	Breaker Name and Picture	Features	Cross Section Geometry	
Heavy Cutting	M	HV	**Alternative chipbreaker for heavy cutting of carbon steel and alloy steel** Single sided chipbreaker. Covers the upper end of the heavy cutting region. Wide land and large chamfer offer high edge strength. A wide chipbreaker prevents chip jamming.	Carbon Steel • Alloy Steel 	
For Cast Iron	M	Flat Top	**First recommendation for rough cutting of cast iron** Double sided flat insert. Most effective for unstable machining due to its high edge strength.	Cast Iron 	
For Cast Iron	G	Flat Top 	**For cast iron** Double sided flat insert. Most effective for unstable machining due to its high edge strength. Can be used on workpieces requiring close tolerances due to G class insert tolerance.	Cast Iron 	

CLASSIFICATION

Rhombic 80°	Rhombic 55°	Square 90°	Triangular 60°	Rhombic 35°	Trigon 80°	Round	Breaker Name and Cross Section
CNMM_HV 107		SNMM_HV 119					HV
CNMA 107	DNMA  112	SNMA 119	TNMA 126		WNMA 133		Flat Top(M)
	DNGA 112	SNGA 119	TNGA 126	VNGA 129			Flat Top(G)

CLASSIFICATION

5° POSITIVE INSERTS WITH HOLE

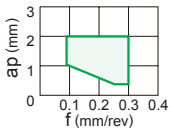
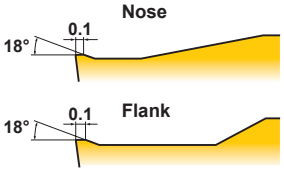
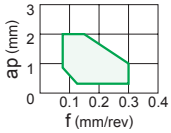
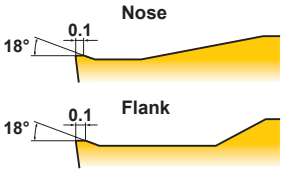
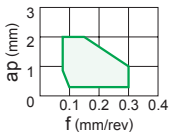
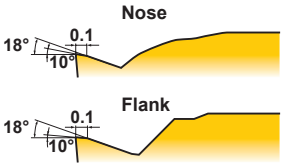
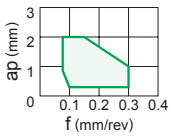
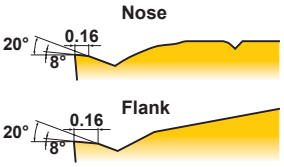
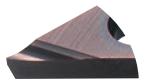
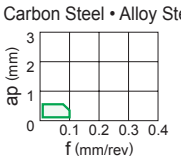
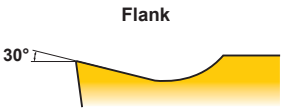
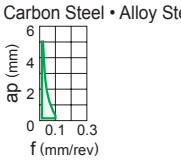
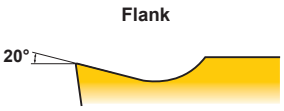
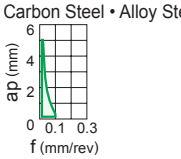
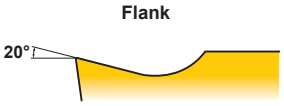
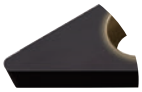
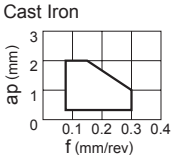
Application	Tolerance	Breaker Name and Picture	Features	Cross Section Geometry
Finish Cutting	M	FP	**First recommendation for finishing carbon steel and alloy steel** Breaker protrusion at the corner tip controls chips even at small depth of cut. Maintains the edge strength at the corner and prevents sudden fractures.	Carbon Steel • Alloy Steel  
		FM	**First recommendation for finishing stainless steel** Breaker protrusion at the corner tip controls chips even at small depth of cut. Maintains the edge strength at the corner and prevents sudden fractures.	Stainless Steel  
		FV	**First recommendation for finishing carbon steel, alloy steel, mild steel and stainless steel** Suitable for low depths of cut and low feed rates. Sharp cutting edge and low resistance design achieves excellent cutting performance.	Carbon Steel • Alloy Steel  
	G	R/L-F	**Finishing** Lead chipbreaker controls chip flow. Sharp cutting edge gives a good surface finish.	Carbon Steel • Alloy Steel  
Light Cutting	M	LP	**First recommendation for light cutting of carbon steel and alloy steel** Sharp cutting edge due to a large rake angle. Prevents welding of the insert and controls white turbidity of the surface finish. Breaker protrusion suitable for depth of cut area achieves a wide range of chip control.	Carbon Steel • Alloy Steel  
		LM	**First recommendation for light cutting of stainless steel** Sharp cutting edge due to a large rake angle. Prevents welding of the insert and controls white turbidity of the surface finish. Breaker protrusion suitable for depth of cut area achieves a wide range of chip control.	Stainless Steel  
		SV	**Light cutting of carbon steel, alloy steel, mild steel and stainless steel** Large rake angle provides sharp cutting action. A peninsular dot ensures chip control at depths of cut under 1mm.	Carbon Steel • Alloy Steel  
Medium Cutting	M	MK	**First recommendation for medium cutting of cast iron** Optimum balance between sharpness and high edge strength for general use.	Cast Iron  
		MP	**First recommendation for medium cutting of carbon steel and alloy steel** Good balance of wear resistance and fracture resistance because of the flat land cutting edge. A wide chip pocket controls increasing of the cutting resistance and reduces vibration and chip jamming even at large depth of cut.	Carbon Steel • Alloy Steel  

CLASSIFICATION

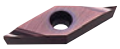
Rhombic 80°	Rhombic 55°	Square 90°	Triangular 60°	Rhombic 35°	Trigon 80°	Round	Breaker Name and Cross Section
				VBMT_FP 160			FP
				VBMT_FM 160			FM
				VBMT_FV 160			FV
				VBGT_R/L-F 160	WBGT_R/L-F 166		R/L-F
				VBMT_LP 160			LP
				VBMT_LM 160			LM
				VBMT_SV 160			SV
				VBMT_MK 161			MK
				VBMT_MP 160			MP

CLASSIFICATION

5° POSITIVE INSERTS WITH HOLE

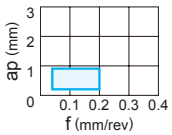
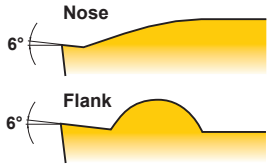
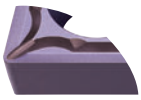
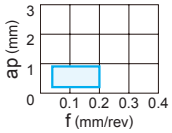
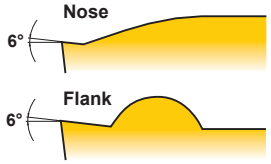
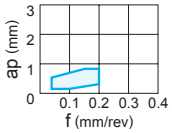
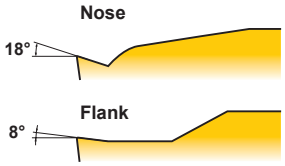
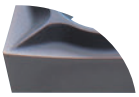
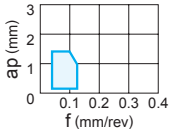
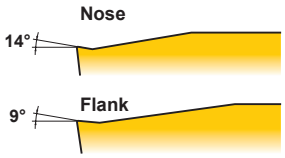
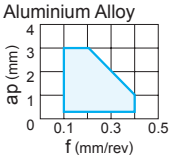
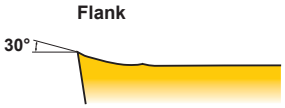
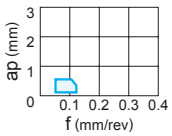
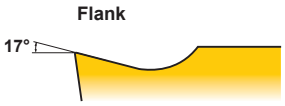
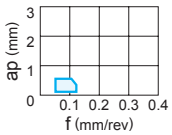
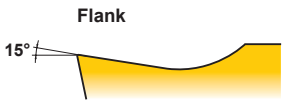
Application	Tolerance	Breaker Name and Picture	Features		Cross Section Geometry
Medium Cutting	M	MM	**First recommendation for medium cutting of stainless steel** Good balance of wear resistance and fracture resistance because of the flat land cutting edge. A wide chip pocket controls increasing of the cutting resistance and reduces vibration and chip jamming even at large depth of cut.	Stainless Steel 	
		Standard	**Medium cutting of carbon steel, alloy steel and stainless steel** Balance of edge strength and sharpness due to a combination of a flat land and large rake angle.	Carbon Steel • Alloy Steel 	
		MV	**Medium cutting of carbon steel, alloy steel, mild steel and stainless steel** A positive insert with a large rake angle achieves sharp cutting edge performance. The double breakers and round-shaped dots in the rake face achieve a wide range of chip discharge.	Carbon Steel • Alloy Steel 	
		R/L-MV	**Medium cutting of carbon steel, alloy steel, mild steel and stainless steel** A positive insert with a large rake angle achieves sharp cutting edge performance. The double breakers and round-shaped dots in the rake face achieve a wide range of chip discharge.	Carbon Steel • Alloy Steel 	
	E	R/L-SR 	**Medium cutting of automatic lathe machining** A wide lead chipbreaker. Insert designed for low resistance chip control.	Carbon Steel • Alloy Steel 	
		R/L-SN	**Medium cutting of automatic lathe machining** A parallel chipbreaker. Excellent chip control for low to medium feed rates.	Carbon Steel • Alloy Steel 	
		R/LW-SN	**Medium cutting of automatic lathe machining** A parallel chipbreaker. Excellent chip control for low to medium feed rates. The wiper produces good cutting surface.	Carbon Steel • Alloy Steel 	
For Cast Iron	M	Flat Top 	**Heavy cutting of cast iron** Flat top. Most effective for unstable machining due to its high edge strength.	Cast Iron 	

CLASSIFICATION

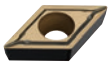
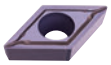
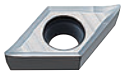
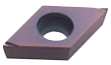
Rhombic 80°	Rhombic 55°	Square 90°	Triangular 60°	Rhombic 35°	Trigon 80°	Round	Breaker Name and Cross Section
				VBMT_MM 160			MM
				VBMT 161			Standard
				VBMT_MV 161			MV
					WBMT_R/L-MV 166		R/L-MV
				VBET_R/L-SR  161			R/L-SR
				VBET_R/L-SN 161			R/L-SN
				VBET_R/LW-SN 161			R/LW-SN
				VBMW 161			Flat Top(M)

CLASSIFICATION

7° POSITIVE INSERTS WITH HOLE

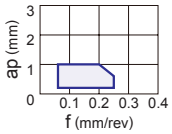
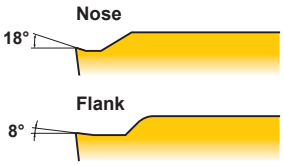
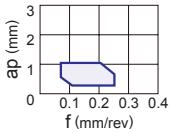
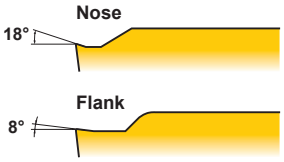
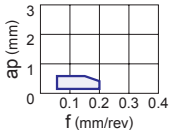
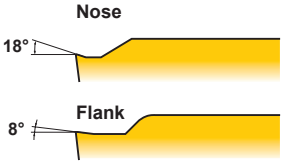
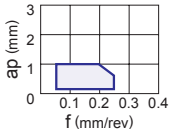
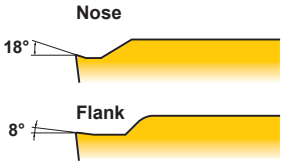
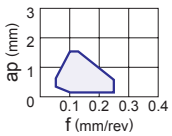
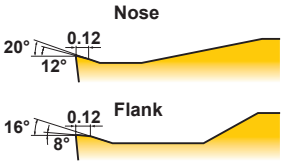
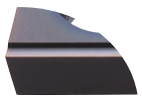
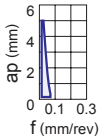
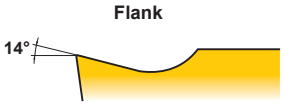
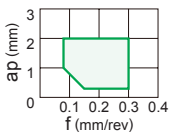
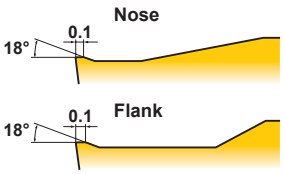
Application	Tolerance	Breaker Name and Picture	Features	Cross Section Geometry
Finish Cutting	M	**FP**	**First recommendation for finishing carbon steel and alloy steel** Breaker protrusion at the corner tip controls chips even at small depth of cut. Maintains the edge strength at the corner and prevents sudden fractures.	Carbon Steel • Alloy Steel  
		FM 	**First recommendation for finishing stainless steel** Breaker protrusion at the corner tip controls chips even at small depth of cut. Maintains the edge strength at the corner and prevents sudden fractures.	Stainless Steel  
		FV	**First recommendation for finishing carbon steel, alloy steel, mild steel and stainless steel** Suitable for low depths of cut and low feed rates. Sharp cutting edge and low resistance design achieves excellent cutting performance.	Carbon Steel • Alloy Steel  
		FJ 	**First recommendation for finishing difficult-to-cut materials** Ideal for heat-resistant alloy and titanium alloy. The sharp edge produces a good surface finish. The curved edge allows smooth chip discharge.	Difficult-to-Cut Materials  
		AZ	**For aluminium alloy** The high rake angle and 3D curved cutting edge provides sharpness at the cutting point. Additionally the 3D shape of the rake face enables excellent chip control. Lapping of the top surface gives a mirror finish for improved welding resistance.	Aluminium Alloy  
		R/L-F	**Finishing** Lead chipbreaker controls chip flow. Sharp cutting edge gives a good surface finish.	Carbon Steel • Alloy Steel  
		R/L	**Finishing** Lead chipbreaker. Excellent chip control at low feed rates.	Carbon Steel • Alloy Steel  

CLASSIFICATION

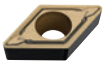
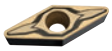
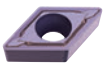
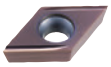
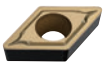
Rhombic 80°	Rhombic 55°	Square 90°	Triangular 60°	Rhombic 35°	Trigon 80°	Rhombic 25°	Round	Breaker Name and Cross Section
CCMT_FP 138	DCMT_FP  145	SCMT_FP 152	TCMT_FP 155	VCMT_FP 162				FP
CCMT_FM 138	DCMT_FM  145	SCMT_FM 152	TCMT_FM 155	VCMT_FM 162				FM
CCMT_FV 138	DCMT_FV 145	SCMT_FV 152	TCMT_FV 155	VCMT_FV 162				FV
CCGT_FJ 138								FJ
CCGT_AZ 138	DCGT_AZ  145		TCGT_AZ 155	VCGT_AZ 162			RCGT_AZ 151	AZ
CCGT_L-F CCGH_R/L-F 139	DCGT_R/L-F  145		TCGT_R/L-F 155	VCGT_R/L-F 162				R/L-F
					WCGT_R/L 167			R/L

CLASSIFICATION

7° POSITIVE INSERTS WITH HOLE

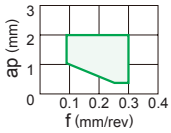
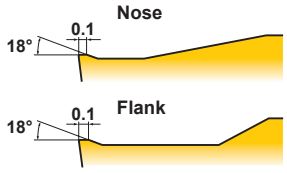
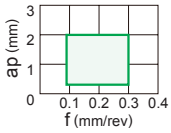
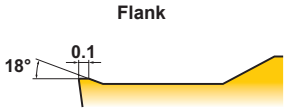
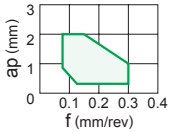
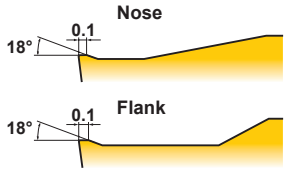
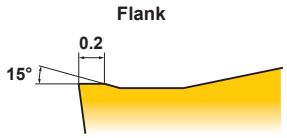
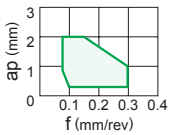
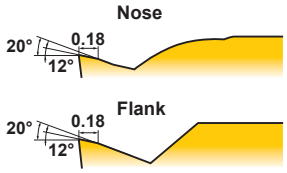
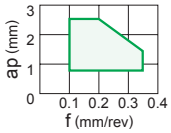
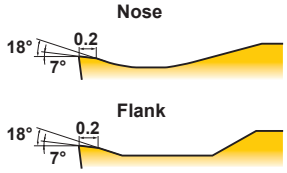
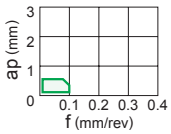
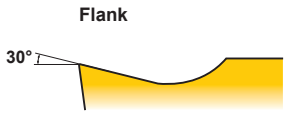
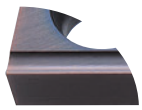
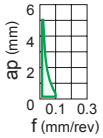
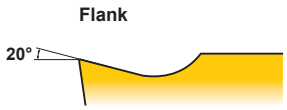
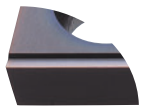
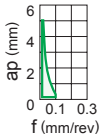
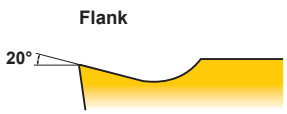
Application	Tolerance	Breaker Name and Picture	Features	Cross Section Geometry
Light Cutting	M	LP	**First recommendation for light cutting of carbon steel and alloy steel** Sharp cutting edge due to a large rake angle. Prevents welding of the insert and controls white turbidity of the surface finish. Breaker protrusion suitable for depth of cut area achieves a wide range of chip control.	Carbon Steel • Alloy Steel  
		LM	**First recommendation for light cutting of stainless steel** Sharp cutting edge due to a large rake angle. Prevents welding of the insert and controls white turbidity of the surface finish. Breaker protrusion suitable for depth of cut area achieves a wide range of chip control.	Stainless Steel  
		SVX	**Light cutting of carbon steel and alloy steel** Chip control is improved by having a chip breaker geometry suitable for copying.	Carbon Steel • Alloy Steel  
		SV	**Alternative chipbreaker for light cutting of carbon steel, alloy steel, mild steel and stainless steel** Large rake angle provides sharp cutting action. A peninsular dot ensures chip control at depths of cut under 1mm.	Carbon Steel • Alloy Steel  
		SW	**Wiper insert for light cutting of carbon steel, alloy steel, mild steel and stainless steel** The wiper allows up to two times higher feed. Positive land improves sharpness.	Carbon Steel • Alloy Steel  
		R/L-SS 	**Light cutting of automatic lathe machining** A parallel chipbreaker. Excellent chip control at low feed rates.	Carbon Steel • Alloy Steel  
Medium Cutting	M	MP	**First recommendation for medium cutting of carbon steel and alloy steel** Good balance of wear resistance and fracture resistance because of the flat land cutting edge. A wide chip pocket controls increasing of the cutting resistance and reduces vibration and chip jamming even at large depth of cut.	Carbon Steel • Alloy Steel  

CLASSIFICATION

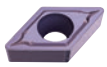
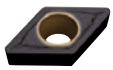
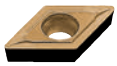
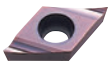
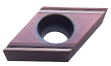
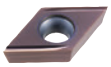
Rhombic 80°	Rhombic 55°	Square 90°	Triangular 60°	Rhombic 35°	Trigon 80°	Rhombic 25°	Round	Breaker Name and Cross Section
CCMT_LP 139	DCMT_LP  145	SCMT_LP 152	TCMT_LP 155	VCMT_LP  162				LP
CCMT_LM 139	DCMT_LM  146	SCMT_LM 152	TCMT_LM 155	VCMT_LM 162				LM
						XCMT_SVX 169		SVX
CCMH_SV 139	DCMT_SV 146			VCMT_SV 163				SV
CCMT_SW 139								SW
CCGT_R/L-SS 139	DCGT_R/L-SS  146							R/L-SS
CCMT_MP 140	DCMT_MP  146	SCMT_MP 152	TCMT_MP 156	VCMT_MP 163				MP

CLASSIFICATION

7° POSITIVE INSERTS WITH HOLE

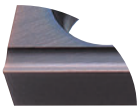
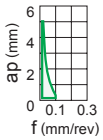
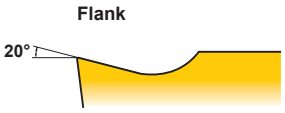
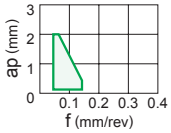
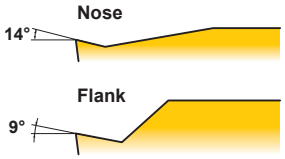
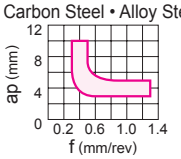
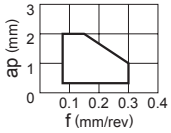
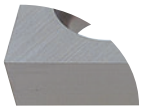
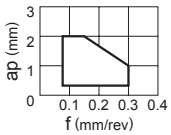
Application	Tolerance	Breaker Name and Picture	Features	Cross Section Geometry
Medium Cutting	M	MM	**First recommendation for medium cutting of stainless steel** Good balance of wear resistance and fracture resistance because of the flat land cutting edge. A wide chip pocket controls increasing of the cutting resistance and reduces vibration and chip jamming even at large depth of cut.	Stainless Steel  
		MK	**First recommendation for medium cutting of cast iron** Optimum balance between sharpness and high edge strength for general use.	Cast Iron  
		Standard	**First recommendation for medium cutting of carbon steel, alloy steel, mild steel, stainless steel and cast iron** Balance of edge strength and sharpness due to a combination of a flat land and large rake angle.	Carbon Steel • Alloy Steel   
		MV	**Alternative chipbreaker for medium cutting of carbon steel, alloy steel, mild steel and stainless steel** A positive insert and the large rake angle achieve sharp cutting edge performance. The double breakers and round shape in the rake face achieve a wide range of chip discharge.	Carbon Steel • Alloy Steel  
		MW	**Wiper insert for medium cutting of carbon steel, alloy steel, mild steel and stainless steel** The wiper allows up to two times higher feed. A wide chip pocket prevents chip jamming.	Carbon Steel • Alloy Steel  
	E	R/L-SR	**Medium cutting of automatic lathe machining** A wide lead chipbreaker. Insert designed for low resistance chip control.	Carbon Steel • Alloy Steel  
		R/L-SN 	**Medium cutting of automatic lathe machining** A parallel chipbreaker. Excellent chip control at low to medium feed rates. Suitable for precise machining with E class tolerance.	Carbon Steel • Alloy Steel  
	G	R/L-SN 	**Medium cutting of automatic lathe machining** A parallel chipbreaker. Excellent chip control at low to medium feed rates.	Carbon Steel • Alloy Steel  

CLASSIFICATION

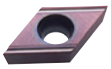
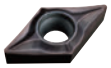
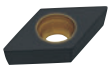
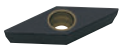
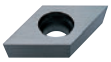
Rhombic 80°	Rhombic 55°	Square 90°	Triangular 60°	Rhombic 35°	Trigon 80°	Rhombic 25°	Round	Breaker Name and Cross Section
CCMT_MM 140	DCMT_MM  147	SCMT_MM 152	TCMT_MM 156	VCMT_MM 163				MM
CCMT_MK 140	DCMT_MK  147	SCMT_MK 152	TCMT_MK 156	VCMT_MK 163				MK
CCMT 140	DCMT  147	SCMT 152	TCMT 156	VCMT 163	WCMT 167		RCMT 151	Standard
							RCMX 151	
CCMH_MV 141	DCMT_MV 147			VCMT_MV 163				MV
CCMT_MW 141								MW
CCET_R/L-SR 141	DCET_R/L-SR  147							R/L-SR
CCET_R/L-SN 141	DCET_R/L-SN  148							R/L-SN(E)
CCGT_R/L-SN 142	DCGT_R/L-SN  148							R/L-SN(G)

CLASSIFICATION

7° POSITIVE INSERTS WITH HOLE

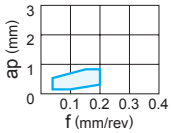
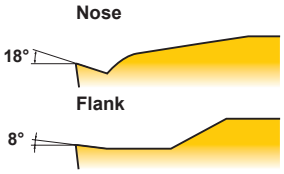
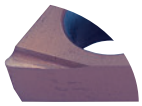
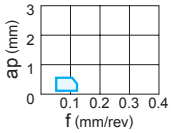
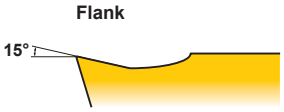
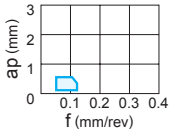
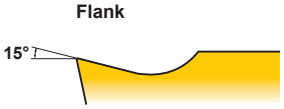
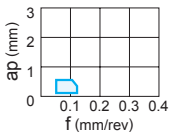
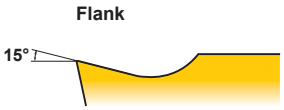
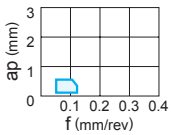
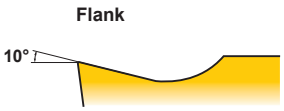
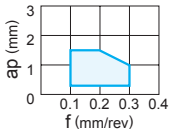
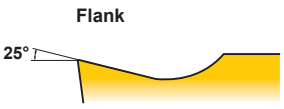
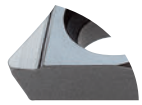
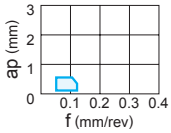
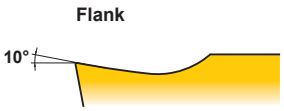
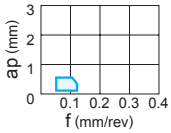
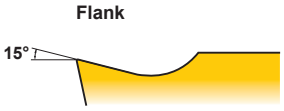
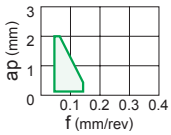
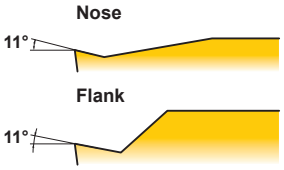
Application	Tolerance	Breaker Name and Picture	Features		Cross Section Geometry
Medium Cutting	E	R/LW-SN 	**Medium cutting of automatic lathe machining** A parallel chipbreaker. Excellent chip control at low to medium feed rates. The wiper produces a good surface finish.	Carbon Steel • Alloy Steel 	
Medium Cutting	G	SMG	**Medium cutting of automatic lathe machining** 3D moulded chipbreaker provides good chip control. G class insert gives sharp cutting action, allowing high precision machining. Breaker geometry appropriate for copying and back turning.	Carbon Steel • Alloy Steel 	
Heavy Cutting	M	RR	**Heavy cutting of carbon steel and alloy steel** A wide groove chipbreaker prevents chips from jamming at large depths of cut. Small dimples improve chip control at small depths of cut.	Carbon Steel • Alloy Steel 	
For Cast Iron	M	Flat Top	**Heavy cutting of cast iron** Flat top. Most effective for unstable machining due to its high edge strength.	Cast Iron 	
For Cast Iron	G	Flat Top 	**For cast iron** Flat top. Most effective for unstable machining due to its high edge strength. Can be used on workpieces requiring close tolerances due to G class insert tolerance.	Cast Iron 	

CLASSIFICATION

Rhombic 80°	Rhombic 55°	Square 90°	Triangular 60°	Rhombic 35°	Trigon 80°	Rhombic 25°	Round	Breaker Name and Cross Section
CCET_R/LW-SN 142	DCET_R/LW-SN  148							R/LW-SN
CCGT_SMG 142	DCGT_SMG  148							SMG
							RCMX_RR 151	RR
CCMW 142	DCMW  149	SCMW 153	TCMW 156	VCMW  163				Flat Top(M)
CCGW 142	DCGW  149							Flat Top(G)

CLASSIFICATION

11° POSITIVE INSERTS WITH HOLE

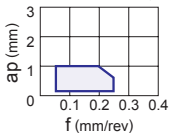
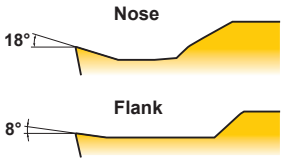
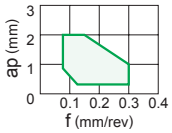
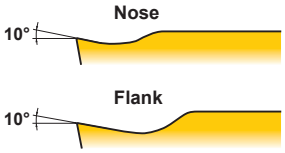
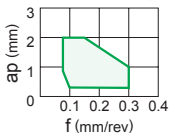
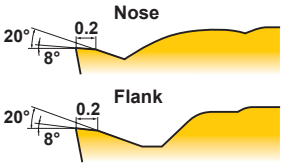
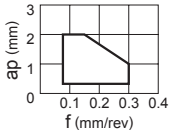
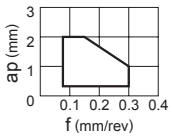
Application	Tolerance	Breaker Name and Picture	Features	Cross Section Geometry
Finish Cutting	M	FV	**First recommendation for finishing carbon steel, alloy steel, mild steel and stainless steel** Suitable for low depths of cut and low feed rates. Sharp cutting edge and low resistance design achieves excellent cutting performance.	Carbon Steel • Alloy Steel  
	G	R/L-FS 	**Alternative chipbreaker for finishing carbon steel, alloy steel, stainless steel, cast iron and aluminium alloy** Small wide lead chipbreaker. Sharp cutting edge gives a good surface finish.	Carbon Steel • Alloy Steel  
	M	R/L-F	**Finishing** Lead chipbreaker controls chip flow. Sharp cutting edge gives a good surface finish.	Carbon Steel • Alloy Steel  
	G	R/L-F	**Finishing** Lead chipbreaker controls chip flow. Sharp cutting edge gives a good surface finish.	Carbon Steel • Alloy Steel  
		R/L	**Finishing** Lead chipbreaker controls chip flow. Good chip control for low to medium feed rates.	Carbon Steel • Alloy Steel  
		Standard	**Finishing** Lead chipbreaker controls chip flow. Good chip control for low to medium feed rates.	Aluminium Alloy  
	M	L 	**Finishing** Lead chipbreaker controls chip flow. Good chip control for low to medium feed rates.	Carbon Steel • Alloy Steel  
	E	SRF	**Finishing** Lead chipbreaker controls chip flow. Sharp cutting edge gives a good surface finish.	Carbon Steel • Alloy Steel  
	G	SMG	**Medium cutting of automatic lathe machining** 3D moulded chipbreaker provides good chip control. G class insert gives sharp cutting action, allowing high precision machining. Breaker geometry appropriate for copying and back turning.	Carbon Steel • Alloy Steel  

CLASSIFICATION

Rhombic 80°	Rhombic 55°	Square 90°	Triangular 60°	Rhombic 35°	Trigon 80°	Round	Breaker Name and Cross Section
CPMH_FV 144			TPMH_FV 158				FV
			TPGH_R/L-FS 158		WPGT_R/L-FS 168		R/L-FS
CPMH_R/L-F 144							R/L-F(M)
CPGT_R/L-F 144							R/L-F(G)
			TPGX_R/L 159				R/L
CPGT 144							Standard
			TPMX_L 159				L
				VPET_R/L-SRF 165			SRF
				VPGT_SMG 165			SMG

CLASSIFICATION

11° POSITIVE INSERTS WITH HOLE

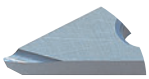
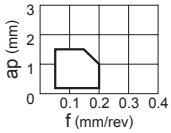
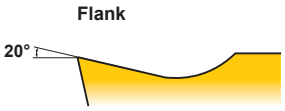
Application	Tolerance	Breaker Name and Picture	Features		Cross Section Geometry
Light Cutting	M	SV	**First recommendation for light cutting of carbon steel, alloy steel, mild steel, stainless steel and cast iron** Large rake angle provides sharp cutting action. A peninsular dot ensures chip control at depths of cut under 1mm.	Carbon Steel • Alloy Steel 	
Medium Cutting	M	Standard	**Alternative chipbreaker for medium cutting of carbon steel, alloy steel and stainless steel** Standard, general purpose chipbreaker.	Carbon Steel • Alloy Steel 	
		MV	**First recommendation for medium cutting of carbon steel, alloy steel, mild steel, stainless steel and cast iron** A positive insert and large rake angle achieves sharp cutting edge performance. Double breakers in the rake face achieve a wide range of chip discharge.	Carbon Steel • Alloy Steel 	
For Cast Iron	M	Flat Top	**Heavy cutting of cast iron** Flat top. Most effective for unstable machining due to its high edge strength.	Cast Iron 	
	G	Flat Top	**For cast iron** Flat top. Most effective for unstable machining due to its high edge strength. Can be used on workpieces requiring close tolerances due to G class insert tolerance.	Cast Iron 	

CLASSIFICATION

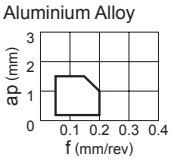
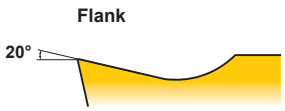
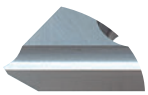
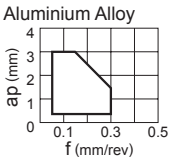
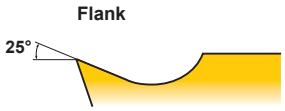
Rhombic 80°	Rhombic 55°	Square 90°	Triangular 60°	Rhombic 35°	Trigon 80°	Round	Breaker Name and Cross Section
CPMH_SV 144			TPMH_SV 158				SV
CPMX 144		SPMT 154	TPMX 158				Standard
CPMH_MV 144			TPMH_MV 159		WPMT_MV 168		MV
		SPMW 154					Flat Top(M)
		SPGX 154	TPGX 159				Flat Top(G)

CLASSIFICATION

15° POSITIVE INSERTS WITH HOLE

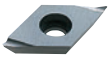
Application	Tolerance	Breaker Name and Picture	Features		Cross Section Geometry
For Aluminium Alloy	G	R/L 	**For aluminium alloy cutting** Lead chipbreaker. Sharp cutting edge gives a good surface finish.	Aluminium Alloy 	

20° POSITIVE INSERTS WITH HOLE

Application	Tolerance	Breaker Name and Picture	Features		Cross Section Geometry
For Aluminium Alloy	G	R/L-F	**For aluminium alloy cutting** Lead chipbreaker. Sharp cutting edge gives a good surface finish.	Aluminium Alloy 	
		R/L 	**For aluminium alloy cutting** A parallel chipbreaker. Sharp cutting edge gives a good surface finish. Good chip control for medium feed rates.	Aluminium Alloy 	

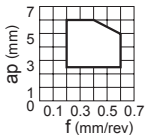
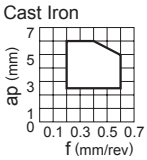
CLASSIFICATION

Rhombic 80°	Rhombic 55°	Square 90°	Triangular 60°	Rhombic 35°	Trigon 80°	Round	Breaker Name and Cross Section
				VDGX_R/L 164			R/L

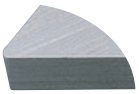
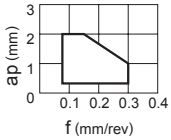
Rhombic 80°	Rhombic 55°	Square 90°	Triangular 60°	Rhombic 35°	Trigon 80°	Round	Breaker Name and Cross Section
	DEGX_R/L-F  150						R/L-F
	DEGX_R/L 150		TEGX_R/L 157				R/L

CLASSIFICATION

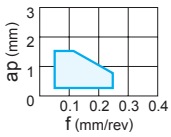
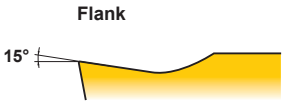
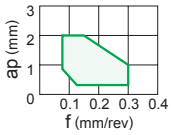
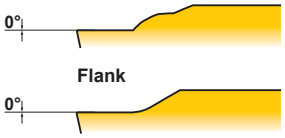
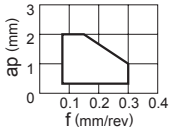
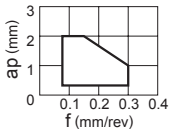
NEGATIVE INSERTS WITHOUT HOLE

Application	Tolerance	Breaker Name and Picture	Features	Cross Section Geometry
For Cast Iron	M	Flat Top	**Heavy cutting of cast iron** Double sided flat insert. Most effective for unstable machining due to high edge strength and stable insert clamping.	Cast Iron 
For Cast Iron	G	Flat Top	**For cast iron** Double sided flat insert. Most effective for unstable machining due to high edge strength and stable insert clamping. Can be used on workpieces requiring close tolerances due to G class insert tolerance.	Cast Iron 

7° POSITIVE INSERTS WITHOUT HOLE

Application	Tolerance	Breaker Name and Picture	Features	Cross Section Geometry
For Cast Iron	G	Flat Top 	**For cast iron** Double sided flat insert. Most effective for unstable machining due to high edge strength and stable insert clamping. Can be used on workpieces requiring close tolerances due to G class insert tolerance.	Cast Iron 

11° POSITIVE INSERTS WITHOUT HOLE

Application	Tolerance	Breaker Name and Picture	Features	Cross Section Geometry
Finish Cutting	G	R/L	**Finishing** A parallel chipbreaker. Good chip control for low to medium feed rates.	Carbon Steel • Alloy Steel  
Light to Medium Cutting	M	Standard	**Light to medium cutting of carbon steel, alloy steel and stainless steel** Standard, general purpose chipbreaker.	Carbon Steel • Alloy Steel  
For Cast Iron	M	Flat Top	**Heavy cutting of cast iron** Flat top. Most effective for unstable machining due to high edge strength and stable insert clamping.	Cast Iron 
For Cast Iron	G	Flat Top	**For cast iron** Flat top. Most effective for unstable machining due to high edge strength and stable insert clamping. Can be used on workpieces requiring close tolerances due to G class insert tolerance.	Cast Iron 

CLASSIFICATION

Rhombic 80°	Square 90°	Triangular 60°	Breaker Name and Cross Section
CNMN 134	SNMN 135	TNMN 136	Flat Top(M)
	SNGN 135	TNGN 136	Flat Top(G)

Rhombic 80°	Square 90°	Triangular 60°	Breaker Name and Cross Section
		TCGN 172	Flat Top

Rhombic 80°	Square 90°	Triangular 60°	Breaker Name and Cross Section
	SPGR_R 171	TPGR_R/L 173	R/L
	SPMR 171	TPMR 173	Standard
	SPMN 171	TPMN 173	Flat Top(M)
	SPGN 171	TPGN 173	Flat Top(G)

SPECIAL PURPOSE INSERTS

Application	Tolerance	Tool Holder Type	Inserts
Special	G	TL Type	RTG 170

CN**

Rhombic 80°, Neg, With hole

Product Information

80°

APPLICABLE HOLDER PAGE (EXTERNAL TURNING TOOLS) >> 296
IDENTIFICATION >> 30
TECHNICAL INFO >> 1971
APPLICABLE HOLDER PAGE (BORING BARS) >> 400
GRADES >> 58
SUITABLE GRADE, CHIPBREAKER >> 38

Stock status (10 inserts in one case)
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✤: Unstable Cutting

Inserts Shape	Order Number	RE (mm)	UE6105	UE6110	UE6020	MC6015	MC6025	MC6035	UE6035	UH6400	MC7015	MC7025	MP7035	US7020	US735	US905	MC5005	MC5015	UC5105	UC5115	MP9005	MP9015	VP05RT	VP10RT	VP15TF	UP20M	NX2525	NX3035	MP3025	AP25N	VP25N	UTi20T	HTi05T	HTi10	RT9010	MT9015
Work Material	P Steel		●	◐	✤	◐	✤	✤	✤	✤															✤	✤	●	◐	◐	●	●	✤				
	M Stainless steel										●	◐	✤	●	✤									◐	✤	✤	●			●	●	✤				
	K Cast iron																◐	✤	●	◐				◐	✤		●			●	●	✤	●	◐		
	N Non-Ferrous Metal																																	◐		
	S Heat-resistant Alloy, Titanium Alloy															●					●	◐	●	◐	✤									◐	◐	◐
			Coated																								Cermet		Coated Cermet			Carbide				
FP	CNMG120402-FP	0.2				●	●																				●		●							
	CNMG120404-FP	0.4				●	●																				●		●							
	CNMG120408-FP	0.8				●	●																				●		●							
FH	CNMG120402-FH	0.2		●	▲																						●	●	●							
	CNMG120404-FH	0.4		●	▲																						●		●	●						
	CNMG120408-FH	0.8		●																							●		●	●						
	CNMG120412-FH	1.2																									●			●						
FS	CNMG120404-FS	0.4			▲																						●									
	CNMG120408-FS	0.8																									●									
FY	CNMG120404-FY	0.4			▲																						●	●	●		●					
	CNMG120408-FY	0.8			▲																						●		●		●					
FJ	CNGG120401-FJ	0.1																						●											●	
	CNGG120402-FJ	0.2																						●											●	
	CNGG120404-FJ	0.4																						●	●										●	
	CNGG120408-FJ	0.8																						●	●										●	
	CNGG1204V5-FJ	0.05																						●											●	
PK	CNGG120404-PK	0.4																									●									
LP	CNMG120404-LP	0.4	●	●		●	●	●																					●							
	CNMG120408-LP	0.8	●	●		●	●	●																					●							
	CNMG120412-LP	1.2	●	●		●	●	●																												
LM	CNMG120404-LM	0.4									●	●	●																							
	CNMG120408-LM	0.8									●	●	●																							
	CNMG120412-LM	1.2									●	●	●																							
LK	CNMG120404-LK	0.4															●	●																		
	CNMG120408-LK	0.8															●	●																		
	CNMG120412-LK	1.2															●	●																		

MITSUBISHI MATERIALS

Stock status (10 inserts in one case)
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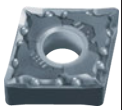
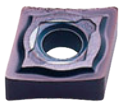
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Work Material																																											
	P	Steel	●	◐	✣		◐	✣	✣	✣	✣																			✣	✣	●	◐		◐	●	●	✣				
	M	Stainless steel										○	◐		✣	○	✣												◐	✣	✣	○				○	○	✣				
	K	Cast iron																	◐	✣	●	◐				◐	✣		●						●	●	✣	●	◐		
	N	Non-Ferrous Metal																																					◐		
	S	Heat-resistant Alloy, Titanium Alloy																●					●	◐	●	◐	✣											◐	◐	◐
Inserts Shape	Order Number	RE (mm)	Coated																									Cermet		Coated Cermet			Carbide				
			UE6105	UE6110	UE6020	MC6015	MC6025	MC6035	UE6035	UH6400	MC7015	MC7025	MP7035	US7020	US735	US905	MC5005	MC5015	UC5105	UC5115	MP9005	MP9015	VP05RT	VP10RT	VP15TF	UP20M	NX2525	NX3035	MP3025	AP25N	VP25N	UTi20T	HTi05T	HTi10	RT9010	MT9015
LS 	CNMG120404-LS	0.4																			●	●															●
	CNMG120408-LS	0.8																			●	●															●
SH	CNMG09T304-SH	0.4		●											●																						
	CNMG09T308-SH	0.8		●																																	
	CNMG120404-SH	0.4	●	●	▲	●	●								●					●							●	●		●							
	CNMG120408-SH	0.8	●	●	▲	●	●								●					●							●	●		●							
	CNMG120412-SH	1.2	●	●	▲	●	●																														
SA	CNMG120404-SA	0.4	●	●	▲	●	●																				●	●									
	CNMG120408-SA	0.8	●	●	▲	●	●																				●	●									
	CNMG120412-SA	1.2	●	●	▲	●	●																					●									
SW	CNMG120404-SW	0.4	●	●		●								▲			●	●		●							●	●	●								
	CNMG120408-SW	0.8	●	●		●								▲			●	●		●							●	●	●								
	CNMG120412-SW	1.2	●	●		●								▲													●	●	●								
SY	CNMG120404-SY	0.4			▲																						●		●		●						
	CNMG120408-SY	0.8			▲																						●		●		●						
C	CNMG120404-C	0.4																									▲	▲									
	CNMG120408-C	0.8																									▲	▲									
MJ 	CNGG120404-MJ	0.4																						●	●									●	●		
	CNGG120408-MJ	0.8																						●	●									●	●		
MJ	CNMG120404-MJ	0.4														●							●	●												●
	CNMG120408-MJ	0.8														●							●	●												●
	CNMG120412-MJ	1.2														●							●	●												
	CNMG120416-MJ	1.6														●							●	●												
MP	CNMG120404-MP	0.4	●	●	▲	●	●	●												●									●							
	CNMG120408-MP	0.8	●	●	▲	●	●	●												●									●							
	CNMG120412-MP	1.2	●	●	▲	●	●	●												●									●							
	CNMG120416-MP	1.6	●	●	▲	●	●	●												●																
	CNMG160608-MP	0.8	●	●	▲		●													●																
	CNMG160612-MP	1.2	●	●	▲		●													●																
	CNMG160616-MP	1.6	●	●	▲		●													●																
MM	CNMG120408-MM	0.8									●	●	●																							
	CNMG120412-MM	1.2									●	●	●																							
	CNMG120416-MM	1.6									●	●	●																							
	CNMG160608-MM	0.8									●	●	●																							

CN**

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Work Material																																													
P	Steel	●	◐	✣		◐	✣	✣	✣	✣																✣	✣	●	◐		◐	●	●	✣										
M	Stainless steel										○	◐		✣	○	✣									◐	✣	✣	○				○	○	✣										
K	Cast iron																	◐	✣	●	◐				◐	✣		●				●	●	✣	●	◐								
N	Non-Ferrous Metal																																			◐								
S	Heat-resistant Alloy, Titanium Alloy																●					●	◐	●	◐	✣										◐	◐	◐						

Inserts Shape	Order Number	RE (mm)	Coated																										Cermet		Coated Cermet			Carbide				
			UE6105	UE6110	UE6020		MC6015	MC6025	MC6035	UE6035	UH6400	MC7015	MC7025		MP7035	US7020	US735	US905	MC5005	MC5015	UC5105	UC5115	MP9005	MP9015	VP05RT	VP10RT	VP15TF	UP20M	NX2525	NX3035	MP3025	AP25N	VP25N	UTi20T	HTi05T	HTi10	RT9010	MT9015
	CNMG160612-MM	1.2										●	●		●																								
	CNMG160616-MM	1.6										●	●		●																								
	CNMG190608-MM	0.8										●	●		●																								
	CNMG190612-MM	1.2										●	●		●																								
	CNMG190616-MM	1.6										●	●		●																								
MK	CNMG120404-MK	0.4																	●	●																			
	CNMG120408-MK	0.8																	●	●																			
	CNMG120412-MK	1.2																	●	●																			
	CNMG120416-MK	1.6																	●	●																			
	CNMG160608-MK	0.8																	●	●																			
	CNMG160612-MK	1.2																	●	●																			
	CNMG160616-MK	1.6																	●	●																			
	CNMG190612-MK	1.2																	●	●																			
	CNMG190616-MK	1.6																	●	●																			
GK	CNMG120404-GK	0.4																	●	●																			
	CNMG120408-GK	0.8																	●	●																			
	CNMG120412-GK	1.2																	●	●																			
GM	CNMG120404-GM	0.4										●	●		●																								
	CNMG120408-GM	0.8										●	●		●																								
	CNMG120412-GM	1.2										●	●		●																								
MA	CNMG120404-MA	0.4	●	●	▲		●	●					●		●	▲	●		●	●	●	●		●			●			●									
	CNMG120408-MA	0.8	●	●	▲		●	●	●	●			●		●	▲	●		●	●	●	●		●			●			●									
	CNMG120412-MA	1.2	●	●	▲		●	●	●	●			●		●	▲	●		●	●	●	●		●			●			●									
	CNMG120416-MA	1.6	●	●	▲											▲	●					●		●															
	CNMG160608-MA	0.8	●	●	▲		●	●	●	●							●					●																	
	CNMG160612-MA	1.2	●	●	▲		●	●	●	●						▲	●					●																	
	CNMG160616-MA	1.6	●	●			●	●	●								●					●																	
	CNMG190612-MA	1.2	●	●	▲		●	●	●	●						▲	●				●	●																	
	CNMG190616-MA	1.6		●	▲		●	●	●								●					●																	
MH	CNMG120404-MH	0.4	●	●	▲					●						▲																							
	CNMG120408-MH	0.8	●	●	▲		●	●	●	●						▲						●																	
	CNMG120412-MH	1.2	●	●	▲		●	●	●	●						▲						●																	
	CNMG120416-MH	1.6	●	●	▲																	●																	
	CNMG160608-MH	0.8	●	●																		●																	
	CNMG160612-MH	1.2	●	●	▲		●	●	●							▲						●																	
	CNMG160616-MH	1.6	●	●																		●																	
	CNMG190612-MH	1.2	●	●	▲		●	●	●	●						▲						●																	
	CNMG190616-MH	1.6	●	●	▲																																		
Standard	CNMG090308	0.8		●																																			
	CNMG09T304	0.4		●			●	●																					●										
	CNMG09T308	0.8		●			●	●																					●										
	CNMG120404	0.4	●	●	▲		●	●		●											●	●							●	●	●			●		●			
	CNMG120408	0.8	●	●	▲		●	●	●	●											●	●					●		●		●			●		●			

Stock status (10 inserts in one case)
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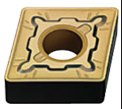
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Work Material																																															
P	Steel	●	◐	✣		◐	✣	✣	✣	✣																✣	✣	●	◐		◐	●	●	✣											
M	Stainless steel										○	◐		✣	○	✣									◐	✣	✣	○				○	○	✣											
K	Cast iron																	◐	✣	●	◐				◐	✣		●				●	●	✣	●	◐									
N	Non-Ferrous Metal																																			◐									
S	Heat-resistant Alloy, Titanium Alloy																●					●	◐	●	◐	✣										◐	◐	◐							

Inserts Shape	Order Number	RE (mm)	Coated																									Cermet		Coated Cermet			Carbide				
			UE6105	UE6110	UE6020		MC6015	MC6025	MC6035	UE6035	UH6400	MC7015	MC7025		MP7035	US7020	US735	US905	MC5005	MC5015	UC5105	UC5115	MP9005	MP9015	VP05RT	VP10RT	VP15TF	UP20M	NX2525	NX3035	MP3025	AP25N	VP25N	UTi20T	HTi05T	HTi10	RT9010	MT9015
	CNMG120412	1.2	●	●	▲		●	●	●	●											●	●					●		●									
	CNMG120416	1.6	●	●			●	●													●	●																
	CNMG160608	0.8	●	●	▲		●	●	●																													
	CNMG160612	1.2	●	●	▲		●	●	●												●	●																
	CNMG160616	1.6	●	●			●	●	●												●	●																
	CNMG190608	0.8	●	●	▲		●	●	●	●																												
	CNMG190612	1.2	●	●	▲		●	●	●	●											●	●																
	CNMG190616	1.6	●	●	▲		●	●	●	●												●																
MW	CNMG120408-MW	0.8	●	●	▲		●	●								●			●	●	●	●																
	CNMG120412-MW	1.2	●	●	▲		●	●								●			●	●	●	●																
MS	CNMG090304-MS	0.4															●																					
	CNMG090308-MS	0.8		●													●																					
	CNMG09T304-MS	0.4															●																	●				
	CNMG09T308-MS	0.8		●													●																					
	CNMG120404-MS	0.4		●	▲											▲	●	●							●	●	●	●								●	●	
	CNMG120408-MS	0.8		●	▲											▲	●	●							●	●	●	●						●		●	●	
	CNMG120412-MS	1.2		●												▲	●	●							●	●	●										●	
	CNMG160608-MS	0.8															●																					
	CNMG160612-MS	1.2															●																					
	CNMG190612-MS	1.2															●																					
	CNMG190616-MS	1.6															●																					
MS	CNMG120404-MS	0.4																					●	●														●
	CNMG120408-MS	0.8																					●	●														●
	CNMG120412-MS	1.2																					●	●														●
	CNMG160612-MS	1.2																					●	●														●
	CNMG160616-MS	1.6																					●	●														●
RP 	CNMG120408-RP	0.8	●	●			●	●	●																													
	CNMG120412-RP	1.2	●	●			●	●	●																													
	CNMG120416-RP	1.6	●	●			●	●	●																													
	CNMG160612-RP	1.2	●	●			●	●	●																													
	CNMG160616-RP	1.6	●	●			●	●	●																													
	CNMG190612-RP	1.2	●	●			●	●	●																													
	CNMG190616-RP	1.6	●	●			●	●	●																													
RM	CNMG120408-RM	0.8										●	●		●																							
	CNMG120412-RM	1.2										●	●		●																							
	CNMG120416-RM	1.6										●	●		●																							
	CNMG160612-RM	1.2										●	●		●																							
	CNMG160616-RM	1.6										●	●		●																							
	CNMG190612-RM	1.2										●	●		●																							
	CNMG190616-RM	1.6										●	●		●																							

CN**

Stock status (10 inserts in one case)
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Work Material		UE6105	UE6110	UE6020	MC6015	MC6025	MC6035	UE6035	UH6400	MC7015	MC7025	MP7035	US7020	US735	US905	MC5005	MC5015	UC5105	UC5115	MP9005	MP9015	VP05RT	VP10RT	VP15TF	UP20M	NX2525	NX3035	MP3025	AP25N	VP25N	UTi20T	HTi05T	HTi10	RT9010	MT9015
		Coated																								Cermet		Coated Cermet			Carbide				
P	Steel	●	◐	✣		◐	✣	✣	✣	✣														✣	✣	●	◐		◐	●	●	✣			
M	Stainless steel									○	◐		✣	○	✣								◐	✣	✣	○				○	○	✣			
K	Cast iron															◐	✣	●	◐				◐	✣		●				●	●	✣	●	◐	
N	Non-Ferrous Metal																																◐		
S	Heat-resistant Alloy, Titanium Alloy														●					●	◐	●	◐	✣									◐	◐	◐
Inserts Shape	Order Number	RE (mm)																																	
RK	CNMG120408-RK	0.8														●	●																		
	CNMG120412-RK	1.2														●	●																		
	CNMG120416-RK	1.6														●	●																		
	CNMG160608-RK	0.8														●	●																		
	CNMG160612-RK	1.2														●	●																		
	CNMG160616-RK	1.6														●	●																		
	CNMG190612-RK	1.2														●	●																		
	CNMG190616-RK	1.6														●	●																		
RS	CNMG120408-RS	0.8																			●														●
	CNMG120412-RS	1.2																			●														●
	CNMG120416-RS	1.6																			●														●
	CNMG160612-RS	1.2																			●														●
	CNMG160616-RS	1.6																			●														●
	CNMG190612-RS	1.2																			●														●
	CNMG190616-RS	1.6																			●														●
GH	CNMG120408-GH	0.8	●	●	▲								▲	●				●	●																
	CNMG120412-GH	1.2	●	●	▲								▲	●				●	●																
	CNMG120416-GH	1.6	●	●														●	●																
	CNMG160612-GH	1.2	●	●	▲								▲	●				●	●																
	CNMG160616-GH	1.6	●	●														●	●																
	CNMG190612-GH	1.2	●	●	▲									●				●	●																
	CNMG190616-GH	1.6	●	●	▲								▲	●				●	●																
GJ	CNMG120408-GJ	0.8													●								●	●										●	
	CNMG120412-GJ	1.2													●								●	●										●	
	CNMG120416-GJ	1.6													●								●	●										●	
	CNMG160612-GJ	1.2													●								●											●	
	CNMG190612-GJ	1.2													●								●											●	
	CNMG190616-GJ	1.6													●								●											●	
HZ	CNMM120408-HZ	0.8		●	▲		●	●																											
	CNMM120412-HZ	1.2		●	▲		●	●																											
	CNMM120416-HZ	1.6						●																											
	CNMM160612-HZ	1.2		●	▲																														
	CNMM160616-HZ	1.6		●	▲																														
	CNMM190612-HZ	1.2		●	▲				●																										
	CNMM190616-HZ	1.6		●	▲				●																										
HX	CNMM120408-HX	0.8					●	●																											
	CNMM120412-HX	1.2					●	●																											
	CNMM160612-HX	1.2					●	●																											
	CNMM160616-HX	1.6					●	●																											
	CNMM190612-HX	1.2		●	▲		●	●	●																										
	CNMM190616-HX	1.6		●	▲		●	●	●																										
	CNMM190624-HX	2.4		●	▲		●	●	●																										
	CNMM250924-HX	2.4		●	▲		●	●	●																										

Stock status (10 inserts in one case)
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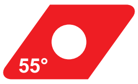
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Work Material																																															
	P	Steel	●	◐	✣		◐	✣	✣	✣	✣															✣	✣	●	◐		◐	●	●	✣												
	M	Stainless steel										○	◐		✣	○	✣									◐	✣	✣	○				○	○	✣												
	K	Cast iron																	◐	✣	●	◐				◐	✣		●				●	●	✣	●	◐										
	N	Non-Ferrous Metal																																			◐										
	S	Heat-resistant Alloy, Titanium Alloy																●					●	◐	●	◐	✣										◐	◐	◐								
Inserts Shape	Order Number	RE (mm)	Coated																										Cermet		Coated Cermet			Carbide												
			UE6105	UE6110	UE6020	MC6015	MC6025	MC6035	UE6035	UH6400	MC7015	MC7025	MP7035	US7020	US735	US905	MC5005	MC5015	UC5105	UC5115	MP9005	MP9015	VP05RT	VP10RT	VP15TF	UP20M	NX2525	NX3035	MP3025	AP25N	VP25N	UTi20T	HTi05T	HTi10	RT9010	MT9015
HV	CNMM190616-HV	1.6		●	▲			●	●		●																																			
	CNMM190624-HV	2.4		●	▲			●	●		●																																			
	CNMM250924-HV	2.4		●	▲			●	●		●																																			
Flat Top	CNMA120404	0.4															●	●	●	●														●	●											
	CNMA120408	0.8															●	●	●	●														●	●											
	CNMA120412	1.2															●	●	●	●																											
	CNMA120416	1.6															●	●	●	●																											
	CNMA160612	1.2															●	●	●	●																											
	CNMA160616	1.6															●	●	●	●																											
	CNMA190612	1.2															●	●	●	●																											
	CNMA190616	1.6															●	●	●	●																											
	CNMA190624	2.4															●	●																													
HL	CNMM120408-HL	0.8					●	●							●																															
	CNMM120412-HL	1.2					●	●							●																															
	CNMM120416-HL	1.6						●																																							
	CNMM160612-HL	1.2					●	●							●																															
	CNMM160616-HL	1.6					●	●							●																															
	CNMM190612-HL	1.2					●	●							●																															
	CNMM190616-HL	1.6					●	●							●																															
	CNMM190624-HL	2.4					●	●							●																															
HM	CNMM160612-HM	1.2					●	●							●																															
	CNMM160616-HM	1.6					●	●							●																															
	CNMM190612-HM	1.2					●	●							●																															
	CNMM190616-HM	1.6					●	●							●																															
	CNMM190624-HM	2.4					●	●							●																															
	CNMM250924-HM	2.4					●	●																																							
HR	CNMM250924-HR	2.4					●	●																																							

DN**

Rhombic 55°, Neg, With hole

Product Information



APPLICABLE HOLDER PAGE (EXTERNAL TURNING TOOLS) >> 300
IDENTIFICATION >> 30
TECHNICAL INFO >> 1971
APPLICABLE HOLDER PAGE (BORING BARS) >> 401
GRADES >> 58
SUITABLE GRADE, CHIPBREAKER >> 38

Stock status (10 inserts in one case)
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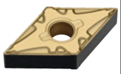
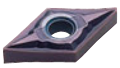
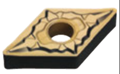
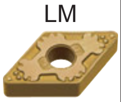
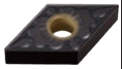
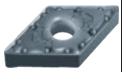
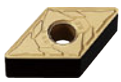
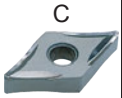
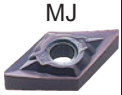
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Inserts Shape	Order Number	RE (mm)	UE6105	UE6110	UE6020	MC6015	MC6025	MC6035	UE6035	UH6400	MC7015	MC7025	MP7035	US7020	US735	US905	MC5005	MC5015	UC5105	UC5115	MP9005	MP9015	VP05RT	VP10RT	VP15TF	UP20M	NX2525	NX3035	MP3025	AP25N	VP25N	UTi20T	HTi05T	HTi10	RT9010	MT9015
			Coated																								Cermet		Coated Cermet			Carbide				
Work Material	P Steel		●	◐	✣	◐	✣	✣	✣	✣															✣	✣	●	◐	◐	●	●	✣				
Work Material	M Stainless steel										●	◐	✣	●	✣									◐	✣	✣	●			●	●	✣				
Work Material	K Cast iron																◐	✣	●	◐				◐	✣		●			●	●	✣	●	◐		
Work Material	N Non-Ferrous Metal																																	◐		
Work Material	S Heat-resistant Alloy, Titanium Alloy															●					●	◐	●	◐	✣									◐	◐	◐
FP 	DNMG150402-FP	0.2				●	●																				●		●							
	DNMG150404-FP	0.4				●	●																				●		●							
	DNMG150408-FP	0.8				●	●																				●		●							
	DNMG150602-FP	0.2				●	●																				●		●							
	DNMG150604-FP	0.4				●	●																				●		●							
	DNMG150608-FP	0.8				●	●																				●		●							
FH	DNMG150402-FH	0.2		●	▲																						●	●	●							
	DNMG150404-FH	0.4		●																							●	●	●	●						
	DNMG150408-FH	0.8		●																							●		●	●						
	DNMG150602-FH	0.2		●	▲																						●	●	●							
	DNMG150604-FH	0.4		●	▲																								●							
	DNMG150608-FH	0.8		●	▲																								●							
FS	DNMG150404-FS	0.4																									●									
	DNMG150408-FS	0.8			▲																						●									
FY	DNMG150404-FY	0.4			▲																						●	●	●		●					
	DNMG150408-FY	0.8			▲																						●		●		●					
	DNMG150604-FY	0.4																											●							
	DNMG150608-FY	0.8			▲																								●							
FJ 	DNGG150404-FJ	0.4																						●	●										●	
	DNGG150408-FJ	0.8																						●	●										●	
PK	DNGG150404-PK	0.4																									●									
LP 	DNMG110404-LP	0.4	●	●		●	●	●																					●							
	DNMG110408-LP	0.8	●	●		●	●	●																					●							
	DNMG150404-LP	0.4	●	●		●	●	●																					●							
	DNMG150408-LP	0.8	●	●		●	●	●																					●							
	DNMG150412-LP	1.2	●	●		●	●	●																					●							
	DNMG150604-LP	0.4	●	●		●	●	●																					●							
	DNMG150608-LP	0.8	●	●		●	●	●																					●							
	DNMG150612-LP	1.2	●	●		●	●	●																												
LM 	DNMG110404-LM	0.4									●	●	●																							
	DNMG110408-LM	0.8									●	●	●																							
	DNMG150404-LM	0.4									●	●	●																							
	DNMG150408-LM	0.8									●	●	●																							
	DNMG150412-LM	1.2									●	●	●																							
	DNMG150604-LM	0.4									●	●	●																							
	DNMG150608-LM	0.8									●	●	●																							

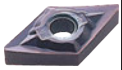
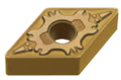
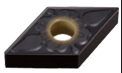
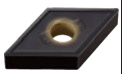
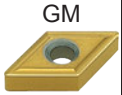
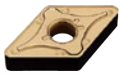
MITSUBISHI MATERIALS

Stock status (10 inserts in one case)
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Work Material		UE6105	UE6110	UE6020	MC6015	MC6025	MC6035	UE6035	UH6400	MC7015	MC7025	MP7035	US7020	US735	US905	MC5005	MC5015	UC5105	UC5115	MP9005	MP9015	VP05RT	VP10RT	VP15TF	UP20M	NX2525	NX3035	MP3025	AP25N	VP25N	UTi20T	HTi05T	HTi10	RT9010	MT9015
		Coated																								Cermet		Coated Cermet			Carbide				
Steel	P	●	◐	✣		◐	✣	✣	✣	✣														✣	✣	●	◐	◐	●	●	✣				
Stainless steel	M									○	◐		✣	○	✣								◐	✣	✣	○			○	○	✣				
Cast iron	K															◐	✣	●	◐				◐	✣		●			●	●	✣	●	◐		
Non-Ferrous Metal	N																																◐		
Heat-resistant Alloy, Titanium Alloy	S														●					●	◐	●	◐	✣									◐	◐	◐
Inserts Shape	Order Number	RE (mm)																																	
	DNMG150612-LM	1.2								●	●		●																						
LK 	DNMG110408-LK	0.8														●	●																		
	DNMG150404-LK	0.4														●	●																		
	DNMG150408-LK	0.8														●	●																		
	DNMG150412-LK	1.2														●	●																		
	DNMG150604-LK	0.4														●	●																		
	DNMG150608-LK	0.8														●	●																		
	DNMG150612-LK	1.2														●	●																		
LS 	DNMG150404-LS	0.4																		●	●														●
	DNMG150408-LS	0.8																		●	●														●
	DNMG150604-LS	0.4																		●	●														●
	DNMG150608-LS	0.8																		●	●														●
SH	DNMG110404-SH	0.4	●	●										●																					
	DNMG110408-SH	0.8	●	●										●																					
	DNMG150404-SH	0.4	●	●	▲	●	●							●					●							●	●		●						
	DNMG150408-SH	0.8	●	●	▲	●	●							●					●							●	●		●						
	DNMG150412-SH	1.2	●	●	▲	●	●							●					●							●			●						
	DNMG150604-SH	0.4	●	●																															
	DNMG150608-SH	0.8	●	●															●																
	DNMG150612-SH	1.2	●	●															●																
SA	DNMG150404-SA	0.4	●	●	▲	●	●																			●	●								
	DNMG150408-SA	0.8	●	●	▲	●	●																			●	●								
	DNMG150412-SA	1.2	●	●	▲	●	●																				●								
	DNMG150604-SA	0.4	●	●	▲																						●								
	DNMG150608-SA	0.8	●	●	▲																						●								
	DNMG150612-SA	1.2	●	●	▲																						●								
SW 	DNMX110404-SW	0.4	●			●																													
	DNMX110408-SW	0.8	●			●																													
	DNMX150404-SW	0.4	●	●		●							▲													●	●	●							
	DNMX150408-SW	0.8	●	●		●							▲													●	●	●							
	DNMX150412-SW	1.2	●	●		●							▲													●	●								
	DNMX150604-SW	0.4	●	●		●							▲													●	●	●							
	DNMX150608-SW	0.8	●	●		●							▲													●	●	●							
	DNMX150612-SW	1.2	●	●		●							▲													●	●								
SY	DNMG150404-SY	0.4			▲																					●	●	●							
	DNMG150408-SY	0.8			▲																					●		●		●					
	DNMG150604-SY	0.4																										●							
	DNMG150608-SY	0.8			▲																							●							
C 	DNMG150404-C	0.4																								▲	▲								
	DNMG150408-C	0.8																								▲	▲								
	DNMG150604-C	0.4																								▲	▲								
	DNMG150608-C	0.8																								▲	▲								
MJ 	DNGM150404-MJ	0.4																					●	●								●	●		
	DNGM150408-MJ	0.8																					●	●								●	●		

DN**

Stock status (10 inserts in one case)
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Work Material		UE6105	UE6110	UE6020	MC6015	MC6025	MC6035	UE6035	UH6400	MC7015	MC7025	MP7035	US7020	US735	US905	MC5005	MC5015	UC5105	UC5115	MP9005	MP9015	VP05RT	VP10RT	VP15TF	UP20M	NX2525	NX3035	MP3025	AP25N	VP25N	UTi20T	HTi05T	HTi10	RT9010	MT9015
		Coated																								Cermet		Coated Cermet			Carbide				
Work Material	P Steel	●	◐	✣		◐	✣	✣	✣	✣														✣	✣	●	◐	◐	●	●	✣				
	M Stainless steel									○	◐		✣	○	✣								◐	✣	✣	○			○	○	✣				
	K Cast iron															◐	✣	●	◐				◐	✣		●			●	●	✣	●	◐		
	N Non-Ferrous Metal																																◐		
	S Heat-resistant Alloy, Titanium Alloy														●					●	◐	●	◐	✣									◐	◐	◐
Inserts Shape	Order Number	RE (mm)																																	
MJ 	DNMG150404-MJ	0.4													●							●	●											●	
	DNMG150408-MJ	0.8													●							●	●											●	
	DNMG150412-MJ	1.2													●							●	●												
	DNMG150416-MJ	1.6													●							●	●												
	DNMG150604-MJ	0.4													●							●	●												
	DNMG150608-MJ	0.8													●							●	●												
	DNMG150612-MJ	1.2													●							●	●												
	DNMG150616-MJ	1.6													●							●	●												
MP	DNMG150404-MP	0.4	●	●	▲	●	●	●											●									●							
	DNMG150408-MP	0.8	●	●	▲	●	●	●											●									●							
	DNMG150412-MP	1.2	●	●	▲	●	●	●											●									●							
	DNMG150416-MP	1.6	●	●	▲	●	●	●											●																
	DNMG150604-MP	0.4	●	●	▲	●	●	●											●									●							
	DNMG150608-MP	0.8	●	●	▲	●	●	●											●									●							
	DNMG150612-MP	1.2	●	●	▲	●	●	●											●									●							
	DNMG150616-MP	1.6	●	●	▲	●	●	●											●																
MM 	DNMG150408-MM	0.8								●	●	●																							
	DNMG150412-MM	1.2								●	●	●																							
	DNMG150608-MM	0.8								●	●	●																							
	DNMG150612-MM	1.2								●	●	●																							
MK 	DNMG110408-MK	0.8														●	●																		
	DNMG150404-MK	0.4														●	●																		
	DNMG150408-MK	0.8														●	●																		
	DNMG150412-MK	1.2														●	●																		
	DNMG150604-MK	0.4														●	●																		
	DNMG150608-MK	0.8														●	●																		
	DNMG150612-MK	1.2														●	●																		
GK 	DNMG150404-GK	0.4														●	●																		
	DNMG150408-GK	0.8														●	●																		
	DNMG150412-GK	1.2														●	●																		
	DNMG150604-GK	0.4														●	●																		
	DNMG150608-GK	0.8														●	●																		
	DNMG150612-GK	1.2														●	●																		
GM 	DNMG150404-GM	0.4								●	●	●																							
	DNMG150408-GM	0.8								●	●	●																							
	DNMG150412-GM	1.2								●	●	●																							
	DNMG150604-GM	0.4								●	●	●																							
	DNMG150608-GM	0.8								●	●	●																							
	DNMG150612-GM	1.2								●	●	●																							
MA 	DNMG110404-MA	0.4	●	●		●	●																												
	DNMG110408-MA	0.8	●	●		●	●																												
	DNMG110412-MA	1.2	●	●		●	●																												
	DNMG150404-MA	0.4	●	●	▲	●	●				●	●	▲	●		●	●	●	●					●			●								
	DNMG150408-MA	0.8	●	●	▲	●	●	●	●		●	●	▲	●		●	●	●	●					●			●								

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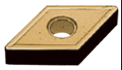
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Work Material																																											
	P	Steel	●	◐	✣		◐	✣	✣	✣	✣																			✣	✣	●	◐		◐	●	●	✣				
	M	Stainless steel										○	◐		✣	○	✣											◐	✣	✣	○				○	○	✣					
	K	Cast iron																	◐	✣	●	◐					◐	✣		●				●	●	✣	●	◐			
	N	Non-Ferrous Metal																																				◐			
	S	Heat-resistant Alloy, Titanium Alloy															●					●	◐	●	◐	✣										◐	◐	◐
Inserts Shape	Order Number	RE (mm)	Coated																									Cermet		Coated Cermet			Carbide				
			UE6105	UE6110	UE6020	MC6015	MC6025	MC6035	UE6035	UH6400	MC7015	MC7025	MP7035	US7020	US735	US905	MC5005	MC5015	UC5105	UC5115	MP9005	MP9015	VP05RT	VP10RT	VP15TF	UP20M	NX2525	NX3035	MP3025	AP25N	VP25N	UTi20T	HTi05T	HTi10	RT9010	MT9015
	DNMG150412-MA	1.2	●	●	▲	●	●	●	●			●	●		●		●	●		●					●			●									
	DNMG150604-MA	0.4	●	●	▲	●	●					●	●	▲	●		●	●							●			●									
	DNMG150608-MA	0.8	●	●	▲	●	●	●	●			●	●	▲	●		●	●	●	●					●			●									
	DNMG150612-MA	1.2	●	●	▲	●	●	●				●	●	▲	●		●	●	●	●					●			●									
	DNMG150616-MA	1.6		●																																	
MH	DNMG150404-MH	0.4	●	●	▲																																
	DNMG150408-MH	0.8	●	●	▲	●	●	●	●					▲						●																	
	DNMG150412-MH	1.2	●	●	▲	●	●	●						▲						●																	
	DNMG150604-MH	0.4	●	●																●																	
	DNMG150608-MH	0.8	●	●	▲	●	●	●						▲						●																	
	DNMG150612-MH	1.2	●	●	▲	●	●	●												●																	
Standard 	DNMG110408	0.8		●																																	
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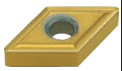
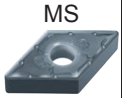
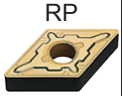
	DNMG150408	0.8	●	●	▲	●	●	●											●	●					●		●	●	●				●				
	DNMG150412	1.2	●	●	▲	●	●	●											●	●					●		●										
	DNMG150416	1.6		●		●	●	●																													
	DNMG150604	0.4	●	●	▲	●	●												●	●							●		●								
	DNMG150608	0.8	●	●	▲	●	●	●											●	●					●		●		●								
	DNMG150612	1.2	●	●	▲	●	●	●											●	●					●												
	DNMG150616	1.6		●		●	●	●																													
MW	DNMX150408-MW	0.8	●	●		●											●	●	●	●																	
	DNMX150412-MW	1.2	●	●		●											●	●	●	●																	
	DNMX150608-MW	0.8	●	●		●								▲			●	●	●	●																	
	DNMX150612-MW	1.2	●	●		●											●	●																			
MS 	DNMG110408-MS	0.8		●											●																						
	DNMG150404-MS	0.4		●	▲									▲	●	●							●	●	●												
	DNMG150408-MS	0.8		●										▲	●	●							●	●	●	●									●		
	DNMG150412-MS	1.2		●											●	●							●	●													
	DNMG150604-MS	0.4		●										▲	●	●							●	●		●											
	DNMG150608-MS	0.8		●										▲	●	●							●	●													
	DNMG150612-MS	1.2		●												●							●	●													
MS 	DNMG150404-MS	0.4																			●	●															●
	DNMG150408-MS	0.8																			●	●															●
	DNMG150412-MS	1.2																			●	●															●
	DNMG150604-MS	0.4																			●	●															●
	DNMG150608-MS	0.8																			●	●															●
	DNMG150612-MS	1.2																			●	●															●
RP 	DNMG150408-RP	0.8	●	●		●	●	●																													
	DNMG150412-RP	1.2	●	●		●	●	●																													
	DNMG150416-RP	1.6	●	●		●	●	●																													
	DNMG150608-RP	0.8	●	●		●	●	●																													
	DNMG150612-RP	1.2	●	●		●	●	●																													
	DNMG150616-RP	1.6	●	●		●	●	●																													

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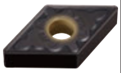
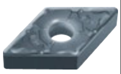
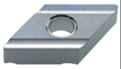
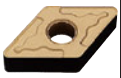
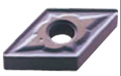
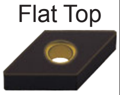
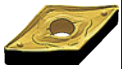
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. Stock status (10 inserts in one case) ☐: Non stock, produced to order only.

Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Inserts Shape	Order Number	RE (mm)	UE6105	UE6110	UE6020	MC6015	MC6025	MC6035	UE6035	UH6400	MC7015	MC7025	MP7035	US7020	US735	US905	MC5005	MC5015	UC5105	UC5115	MP9005	MP9015	VP05RT	VP10RT	VP15TF	UP20M	NX2525	NX3035	MP3025	AP25N	VP25N	UTi20T	HTi05T	HTi10	RT9010	MT9015
Work Material	P Steel		●	◐	✣	◐	✣	✣	✣	✣															✣	✣	●	◐	◐	●	●	✣				
	M Stainless steel										●	◐	✣	●	✣									◐	✣	✣	●			●	●	✣				
	K Cast iron																◐	✣	●	◐				◐	✣		●			●	●	✣	●	◐		
	N Non-Ferrous Metal																																	◐		
	S Heat-resistant Alloy, Titanium Alloy															●					●	◐	●	◐	✣									◐	◐	◐
			Coated																								Cermet		Coated Cermet			Carbide				
RM	DNMG150408-RM	0.8									●	●	●																							
	DNMG150412-RM	1.2									●	●	●																							
	DNMG150416-RM	1.6									●	●	●																							
	DNMG150608-RM	0.8									●	●	●																							
	DNMG150612-RM	1.2									●	●	●																							
	DNMG150616-RM	1.6									●	●	●																							
RK 	DNMG150408-RK	0.8															●	●																		
	DNMG150412-RK	1.2															●	●																		
	DNMG150608-RK	0.8															●	●																		
	DNMG150612-RK	1.2															●	●																		
RS 	DNMG150408-RS	0.8																				●														●
	DNMG150412-RS	1.2																				●														●
	DNMG150416-RS	1.6																				●														●
	DNMG150608-RS	0.8																				●														●
	DNMG150612-RS	1.2																				●														●
	DNMG150616-RS	1.6																				●														●
R/L 	DNGG150404L	0.4																									●	●				●		●		
	DNGG150404R	0.4																									●	●				●		●		
	DNGG150408L	0.8																									●	●								
	DNGG150408R	0.8																									●	●				●				
	DNGG150604L	0.4																										●								
	DNGG150604R	0.4																										●				●				
	DNGG150608L	0.8																										●								
	DNGG150608R	0.8																										●								
GH 	DNMG150408-GH	0.8	●	●	▲										●				●	●																
	DNMG150412-GH	1.2	●	●	▲									▲	●				●	●																
	DNMG150608-GH	0.8	●	●	▲										●				●	●																
	DNMG150612-GH	1.2	●	●	▲										●				●	●																
GJ 	DNMG150408-GJ	0.8														●								●	●										●	
	DNMG150412-GJ	1.2														●								●	●										●	
	DNMG150416-GJ	1.6														●								●	●										●	
	DNMG150608-GJ	0.8														●								●												
	DNMG150612-GJ	1.2														●								●												
	DNMG150616-GJ	1.6														●								●												
HZ	DNMM150408-HZ	0.8		●	▲		●	●																												
	DNMM150412-HZ	1.2		●	▲		●	●																												
	DNMM150608-HZ	0.8		●	▲		●	●																												
	DNMM150612-HZ	1.2		●	▲		●	●																												
Flat Top	DNGA150404	0.4																																●		
	DNGA150408	0.8																															●	●		
Flat Top 	DNMA150404	0.4															●	●	●	●														●		
	DNMA150408	0.8															●	●	●	●							●						●	●		
	DNMA150412	1.2															●	●	●	●																

Stock status (10 inserts in one case)
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Work Material																																															
				Coated																																Cermet		Coated Cermet			Carbide					
Inserts Shape		Order Number	RE (mm)	UE6105	UE6110	UE6020		MC6015	MC6025	MC6035	UE6035	UH6400	MC7015	MC7025		MP7035	US7020	US735	US905	MC5005	MC5015	UC5105	UC5115	MP9005	MP9015	VP05RT	VP10RT	VP15TF	UP20M	NX2525	NX3035		MP3025	AP25N	VP25N	UTi20T	HTi05T	HTi10	RT9010	MT9015
P	Steel			●	◐	✣		◐	✣	✣	✣	✣																✣	✣	●	◐		◐	●	●	✣					
M	Stainless steel												○	◐		✣	○	✣									◐	✣	✣	○				○	○	✣					
K	Cast iron																			◐	✣	●	◐				◐	✣		●				●	●	✣	●	◐			
N	Non-Ferrous Metal																																					◐			
S	Heat-resistant Alloy, Titanium Alloy																		●					●	◐	●	◐	✣									◐	◐	◐
		DNMA150604	0.4																	●	●																				
		DNMA150608	0.8																	●	●	●	●																		
		DNMA150612	1.2																	●	●	●	●																		
HL 		DNMM150408-HL	0.8						●	●								●																						
		DNMM150412-HL	1.2						●	●								●																						
		DNMM150608-HL	0.8						●	●								●																						
		DNMM150612-HL	1.2						●	●								●																						

RN**

Round, Neg, With hole

Product Information

IDENTIFICATION >> 30
TECHNICAL INFO >> 1971
GRADES >> 58
SUITABLE GRADE, CHIPBREAKER >> 38

Stock status (10 inserts in one case)
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Inserts Shape	Order Number	RE (mm)	UE6105	UE6110	UE6020		MC6015	MC6025	MC6035	UE6035	UH6400	MC7015	MC7025		MP7035	US7020	US735	US905	MC5005	MC5015	UC5105	UC5115	MP9005	MP9015	VP05RT	VP10RT	VP15TF	UP20M	NX2525	NX3035		MP3025	AP25N	VP25N	UTi20T	HTi05T	HTi10	RT9010	MT9015
			Coated																										Cermet			Coated Cermet			Carbide				
Work Material	P Steel		●	◐	✣		◐	✣	✣	✣	✣																✣	✣	●	◐		◐	●	●	✣				
Work Material	M Stainless steel											●	◐		✣	●	✣									◐	✣	✣	●				●	●	✣				
Work Material	K Cast iron																		◐	✣	●	◐				◐	✣		●				●	●	✣	●	◐		
Work Material	N Non-Ferrous Metal																																				◐		
Work Material	S Heat-resistant Alloy, Titanium Alloy																	●					●	◐	●	◐	✣										◐	◐	◐
Standard	RNMG120400			●	▲		●	●																															

MITSUBISHI MATERIALS

SN**

Square, Neg, With hole

Product Information

APPLICABLE HOLDER PAGE (EXTERNAL TURNING TOOLS) >> 303
IDENTIFICATION >> 30
TECHNICAL INFO >> 1971
APPLICABLE HOLDER PAGE (BORING BARS) >> 402
GRADES >> 58
SUITABLE GRADE, CHIPBREAKER >> 38

Stock status (10 inserts in one case)
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✤: Unstable Cutting

Inserts Shape	Order Number	RE (mm)	UE6105	UE6110	UE6020	MC6015	MC6025	MC6035	UE6035	UH6400	MC7015	MC7025	MP7035	US7020	US735	US905	MC5005	MC5015	UC5105	UC5115	MP9005	MP9015	VP05RT	VP10RT	VP15TF	UP20M	NX2525	NX3035	MP3025	AP25N	VP25N	UTi20T	HTi05T	HTi10	RT9010	MT9015
Work Material	P Steel		●	◐	✤	◐	✤	✤	✤	✤															✤	✤	●	◐	◐	●	●	✤				
	M Stainless steel										●	◐	✤	●	✤									◐	✤	✤	●			●	●	✤				
	K Cast iron																◐	✤	●	◐				◐	✤		●			●	●	✤	●	◐		
	N Non-Ferrous Metal																																	◐		
	S Heat-resistant Alloy, Titanium Alloy															●					●	◐	●	◐	✤									◐	◐	◐
			Coated																								Cermet		Coated Cermet			Carbide				
FP	SNMG120404-FP	0.4				●	●																				●		●							
	SNMG120408-FP	0.8				●	●																				●		●							
FH	SNMG090304-FH	0.4																									●									
	SNMG090308-FH	0.8																									●									
	SNMG120404-FH	0.4		●																							●		●							
	SNMG120408-FH	0.8		●																									●							
FS	SNMG120408-FS	0.8																									●									
LP	SNMG120404-LP	0.4	●	●		●	●	●																					●							
	SNMG120408-LP	0.8	●	●		●	●	●																					●							
	SNMG120412-LP	1.2	●	●		●	●	●																												
LM	SNMG120404-LM	0.4									●	●	●																							
	SNMG120408-LM	0.8									●	●	●																							
LK	SNMG120408-LK	0.8															●	●																		
	SNMG120412-LK	1.2															●	●																		
SH	SNMG120404-SH	0.4		●																●																
	SNMG120408-SH	0.8	●	●	▲															●							●									
	SNMG120412-SH	1.2		●	▲															●																
SA	SNMG120404-SA	0.4		●																								●								
	SNMG120408-SA	0.8	●	●	▲																							●								
	SNMG120412-SA	1.2		●	▲																							●								
SY	SNMG120408-SY	0.8			▲																								●							

SN**

Stock status (10 inserts in one case)
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

| Work Material | | |

Stock status (10 inserts in one case)
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✻: Unstable Cutting

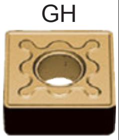
Work Material		UE6105	UE6110	UE6020	MC6015	MC6025	MC6035	UE6035	UH6400	MC7015	MC7025	MP7035	US7020	US735	US905	MC5005	MC5015	UC5105	UC5115	MP9005	MP9015	VP05RT	VP10RT	VP15TF	UP20M	NX2525	NX3035	MP3025	AP25N	VP25N	UTi20T	HTi05T	HTi10	RT9010	MT9015
P	Steel	●	◐	✻	◐	✻	✻	✻	✻															✻	✻	●	◐	◐	●	●	✻				
M	Stainless steel									●	◐	✻	●	✻									◐	✻	✻	●			●	●	✻				
K	Cast iron															◐	✻	●	◐				◐	✻		●			●	●	✻	●	◐		
N	Non-Ferrous Metal																																◐		
S	Heat-resistant Alloy, Titanium Alloy														●					●	◐	●	◐	✻									◐	◐	◐

Coated: UE6105 – UP20M; Cermet: NX2525, NX3035; Coated Cermet: MP3025, AP25N, VP25N; Carbide: UTi20T, HTi05T, HTi10, RT9010, MT9015

Inserts Shape	Order Number	RE (mm)	UE6105	UE6110	UE6020	MC6015	MC6025	MC6035	UE6035	UH6400	MC7015	MC7025	MP7035	US7020	US735	US905	MC5005	MC5015	UC5105	UC5115	MP9005	MP9015	VP05RT	VP10RT	VP15TF	UP20M	NX2525	NX3035	MP3025	AP25N	VP25N	UTi20T	HTi05T	HTi10	RT9010	MT9015
	SNMG150608-MA	0.8	●	●	▲				●						●																					
	SNMG150612-MA	1.2	●	●	▲	●	●	●	●						●					●																
	SNMG150616-MA	1.6		●		●	●	●																												
	SNMG190612-MA	1.2	●	●	▲	●	●	●												●																
	SNMG190616-MA	1.6	●	●	▲	●	●	●	●						●																					
MH	SNMG120408-MH	0.8	●	●	▲	●	●	●						▲						●																
	SNMG120412-MH	1.2	●	●	▲	●	●	●						▲						●																
	SNMG190612-MH	1.2	●	●	▲															●																
	SNMG190616-MH	1.6	●	●	▲																															
Standard	SNMG090304	0.4	●	●	▲	●	●																				●	●	●			●				
	SNMG090308	0.8	●	●	▲	●	●																				●	●	●			●	●	●		
	SNMG120404	0.4	●	●	▲	●	●																				●		●			●		●		
	SNMG120408	0.8	●	●	▲	●	●	●	●										●	●					●		●	●	●			●	●	●		
	SNMG120412	1.2	●	●	▲	●	●	●											●	●								●				●	●			
	SNMG120416	1.6		●	▲	●	●	●											●	●								●				●				
	SNMG120420	2			▲	●	●	●																												
	SNMG150612	1.2	●	●	▲	●	●	●	●										●	●																
	SNMG150616	1.6				●	●	●																												
	SNMG190612	1.2	●	●	▲	●	●	●	●										●	●												●				
	SNMG190616	1.6	●	●	▲	●	●	●	●											●												●				
MS	SNMG090304-MS	0.4													●																					
	SNMG090308-MS	0.8													●																					
	SNMG120404-MS	0.4		●										▲	●																					
	SNMG120408-MS	0.8		●	▲									▲	●	●							●	●	●	●						●			●	
	SNMG120412-MS	1.2		●										▲	●	●							●	●	●											
	SNMG120416-MS	1.6													●																					
	SNMG190616-MS	1.6													●																					
MS	SNMG120404-MS	0.4																			●	●														●
	SNMG120408-MS	0.8																			●	●														●
	SNMG120412-MS	1.2																			●	●														●
	SNMG150612-MS	1.2																			●	●														●
	SNMG150616-MS	1.6																			●	●														●
RP	SNMG120408-RP	0.8	●	●		●	●	●																												
	SNMG120412-RP	1.2	●	●		●	●	●																												
	SNMG120416-RP	1.6	●	●		●	●	●																												
	SNMG150612-RP	1.2	●	●		●	●	●																												
	SNMG150616-RP	1.6	●	●		●	●	●																												
	SNMG190612-RP	1.2	●	●		●	●	●																												

SN**

Stock status (10 inserts in one case)
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. ☐: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✤: Unstable Cutting

Inserts Shape	Order Number	RE (mm)	UE6105	UE6110	UE6020	MC6015	MC6025	MC6035	UE6035	UH6400	MC7015	MC7025	MP7035	US7020	US735	US905	MC5005	MC5015	UC5105	UC5115	MP9005	MP9015	VP05RT	VP10RT	VP15TF	UP20M	NX2525	NX3035	MP3025	AP25N	VP25N	UTi20T	HTi05T	HTi10	RT9010	MT9015
Work Material	P Steel		●	◐	✤	◐	✤	✤	✤	✤															✤	✤	●	◐	◐	●	●	✤				
	M Stainless steel										●	◐	✤	●	✤									◐	✤	✤	●			●	●	✤				
	K Cast iron																◐	✤	●	◐				◐	✤		●			●	●	✤	●	◐		
	N Non-Ferrous Metal																																	◐		
	S Heat-resistant Alloy, Titanium Alloy															●					●	◐	●	◐	✤									◐	◐	◐
			Coated																								Cermet		Coated Cermet			Carbide				
	SNMG190616-RP	1.6	●	●		●	●	●																												
RM	SNMG120408-RM	0.8									●	●	●																							
	SNMG120412-RM	1.2									●	●	●																							
	SNMG120416-RM	1.6									●	●	●																							
	SNMG150612-RM	1.2									●	●	●																							
	SNMG150616-RM	1.6									●	●	●																							
	SNMG190612-RM	1.2									●	●	●																							
	SNMG190616-RM	1.6									●	●	●																							
RK	SNMG120408-RK	0.8															●	●																		
	SNMG120412-RK	1.2															●	●																		
	SNMG120416-RK	1.6															●	●																		
	SNMG150612-RK	1.2															●	●																		
	SNMG150616-RK	1.6															●	●																		
	SNMG190612-RK	1.2															●	●																		
	SNMG190616-RK	1.6															●	●																		
RS	SNMG120408-RS	0.8																				●														●
	SNMG120412-RS	1.2																				●														●
	SNMG120416-RS	1.6																				●														●
	SNMG150616-RS	1.6																				●														●
	SNMG190616-RS	1.6																				●														●
R/L	SNGG090304L	0.4																									●	●				●				
	SNGG090304R	0.4																									●	●				●		●		
	SNGG090308L	0.8																									●	●								
	SNGG090308R	0.8																									●	●								
	SNGG120404L	0.4																									●	●	●			●				
	SNGG120404R	0.4																									●	●	●			●				
	SNGG120408L	0.8																									●	●	●			●		●		
	SNGG120408R	0.8																									●	●	●							
GH 	SNMG120408-GH	0.8	●	●	▲									▲	●				●	●																
	SNMG120412-GH	1.2	●	●	▲									▲	●				●	●																
	SNMG120416-GH	1.6	●	●											●																					
	SNMG150612-GH	1.2	●	●																																
	SNMG150616-GH	1.6		●																																
	SNMG190612-GH	1.2	●	●											●																					
	SNMG190616-GH	1.6	●	●										▲	●																					

Stock status (10 inserts in one case)
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. ☐: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Inserts Shape	Order Number	RE (mm)	Coated																								Cermet		Coated Cermet			Carbide				
			UE6105	UE6110	UE6020	MC6015	MC6025	MC6035	UE6035	UH6400	MC7015	MC7025	MP7035	US7020	US735	US905	MC5005	MC5015	UC5105	UC5115	MP9005	MP9015	VP05RT	VP10RT	VP15TF	UP20M	NX2525	NX3035	MP3025	AP25N	VP25N	UTi20T	HTi05T	HTi10	RT9010	MT9015
Work Material	P Steel		●	◐	✣	◐	✣	✣	✣	✣															✣	✣	●	◐	◐	●	●	✣				
	M Stainless steel										●	◐	✣	●	✣									◐	✣	✣	●			●	●	✣				
	K Cast iron																◐	✣	●	◐				◐	✣		●			●	●	✣	●	◐		
	N Non-Ferrous Metal																																	◐		
	S Heat-resistant Alloy, Titanium Alloy															●					●	◐	●	◐	✣									◐	◐	◐
HZ	SNMM120408-HZ	0.8		●	▲		●	●																												
	SNMM120412-HZ	1.2		●	▲		●	●																												
	SNMM150612-HZ	1.2		●	▲																															
	SNMM190612-HZ	1.2		●	▲					●																										
	SNMM190616-HZ	1.6		●	▲					●																										
HX	SNMM120408-HX	0.8					●	●																												
	SNMM120412-HX	1.2					●	●																												
	SNMM150612-HX	1.2					●	●																												
	SNMM190612-HX	1.2		●	▲		●	●		●																										
	SNMM190616-HX	1.6		●	▲		●	●		●																										
	SNMM190624-HX	2.4		●	▲		●	●		●																										
	SNMM250724-HX	2.4		●	▲		●	●		●																										
	SNMM250924-HX	2.4		●	▲		●	●		●																										
HV	SNMM190616-HV	1.6		●	▲		●	●		●																										
	SNMM190624-HV	2.4		●	▲		●	●		●																										
	SNMM250724-HV	2.4		●	▲		●	●		●																										
	SNMM250924-HV	2.4		●	▲		●	●		●																										
Flat Top	SNGA090304	0.4																									●									
	SNGA120404	0.4																																●		
	SNGA120408	0.8																									●						●	●		
Flat Top	SNMA090304	0.4																																●		
	SNMA090308	0.8															●	●	●	●														●		
	SNMA120408	0.8															●	●	●	●												●	●	●		
	SNMA120412	1.2															●	●	●	●														●		
	SNMA120416	1.6															●	●	●	●																
	SNMA150612	1.2															●	●																		
	SNMA150616	1.6															●	●																		
	SNMA190612	1.2															●	●	●	●																
	SNMA190616	1.6															●	●	●	●																
HL	SNMM120408-HL	0.8					●	●							●																					
	SNMM120412-HL	1.2					●	●							●																					
	SNMM150612-HL	1.2					●	●							●																					
	SNMM190612-HL	1.2					●	●							●																					
	SNMM190616-HL	1.6					●	●							●																					
	SNMM190624-HL	2.4					●	●							●																					

SN**

Stock status (10 inserts in one case)
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Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Work Material			UE6105	UE6110	UE6020	MC6015	MC6025	MC6035	UE6035	UH6400	MC7015	MC7025	MP7035	US7020	US735	US905	MC5005	MC5015	UC5105	UC5115	MP9005	MP9015	VP05RT	VP10RT	VP15TF	UP20M	NX2525	NX3035	MP3025	AP25N	VP25N	UTi20T	HTi05T	HTi10	RT9010	MT9015
			Coated																								Cermet		Coated Cermet			Carbide				
Work Material	P	Steel	●	◐	✣		◐	✣	✣	✣	✣														✣	✣	●	◐		◐	●	●	✣			
	M	Stainless steel										○	◐		✣	○	✣							◐	✣	✣	○				○	○	✣			
	K	Cast iron																◐	✣	●	◐			◐	✣		●				●	●	✣	●	◐	
	N	Non-Ferrous Metal																																◐		
	S	Heat-resistant Alloy, Titanium Alloy														●					●	◐	●	◐	✣									◐	◐	◐
Inserts Shape	Order Number	RE (mm)																																		
HM	SNMM150612-HM	1.2					●	●							●																					
	SNMM190612-HM	1.2					●	●							●																					
	SNMM190616-HM	1.6					●	●							●																					
	SNMM190624-HM	2.4					●	●							●																					
	SNMM250724-HM	2.4					●	●																												
	SNMM250924-HM	2.4					●	●																												
HR	SNMM250724-HR	2.4					●	●																												
	SNMM250924-HR	2.4					●	●																												

TN**

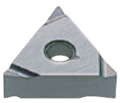
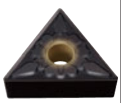
Triangular, Neg, With hole

Product Information

60°

APPLICABLE HOLDER PAGE (EXTERNAL TURNING TOOLS) >> 310
IDENTIFICATION >> 30
TECHNICAL INFO >> 1971
APPLICABLE HOLDER PAGE (BORING BARS) >> 403
GRADES >> 58
SUITABLE GRADE, CHIPBREAKER >> 38

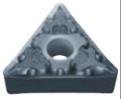
Stock status (10 inserts in one case)
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. ☐: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Inserts Shape	Order Number	RE (mm)	UE6105	UE6110	UE6020	MC6015	MC6025	MC6035	UE6035	UH6400	MC7015	MC7025	MP7035	US7020	US735	US905	MC5005	MC5015	UC5105	UC5115	MP9005	MP9015	VP05RT	VP10RT	VP15TF	UP20M	NX2525	NX3035	MP3025	AP25N	VP25N	UTi20T	HTi05T	HTi10	RT9010	MT9015
Work Material	P Steel		●	◐	✣	◐	✣	✣	✣	✣															✣	✣	●	◐	◐	●	●	✣				
Work Material	M Stainless steel										●	◐	✣	●	✣									◐	✣	✣	●			●	●	✣				
Work Material	K Cast iron																◐	✣	●	◐				◐	✣		●			●	●	✣	●	◐		
Work Material	N Non-Ferrous Metal																																	◐		
Work Material	S Heat-resistant Alloy, Titanium Alloy															●					●	◐	●	◐	✣									◐	◐	◐
			Coated																								Cermet		Coated Cermet			Carbide				
FP	TNMG160402-FP	0.2				●	●																				●		●							
FP	TNMG160404-FP	0.4				●	●																				●		●							
FP	TNMG160408-FP	0.8				●	●																				●		●							
FH	TNMG110304-FH	0.4																									●									
FH	TNMG160402-FH	0.2		●	▲																						●	●	●							
FH	TNMG160404-FH	0.4		●																							●	●	●	●						
FH	TNMG160408-FH	0.8		●	▲																						●	●	●	●						
FS	TNMG160404-FS	0.4			▲																						●									
FS	TNMG160408-FS	0.8			▲																						●									
FY	TNMG160404-FY	0.4			▲																						●	●	●		●					
FY	TNMG160408-FY	0.8			▲																						●		●		●					
R/L-F 	TNGG160402L-F	0.2																							●		●	●	●							
R/L-F	TNGG160402R-F	0.2																							●		●	●	●							
R/L-F	TNGG160404L-F	0.4																							●		●	●	●							
R/L-F	TNGG160404R-F	0.4																							●		●	●	●							
R/L-F	TNGG160408L-F	0.8																							●		●	●	●							
R/L-F	TNGG160408R-F	0.8																							●		●	●	●							
PK	TNGG160404-PK	0.4																									●									
PK	TNGG160408-PK	0.8																									●									
LP	TNMG160404-LP	0.4	●	●		●	●	●																					●							
LP	TNMG160408-LP	0.8	●	●		●	●	●																					●							
LP	TNMG160412-LP	1.2	●	●		●	●	●																					●							
LP	TNMG220408-LP	0.8	●	●		●	●	●																					●							
LP	TNMG220412-LP	1.2	●	●		●	●	●																												
LM	TNMG160404-LM	0.4									●	●	●																							
LM	TNMG160408-LM	0.8									●	●	●																							
LM	TNMG160412-LM	1.2									●	●	●																							
LK 	TNMG160404-LK	0.4															●	●																		
LK	TNMG160408-LK	0.8															●	●																		
LK	TNMG160412-LK	1.2															●	●																		

TN**

●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. Stock status (10 inserts in one case) □: Non stock, produced to order only.

Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✲: Unstable Cutting

Inserts Shape	Order Number	RE (mm)	UE6105	UE6110	UE6020	MC6015	MC6025	MC6035	UE6035	UH6400	MC7015	MC7025	MP7035	US7020	US735	US905	MC5005	MC5015	UC5105	UC5115	MP9005	MP9015	VP05RT	VP10RT	VP15TF	UP20M	NX2525	NX3035	MP3025	AP25N	VP25N	UTi20T	HTi05T	HTi10	RT9010	MT9015
			Coated																								Cermet		Coated Cermet			Carbide				
Work Material	P	Steel	●	◐	✲	◐	✲	✲	✲	✲															✲	✲	●	◐	◐	●	●	✲				
	M	Stainless steel									●	◐	✲	●	✲									◐	✲	✲	●			●	●	✲				
	K	Cast iron															◐	✲	●	◐				◐	✲		●			●	●	✲	●	◐		
	N	Non-Ferrous Metal																																◐		
	S	Heat-resistant Alloy, Titanium Alloy														●					●	◐	●	◐	✲									◐	◐	◐
LS 	TNMG160404-LS	0.4																			●	●														●
	TNMG160408-LS	0.8																			●	●														●
SH	TNMG160404-SH	0.4	●	●	▲	●	●								●					●							●	●		●						
	TNMG160408-SH	0.8	●	●	▲	●	●								●					●							●	●		●						
	TNMG220408-SH	0.8	●	●											●																					
SA	TNMG160404-SA	0.4	●	●	▲	●	●																				●	●								
	TNMG160408-SA	0.8	●	●	▲	●	●																				●	●								
	TNMG160412-SA	1.2	●	●	▲																							●								
	TNMG220408-SA	0.8	●	●	▲																															
	TNMG220412-SA	1.2		●																																
SW	TNMX160404-SW	0.4	●	●		●								▲													●	●	●							
	TNMX160408-SW	0.8	●	●		●								▲													●	●	●							
SY	TNMG160404-SY	0.4			▲																						●	●	●		●					
	TNMG160408-SY	0.8			▲																						●		●		●					
C	TNMG160404-C	0.4																									▲	▲								
	TNMG160408-C	0.8																									▲	▲								
	TNMG220404-C	0.4																									▲	▲								
	TNMG220408-C	0.8																										▲								
R/L-1G	TNMG160404L-1G	0.4																									●									
	TNMG160404R-1G	0.4																									●									
	TNMG220404L-1G	0.4																									●									
	TNMG220404R-1G	0.4																									●									
R/L-2G	TNMG160404L-2G	0.4																									●									
	TNMG160404R-2G	0.4																									●									
	TNMG160408L-2G	0.8																									●									
	TNMG160408R-2G	0.8																									●									
R/L-FS	TNGG160402L-FS	0.2																									●									
	TNGG160402R-FS	0.2																									●									
	TNGG160404L-FS	0.4																									●									
	TNGG160404R-FS	0.4																									●									
MJ	TNMG160404-MJ	0.4														●							●	●											●	
	TNMG160408-MJ	0.8														●							●	●											●	
	TNMG160412-MJ	1.2														●							●	●												

Stock status (10 inserts in one case)
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✤: Unstable Cutting

Work Material	P Steel		●	◐	✤	◐	✤	✤	✤	✤															✤	✤	●	◐	◐	●	●	✤				
	M Stainless steel										●	◐	✤	●	✤									◐	✤	✤	●			●	●	✤				
	K Cast iron																◐	✤	●	◐				◐	✤		●			●	●	✤	●	◐		
	N Non-Ferrous Metal																																	◐		
	S Heat-resistant Alloy, Titanium Alloy															●					●	◐	●	◐	✤									◐	◐	◐
			Coated																								Cermet		Coated Cermet			Carbide				
Inserts Shape	Order Number	RE (mm)	UE6105	UE6110	UE6020	MC6015	MC6025	MC6035	UE6035	UH6400	MC7015	MC7025	MP7035	US7020	US735	US905	MC5005	MC5015	UC5105	UC5115	MP9005	MP9015	VP05RT	VP10RT	VP15TF	UP20M	NX2525	NX3035	MP3025	AP25N	VP25N	UTi20T	HTi05T	HTi10	RT9010	MT9015
MP	TNMG160404-MP	0.4	●	●	▲	●	●	●												●									●							
	TNMG160408-MP	0.8	●	●	▲	●	●	●												●									●							
	TNMG160412-MP	1.2	●	●	▲	●	●	●												●									●							
	TNMG220408-MP	0.8	●	●	▲	●	●	●												●																
	TNMG220412-MP	1.2	●	●	▲	●	●	●												●																
MM	TNMG160408-MM	0.8									●	●	●																							
	TNMG160412-MM	1.2									●	●	●																							
	TNMG220408-MM	0.8									●	●	●																							
	TNMG220412-MM	1.2									●	●	●																							
	TNMG220416-MM	1.6									●	●	●																							
MK	TNMG160404-MK	0.4															●	●																		
	TNMG160408-MK	0.8															●	●																		
	TNMG160412-MK	1.2															●	●																		
	TNMG220408-MK	0.8															●	●																		
	TNMG220412-MK	1.2															●	●																		
	TNMG220416-MK	1.6															●	●																		
GK	TNMG160404-GK	0.4															●	●																		
	TNMG160408-GK	0.8															●	●																		
	TNMG160412-GK	1.2															●	●																		
	TNMG220408-GK	0.8															●	●																		
	TNMG220412-GK	1.2															●	●																		
GM	TNMG160404-GM	0.4									●	●	●																							
	TNMG160408-GM	0.8									●	●	●																							
	TNMG160412-GM	1.2									●	●	●																							
	TNMG220408-GM	0.8									●	●	●																							
	TNMG220412-GM	1.2									●	●	●																							
MA	TNMG160404-MA	0.4	●	●	▲	●	●					●	●	▲	●		●	●	●	●					●			●								
	TNMG160408-MA	0.8	●	●	▲	●	●	●	●			●	●	▲	●		●	●	●	●					●			●								
	TNMG160412-MA	1.2	●	●	▲	●	●	●				●	●	▲	●		●	●		●					●			●								
	TNMG160416-MA	1.6																		●																
	TNMG220408-MA	0.8	●	●	▲	●	●	●	●			●	●	▲	●		●	●	●	●					●											
	TNMG220412-MA	1.2	●	●	▲	●	●	●	●			●	●	▲	●		●	●		●					●											
	TNMG220416-MA	1.6																		●																
	TNMG270608-MA	0.8	●	●	▲				●																											
	TNMG270612-MA	1.2	●	●	▲										●																					
MH	TNMG160404-MH	0.4	●	●	▲									▲						●																
	TNMG160408-MH	0.8	●	●	▲	●	●	●	●					▲						●																
	TNMG160412-MH	1.2	●	●	▲	●	●	●	●					▲						●																

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Stock status (10 inserts in one case)
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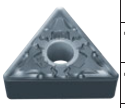
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Work Material																																															
	P	Steel	●	◐	✣		◐	✣	✣	✣	✣																			✣	✣	●	◐		◐	●	●	✣								
	M	Stainless steel										○	◐		✣	○	✣											◐	✣	✣	○					○	○	✣								
	K	Cast iron																	◐	✣	●	◐						◐	✣		●					●	●	✣	●	◐						
	N	Non-Ferrous Metal																																						◐						
	S	Heat-resistant Alloy, Titanium Alloy																●					●	◐	●	◐	✣												◐	◐	◐					
Inserts Shape	Order Number	RE (mm)	Coated																											Cermet		Coated Cermet			Carbide										
			UE6105	UE6110	UE6020		MC6015	MC6025	MC6035	UE6035	UH6400	MC7015	MC7025		MP7035	US7020	US735	US905	MC5005	MC5015	UC5105	UC5115	MP9005	MP9015	VP05RT	VP10RT	VP15TF	UP20M	NX2525	NX3035		MP3025	AP25N	VP25N	UTi20T	HTi05T	HTi10		RT9010	MT9015
	TNMG220408-MH	0.8	●	●	▲		●	●	●	●						▲						●																							
	TNMG220412-MH	1.2	●	●	▲		●	●	●	●												●																							
Standard	TNMG110304	0.4		●	▲		●	●																												●		●							
	TNMG110308	0.8		●	▲		●	●																																					
	TNMG160304	0.4		●			●	●																												●									
	TNMG160308	0.8		●	▲		●	●																												●									
	TNMG160404	0.4	●	●	▲		●	●													●	●					●		●	●		●				●	●	●							
	TNMG160408	0.8	●	●	▲		●	●	●	●											●	●					●		●	●		●				●	●	●							
	TNMG160412	1.2	●	●	▲		●	●	●												●	●							●																
	TNMG160416	1.6		●			●	●	●													●							●																
	TNMG220404	0.4	●	●	▲		●	●	●																					●					●										
	TNMG220408	0.8	●	●	▲		●	●	●	●												●							●	●					●										
	TNMG220412	1.2	●	●	▲		●	●	●													●																							
	TNMG220416	1.6		●	▲		●	●	●																																				
	TNMG270608	0.8		●			●	●	●																																				
	TNMG270612	1.2		●	▲		●	●	●																											●									
	TNMG270616	1.6		●	▲																																								
	TNMG330924	2.4																																		●									
MW	TNMX160408-MW	0.8	●	●			●									▲			●	●		●																							
	TNMX160412-MW	1.2	●	●			●									▲			●	●	●	●																							
MS	TNMG160404-MS	0.4		●												▲	●	●							●	●	●								●									
	TNMG160408-MS	0.8		●	▲											▲	●	●							●	●	●	●		●										●				
	TNMG160412-MS	1.2		●													●	●							●	●																		
	TNMG220408-MS	0.8		●												▲	●	●							●	●	●	●																
	TNMG220412-MS	1.2															●																												
MS 	TNMG160404-MS	0.4																					●	●																				●
	TNMG160408-MS	0.8																					●	●																				●
	TNMG160412-MS	1.2																					●	●																				●
	TNMG220408-MS	0.8																					●	●																				●
	TNMG220412-MS	1.2																					●	●																				●
RP	TNMG160408-RP	0.8	●	●			●	●	●																																				
	TNMG160412-RP	1.2	●	●			●	●	●																																				
	TNMG220408-RP	0.8	●	●			●	●	●																																				
	TNMG220412-RP	1.2	●	●			●	●	●																																				
	TNMG220416-RP	1.6	●	●			●	●	●																																				
	TNMG270612-RP	1.2	●	●			●	●	●																																				
	TNMG270616-RP	1.6	●	●			●	●	●																																				

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Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Work Material																																															
	P	Steel	●	◐	✣		◐	✣	✣	✣	✣																			✣	✣	●	◐		◐	●	●	✣								
	M	Stainless steel										○	◐		✣	○	✣													◐	✣	✣	○				○	○	✣								
	K	Cast iron																	◐	✣	●	◐				◐	✣		●							●	●	✣	●	◐						
	N	Non-Ferrous Metal																																						◐						
	S	Heat-resistant Alloy, Titanium Alloy																●					●	◐	●	◐	✣												◐	◐	◐					
Inserts Shape	Order Number	RE (mm)	Coated																											Cermet		Coated Cermet			Carbide										
			UE6105	UE6110	UE6020		MC6015	MC6025	MC6035	UE6035	UH6400	MC7015	MC7025		MP7035	US7020	US735	US905	MC5005	MC5015	UC5105	UC5115	MP9005	MP9015	VP05RT	VP10RT	VP15TF	UP20M	NX2525	NX3035		MP3025	AP25N	VP25N	UTi20T	HTi05T	HTi10		RT9010	MT9015					
RM	TNMG160408-RM	0.8										●	●		●																																
	TNMG160412-RM	1.2										●	●		●																																
	TNMG220408-RM	0.8										●	●		●																																
	TNMG220412-RM	1.2										●	●		●																																
	TNMG220416-RM	1.6										●	●		●																																
RK	TNMG160408-RK	0.8																	●	●																										
	TNMG160412-RK	1.2																	●	●																										
	TNMG160416-RK	1.6																	●	●																										
	TNMG220408-RK	0.8																	●	●																										
	TNMG220412-RK	1.2																	●	●																										
	TNMG220416-RK	1.6																	●	●																										
RS	TNMG160408-RS	0.8																						●																	●				
	TNMG160412-RS	1.2																						●																	●				
	TNMG220408-RS	0.8																						●																	●				
	TNMG220412-RS	1.2																						●																	●				
R/L	TNGG110302L	0.2																											●	●															
	TNGG110302R	0.2																												●															
	TNGG110304L	0.4																											●	●															
	TNGG110304R	0.4																											●	●															
	TNGG110308L	0.8																											●	●															
	TNGG110308R	0.8																												●															
	TNGG160304L	0.4																											●	●															
	TNGG160304R	0.4																											●	●					●										
	TNGG160402L	0.2																											●	●		●													
	TNGG160402R	0.2																											●	●		●			●		●								
	TNGG160404L	0.4																											●	●		●			●		●								
	TNGG160404R	0.4																											●	●		●			●	●	●								
	TNGG160408L	0.8																											●	●		●			●	●	●								
	TNGG160408R	0.8																											●	●		●			●	●	●								
	TNGG220404L	0.4																											●	●					●										
	TNGG220404R	0.4																											●	●					●										
	TNGG220408L	0.8																											●	●					●										
	TNGG220408R	0.8																											●	●					●										
GH	TNMG160408-GH	0.8	●	●	▲											▲	●				●	●																								
	TNMG160412-GH	1.2	●	●																		●																								
	TNMG220408-GH	0.8	●	●	▲												●					●																								
	TNMG220412-GH	1.2	●	●	▲												●				●	●																								
	TNMG220416-GH	1.6	●	●																																										

TN**

Stock status (10 inserts in one case)
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. ☐: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ❋: Unstable Cutting

Inserts Shape	Order Number	RE (mm)	UE6105	UE6110	UE6020	MC6015	MC6025	MC6035	UE6035	UH6400	MC7015	MC7025	MP7035	US7020	US735	US905	MC5005	MC5015	UC5105	UC5115	MP9005	MP9015	VP05RT	VP10RT	VP15TF	UP20M	NX2525	NX3035	MP3025	AP25N	VP25N	UTi20T	HTi05T	HTi10	RT9010	MT9015
			Coated																								Cermet		Coated Cermet			Carbide				
Work Material	P Steel		●	◐	❋	◐	❋	❋	❋	❋															❋	❋	●	◐	◐	●	●	❋				
	M Stainless steel										●	◐	❋	●	❋									◐	❋	❋	●			●	●	❋				
	K Cast iron																◐	❋	●	◐				◐	❋		●			●	●	❋	●	◐		
	N Non-Ferrous Metal																																	◐		
	S Heat-resistant Alloy, Titanium Alloy															●					●	◐	●	◐	❋									◐	◐	◐
	TNMG270612-GH	1.2	●	●	▲										●																					
	TNMG270616-GH	1.6	●	●																																
HZ	TNMM160408-HZ	0.8		●	▲		●	●																												
	TNMM160412-HZ	1.2					●	●																												
	TNMM220408-HZ	0.8		●	▲																															
	TNMM220412-HZ	1.2		●	▲																															
	TNMM220416-HZ	1.6		●	▲																															
Flat Top	TNGA110304	0.4																																●		
	TNGA110308	0.8																									●							●		
	TNGA160402	0.2																									●							●		
	TNGA160404	0.4																														●	●	●		
	TNGA160408	0.8																															●	●		
	TNGA220404	0.4																														●				
	TNGA220408	0.8																															●			
Flat Top	TNMA160404	0.4															●	●	●	●													●	●		
	TNMA160408	0.8															●	●	●	●												●	●	●		
	TNMA160412	1.2															●	●	●	●																
	TNMA160416	1.6															●	●		●																
	TNMA160420	2															●	●																		
	TNMA220404	0.4																																●		
	TNMA220408	0.8															●	●	●	●							●					●		●		
	TNMA220412	1.2															●	●	●	●																
	TNMA220416	1.6															●	●	●	●												●				
HL	TNMM160408-HL	0.8					●	●							●																					
	TNMM160412-HL	1.2					●	●							●																					
	TNMM220408-HL	0.8					●	●							●																					
	TNMM220412-HL	1.2					●	●							●																					
	TNMM220416-HL	1.6					●	●							●																					
R/L-ES	TNMG160404L-ES	0.4												▲	●																					
	TNMG160404R-ES	0.4												▲	●																					
	TNMG160408L-ES	0.8												▲	●																					
	TNMG160408R-ES	0.8												▲	●																					
	TNMG220408L-ES	0.8													●																					
	TNMG220408R-ES	0.8													●																					
R/L-K	TNGG160402L-K	0.2																									●	●	●							
	TNGG160402R-K	0.2																									●	●	●							
	TNGG160404L-K	0.4																										●	●							
	TNGG160404R-K	0.4																									●	●	●							

Stock status (10 inserts in one case)
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. ☐: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✤: Unstable Cutting

Inserts Shape	Order Number	RE (mm)	UE6105	UE6110	UE6020		MC6015	MC6025	MC6035	UE6035	UH6400	MC7015	MC7025		MP7035	US7020	US735	US905	MC5005	MC5015	UC5105	UC5115	MP9005	MP9015	VP05RT	VP10RT	VP15TF	UP20M	NX2525	NX3035		MP3025	AP25N	VP25N	UTi20T	HTi05T	HTi10	RT9010	MT9015
			Coated																										Cermet			Coated Cermet			Carbide				
Work Material	P Steel		●	◐	✤		◐	✤	✤	✤	✤																✤	✤	●	◐		◐	●	●	✤				
	M Stainless steel											●	◐		✤	●	✤									◐	✤	✤	●				●	●	✤				
	K Cast iron																		◐	✤	●	◐				◐	✤		●				●	●	✤	●	◐		
	N Non-Ferrous Metal																																				◐		
	S Heat-resistant Alloy, Titanium Alloy																	●					●	◐	●	◐	✤										◐	◐	◐
	TNGG160408L-K	0.8																														●							
	TNGG160408R-K	0.8																														●							

VN**

Rhombic 35°, Neg, With hole

Product Information

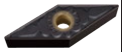
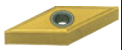
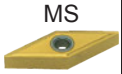
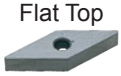
APPLICABLE HOLDER PAGE (EXTERNAL TURNING TOOLS) >> 314
IDENTIFICATION >> 30
TECHNICAL INFO >> 1971
APPLICABLE HOLDER PAGE (BORING BARS) >> 404
GRADES >> 58
SUITABLE GRADE, CHIPBREAKER >> 38

Stock status (10 inserts in one case)
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Work Material																																											
P	Steel	●	◐	✣		◐	✣	✣	✣	✣																	✣	✣	●	◐		◐	●	●	✣							
M	Stainless steel										○	◐		✣	○	✣											◐	✣	✣	○				○	○	✣							
K	Cast iron																	◐	✣	●	◐				◐	✣			●				●	●	✣	●	◐					
N	Non-Ferrous Metal																																				◐					
S	Heat-resistant Alloy, Titanium Alloy															●						●	◐	●	◐	✣											◐	◐	◐			

Inserts Shape	Order Number	RE (mm)	Coated																								Cermet		Coated Cermet			Carbide				
			UE6105	UE6110	UE6020	MC6015	MC6025	MC6035	UE6035	UH6400	MC7015	MC7025	MP7035	US7020	US735	US905	MC5005	MC5015	UC5105	UC5115	MP9005	MP9015	VP05RT	VP10RT	VP15TF	UP20M	NX2525	NX3035	MP3025	AP25N	VP25N	UTi20T	HTi05T	HTi10	RT9010	MT9015
FP	VNMG160402-FP	0.2				●	●																				●		●							
	VNMG160404-FP	0.4				●	●																				●		●							
	VNMG160408-FP	0.8				●	●																				●		●							
FH	VNMG160402-FH	0.2		●	▲																						●	●	●							
	VNMG160404-FH	0.4		●	▲																						●		●	●						
	VNMG160408-FH	0.8		●	▲																						●	●	●	●						
FS	VNMG160404-FS	0.4			▲																						●									
	VNMG160408-FS	0.8			▲																						●									
FJ	VNGG160401-FJ	0.1																						●											●	
	VNGG160402-FJ	0.2																						●											●	
	VNGG1604V5-FJ	0.05																						●											●	
R/L-F	VNGG160402L-F	0.2																							●		●	●	●							
	VNGG160402R-F	0.2																							●		●	●	●							
	VNGG160404L-F	0.4																							●		●	●	●							
	VNGG160404R-F	0.4																							●		●	●	●							
LP	VNMG160404-LP	0.4	●	●		●	●	●																					●							
	VNMG160408-LP	0.8	●	●		●	●	●																					●							
LM	VNMG160404-LM	0.4									●	●	●																							
	VNMG160408-LM	0.8									●	●	●																							
LK	VNMG160404-LK	0.4															●	●																		
	VNMG160408-LK	0.8															●	●																		
LS	VNMG160404-LS	0.4																			●	●														●
	VNMG160408-LS	0.8																			●	●														●
SH	VNMG160404-SH	0.4	●	●	▲	●	●																				●	●		●						
	VNMG160408-SH	0.8	●	●	▲	●	●																				●	●		●						
SA	VNMG160404-SA	0.4				●	●																				●									
	VNMG160408-SA	0.8				●	●																				●									
MJ	VNGM160404-MJ	0.4																						●											●	
	VNGM160408-MJ	0.8																						●											●	
MJ	VNMG160404-MJ	0.4														●							●	●											●	
	VNMG160408-MJ	0.8														●							●	●											●	
	VNMG160412-MJ	1.2														●							●	●												
MP	VNMG160404-MP	0.4	●	●	▲	●	●	●												●									●							
	VNMG160408-MP	0.8	●	●	▲	●	●	●												●									●							
	VNMG160412-MP	1.2	●	●	▲	●	●	●												●																

●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. Stock status (10 inserts in one case) □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Work Material																																											
	P	Steel	●	◐	✣		◐	✣	✣	✣	✣																✣	✣	●	◐		◐	●	●	✣								
	M	Stainless steel										○	◐		✣	○	✣										◐	✣	✣	○				○	○	✣								
	K	Cast iron																	◐	✣	●	◐					◐	✣		●				●	●	✣	●	◐					
	N	Non-Ferrous Metal																																				◐					
	S	Heat-resistant Alloy, Titanium Alloy																●					●	◐	●	◐	✣											◐	◐	◐			
Inserts Shape	Order Number	RE (mm)	Coated																										Cermet		Coated Cermet			Carbide								
			UE6105	UE6110	UE6020		MC6015	MC6025	MC6035	UE6035	UH6400	MC7015	MC7025		MP7035	US7020	US735	US905	MC5005	MC5015	UC5105	UC5115	MP9005	MP9015	VP05RT	VP10RT	VP15TF	UP20M	NX2525	NX3035		MP3025	AP25N	VP25N	UTi20T	HTi05T	HTi10	RT9010	MT9015
MM	VNMG160408-MM	0.8										●	●		●																												
MK 	VNMG160404-MK	0.4																	●	●																							
	VNMG160408-MK	0.8																	●	●																							
	VNMG160412-MK	1.2																	●	●																							
GK	VNMG160404-GK	0.4																	●	●																							
	VNMG160408-GK	0.8																	●	●																							
	VNMG160412-GK	1.2																	●	●																							
GM 	VNMG160404-GM	0.4										●	●		●																												
	VNMG160408-GM	0.8										●	●		●																												
MA	VNMG160404-MA	0.4	●	●	▲		●	●					●		●	▲	●		●	●	●	●					●																
	VNMG160408-MA	0.8	●	●	▲		●	●	●	●			●		●	▲	●		●	●	●	●					●																
MH	VNMG160404-MH	0.4	●	●	▲																	●																					
	VNMG160408-MH	0.8	●	●	▲		●	●	●							▲						●																					
Standard	VNMG160404	0.4	●	●	▲		●	●													●	●					●		●	●		●			●		●						
	VNMG160408	0.8	●	●	▲		●	●	●												●	●					●		●	●		●			●		●						
	VNMG160412	1.2	●	●			●	●	●												●	●							●														
MS 	VNMG160404-MS	0.4		●												▲	●	●							●	●		●															
	VNMG160408-MS	0.8		●												▲	●	●							●	●				●									●				
MS	VNMG160404-MS	0.4																					●	●																			●
	VNMG160408-MS	0.8																					●	●																			●
R/L	VNGG160404L	0.4																											●	●					●								
	VNGG160404R	0.4																											●	●					●		●						
Flat Top 	VNGA160404	0.4																																		●	●						
	VNGA160408	0.8																																		●	●						

WN**

Trigon, Neg, With hole

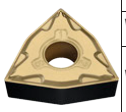
Product Information

APPLICABLE HOLDER PAGE (EXTERNAL TURNING TOOLS) >> 320
IDENTIFICATION >> 30
TECHNICAL INFO >> 1971

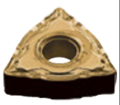
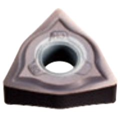
APPLICABLE HOLDER PAGE (BORING BARS) >> 444
GRADES >> 58
SUITABLE GRADE, CHIPBREAKER >> 38

Stock status (10 inserts in one case)
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Work Material																																															
	P	Steel	●	◐	✣		◐	✣	✣	✣	✣																	✣	✣	●	◐		◐	●	●	✣										
	M	Stainless steel										○	◐		✣	○	✣										◐	✣	✣	○				○	○	✣										
	K	Cast iron																	◐	✣	●	◐					◐	✣		●				●	●	✣	●	◐								
	N	Non-Ferrous Metal																																				◐								
	S	Heat-resistant Alloy, Titanium Alloy																●					●	◐	●	◐	✣											◐	◐	◐						

Inserts Shape	Order Number	RE (mm)	Coated																									Cermet		Coated Cermet			Carbide				
			UE6105	UE6110	UE6020		MC6015	MC6025	MC6035	UE6035	UH6400	MC7015	MC7025		MP7035	US7020	US735	US905	MC5005	MC5015	UC5105	UC5115	MP9005	MP9015	VP05RT	VP10RT	VP15TF	UP20M	NX2525	NX3035	MP3025	AP25N	VP25N	UTi20T	HTi05T	HTi10	RT9010	MT9015
FP 	WNMG080402-FP	0.2					●	●																					●		●								
	WNMG080404-FP	0.4					●	●																					●		●								
	WNMG080408-FP	0.8					●	●																					●		●								
FH	WNMG080404-FH	0.4		●																									●		●								
	WNMG080408-FH	0.8		●																									●		●	●							
FS	WNMG080404-FS	0.4			▲																								●										
	WNMG080408-FS	0.8			▲																								●										
FY	WNMG080404-FY	0.4																											●		●								
	WNMG080408-FY	0.8			▲																								●		●		●						
LP	WNMG060404-LP	0.4	●	●			●	●	●																						●								
	WNMG060408-LP	0.8	●	●			●	●	●																						●								
	WNMG06T304-LP	0.4	●	●			●	●	●																						●								
	WNMG06T308-LP	0.8	●	●			●	●	●																						●								
	WNMG080404-LP	0.4	●	●			●	●	●																						●								
	WNMG080408-LP	0.8	●	●			●	●	●																						●								
	WNMG080412-LP	1.2	●	●			●	●	●																														
LM	WNMG060404-LM	0.4										●	●		●																								
	WNMG060408-LM	0.8										●	●		●																								
	WNMG080404-LM	0.4										●	●		●																								
	WNMG080408-LM	0.8										●	●		●																								
LK	WNMG080404-LK	0.4																	●	●																			
	WNMG080408-LK	0.8																	●	●																			
	WNMG080412-LK	1.2																	●	●																			
LS	WNMG080404-LS	0.4																					●	●															●
	WNMG080408-LS	0.8																					●	●															●
SH	WNMG060404-SH	0.4	●	●													●																						
	WNMG060408-SH	0.8	●	●													●																						
	WNMG06T304-SH	0.4	●	●													●																						
	WNMG06T308-SH	0.8	●	●													●																						
	WNMG080404-SH	0.4	●	●			●	●									●					●							●										

Stock status (10 inserts in one case)
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. ☐: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✤: Unstable Cutting

Inserts Shape	Order Number	RE (mm)	UE6105	UE6110	UE6020	MC6015	MC6025	MC6035	UE6035	UH6400	MC7015	MC7025	MP7035	US7020	US735	US905	MC5005	MC5015	UC5105	UC5115	MP9005	MP9015	VP05RT	VP10RT	VP15TF	UP20M	NX2525	NX3035	MP3025	AP25N	VP25N	UTi20T	HTi05T	HTi10	RT9010	MT9015
Work Material	P Steel		●	◐	✤	◐	✤	✤	✤	✤															✤	✤	●	◐	◐	●	●	✤				
	M Stainless steel										●	◐	✤	●	✤									◐	✤	✤	●			●	●	✤				
	K Cast iron																◐	✤	●	◐				◐	✤		●			●	●	✤	●	◐		
	N Non-Ferrous Metal																																	◐		
	S Heat-resistant Alloy, Titanium Alloy															●					●	◐	●	◐	✤									◐	◐	◐
			Coated																								Cermet		Coated Cermet			Carbide				
	WNMG080408-SH	0.8	●	●	▲	●	●								●					●							●									
	WNMG080412-SH	1.2	●	●	▲	●	●								●					●																
SA 	WNMG080404-SA	0.4	●	●	▲	●	●																				●	●								
	WNMG080408-SA	0.8	●	●	▲	●	●																				●	●								
	WNMG080412-SA	1.2	●	●	▲	●	●																					●								
SW	WNMG060404-SW	0.4	●	●		●								▲													●		●							
	WNMG060408-SW	0.8	●	●		●								▲													●		●							
	WNMG080404-SW	0.4	●	●		●								▲			●	●		●							●	●	●							
	WNMG080408-SW	0.8	●	●		●								▲			●	●		●							●	●	●							
	WNMG080412-SW	1.2	●	●		●								▲													●	●	●							
SY	WNMG080404-SY	0.4																									●		●							
	WNMG080408-SY	0.8			▲																						●	●	●		●					
C	WNMG080404-C	0.4																									▲	▲								
	WNMG080408-C	0.8																										▲								
MJ 	WNMG080408-MJ	0.8														●							●	●												
	WNMG080412-MJ	1.2														●							●	●												
	WNMG080416-MJ	1.6														●							●	●												
	WNMG060404-MP	0.4	●	●	▲	●	●	●												●																
	WNMG060408-MP	0.8	●	●	▲	●	●	●												●																
	WNMG060412-MP	1.2	●	●	▲	●	●	●												●																
MP	WNMG06T304-MP	0.4	●	●	▲	●	●	●												●																
	WNMG06T308-MP	0.8	●	●	▲	●	●	●												●																
	WNMG06T312-MP	1.2	●	●	▲	●	●	●												●																
	WNMG080404-MP	0.4	●	●	▲	●	●	●												●									●							
	WNMG080408-MP	0.8	●	●	▲	●	●	●												●									●							
	WNMG080412-MP	1.2	●	●	▲	●	●	●												●									●							
	WNMG080416-MP	1.6	●	●	▲	●	●	●												●																
MM	WNMG060408-MM	0.8									●	●	●																							
	WNMG060412-MM	1.2									●	●	●																							
	WNMG080408-MM	0.8									●	●	●																							
	WNMG080412-MM	1.2									●	●	●																							
MK	WNMG080404-MK	0.4															●	●																		
	WNMG080408-MK	0.8															●	●																		
	WNMG080412-MK	1.2															●	●																		
	WNMG080416-MK	1.6															●	●																		
GK	WNMG060404-GK	0.4															●	●																		
	WNMG060408-GK	0.8															●	●																		
	WNMG080404-GK	0.4															●	●																		

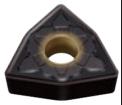
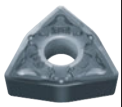
WN**

Stock status (10 inserts in one case)
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Work Material																																															
	P	Steel	●	◐	✣		◐	✣	✣	✣	✣																			✣	✣	●	◐		◐	●	●	✣								
	M	Stainless steel										○	◐		✣	○	✣													◐	✣	✣	○				○	○	✣							
	K	Cast iron																	◐	✣	●	◐				◐	✣		●						●	●	✣	●	◐						
	N	Non-Ferrous Metal																																					◐						
	S	Heat-resistant Alloy, Titanium Alloy																●					●	◐	●	◐	✣												◐	◐	◐				

Inserts Shape	Order Number	RE (mm)	Coated																										Cermet		Coated Cermet			Carbide					
			UE6105	UE6110	UE6020		MC6015	MC6025	MC6035	UE6035	UH6400	MC7015	MC7025		MP7035	US7020	US735	US905	MC5005	MC5015	UC5105	UC5115	MP9005	MP9015	VP05RT	VP10RT	VP15TF	UP20M	NX2525	NX3035	MP3025	AP25N	VP25N	UTi20T	HTi05T	HTi10	RT9010	MT9015
	WNMG080408-GK	0.8																	●	●																			
	WNMG080412-GK	1.2																	●	●																			
GM	WNMG060404-GM	0.4										●	●		●																								
	WNMG060408-GM	0.8										●	●		●																								
	WNMG080404-GM	0.4										●	●		●																								
	WNMG080408-GM	0.8										●	●		●																								
	WNMG080412-GM	1.2										●	●		●																								
MA	WNMG060404-MA	0.4	●	●			●	●									●																						
	WNMG060408-MA	0.8	●	●			●	●					●		●		●		●	●							●												
	WNMG060412-MA	1.2	●	●			●	●					●		●		●		●	●							●												
	WNMG06T304-MA	0.4	●	●													●																						
	WNMG06T308-MA	0.8	●	●													●																						
	WNMG06T312-MA	1.2	●	●													●																						
	WNMG080404-MA	0.4	●	●	▲		●	●					●		●	▲	●		●	●		●					●			●									
	WNMG080408-MA	0.8	●	●	▲		●	●	●	●			●		●	▲	●		●	●	●	●					●			●									
	WNMG080412-MA	1.2	●	●	▲		●	●	●	●			●		●	▲	●		●	●	●	●					●			●									
	WNMG080416-MA	1.6	●	●																		●																	
	WNMG100612-MA	1.2			▲					●																													
MH	WNMG080404-MH	0.4	●	●	▲																																		
	WNMG080408-MH	0.8	●	●	▲		●	●	●	●						▲						●																	
	WNMG080412-MH	1.2	●	●	▲		●	●	●	●												●																	
Standard	WNMG080404	0.4	●	●	▲		●	●													●	●							●		●								
	WNMG080408	0.8	●	●	▲		●	●	●												●	●					●		●		●			●					
	WNMG080412	1.2	●	●	▲		●	●	●												●	●					●							●					
	WNMG080416	1.6																				●																	
MW	WNMG060408-MW	0.8	●	●	▲		●	●											●	●	●	●																	
	WNMG060412-MW	1.2	●	●			●	●											●	●	●	●																	
	WNMG080408-MW	0.8	●	●	▲		●	●								▲			●	●	●	●																	
	WNMG080412-MW	1.2	●	●			●	●								▲			●	●	●	●																	
MS	WNMG060404-MS	0.4		●												▲	●																						
	WNMG060408-MS	0.8		●												▲	●																						
	WNMG06T304-MS	0.4		●												▲	●																						
	WNMG06T308-MS	0.8		●												▲	●																						
	WNMG080404-MS	0.4		●	▲											▲	●																						
	WNMG080408-MS	0.8		●	▲											▲	●	●							●	●	●										●		
	WNMG080412-MS	1.2		●													●	●							●	●													
MS	WNMG080404-MS	0.4																					●	●															●
	WNMG080408-MS	0.8																					●	●															●
	WNMG080412-MS	1.2																					●	●															●

Stock status (10 inserts in one case)
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Work Material																																													
	P	Steel	●	◐	✣		◐	✣	✣	✣	✣																			✣	✣	●	◐		◐	●	●	✣							
	M	Stainless steel										○	◐		✣	○	✣													◐	✣	✣	○				○	○	✣						
	K	Cast iron																	◐	✣	●	◐				◐	✣		●							●	●	✣	●	◐				
	N	Non-Ferrous Metal																																						◐				
	S	Heat-resistant Alloy, Titanium Alloy																●					●	◐	●	◐	✣												◐	◐	◐	
Inserts Shape	Order Number	RE (mm)	Coated																									Cermet			Coated Cermet			Carbide							
			UE6105	UE6110	UE6020		MC6015	MC6025	MC6035	UE6035	UH6400	MC7015	MC7025		MP7035	US7020	US735	US905	MC5005	MC5015	UC5105	UC5115	MP9005	MP9015	VP05RT	VP10RT	VP15TF	UP20M	NX2525	NX3035		MP3025	AP25N	VP25N	UTi20T	HTi05T	HTi10	RT9010	MT9015
RP	WNMG080408-RP	0.8	●	●			●	●	●																																				
	WNMG080412-RP	1.2	●	●			●	●	●																																				
RM	WNMG060408-RM	0.8										●	●		●																														
	WNMG060412-RM	1.2										●	●		●																														
	WNMG080408-RM	0.8										●	●		●																														
	WNMG080412-RM	1.2										●	●		●																														
RK 	WNMG080408-RK	0.8																	●	●																									
	WNMG080412-RK	1.2																	●	●																									
	WNMG080416-RK	1.6																	●	●																									
RS 	WNMG080408-RS	0.8																						●																				●
	WNMG080412-RS	1.2																						●																				●
	WNMG080416-RS	1.6																						●																				●
	WNMG100612-RS	1.2																						●																				●
GH	WNMG080408-GH	0.8	●	●	▲											▲	●				●	●																							
	WNMG080412-GH	1.2	●	●	▲												●				●	●																							
GJ	WNMG080408-GJ	0.8																●								●													●					
	WNMG080412-GJ	1.2																●								●													●					
	WNMG080416-GJ	1.6																●								●													●					
	WNMG100612-GJ	1.2																								●													●					
Flat Top	WNMA060408	0.8																	●	●																									
	WNMA060412	1.2																	●	●																									
	WNMA080404	0.4																	●	●	●	●															●							
	WNMA080408	0.8																	●	●	●	●															●							
	WNMA080412	1.2																	●	●	●	●																							
	WNMA080416	1.6																	●	●		●																							

CN**

Rhombic 80°, Neg, Without hole

Product Information

80°

IDENTIFICATION >> 30
TECHNICAL INFO >> 1971
GRADES >> 58
SUITABLE GRADE, CHIPBREAKER >> 38

Stock status (10 inserts in one case)
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Work Material			Coated																									Cermet		Coated Cermet			Carbide				
			UE6105	UE6110	UE6020		MC6015	MC6025	MC6035	UE6035	UH6400	MC7015	MC7025		MP7035	US7020	US735	US905	MC5005	MC5015	UC5105	UC5115	MP9005	MP9015	VP05RT	VP10RT	VP15TF	UP20M	NX2525	NX3035		MP3025	AP25N	VP25N	UTi20T	HTi05t	HTi10	RT9010	MT9015
P	Steel		●	◐	✣		◐	✣	✣	✣	✣															✣	✣		●	◐		◐	●	●	✣				
M	Stainless steel											○	◐		✣	○	✣								◐	✣	✣		○				○	○	✣				
K	Cast iron																		◐	✣	●	◐			◐	✣			●				●	●	✣	●	◐		
N	Non-Ferrous Metal																																				◐		
S	Heat-resistant Alloy, Titanium Alloy																	●					●	◐	●	◐	✣									◐	◐	◐
Inserts Shape	Order Number	RE (mm)																																					
Flat Top	CNMN120408	0.8																	●	●																			
	CNMN120412	1.2																	●	●																			
	CNMN120416	1.6																	●	●																			

SN**

SQUARE

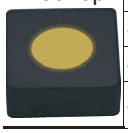
Product Information

90°

IDENTIFICATION >> 30
TECHNICAL INFO >> 1971
GRADES >> 58
SUITABLE GRADE, CHIPBREAKER >> 38

Stock status (10 inserts in one case)
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Work Material																																															
P	Steel	●	◐	✣		◐	✣	✣	✣	✣																		✣	✣	●	◐		◐	●	●	✣										
M	Stainless steel										○	◐		✣	○	✣											◐	✣	✣	○				○	○	✣										
K	Cast iron																		◐	✣	●	◐					◐	✣		●				●	●	✣	●	◐								
N	Non-Ferrous Metal																																					◐									
S	Heat-resistant Alloy, Titanium Alloy																●						●	◐	●	◐	✣											◐	◐	◐							

Inserts Shape	Order Number	RE (mm)	Coated																											Cermet		Coated Cermet			Carbide				
			UE6105	UE6110	UE6020		MC6015	MC6025	MC6035	UE6035	UH6400	MC7015	MC7025		MP7035	US7020	US735	US905	MC5005	MC5015	UC5105	UC5115	MP9005	MP9015	VP05RT	VP10RT	VP15TF	UP20M	NX2525	NX3035		MP3025	AP25N	VP25N	UTi20T	HTi05t	HTi10	RT9010	MT9015
Flat Top	SNGN090308	0.8																																			●		
	SNGN120404	0.4																																	●		●		
	SNGN120408	0.8																																	●				
Flat Top 	SNMN120408	0.8																	●	●	●	●								●					●		●		
	SNMN120412	1.2																	●	●	●	●								●					●				
	SNMN120416	1.6																	●	●	●	●																	
	SNMN190412	1.2																																	●				

TN**

Triangular, Neg, Without hole

Product Information

IDENTIFICATION >> 30
TECHNICAL INFO >> 1971
GRADES >> 58
SUITABLE GRADE, CHIPBREAKER >> 38

Stock status (10 inserts in one case)
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

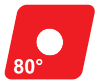
Work Material		Coated																											Cermet		Coated Cermet			Carbide				
		UE6105	UE6110	UE6020		MC6015	MC6025	MC6035	UE6035	UH6400	MC7015	MC7025		MP7035	US7020	US735	US905	MC5005	MC5015	UC5105	UC5115	MP9005	MP9015	VP05RT	VP10RT	VP15TF	UP20M	NX2525	NX3035		MP3025	AP25N	VP25N	UTi20T	HTi05t	HTi10	RT9010	MT9015
P Steel		●	◐	✣		◐	✣	✣	✣	✣																✣	✣	●	◐		◐	●	●	✣				
M Stainless steel											○	◐		✣	○	✣									◐	✣	✣	○				○	○	✣				
K Cast iron																		◐	✣	●	◐				◐	✣		●				●	●	✣	●	◐		
N Non-Ferrous Metal																																				◐		
S Heat-resistant Alloy, Titanium Alloy																	●					●	◐	●	◐	✣										◐	◐	◐
Inserts Shape	Order Number	RE (mm)																																				
Flat Top	TNGN110304	0.4																																		●		
	TNGN110308	0.8																																		●		
	TNGN160404	0.4																																		●		
	TNGN160408	0.8																																		●		
Flat Top	TNMN160308	0.8																										●										
	TNMN160408	0.8																●	●	●	●							●										
	TNMN160412	1.2																●	●	●	●																	
	TNMN160416	1.6																●	●	●	●																	
	TNMN160420	2																			●																	
	TNMN220408	0.8																										●										
	TNMN220412	1.2																																●				

Memo

CC**

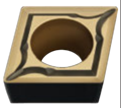
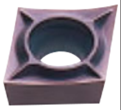
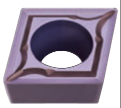
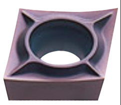
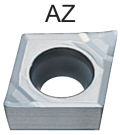
Rhombic 80°, 7° Posi, With hole

Product Information



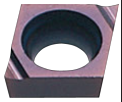
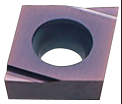
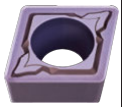
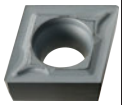
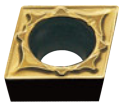
APPLICABLE HOLDER PAGE (EXTERNAL TURNING TOOLS) >> 322
APPLICABLE HOLDER PAGE (BORING BARS) >> 386
GRADES >> 58
SUITABLE GRADE, CHIPBREAKER >> 38
APPLICABLE HOLDER PAGE (SMALL TOOLS) >> 350
IDENTIFICATION >> 30
TECHNICAL INFO >> 1971

Stock status (10 inserts in one case)
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. ☐: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✤: Unstable Cutting

Inserts Shape	Order Number	RE (mm)	UE6105	UE6110	UE6020	MC6015	MC6025	UH6400	MC7025	MP7035	US7020	US735	US905	MC5005	MC5015	UC5105	UC5115	MP9005	MP9015	VP05RT	VP10RT	VP15TF	UP20M	MS6015	NX2525	NX3035		MP3025	AP25N	VP25N	VP45N	UTi20T	HTi05T	HTi10	RT9010	MT9005	MT9015
			Coated																						Cermet			Coated Cermet				Carbide					
Work Material	P Steel		●	◐	✤	◐	✤	✤														✤	✤	◐	●	◐		◐	●	●	◐	✤					
	M Stainless steel								◐	✤	●	✤									◐	✤	✤		●				●	●		✤					
	K Cast iron													◐	✤	●	◐				◐	✤			●				●	●		✤	●	◐			
	N Non-Ferrous Metal																																	◐			
	S Heat-resistant Alloy, Titanium Alloy												●					●	◐	●	◐	✤												◐	◐	●	◐
FP 	CCMT060202-FP	0.2		●		●	●																		●			●									
	CCMT060204-FP	0.4		●		●	●																		●			●									
	CCMT09T302-FP	0.2		●		●	●																		●			●									
	CCMT09T304-FP	0.4		●		●	●																		●			●									
	CCMT09T308-FP	0.8		●		●	●																		●			●									
FS 	CCGT060201M-FS	0.08																●	●																		
	CCGT060202M-FS	0.18																●	●																		
	CCGT09T301M-FS	0.08																●	●																		
	CCGT09T302M-FS	0.18																●	●																		
	CCGT09T304M-FS	0.38																●	●																		
FS-P	CCGT060201M-FS-P	0.08																																		●	
	CCGT060202M-FS-P	0.18																																		●	
	CCGT09T301M-FS-P	0.08																																		●	
	CCGT09T302M-FS-P	0.18																																		●	
	CCGT09T304M-FS-P	0.38																																		●	
FM 	CCMT060202-FM	0.2																				●															
	CCMT060204-FM	0.4																				●															
	CCMT09T302-FM	0.2																				●															
	CCMT09T304-FM	0.4																				●															
	CCMT09T308-FM	0.8																				●															
FV	CCMT060202-FV	0.2			▲																	●			●	●			●		●						
	CCMT060204-FV	0.4			▲																	●			●	●			●		●						
	CCMT09T302-FV	0.2			▲																				●	●					●						
	CCMT09T304-FV	0.4			▲																				●	●			●		●						
	CCMT09T308-FV	0.8			▲																				●	●			●		●						
FJ 	CCGT060201-FJ	0.1																			●																
	CCGT060202-FJ	0.2																			●																
	CCGT0602V5-FJ	0.05																			●																
	CCGT09T301-FJ	0.1																			●														●		
	CCGT09T302-FJ	0.2																			●														●		
	CCGT09T304-FJ	0.4																			●														●		
	CCGT09T3V5-FJ	0.05																			●																
AZ 	CCGT060202-AZ	0.2																																●			
	CCGT060204-AZ	0.4																																●			
	CCGT09T302-AZ	0.2																																●			
	CCGT09T304-AZ	0.4																																●			
	CCGT09T308-AZ	0.8																																●			
	CCGT120402-AZ	0.2																																●			
	CCGT120404-AZ	0.4																																●			
	CCGT120408-AZ	0.8																																●			

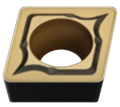
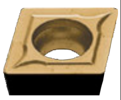
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. Stock status (10 inserts in one case) □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Work Material																																											
	P	Steel	●	◐	✣	◐	✣	✣																	✣	✣	◐	●	◐		◐	●	●	◐	✣							
	M	Stainless steel							◐	✣	○	✣											◐	✣	✣	◐	○				○	○		✣								
	K	Cast iron												◐	✣	●	◐						◐	✣			●				●	●		✣	●	◐						
	N	Non-Ferrous Metal																																	◐						
	S	Heat-resistant Alloy, Titanium Alloy											●					●	◐	●	◐	✣													◐	◐	●	◐

Inserts Shape	Order Number	RE (mm)	Coated																						Cermet		Coated Cermet				Carbide					
			UE6105	UE6110	UE6020	MC6015	MC6025	UH6400	MC7025	MP7035	US7020	US735	US905	MC5005	MC5015	UC5105	UC5115	MP9005	MP9015	VP05RT	VP10RT	VP15TF	UP20M	MS6015	NX2525	NX3035	MP3025	AP25N	VP25N	VP45N	UTi20T	HTi05T	HTi10	RT9010	MT9005	MT9015
R/L-F 	CCGT03S101L-F	0.1																				●			●											
	CCGT03S102L-F	0.2																				●			●		●									
	CCGT03S104L-F	0.4																				●			●		●									
	CCGT03S1V3L-F	0.03																				●			●											
	CCGT04T001L-F	0.1																				●			●											
	CCGT04T002L-F	0.2																				●			●		●									
	CCGT04T004L-F	0.4																				●			●		●									
	CCGT04T0V3L-F	0.03																				●			●											
R/L-F 	CCGH060202L-F	0.2																				●			●			●					●			
	CCGH060202R-F	0.2																				●			●			●					●			
	CCGH060204L-F	0.4																				●			●			●					●			
	CCGH060204R-F	0.4																				●			●			●					●			
LP	CCMT060204-LP	0.4		●		●	●																		●		●									
	CCMT060208-LP	0.8		●		●	●																		●		●									
	CCMT09T304-LP	0.4		●		●	●																		●		●									
	CCMT09T308-LP	0.8		●		●	●																		●		●									
LM 	CCMT060204-LM	0.4							●	●												●														
	CCMT060208-LM	0.8							●	●												●														
	CCMT09T304-LM	0.4							●	●												●														
	CCMT09T308-LM	0.8							●	●												●														
LS 	CCGT060201M-LS	0.08																●	●																	
	CCGT060202M-LS	0.18																●	●																	
	CCGT09T301M-LS	0.08																●	●																	
	CCGT09T302M-LS	0.18																●	●																	
	CCGT09T304M-LS	0.38																●	●																	
LS-P	CCGT060201M-LS-P	0.08																																	●	
	CCGT060202M-LS-P	0.18																																	●	
	CCGT09T301M-LS-P	0.08																																	●	
	CCGT09T302M-LS-P	0.18																																	●	
	CCGT09T304M-LS-P	0.38																																	●	
SV	CCMH060202-SV	0.2			▲		●				▲	●										●			●	●	●			●						
	CCMH060204-SV	0.4			▲		●				▲	●										●			●	●	●			●						
SW 	CCMT060202-SW	0.2		●	▲	●	●				▲														●		●		●							
	CCMT060204-SW	0.4		●	▲	●	●				▲						●								●		●		●							
	CCMT09T302-SW	0.2		●	▲	●	●				▲						●								●		●		●							
	CCMT09T304-SW	0.4		●	▲	●	●				▲						●								●		●		●							
R/L-SS	CCGT060201L-SS	0.1																				●														
	CCGT060201MR-SS	0.1																						●												
	CCGT060201R-SS	0.1																				●														
	CCGT060202L-SS	0.2																				●														
	CCGT060202MR-SS	0.2																						●												
	CCGT060202R-SS	0.2																				●														
	CCGT0602V3L-SS	0.03																				●														

CC**

Stock status (10 inserts in one case)
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✤: Unstable Cutting

			Coated																						Cermet		Coated Cermet				Carbide					
Inserts Shape	Order Number	RE (mm)	UE6105	UE6110	UE6020	MC6015	MC6025	UH6400	MC7025	MP7035	US7020	US735	US905	MC5005	MC5015	UC5105	UC5115	MP9005	MP9015	VP05RT	VP10RT	VP15TF	UP20M	MS6015	NX2525	NX3035	MP3025	AP25N	VP25N	VP45N	UTi20T	HTi05T	HTi10	RT9010	MT9005	MT9015
Work Material	P Steel		●	◐	✤	◐	✤	✤														✤	✤	◐	●	◐	◐	●	●	◐	✤					
Work Material	M Stainless steel								◐	✤	●	✤									◐	✤	✤		●			●	●		✤					
Work Material	K Cast iron													◐	✤	●	◐				◐	✤			●			●	●		✤	●	◐			
Work Material	N Non-Ferrous Metal																																◐			
Work Material	S Heat-resistant Alloy, Titanium Alloy												●					●	◐	●	◐	✤											◐	◐	●	◐
	CCGT0602V3R-SS	0.03																				●														
	CCGT09T301L-SS	0.1																				●														
	CCGT09T301MR-SS	0.1																						●												
	CCGT09T301R-SS	0.1																				●														
	CCGT09T302L-SS	0.2																				●														
	CCGT09T302MR-SS	0.2																						●												
	CCGT09T302R-SS	0.2																				●														
	CCGT09T304MR-SS	0.4																						●												
	CCGT09T3V3L-SS	0.03																				●														
	CCGT09T3V3R-SS	0.03																				●														
MP 	CCMT060204-MP	0.4		●		●	●																		●		●									
MP	CCMT060208-MP	0.8		●		●	●																		●		●									
MP	CCMT09T304-MP	0.4		●		●	●																		●		●									
MP	CCMT09T308-MP	0.8		●		●	●																		●		●									
MP	CCMT120404-MP	0.4		●		●	●																		●		●									
MP	CCMT120408-MP	0.8		●		●	●																		●		●									
MP	CCMT120412-MP	1.2		●		●	●																		●		●									
MM	CCMT060204-MM	0.4							●	●												●														
MM	CCMT060208-MM	0.8							●	●												●														
MM	CCMT09T304-MM	0.4							●	●												●														
MM	CCMT09T308-MM	0.8							●	●												●														
MM	CCMT120404-MM	0.4							●	●												●														
MM	CCMT120408-MM	0.8							●	●												●														
MM	CCMT120412-MM	1.2							●	●												●														
MK	CCMT060204-MK	0.4												●	●																					
MK	CCMT060208-MK	0.8												●	●																					
MK	CCMT09T304-MK	0.4												●	●																					
MK	CCMT09T308-MK	0.8												●	●																					
MK	CCMT120404-MK	0.4												●	●																					
MK	CCMT120408-MK	0.8												●	●																					
MK	CCMT120412-MK	1.2												●	●																					
Standard 	CCMT060202	0.2		●	▲							●													●	●	●	●			●					
Standard	CCMT060204	0.4	●	●	▲							●					●					●			●	●	●	●			●					
Standard	CCMT060208	0.8		●	▲							●					●					●			●						●					
Standard	CCMT080302	0.2		●																																
Standard	CCMT080304	0.4		●								●													●	●	●	●			●					
Standard	CCMT080308	0.8		●								●																			●					
Standard	CCMT09T302	0.2		●	▲							●													●	●	●	●								
Standard	CCMT09T304	0.4	●	●	▲							●					●					●			●	●	●	●			●					
Standard	CCMT09T308	0.8	●	●	▲							●					●					●			●	●	●	●			●					
Standard	CCMT120404	0.4	●	●	▲							●					●					●			●	●	●	●			●					
Standard	CCMT120408	0.8	●	●	▲							●					●					●			●	●	●				●					
Standard	CCMT120412	1.2		●	▲							●					●									●										

TURNING INSERT
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WITH HOLE
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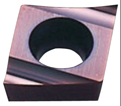
Stock status (10 inserts in one case)
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. ☐: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◑: General Cutting ✥: Unstable Cutting

Inserts Shape	Order Number	RE (mm)	UE6105	UE6110	UE6020	MC6015	MC6025	UH6400	MC7025	MP7035	US7020	US735	US905	MC5005	MC5015	UC5105	UC5115	MP9005	MP9015	VP05RT	VP10RT	VP15TF	UP20M	MS6015	NX2525	NX3035		MP3025	AP25N	VP25N	VP45N	UTi20T	HTi05T	HTi10	RT9010	MT9005	MT9015
			Coated																						Cermet			Coated Cermet				Carbide					
Work Material	P	Steel	●	◑	✥	◑	✥	✥														✥	✥	◑	●	◑		◑	●	●	◑	✥					
Work Material	M	Stainless steel							◑	✥	●	✥									◑	✥	✥		●				●	●		✥					
Work Material	K	Cast iron												◑	✥	●	◑				◑	✥			●				●	●		✥	●	◑			
Work Material	N	Non-Ferrous Metal																																◑			
Work Material	S	Heat-resistant Alloy, Titanium Alloy											●					●	◑	●	◑	✥												◑	◑	●	◑
MV	CCMH060202-MV	0.2			▲		●				▲	●										●			●	●		●	●		●						
	CCMH060204-MV	0.4			▲		●				▲	●			●							●			●	●		●	●		●						
MW	CCMT060204-MW	0.2			▲	●	●				▲														●			●		●							
	CCMT060208-MW	0.8		●	▲	●	●				▲														●			●		●							
	CCMT09T304-MW	0.4		●	▲	●	●				▲														●			●		●							
	CCMT09T308-MW	0.8		●	▲	●	●				▲														●			●		●							
	CCMT120404-MW	0.4		●	▲	●	●				▲						●								●					●							
	CCMT120408-MW	0.8		●	▲	●	●				▲						●								●					●							
R/L-SR 	CCET060201L-SR	0.1																				●			●									●			
	CCET060201R-SR	0.1																				●			●									●			
	CCET060202L-SR	0.2																				●			●									●			
	CCET060202R-SR	0.2																				●			●									●			
	CCET060204L-SR	0.4																				●			●									●			
	CCET060204R-SR	0.4																				●			●									●			
	CCET0602V3L-SR	0.03																				●			●									●			
	CCET0602V3R-SR	0.03																				●			●									●			
	CCET09T301L-SR	0.1																				●			●									●			
	CCET09T301R-SR	0.1																				●			●									●			
	CCET09T302L-SR	0.2																				●			●									●			
	CCET09T302R-SR	0.2																				●			●									●			
	CCET09T304L-SR	0.4																				●			●									●			
	CCET09T304R-SR	0.4																				●			●									●			
	CCET09T3V3L-SR	0.03																				●			●									●			
	CCET09T3V3R-SR	0.03																				●			●									●			
R/L-SN	CCET060200L-SN	0																				●			●									●			
	CCET060200R-SN	0																				●			●									●			
	CCET060201L-SN	0.1																				●			●									●			
	CCET060201R-SN	0.1																				●			●									●			
	CCET060202L-SN	0.2																				●			●									●			
	CCET060202R-SN	0.2																				●			●									●			
	CCET060204L-SN	0.4																				●			●									●			
	CCET060204R-SN	0.4																				●			●									●			
	CCET0602V3L-SN	0.03																				●			●									●			
	CCET0602V3R-SN	0.03																				●			●									●			
	CCET09T300L-SN	0																				●			●									●			
	CCET09T300R-SN	0																				●			●									●			
	CCET09T301L-SN	0.1																				●			●									●			
	CCET09T301R-SN	0.1																				●			●									●			
	CCET09T302L-SN	0.2																				●			●									●			
	CCET09T302R-SN	0.2																				●			●									●			
	CCET09T304L-SN	0.4																				●			●									●			
	CCET09T304R-SN	0.4																				●			●									●			
	CCET09T3V3L-SN	0.03																				●			●									●			

CC**

Stock status (10 inserts in one case)
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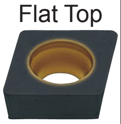
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Inserts Shape	Order Number	RE (mm)	UE6105	UE6110	UE6020	MC6015	MC6025	UH6400	MC7025	MP7035	US7020	US735	US905	MC5005	MC5015	UC5105	UC5115	MP9005	MP9015	VP05RT	VP10RT	VP15TF	UP20M	MS6015	NX2525	NX3035	MP3025	AP25N	VP25N	VP45N	UTi20T	HTi05T	HTi10	RT9010	MT9005	MT9015
Work Material	P Steel		●	◐	✣	◐	✣	✣														✣	✣	◐	●	◐	◐	●	●	◐	✣					
	M Stainless steel								◐	✣	●	✣									◐	✣	✣		●			●	●		✣					
	K Cast iron													◐	✣	●	◐				◐	✣			●			●	●		✣	●	◐			
	N Non-Ferrous Metal																																◐			
	S Heat-resistant Alloy, Titanium Alloy												●					●	◐	●	◐	✣											◐	◐	●	◐
			Coated																						Cermet		Coated Cermet				Carbide					
	CCET09T3V3R-SN	0.03																				●			●								●			
R/L-SN	CCGT060201L-SN	0.1																				●														
	CCGT060201MR-SN	0.1																						●												
	CCGT060201R-SN	0.1																				●														
	CCGT060202L-SN	0.2																				●														
	CCGT060202MR-SN	0.2																						●												
	CCGT060202R-SN	0.2																				●														
	CCGT0602V3R-SN	0.03																				●														
	CCGT09T301L-SN	0.1																				●														
	CCGT09T301MR-SN	0.1																						●												
	CCGT09T301R-SN	0.1																				●														
	CCGT09T302L-SN	0.2																				●														
	CCGT09T302MR-SN	0.2																						●												
	CCGT09T302R-SN	0.2																				●														
	CCGT09T304L-SN	0.4																				●														
	CCGT09T304MR-SN	0.4																						●												
	CCGT09T304R-SN	0.4																				●														
	CCGT09T3V3L-SN	0.03																				●														
	CCGT09T3V3R-SN	0.03																				●														
R/LW-SN	CCET0602V3LW-SN	0.03																				●														
	CCET0602V3RW-SN	0.03																				●														
	CCET09T3V3LW-SN	0.03																				●														
	CCET09T3V3RW-SN	0.03																				●														
SMG	CCGT060201M-SMG	0.1																						●												
	CCGT060202M-SMG	0.2																				●		●												
	CCGT060204M-SMG	0.4																				●		●												
	CCGT09T301M-SMG	0.1																						●												
	CCGT09T302M-SMG	0.2																						●												
	CCGT09T304M-SMG	0.4																						●												
Flat Top	CCGW060200	0																							●											
	CCGW060202E	0.2																							●											
	CCGW060204E	0.4																							●											
	CCGW060208E	0.8																							●											
	CCGW0602V5	0.05																							●											
	CCGW09T300	0																							●											
	CCGW09T3V5	0.05																							●											
Flat Top 	CCMW060202	0.2																															●			
	CCMW060204	0.4												●	●	●	●														●		●			
	CCMW060208	0.8												●	●																					
	CCMW09T304	0.4												●	●	●	●																●			
	CCMW09T308	0.8												●	●	●	●														●		●			
	CCMW09T312	1.2												●	●																					
	CCMW120404	0.4												●	●	●	●																●			
	CCMW120408	0.8												●	●	●	●																●			

Stock status (10 inserts in one case)
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

			Coated																						Cermet		Coated Cermet				Carbide					
Inserts Shape	Order Number	RE (mm)	UE6105	UE6110	UE6020	MC6015	MC6025	UH6400	MC7025	MP7035	US7020	US735	US905	MC5005	MC5015	UC5105	UC5115	MP9005	MP9015	VP05RT	VP10RT	VP15TF	UP20M	MS6015	NX2525	NX3035	MP3025	AP25N	VP25N	VP45N	UTi20T	HTi05T	HTi10	RT9010	MT9005	MT9015
Work Material	P	Steel	●	◐	✣	◐	✣	✣														✣	✣	◐	●	◐	◐	●	●	◐	✣					
Work Material	M	Stainless steel							◐	✣	●	✣									◐	✣	✣		●			●	●		✣					
Work Material	K	Cast iron												◐	✣	●	◐				◐	✣			●			●	●		✣	●	◐			
Work Material	N	Non-Ferrous Metal																															◐			
Work Material	S	Heat-resistant Alloy, Titanium Alloy											●					●	◐	●	◐	✣											◐	◐	●	◐
	CCMW120412	1.2												●	●		●																			

TURNING INSERT
POSI
WITH HOLE
C
D
R
S
T
V
W
X

CP**

Rhombic 80°, 11° Posi, With hole

Product Information

APPLICABLE HOLDER PAGE (BORING BARS) >> 386
GRADES >> 58
SUITABLE GRADE, CHIPBREAKER >> 38
IDENTIFICATION >> 30
TECHNICAL INFO >> 1971

Stock status (10 inserts in one case)
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Work Material		Coated																						Cermet		Coated Cermet				Carbide					
		UE6105	UE6110	UE6020	MC6015	MC6025	UH6400	MC7025	MP7035	US7020	US735	US905	MC5005	MC5015	UC5105	UC5115	MP9005	MP9015	VP05RT	VP10RT	VP15TF	UP20M	MS6015	NX2525	NX3035	MP3025	AP25N	VP25N	VP45N	UTi20T	HTi05T	HTi10	RT9010	MT9005	MT9015
P	Steel	●	◐	✣	◐	✣	✣														✣	✣	◐	●	◐	◐	●	●	◐	✣					
M	Stainless steel							◐	✣	○	✣									◐	✣	✣		○			○	○		✣					
K	Cast iron												◐	✣	●	◐				◐	✣			●			●	●		✣	●	◐			
N	Non-Ferrous Metal																															◐			
S	Heat-resistant Alloy, Titanium Alloy											●					●	◐	●	◐	✣											◐	◐	●	◐

Inserts Shape	Order Number	RE (mm)	UE6105	UE6110	UE6020	MC6015	MC6025	UH6400	MC7025	MP7035	US7020	US735	US905	MC5005	MC5015	UC5105	UC5115	MP9005	MP9015	VP05RT	VP10RT	VP15TF	UP20M	MS6015	NX2525	NX3035	MP3025	AP25N	VP25N	VP45N	UTi20T	HTi05T	HTi10	RT9010	MT9005	MT9015
FV	CPMH080202-FV	0.2			▲																	●			●	●	●									
	CPMH080204-FV	0.4			▲																	●			●	●	●									
	CPMH090302-FV	0.2			▲																	●			●	●	●									
	CPMH090304-FV	0.4			▲																	●			●	●	●									
	CPMH090308-FV	0.8			▲																	●			●	●	●									
R/L-F	CPGT080204L-F	0.4																							●											
	CPGT080204R-F	0.4																							●											
	CPGT090302L-F	0.2																							●											
	CPGT090302R-F	0.2																							●											
	CPGT090304L-F	0.4																							●											
	CPGT090304R-F	0.4																							●											
R/L-F	CPMH080204L-F	0.4																				●			●								●			
	CPMH080204R-F	0.4																				●			●								●			
	CPMH090304L-F	0.4																				●			●			●					●			
	CPMH090304R-F	0.4																				●			●								●			
SV	CPMH080202-SV	0.2			▲	●				▲	●											●			●	●	●			●						
	CPMH080204-SV	0.4			▲	●				▲	●											●			●	●	●			●						
	CPMH090302-SV	0.2			▲	●				▲	●											●			●	●	●			●						
	CPMH090304-SV	0.4			▲	●				▲	●											●			●	●	●			●						
	CPMH090308-SV	0.8			▲	●				▲	●											●			●	●	●			●						
Standard	CPGT080202	0.2																															●			
	CPGT080204	0.4																															●			
	CPGT090302	0.2																															●			
	CPGT090304	0.4																															●			
Standard	CPMX080204	0.4		●																			●													
	CPMX080208	0.8		●																			●													
	CPMX090304	0.4		●																			●		●						●					
	CPMX090308	0.8		●	▲																		●								●					
MV	CPMH080204-MV	0.4			▲	●				▲	●			●								●			●	●	●	●		●						
	CPMH080208-MV	0.8			▲	●				▲	●			●								●			●	●	●	●		●						
	CPMH090304-MV	0.4			▲	●				▲	●			●								●			●	●	●	●		●						
	CPMH090308-MV	0.8			▲	●				▲	●			●								●			●	●	●	●		●						

DC**

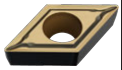
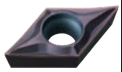
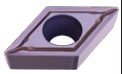
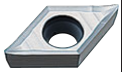
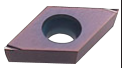
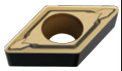
Rhombic 55°, 7° Posi, With hole

Product Information

APPLICABLE HOLDER PAGE (EXTERNAL TURNING TOOLS) >> 323
APPLICABLE HOLDER PAGE (BORING BARS) >> 390
GRADES >> 58
SUITABLE GRADE, CHIPBREAKER >> 38
APPLICABLE HOLDER PAGE (SMALL TOOLS) >> 352
IDENTIFICATION >> 30
TECHNICAL INFO >> 1971

●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. Stock status (10 inserts in one case) □: Non stock, produced to order only.

Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Work Material			UE6105	UE6110	UE6020	MC6015	MC6025	UH6400	MC7025	MP7035	US7020	US735	US905	MC5005	MC5015	UC5105	UC5115	MP9005	MP9015	VP05RT	VP10RT	VP15TF	UP20M	MS6015	NX2525	NX3035	MP3025	AP25N	VP25N	VP45N	UTi20T	HTi05T	HTi10	RT9010	MT9005	MT9015
			Coated																						Cermet		Coated Cermet				Carbide					
Work Material	P	Steel	●	◐	✣	◐	✣	✣														✣	✣	◐	●	◐	◐	●	●	◐	✣					
	M	Stainless steel							◐	✣	○	✣									◐	✣	✣		○			○	○		✣					
	K	Cast iron												◐	✣	●	◐				◐	✣			●			●	●		✣	●	◐			
	N	Non-Ferrous Metal																															◐			
	S	Heat-resistant Alloy, Titanium Alloy											●					●	◐	●	◐	✣											◐	◐	●	◐
Inserts Shape	Order Number	RE (mm)																																		
FP 	DCMT070202-FP	0.2		●		●	●																		●		●									
	DCMT070204-FP	0.4		●		●	●																		●		●									
	DCMT11T302-FP	0.2		●		●	●																		●		●									
	DCMT11T304-FP	0.4		●		●	●																		●		●									
	DCMT11T308-FP	0.8		●		●	●																		●		●									
FS 	DCGT070201M-FS	0.08																●	●																	
	DCGT070202M-FS	0.18																●	●																	
	DCGT11T301M-FS	0.08																●	●																	
	DCGT11T302M-FS	0.18																●	●																	
FS-P	DCGT070201M-FS-P	0.08																																	●	
	DCGT070202M-FS-P	0.18																																	●	
	DCGT11T301M-FS-P	0.08																																	●	
	DCGT11T302M-FS-P	0.18																																	●	
FM 	DCMT070202-FM	0.2																				●														
	DCMT070204-FM	0.4																				●														
	DCMT11T302-FM	0.2																				●														
	DCMT11T304-FM	0.4																				●														
	DCMT11T308-FM	0.8																				●														
FV	DCMT070202-FV	0.2		●	▲																	●			●	●		●								
	DCMT070204-FV	0.4		●	▲																	●			●	●		●								
	DCMT070208-FV	0.8			▲																	●			●	●										
	DCMT11T302-FV	0.2			▲																	●			●	●										
	DCMT11T304-FV	0.4		●	▲																	●			●	●		●								
	DCMT11T308-FV	0.8		●	▲																	●			●	●		●								
AZ 	DCGT070202-AZ	0.2																															●			
	DCGT070204-AZ	0.4																															●			
	DCGT11T302-AZ	0.2																															●			
	DCGT11T304-AZ	0.4																															●			
	DCGT11T308-AZ	0.8																															●			
R/L-F 	DCGT070202L-F	0.2																				●			●			●					●			
	DCGT070202R-F	0.2																				●			●								●			
	DCGT070204L-F	0.4																				●			●			●					●			
	DCGT070204R-F	0.4																				●			●								●			
	DCGT11T302L-F	0.2																				●			●			●					●			
	DCGT11T302R-F	0.2																				●			●								●			
	DCGT11T304L-F	0.4																				●			●			●					●			
	DCGT11T304R-F	0.4																				●			●								●			
LP 	DCMT070204-LP	0.4		●		●	●																		●		●									
	DCMT070208-LP	0.8		●		●	●																		●		●									
	DCMT11T304-LP	0.4		●		●	●																		●		●									

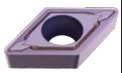
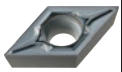
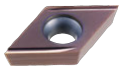
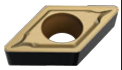
DC**

●: Inventory maintained in Japan. ▲: This item to be discontinued within two years.

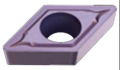
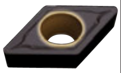
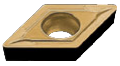
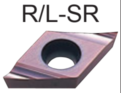
Stock status (10 inserts in one case) □: Non stock, produced to order only.

Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Work Material																																									
	P	Steel	●	◐	✣	◐	✣	✣															✣	✣	◐	●	◐		◐	●	●	◐	✣								
	M	Stainless steel							◐	✣	○	✣									◐	✣	✣	◐	○				○	○		✣									
	K	Cast iron												◐	✣	●	◐				◐	✣			●				●	●		✣	●	◐								
	N	Non-Ferrous Metal																																◐							
	S	Heat-resistant Alloy, Titanium Alloy											●					●	◐	●	◐	✣												◐	◐	●	◐				

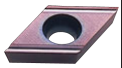
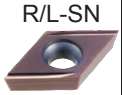
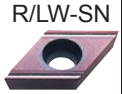
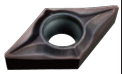
Inserts Shape	Order Number	RE (mm)	Coated																						Cermet		Coated Cermet				Carbide					
			UE6105	UE6110	UE6020	MC6015	MC6025	UH6400	MC7025	MP7035	US7020	US735	US905	MC5005	MC5015	UC5105	UC5115	MP9005	MP9015	VP05RT	VP10RT	VP15TF	UP20M	MS6015	NX2525	NX3035	MP3025	AP25N	VP25N	VP45N	UTi20T	HTi05T	HTi10	RT9010	MT9005	MT9015
	DCMT11T308-LP	0.8		●		●	●																		●		●									
LM 	DCMT070204-LM	0.4							●	●												●														
	DCMT070208-LM	0.8							●	●												●														
	DCMT11T304-LM	0.4							●	●												●														
	DCMT11T308-LM	0.8							●	●												●														
LS 	DCGT070201M-LS	0.08																●	●																	
	DCGT070202M-LS	0.18																●	●																	
	DCGT070204M-LS	0.38																●	●																	
	DCGT11T301M-LS	0.08																●	●																	
	DCGT11T302M-LS	0.18																●	●																	
	DCGT11T304M-LS	0.38																●	●																	
LS-P	DCGT070201M-LS-P	0.08																																	●	
	DCGT070202M-LS-P	0.18																																	●	
	DCGT070204M-LS-P	0.38																																	●	
	DCGT11T301M-LS-P	0.08																																	●	
	DCGT11T302M-LS-P	0.18																																	●	
	DCGT11T304M-LS-P	0.38																																	●	
SV	DCMT070202-SV	0.2			▲						▲	●										●			●	●				●						
	DCMT070204-SV	0.4		●	▲						▲	●										●			●	●				●						
	DCMT070208-SV	0.8		●	▲						▲	●										●			●	●				●						
	DCMT11T302-SV	0.2		●	▲						▲	●										●			●	●				●						
	DCMT11T304-SV	0.4		●	▲						▲	●										●			●	●				●						
	DCMT11T308-SV	0.8		●	▲						▲	●										●			●	●				●						
R/L-SS 	DCGT070201L-SS	0.1																				●														
	DCGT070201MR-SS	0.1																						●												
	DCGT070201R-SS	0.1																				●														
	DCGT070202L-SS	0.2																				●														
	DCGT070202MR-SS	0.2																						●												
	DCGT070202R-SS	0.2																				●														
	DCGT0702V3L-SS	0.03																				●														
	DCGT0702V3R-SS	0.03																				●														
	DCGT11T301MR-SS	0.1																						●												
	DCGT11T301R-SS	0.1																				●														
	DCGT11T302MR-SS	0.2																						●												
	DCGT11T302R-SS	0.2																				●														
	DCGT11T304MR-SS	0.4																						●												
	DCGT11T3V3R-SS	0.03																				●														
MP 	DCMT070204-MP	0.4		●		●	●																		●		●									
	DCMT070208-MP	0.8		●		●	●																		●		●									
	DCMT11T304-MP	0.4		●		●	●																		●		●									
	DCMT11T308-MP	0.8		●		●	●																		●		●									
	DCMT150404-MP	0.4		●		●	●																		●		●									
	DCMT150408-MP	0.8		●		●	●																		●		●									

Stock status (10 inserts in one case)
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✤: Unstable Cutting

Work Material			UE6105	UE6110	UE6020	MC6015	MC6025	UH6400	MC7025	MP7035	US7020	US735	US905	MC5005	MC5015	UC5105	UC5115	MP9005	MP9015	VP05RT	VP10RT	VP15TF	UP20M	MS6015	NX2525	NX3035	MP3025	AP25N	VP25N	VP45N	UTi20T	HTi05T	HTi10	RT9010	MT9005	MT9015
	P	Steel	●	◐	✤	◐	✤	✤														✤	✤	◐	●	◐	◐	●	●	◐	✤					
	M	Stainless steel							◐	✤	●	✤									◐	✤	✤		●			●	●		✤					
	K	Cast iron												◐	✤	●	◐				◐	✤			●			●	●		✤	●	◐			
	N	Non-Ferrous Metal																															◐			
	S	Heat-resistant Alloy, Titanium Alloy											●					●	◐	●	◐	✤											◐	◐	●	◐
Inserts Shape	Order Number	RE (mm)	Coated																						Cermet		Coated Cermet				Carbide					
MM 	DCMT070204-MM	0.4							●	●												●														
	DCMT070208-MM	0.8							●	●												●														
	DCMT11T304-MM	0.4							●	●												●														
	DCMT11T308-MM	0.8							●	●												●														
	DCMT150404-MM	0.4							●	●												●														
	DCMT150408-MM	0.8							●	●												●														
MK 	DCMT070204-MK	0.4												●	●																					
	DCMT070208-MK	0.8												●	●																					
	DCMT11T304-MK	0.4												●	●																					
	DCMT11T308-MK	0.8												●	●																					
	DCMT150404-MK	0.4												●	●																					
	DCMT150408-MK	0.8												●	●																					
Standard 	DCMT070202	0.2		●	▲							●													●	●	●	●			●					
	DCMT070204	0.4	●	●	▲							●					●					●			●	●	●	●			●					
	DCMT070208	0.8		●								●					●								●	●	●	●								
	DCMT11T302	0.2		●	▲							●													●	●	●	●			●					
	DCMT11T304	0.4	●	●	▲							●					●					●			●	●	●	●			●					
	DCMT11T308	0.8	●	●	▲							●					●					●			●	●	●	●			●					
	DCMT11T312	1.2		●																																
	DCMT150404	0.4		●	▲							●					●								●	●	●	●			●					
	DCMT150408	0.8		●	▲							●					●								●	●	●				●					
	DCMT150412	1.2		●																																
MV	DCMT070202-MV	0.2		●	▲		●				▲	●										●			●	●	●	●		●						
	DCMT070204-MV	0.4		●	▲		●				▲	●			●							●			●	●	●	●		●						
	DCMT070208-MV	0.8		●	▲		●				▲	●			●							●			●	●	●	●		●						
	DCMT11T302-MV	0.2		●	▲		●				▲	●										●			●	●	●	●		●						
	DCMT11T304-MV	0.4		●	▲		●				▲	●			●							●			●	●	●	●		●						
	DCMT11T308-MV	0.8		●	▲		●				▲	●			●							●			●	●	●	●		●						
R/L-SR 	DCET070201L-SR	0.1																				●			●								●			
	DCET070201R-SR	0.1																				●			●								●			
	DCET070202L-SR	0.2																				●			●								●			
	DCET070202R-SR	0.2																				●			●								●			
	DCET070204L-SR	0.4																				●			●								●			
	DCET070204R-SR	0.4																				●			●								●			
	DCET0702V3L-SR	0.03																				●			●								●			
	DCET0702V3R-SR	0.03																				●			●								●			
	DCET11T301L-SR	0.1																				●			●								●			
	DCET11T301R-SR	0.1																				●			●								●			
	DCET11T302L-SR	0.2																				●			●								●			
	DCET11T302R-SR	0.2																				●			●								●			
	DCET11T304L-SR	0.4																				●			●								●			
	DCET11T304R-SR	0.4																				●			●								●			
	DCET11T3V3L-SR	0.03																				●			●								●			
	DCET11T3V3R-SR	0.03																				●			●								●			

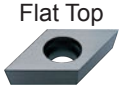
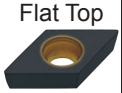
DC**

Stock status (10 inserts in one case)
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Work Material		UE6105	UE6110	UE6020	MC6015	MC6025	UH6400	MC7025	MP7035	US7020	US735	US905	MC5005	MC5015	UC5105	UC5115	MP9005	MP9015	VP05RT	VP10RT	VP15TF	UP20M	MS6015	NX2525	NX3035	MP3025	AP25N	VP25N	VP45N	UTi20T	HTi05T	HTi10	RT9010	MT9005	MT9015
		Coated																						Cermet		Coated Cermet				Carbide					
Work Material	P Steel	●	◐	✣	◐	✣	✣														✣	✣	◐	●	◐	◐	●	●	◐	✣					
	M Stainless steel							◐	✣	○	✣									◐	✣	✣		○			○	○		✣					
	K Cast iron												◐	✣	●	◐				◐	✣			●			●	●		✣	●	◐			
	N Non-Ferrous Metal																															◐			
	S Heat-resistant Alloy, Titanium Alloy											●					●	◐	●	◐	✣											◐	◐	●	◐
Inserts Shape	Order Number	RE (mm)																																	
R/L-SN 	DCET070200L-SN	0																			●			●								●			
	DCET070200R-SN	0																			●			●								●			
	DCET070201L-SN	0.1																			●			●								●			
	DCET070201R-SN	0.1																			●			●								●			
	DCET070202L-SN	0.2																			●			●								●			
	DCET070202R-SN	0.2																			●			●								●			
	DCET070204L-SN	0.4																			●			●								●			
	DCET070204R-SN	0.4																			●			●								●			
	DCET0702V3L-SN	0.03																			●			●								●			
	DCET0702V3R-SN	0.03																			●			●								●			
	DCET11T300L-SN	0																			●			●								●			
	DCET11T300R-SN	0																			●			●								●			
	DCET11T301L-SN	0.1																			●			●								●			
	DCET11T301R-SN	0.1																			●			●								●			
	DCET11T302L-SN	0.2																			●			●								●			
	DCET11T302R-SN	0.2																			●			●								●			
	DCET11T304L-SN	0.4																			●			●								●			
	DCET11T304R-SN	0.4																			●			●								●			
	DCET11T3V3L-SN	0.03																			●			●								●			
	DCET11T3V3R-SN	0.03																			●			●								●			
R/L-SN 	DCGT070201MR-SN	0.1																					●												
	DCGT070201R-SN	0.1																			●														
	DCGT070202L-SN	0.2																			●														
	DCGT070202MR-SN	0.2																					●												
	DCGT070202R-SN	0.2																			●														
	DCGT0702V3R-SN	0.03																			●														
	DCGT11T301L-SN	0.1																			●														
	DCGT11T301MR-SN	0.1																					●												
	DCGT11T301R-SN	0.1																			●														
	DCGT11T302L-SN	0.2																			●														
	DCGT11T302MR-SN	0.2																					●												
	DCGT11T302R-SN	0.2																			●														
	DCGT11T304L-SN	0.4																			●														
	DCGT11T304MR-SN	0.4																					●												
	DCGT11T304R-SN	0.4																			●														
	DCGT11T3V3L-SN	0.03																			●														
	DCGT11T3V3R-SN	0.03																			●														
R/LW-SN 	DCET0702V3LW-SN	0.03																			●														
	DCET0702V3RW-SN	0.03																			●														
	DCET11T3V3LW-SN	0.03																			●														
	DCET11T3V3RW-SN	0.03																			●														
SMG 	DCGT070201M-SMG	0.1																					●												
	DCGT070202M-SMG	0.2																			●		●												
	DCGT070204M-SMG	0.4																			●		●												
	DCGT11T301M-SMG	0.1																					●												

Stock status (10 inserts in one case)
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Work Material																																															
P	Steel	●	◐	✣	◐	✣	✣																	✣	✣	◐	●	◐		◐	●	●	◐	✣												
M	Stainless steel							◐	✣	○	✣											◐	✣	✣		○				○	○		✣													
K	Cast iron												◐	✣	●	◐						◐	✣			●				●	●		✣	●	◐											
N	Non-Ferrous Metal																																		◐											
S	Heat-resistant Alloy, Titanium Alloy											●					●	◐	●	◐	✣													◐	◐	●	◐								

Inserts Shape	Order Number	RE (mm)	Coated																						Cermet		Coated Cermet				Carbide					
			UE6105	UE6110	UE6020	MC6015	MC6025	UH6400	MC7025	MP7035	US7020	US735	US905	MC5005	MC5015	UC5105	UC5115	MP9005	MP9015	VP05RT	VP10RT	VP15TF	UP20M	MS6015	NX2525	NX3035	MP3025	AP25N	VP25N	VP45N	UTi20T	HTi05T	HTi10	RT9010	MT9005	MT9015
	DCGT11T302M-SMG	0.2																				●		●												
	DCGT11T304M-SMG	0.4																				●		●												
Flat Top 	DCGW070200	0																							●											
	DCGW0702V5	0.05																							●											
	DCGW11T300	0																							●											
	DCGW11T3V5	0.05																							●											
Flat Top 	DCMW070204	0.4												●	●	●	●																●			
	DCMW11T304	0.4												●	●	●	●														●		●			
	DCMW11T308	0.8												●	●	●	●																●			
	DCMW150404	0.4																															●			
	DCMW150408	0.8																															●			

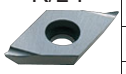
DE**

Rhombic 55°, 20° Posi, With hole

Product Information

APPLICABLE HOLDER PAGE (EXTERNAL TURNING TOOLS) >> 336
GRADES >> 58
SUITABLE GRADE, CHIPBREAKER >> 38
IDENTIFICATION >> 30
TECHNICAL INFO >> 1971

●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. Stock status (10 inserts in one case) □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Work Material			Coated																						Cermet		Coated Cermet				Carbide					
			UE6105	UE6110	UE6020	MC6015	MC6025	UH6400	MC7025	MP7035	US7020	US735	US905	MC5005	MC5015	UC5105	UC5115	MP9005	MP9015	VP05RT	VP10RT	VP15TF	UP20M	MS6015	NX2525	NX3035	MP3025	AP25N	VP25N	VP45N	UTi20T	HTi05T	HTi10	RT9010	MT9005	MT9015
P	Steel		●	◐	✣	◐	✣	✣														✣	✣	◐	●	◐	◐	●	●	◐	✣					
M	Stainless steel								◐	✣	●	✣									◐	✣	✣		●			●	●		✣					
K	Cast iron													◐	✣	●	◐				◐	✣			●			●	●		✣	●	◐			
N	Non-Ferrous Metal																																◐			
S	Heat-resistant Alloy, Titanium Alloy												●					●	◐	●	◐	✣											◐	◐	●	◐
Inserts Shape	Order Number	RE (mm)																																		
R/L-F 	DEGX150402L-F	0.2																															●			
	DEGX150402R-F	0.2																															●			
	DEGX150404L-F	0.4																															●			
	DEGX150404R-F	0.4																															●			
R/L	DEGX150402L	0.2																															●			
	DEGX150402R	0.2																															●			
	DEGX150404L	0.4																															●			
	DEGX150404R	0.4																															●			

RC**

Round, 7° Posi, With hole

Product Information

APPLICABLE HOLDER PAGE (EXTERNAL TURNING TOOLS) >> 327
GRADES >> 58
SUITABLE GRADE, CHIPBREAKER >> 38
IDENTIFICATION >> 30
TECHNICAL INFO >> 1971

Stock status (10 inserts in one case)
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. ☐: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Inserts Shape	Order Number	RE (mm)	UE6105	UE6110	UE6020	MC6015	MC6025	UH6400	MC7025	MP7035	US7020	US735	US905	MC5005	MC5015	UC5105	UC5115	MP9005	MP9015	VP05RT	VP10RT	VP15TF	UP20M	MS6015	NX2525	NX3035		MP3025	AP25N	VP25N	VP45N	UTi20T	HTi05T	HTi10	RT9010	MT9005	MT9015
Work Material	P Steel		●	◐	✣	◐	✣	✣														✣	✣	◐	●	◐		◐	●	●	◐	✣					
	M Stainless steel								◐	✣	●	✣									◐	✣	✣		●				●	●		✣					
	K Cast iron													◐	✣	●	◐				◐	✣			●				●	●		✣	●	◐			
	N Non-Ferrous Metal																																	◐			
	S Heat-resistant Alloy, Titanium Alloy												●					●	◐	●	◐	✣												◐	◐	●	◐
			Coated																						Cermet			Coated Cermet				Carbide					
AZ	RCGT0803M0-AZ																																	●			
	RCGT10T3M0-AZ																																	●			
Standard	RCMX1003M0			●	▲		●					●								●					●	●		●									
	RCMX1204M0		●	●	▲		●					●	●		●		●			●	●				●	●		●									
	RCMX1606M0		●	●	▲		●	●				●	●							●	●																
	RCMX2006M0		●	●	▲		●	●				●																									
	RCMX2507M0		●	●	▲		●																														
	RCMX3209M0		●	●	▲																																
Standard	RCMT0602M0			●																					●	●		●				●					
	RCMT0803M0			●								●													●	●		●				●					
RR	RCMX1606M0-RR			●	▲		●	●				●																									
	RCMX2006M0-RR			●	▲		●	●				●																									
	RCMX2507M0-RR			●	▲		●	●				●																									
	RCMX3209M0-RR			●	▲																																

SC**

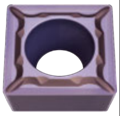
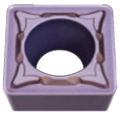
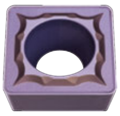
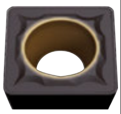
Square, 11° Posi, With hole

Product Information

90°

APPLICABLE HOLDER PAGE (EXTERNAL TURNING TOOLS) >> 329
IDENTIFICATION >> 30
TECHNICAL INFO >> 1971
APPLICABLE HOLDER PAGE (BORING BARS) >> 434
GRADES >> 58
SUITABLE GRADE, CHIPBREAKER >> 38

Stock status (10 inserts in one case)
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. ☐: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✤: Unstable Cutting

Inserts Shape	Order Number	RE (mm)	UE6105	UE6110	UE6020	MC6015	MC6025	UH6400	MC7025	MP7035	US7020	US735	US905	MC5005	MC5015	UC5105	UC5115	MP9005	MP9015	VP05RT	VP10RT	VP15TF	UP20M	MS6015	NX2525	NX3035		MP3025	AP25N	VP25N	VP45N	UTi20T	HTi05T	HTi10	RT9010	MT9005	MT9015
			Coated																						Cermet			Coated Cermet				Carbide					
Work Material	P Steel		●	◐	✤	◐	✤	✤														✤	✤	◐	●	◐		◐	●	●	◐	✤					
	M Stainless steel								◐	✤	●	✤									◐	✤	✤		●				●	●		✤					
	K Cast iron													◐	✤	●	◐				◐	✤			●				●	●		✤	●	◐			
	N Non-Ferrous Metal																																	◐			
	S Heat-resistant Alloy, Titanium Alloy												●					●	◐	●	◐	✤												◐	◐	●	◐
FP	SCMT09T304-FP	0.4		●		●	●																		●			●									
	SCMT09T308-FP	0.8		●		●	●																		●			●									
FM	SCMT09T304-FM	0.4																				●															
	SCMT09T308-FM	0.8																				●															
FV	SCMT09T304-FV	0.4			▲																				●	●			●		●						
LP	SCMT09T304-LP	0.4		●		●	●																		●			●									
	SCMT09T308-LP	0.8		●		●	●																		●			●									
LM	SCMT09T304-LM	0.4							●	●												●															
	SCMT09T308-LM	0.8							●	●												●															
MP	SCMT09T304-MP	0.4		●		●	●																		●			●									
	SCMT09T308-MP	0.8		●		●	●																		●			●									
	SCMT120404-MP	0.4		●		●	●																		●			●									
	SCMT120408-MP	0.8		●		●	●																		●			●									
MM	SCMT09T304-MM	0.4							●	●												●															
	SCMT09T308-MM	0.8							●	●												●															
	SCMT120404-MM	0.4							●	●												●															
	SCMT120408-MM	0.8							●	●												●															
MK	SCMT09T304-MK	0.4												●	●																						
	SCMT09T308-MK	0.8												●	●																						
	SCMT120404-MK	0.4												●	●																						
	SCMT120408-MK	0.8												●	●																						
Standard	SCMT09T304	0.4	●	●	▲							●					●								●	●		●	●			●					
	SCMT09T308	0.8	●	●	▲							●					●								●	●		●	●			●					
	SCMT120404	0.4	●	●	▲							●					●								●	●		●									
	SCMT120408	0.8	●	●	▲							●					●								●	●		●	●			●					
	SCMT120412	1.2		●																																	

MITSUBISHI MATERIALS

Stock status (10 inserts in one case)
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. ☐: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Inserts Shape	Order Number	RE (mm)	UE6105	UE6110	UE6020	MC6015	MC6025	UH6400	MC7025	MP7035	US7020	US735	US905	MC5005	MC5015	UC5105	UC5115	MP9005	MP9015	VP05RT	VP10RT	VP15TF	UP20M	MS6015	NX2525	NX3035	MP3025	AP25N	VP25N	VP45N	UTi20T	HTi05T	HTi10	RT9010	MT9005	MT9015
			Coated																						Cermet		Coated Cermet				Carbide					
Work Material	P Steel		●	◐	✣	◐	✣	✣														✣	✣	◐	●	◐	◐	●	●	◐	✣					
Work Material	M Stainless steel								◐	✣	●	✣									◐	✣	✣		●			●	●		✣					
Work Material	K Cast iron													◐	✣	●	◐				◐	✣			●			●	●		✣	●	◐			
Work Material	N Non-Ferrous Metal																																◐			
Work Material	S Heat-resistant Alloy, Titanium Alloy												●					●	◐	●	◐	✣											◐	◐	●	◐
Flat Top	SCMW09T304	0.4												●	●		●														●		●			
	SCMW09T308	0.8												●	●	●	●																			
	SCMW120408	0.8												●	●	●	●																			

TURNING INSERT
POSI
WITH HOLE
C
D
R
S
T
V
W
X

SP**

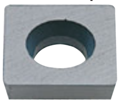
Square, 11° Posi, With hole

Product Information

90°

IDENTIFICATION >> 30
TECHNICAL INFO >> 1971
GRADES >> 58
SUITABLE GRADE, CHIPBREAKER >> 38

Stock status (10 inserts in one case)
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✱: Unstable Cutting

Inserts Shape	Order Number	RE (mm)	UE6105	UE6110	UE6020	MC6015	MC6025	UH6400	MC7025	MP7035	US7020	US735	US905	MC5005	MC5015	UC5105	UC5115	MP9005	MP9015	VP05RT	VP10RT	VP15TF	UP20M	MS6015	NX2525	NX3035	MP3025	AP25N	VP25N	VP45N	UTi20T	HTi05T	HTi10	RT9010	MT9005	MT9015
			Coated																						Cermet		Coated Cermet				Carbide					
Work Material	P Steel		●	◐	✱	◐	✱	✱														✱	✱	◐	●	◐	◐	●	●	◐	✱					
	M Stainless steel								◐	✱	●	✱									◐	✱	✱		●			●	●		✱					
	K Cast iron													◐	✱	●	◐				◐	✱			●			●	●		✱	●	◐			
	N Non-Ferrous Metal																																◐			
	S Heat-resistant Alloy, Titanium Alloy												●					●	◐	●	◐	✱											◐	◐	●	◐
Standard	SPMT090304	0.4																							●											
	SPMT090308	0.8																							●											
	SPMT120308	0.8																							●						●					
Flat Top 	SPGX090304	0.4																							●								●			
	SPGX090308	0.8																															●			
	SPGX120304	0.4																															●			
	SPGX120308	0.8																															●			
Flat Top	SPMW090304	0.4																				●	●		●						●		●			
	SPMW090308	0.8																				●	●		●						●		●			
	SPMW120304	0.4																				●	●		●						●		●			
	SPMW120308	0.8																				●	●		●						●		●			

TC**

Triangular, 7° Posi, With hole

Product Information

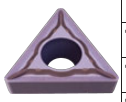
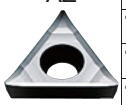
60°

APPLICABLE HOLDER PAGE (EXTERNAL TURNING TOOLS) >> 330
IDENTIFICATION >> 30
TECHNICAL INFO >> 1971

APPLICABLE HOLDER PAGE (BORING BARS) >> 424
GRADES >> 58
SUITABLE GRADE, CHIPBREAKER >> 38

Stock status (10 inserts in one case)
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Work Material		UE6105	UE6110	UE6020	MC6015	MC6025	UH6400	MC7025	MP7035	US7020	US735	US905	MC5005	MC5015	UC5105	UC5115	MP9005	MP9015	VP05RT	VP10RT	VP15TF	UP20M	MS6015	NX2525	NX3035	MP3025	AP25N	VP25N	VP45N	UTi20T	HTi05T	HTi10	RT9010	MT9005	MT9015
		Coated																						Cermet		Coated Cermet				Carbide					
P	Steel	●	◐	✣	◐	✣	✣														✣	✣	◐	●	◐	◐	●	●	◐	✣					
M	Stainless steel							◐	✣	○	✣									◐	✣	✣		○			○	○		✣					
K	Cast iron												◐	✣	●	◐				◐	✣			●			●	●		✣	●	◐			
N	Non-Ferrous Metal																															◐			
S	Heat-resistant Alloy, Titanium Alloy											●					●	◐	●	◐	✣											◐	◐	●	◐

Inserts Shape	Order Number	RE (mm)	UE6105	UE6110	UE6020	MC6015	MC6025	UH6400	MC7025	MP7035	US7020	US735	US905	MC5005	MC5015	UC5105	UC5115	MP9005	MP9015	VP05RT	VP10RT	VP15TF	UP20M	MS6015	NX2525	NX3035	MP3025	AP25N	VP25N	VP45N	UTi20T	HTi05T	HTi10	RT9010	MT9005	MT9015
FP	TCMT090202-FP	0.2		●		●	●																		●		●									
	TCMT090204-FP	0.4		●		●	●																		●		●									
	TCMT110202-FP	0.2		●		●	●																		●		●									
	TCMT110204-FP	0.4		●		●	●																		●		●									
	TCMT16T304-FP	0.4		●		●	●																		●		●									
FM 	TCMT090202-FM	0.2																				●														
	TCMT090204-FM	0.4																				●														
	TCMT110202-FM	0.2																				●														
	TCMT110204-FM	0.4																				●														
	TCMT16T304-FM	0.4																				●														
FV	TCMT110204-FV	0.4			▲																				●	●		●		●						
	TCMT16T304-FV	0.4			▲																				●	●		●								
AZ 	TCGT110202-AZ	0.2																															●			
	TCGT110204-AZ	0.4																															●			
	TCGT110208-AZ	0.8																															●			
	TCGT16T302-AZ	0.2																															●			
	TCGT16T304-AZ	0.4																															●			
	TCGT16T308-AZ	0.8																															●			
R/L-F	TCGT060101L-F	0.1																				●			●											
	TCGT060102L-F	0.2																				●			●								●			
	TCGT060102R-F	0.2																				●			●								●			
	TCGT060104L-F	0.4																				●			●								●			
	TCGT060104R-F	0.4																							●								●			
	TCGT0601V3L-F	0.03																							●											
LP	TCMT090204-LP	0.4		●		●	●																		●		●									
	TCMT090208-LP	0.8		●		●	●																		●		●									
	TCMT110204-LP	0.4		●		●	●																		●		●									
	TCMT110208-LP	0.8		●		●	●																		●		●									
	TCMT16T304-LP	0.4		●		●	●																		●		●									
	TCMT16T308-LP	0.8		●		●	●																		●		●									
LM	TCMT090204-LM	0.4							●	●												●														
	TCMT090208-LM	0.8							●	●												●														
	TCMT110204-LM	0.4							●	●												●														
	TCMT110208-LM	0.8							●	●												●														
	TCMT16T304-LM	0.4							●	●												●														
	TCMT16T308-LM	0.8							●	●												●														

TC**

Stock status (10 inserts in one case)
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Work Material		UE6105	UE6110	UE6020	MC6015	MC6025	UH6400	MC7025	MP7035	US7020	US735	US905	MC5005	MC5015	UC5105	UC5115	MP9005	MP9015	VP05RT	VP10RT	VP15TF	UP20M	MS6015	NX2525	NX3035	MP3025	AP25N	VP25N	VP45N	UTi20T	HTi05T	HTi10	RT9010	MT9005	MT9015
		Coated																						Cermet		Coated Cermet				Carbide					
P	Steel	●	◐	✣	◐	✣	✣														✣	✣	◐	●	◐	◐	●	●	◐	✣					
M	Stainless steel							◐	✣	○	✣									◐	✣	✣		○			○	○		✣					
K	Cast iron												◐	✣	●	◐				◐	✣			●			●	●		✣	●	◐			
N	Non-Ferrous Metal																															◐			
S	Heat-resistant Alloy, Titanium Alloy											●					●	◐	●	◐	✣											◐	◐	●	◐
Inserts Shape	Order Number	RE (mm)																																	
MP	TCMT090204-MP	0.4		●		●	●																	●		●									
	TCMT090208-MP	0.8		●		●	●																	●		●									
	TCMT110204-MP	0.4		●		●	●																	●		●									
	TCMT110208-MP	0.8		●		●	●																	●		●									
	TCMT130304-MP	0.4		●		●	●																	●		●									
	TCMT16T304-MP	0.4		●		●	●																	●		●									
	TCMT16T308-MP	0.8		●		●	●																	●		●									
	TCMT16T312-MP	1.2		●		●	●																	●		●									
MM	TCMT090204-MM	0.4							●	●											●														
	TCMT090208-MM	0.8							●	●											●														
	TCMT110204-MM	0.4							●	●											●														
	TCMT110208-MM	0.8							●	●											●														
	TCMT130304-MM	0.4							●	●											●														
	TCMT16T304-MM	0.4							●	●											●														
	TCMT16T308-MM	0.8							●	●											●														
	TCMT16T312-MM	1.2							●	●											●														
MK	TCMT110204-MK	0.4											●	●																					
	TCMT110208-MK	0.8											●	●																					
	TCMT16T304-MK	0.4											●	●																					
	TCMT16T308-MK	0.8											●	●																					
	TCMT16T312-MK	1.2											●	●																					
Standard	TCMT080204	0.4																							●	●				●					
	TCMT090204	0.4		●	▲						●													●	●	●	●			●					
	TCMT110202	0.2		●	▲						●										●			●	●	●	●								
	TCMT110204	0.4	●	●	▲						●					●					●			●	●	●	●			●					
	TCMT110208	0.8	●	●																	●					●									
	TCMT130302	0.2																								●	●								
	TCMT130304	0.4		●							●														●	●									
	TCMT16T304	0.4	●	●	▲						●					●					●			●	●	●	●			●					
	TCMT16T308	0.8	●	●	▲						●					●					●			●	●	●	●			●					
	TCMT16T312	1.2		●																															
Flat Top	TCMW110204	0.4											●	●	●	●																●			
	TCMW130304	0.4																														●			
	TCMW16T304	0.4											●	●	●	●																●			
	TCMW16T308	0.8											●	●	●	●																●			
	TCMW16T312	1.2											●	●																					

TE**

Triangular, 20° Posi, With hole

Product Information

APPLICABLE HOLDER PAGE (EXTERNAL TURNING TOOLS) >> 338
IDENTIFICATION >> 30
TECHNICAL INFO >> 1971

APPLICABLE HOLDER PAGE (BORING BARS) >> 451
GRADES >> 58
SUITABLE GRADE, CHIPBREAKER >> 38

Stock status (10 inserts in one case)
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Work Material			Coated																						Cermet		Coated Cermet				Carbide					
			UE6105	UE6110	UE6020	MC6015	MC6025	UH6400	MC7025	MP7035	US7020	US735	US905	MC5005	MC5015	UC5105	UC5115	MP9005	MP9015	VP05RT	VP10RT	VP15TF	UP20M	MS6015	NX2525	NX3035	MP3025	AP25N	VP25N	VP45N	UTi20T	HTi05T	HTi10	RT9010	MT9005	MT9015
P	Steel		●	◐	✣	◐	✣	✣														✣	✣	◐	●	◐	◐	●	●	◐	✣					
M	Stainless steel								◐	✣	○	✣									◐	✣	✣		○			○	○		✣					
K	Cast iron													◐	✣	●	◐				◐	✣			●			●	●		✣	●	◐			
N	Non-Ferrous Metal																																◐			
S	Heat-resistant Alloy, Titanium Alloy												●					●	◐	●	◐	✣											◐	◐	●	◐
Inserts Shape	Order Number	RE (mm)																																		
R/L	TEGX160302L	0.2																															●			
	TEGX160302R	0.2																															●			
	TEGX160304L	0.4																															●			
	TEGX160304R	0.4																															●			

TP**

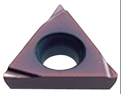
Triangular, 11° Posi, With hole

Product Information

60°

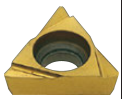
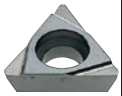
APPLICABLE HOLDER PAGE (BORING BARS) >> 388
GRADES >> 58
SUITABLE GRADE, CHIPBREAKER >> 38
IDENTIFICATION >> 30
TECHNICAL INFO >> 1971

Stock status (10 inserts in one case)
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✤: Unstable Cutting

Inserts Shape	Order Number	RE (mm)	UE6105	UE6110	UE6020	MC6015	MC6025	UH6400	MC7025	MP7035	US7020	US735	US905	MC5005	MC5015	UC5105	UC5115	MP9005	MP9015	VP05RT	VP10RT	VP15TF	UP20M	MS6015	NX2525	NX3035	MP3025	AP25N	VP25N	VP45N	UTi20T	HTi05T	HTi10	RT9010	MT9005	MT9015
Work Material	P Steel		●	◐	✤	◐	✤	✤														✤	✤	◐	●	◐	◐	●	●	◐	✤					
	M Stainless steel								◐	✤	●	✤									◐	✤	✤		●			●	●		✤					
	K Cast iron													◐	✤	●	◐				◐	✤			●			●	●		✤	●	◐			
	N Non-Ferrous Metal																																◐			
	S Heat-resistant Alloy, Titanium Alloy												●					●	◐	●	◐	✤											◐	◐	●	◐
			Coated																						Cermet		Coated Cermet				Carbide					
FV	TPMH080202-FV	0.2			▲																	●			●	●	●									
	TPMH080204-FV	0.4			▲																	●			●	●	●									
	TPMH090202-FV	0.2			▲																	●			●	●	●									
	TPMH090204-FV	0.4			▲																	●			●	●	●									
	TPMH110302-FV	0.2			▲																	●			●	●	●									
	TPMH110304-FV	0.4			▲																	●			●	●	●									
	TPMH110308-FV	0.8			▲																	●			●	●	●									
	TPMH160302-FV	0.2			▲																	●			●	●	●									
	TPMH160304-FV	0.4			▲																	●			●	●	●									
	TPMH160308-FV	0.8			▲																	●			●	●	●									
SV	TPMH080202-SV	0.2			▲		●				▲	●										●			●	●	●									
	TPMH080204-SV	0.4			▲		●				▲	●										●			●	●	●			●						
	TPMH090202-SV	0.2			▲		●				▲	●										●			●	●	●									
	TPMH090204-SV	0.4			▲		●				▲	●										●			●	●	●			●						
	TPMH110302-SV	0.2			▲		●				▲	●										●			●	●	●			●						
	TPMH110304-SV	0.4			▲		●				▲	●										●			●	●	●			●						
	TPMH110308-SV	0.8			▲		●				▲	●										●			●	●	●			●						
	TPMH160302-SV	0.2			▲		●				▲	●										●			●	●	●			●						
	TPMH160304-SV	0.4			▲		●				▲	●										●			●	●	●			●						
	TPMH160308-SV	0.8			▲		●				▲	●										●			●	●	●			●						
R/L-FS 	TPGH080202L-FS	0.2																				●			●		●	●					●			
	TPGH080202R-FS	0.2																				●			●								●			
	TPGH080204L-FS	0.4																				●			●		●	●					●			
	TPGH080204R-FS	0.4																				●			●								●			
	TPGH090202L-FS	0.2																				●			●		●	●					●			
	TPGH090202R-FS	0.2																				●			●								●			
	TPGH090204L-FS	0.4																				●			●		●	●					●			
	TPGH090204R-FS	0.4																				●			●								●			
	TPGH110302L-FS	0.2																				●			●		●	●					●			
	TPGH110302R-FS	0.2																				●			●								●			
	TPGH110304L-FS	0.4																				●			●		●	●					●			
	TPGH110304R-FS	0.4																				●			●								●			
	TPGH160304L-FS	0.4																				●			●		●						●			
	TPGH160304R-FS	0.4																				●			●								●			
	TPGH160308L-FS	0.8																				●			●		●						●			
	TPGH160308R-FS	0.8																				●			●								●			
Standard	TPMX110304	0.4																							●	●	●									
	TPMX110308	0.8																							●	●	●									

Stock status (10 inserts in one case)
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Work Material		Coated																						Cermet		Coated Cermet				Carbide					
		UE6105	UE6110	UE6020	MC6015	MC6025	UH6400	MC7025	MP7035	US7020	US735	US905	MC5005	MC5015	UC5105	UC5115	MP9005	MP9015	VP05RT	VP10RT	VP15TF	UP20M	MS6015	NX2525	NX3035	MP3025	AP25N	VP25N	VP45N	UTi20T	HTi05T	HTi10	RT9010	MT9005	MT9015
P	Steel	●	◐	✣	◐	✣	✣														✣	✣	◐	●	◐	◐	●	●	◐	✣					
M	Stainless steel							◐	✣	○	✣									◐	✣	✣		○			○	○		✣					
K	Cast iron												◐	✣	●	◐				◐	✣			●			●	●		✣	●	◐			
N	Non-Ferrous Metal																															◐			
S	Heat-resistant Alloy, Titanium Alloy											●					●	◐	●	◐	✣											◐	◐	●	◐

Inserts Shape	Order Number	RE (mm)	UE6105	UE6110	UE6020	MC6015	MC6025	UH6400	MC7025	MP7035	US7020	US735	US905	MC5005	MC5015	UC5105	UC5115	MP9005	MP9015	VP05RT	VP10RT	VP15TF	UP20M	MS6015	NX2525	NX3035	MP3025	AP25N	VP25N	VP45N	UTi20T	HTi05T	HTi10	RT9010	MT9005	MT9015
MV	TPMH080202-MV	0.2			▲		●				▲	●										●			●	●	●									
	TPMH080204-MV	0.4			▲		●				▲	●			●							●			●	●	●	●		●						
	TPMH090202-MV	0.2			▲		●				▲	●										●			●	●	●									
	TPMH090204-MV	0.4			▲		●				▲	●			●							●			●	●	●	●		●						
	TPMH090208-MV	0.8			▲		●								●							●				●	●									
	TPMH110302-MV	0.2			▲		●				▲	●										●			●	●	●	●		●						
	TPMH110304-MV	0.4			▲		●				▲	●			●							●			●	●	●	●		●						
	TPMH110308-MV	0.8			▲		●				▲	●			●							●			●	●	●	●		●						
	TPMH160304-MV	0.4			▲		●				▲	●			●							●			●	●	●	●		●						
	TPMH160308-MV	0.8			▲		●				▲	●			●							●			●	●	●	●		●						
R/L 	TPGX080202L	0.2																							●						●		●			
	TPGX080202R	0.2																							●											
	TPGX080204L	0.4																					●		●						●		●			
	TPGX080204R	0.4																							●								●			
	TPGX090202L	0.2																							●						●		●			
	TPGX090202R	0.2																							●											
	TPGX090204L	0.4																					●		●						●		●			
	TPGX090204R	0.4																							●								●			
	TPGX090208L	0.8																							●								●			
	TPGX090208R	0.8																															●			
	TPGX110302L	0.2																							●						●		●			
	TPGX110304L	0.4																					●		●						●		●			
	TPGX110304R	0.4																					●		●								●			
	TPGX110308L	0.8																					●		●						●	●	●			
	TPGX110308R	0.8																							●								●			
R/L 	TPMX090204L	0.4																							●											
	TPMX110304L	0.4																							●											
Flat Top	TPGX080202	0.2																															●			
	TPGX080204	0.4																				●	●		●						●		●			
	TPGX080208	0.8																							●						●		●			
	TPGX090202	0.2																															●			
	TPGX090204	0.4																					●		●						●		●			
	TPGX090208	0.8																					●		●						●		●			
	TPGX110302	0.2																															●			
	TPGX110304	0.4																				●	●		●						●	●	●			
	TPGX110308	0.8																					●		●						●	●	●			
	TPGX160304	0.4																							●						●		●			
	TPGX160308	0.8																													●		●			

VB**

Rhombic 35°, 5° Posi, With hole

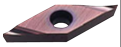
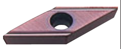
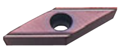
Product Information

APPLICABLE HOLDER PAGE (SMALL TOOLS) >> 355
IDENTIFICATION >> 30
TECHNICAL INFO >> 1971
APPLICABLE HOLDER PAGE (BORING BARS) >> 396
GRADES >> 58
SUITABLE GRADE, CHIPBREAKER >> 38

Stock status (10 inserts in one case)
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Work Material		Coated																						Cermet		Coated Cermet				Carbide					
		UE6105	UE6110	UE6020	MC6015	MC6025	UH6400	MC7025	MP7035	US7020	US735	US905	MC5005	MC5015	UC5105	UC5115	MP9005	MP9015	VP05RT	VP10RT	VP15TF	UP20M	MS6015	NX2525	NX3035	MP3025	AP25N	VP25N	VP45N	UTi20T	HTi05T	HTi10	RT9010	MT9005	MT9015
P Steel		●	◐	✣	◐	✣	✣														✣	✣	◐	●	◐	◐	●	●	◐	✣					
M Stainless steel								◐	✣	○	✣									◐	✣	✣		○			○	○		✣					
K Cast iron													◐	✣	●	◐				◐	✣			●			●	●		✣	●	◐			
N Non-Ferrous Metal																																◐			
S Heat-resistant Alloy, Titanium Alloy												●					●	◐	●	◐	✣											◐	◐	●	◐
Inserts Shape	Order Number	RE (mm)																																	
FP	VBMT110302-FP	0.2		●		●	●																	●		●									
	VBMT110304-FP	0.4		●		●	●																	●		●									
	VBMT110308-FP	0.8		●		●	●																	●		●									
	VBMT160404-FP	0.4		●		●	●																	●		●									
	VBMT160408-FP	0.8		●		●	●																	●		●									
FM	VBMT110302-FM	0.2																			●														
	VBMT110304-FM	0.4																			●														
	VBMT110308-FM	0.8																			●														
	VBMT160404-FM	0.4																			●														
	VBMT160408-FM	0.8																			●														
FV	VBMT110304-FV	0.4			▲																●			●	●										
	VBMT110308-FV	0.8			▲																●			●	●										
	VBMT160404-FV	0.4			▲																●			●	●										
	VBMT160408-FV	0.8			▲																●			●	●										
R/L-F	VBGT110302L-F	0.2																			●			●		●	●					●			
	VBGT110302R-F	0.2																			●			●		●	●					●			
	VBGT110304L-F	0.4																			●			●			●					●			
	VBGT110304R-F	0.4																			●			●			●					●			
	VBGT160402L-F	0.2																			●			●			●					●			
	VBGT160402R-F	0.2																			●			●			●					●			
	VBGT160404L-F	0.4																			●			●			●					●			
	VBGT160404R-F	0.4																			●			●			●					●			
LP	VBMT110304-LP	0.4		●		●	●																	●		●									
	VBMT110308-LP	0.8		●		●	●																	●		●									
	VBMT160404-LP	0.4		●		●	●																	●		●									
	VBMT160408-LP	0.8		●		●	●																	●		●									
LM	VBMT110304-LM	0.4						●	●												●														
	VBMT110308-LM	0.8						●	●												●														
	VBMT160404-LM	0.4						●	●												●														
	VBMT160408-LM	0.8						●	●												●														
SV	VBMT110304-SV	0.4			▲																●				●										
	VBMT110308-SV	0.8			▲																●				●										
	VBMT160404-SV	0.4			▲																●				●										
	VBMT160408-SV	0.8			▲																●				●										
MP	VBMT160404-MP	0.4		●		●	●																	●		●									
	VBMT160408-MP	0.8		●		●	●																	●		●									
MM	VBMT160404-MM	0.4						●	●												●														
	VBMT160408-MM	0.8						●	●												●														

Stock status (10 inserts in one case)
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✤: Unstable Cutting

			Coated																						Cermet		Coated Cermet				Carbide					
Inserts Shape	Order Number	RE (mm)	UE6105	UE6110	UE6020	MC6015	MC6025	UH6400	MC7025	MP7035	US7020	US735	US905	MC5005	MC5015	UC5105	UC5115	MP9005	MP9015	VP05RT	VP10RT	VP15TF	UP20M	MS6015	NX2525	NX3035	MP3025	AP25N	VP25N	VP45N	UTi20T	HTi05T	HTi10	RT9010	MT9005	MT9015
Work Material	P Steel		●	◐	✤	◐	✤	✤														✤	✤	◐	●	◐	◐	●	●	◐	✤					
	M Stainless steel								◐	✤	●	✤									◐	✤	✤		●			●	●		✤					
	K Cast iron													◐	✤	●	◐				◐	✤			●			●	●		✤	●	◐			
	N Non-Ferrous Metal																																◐			
	S Heat-resistant Alloy, Titanium Alloy												●					●	◐	●	◐	✤											◐	◐	●	◐
MK	VBMT160404-MK	0.4												●	●																					
	VBMT160408-MK	0.8												●	●																					
Standard	VBMT160404	0.4		●																																
	VBMT160408	0.8		●																																
MV	VBMT110304-MV	0.4			▲		●				▲	●			●							●			●	●	●	●		●						
	VBMT110308-MV	0.8			▲		●				▲	●			●							●			●	●	●	●		●						
	VBMT160404-MV	0.4			▲		●				▲	●			●							●			●	●	●	●		●						
	VBMT160408-MV	0.8			▲		●				▲	●			●							●			●	●	●	●		●						
R/L-SR 	VBET110301L-SR	0.1																				●			●								●			
	VBET110301R-SR	0.1																				●			●								●			
	VBET110302L-SR	0.2																				●			●								●			
	VBET110302R-SR	0.2																				●			●								●			
	VBET110304L-SR	0.4																				●			●								●			
	VBET110304R-SR	0.4																				●			●								●			
	VBET1103V3L-SR	0.03																				●			●								●			
	VBET1103V3R-SR	0.03																				●			●								●			
R/L-SN 	VBET110300L-SN	0																				●			●								●			
	VBET110300R-SN	0																				●			●								●			
	VBET110301L-SN	0.1																				●			●								●			
	VBET110301R-SN	0.1																				●			●								●			
	VBET110302L-SN	0.2																				●			●								●			
	VBET110302R-SN	0.2																				●			●								●			
	VBET110304L-SN	0.4																				●			●								●			
	VBET110304R-SN	0.4																				●			●								●			
	VBET1103V3L-SN	0.03																				●			●								●			
	VBET1103V3R-SN	0.03																				●			●								●			
R/LW-SN 	VBET1103V3LW-SN	0.03																				●														
	VBET1103V3RW-SN	0.03																				●														
Flat Top	VBMW160408	0.8												●	●																					

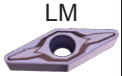
VC**

Rhombic 35°, 7° Posi, With hole

Product Information

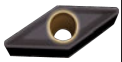
APPLICABLE HOLDER PAGE (EXTERNAL TURNING TOOLS) >> 331
IDENTIFICATION >> 30
TECHNICAL INFO >> 1971
APPLICABLE HOLDER PAGE (BORING BARS) >> 432
GRADES >> 58
SUITABLE GRADE, CHIPBREAKER >> 38

Stock status (10 inserts in one case)
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Work Material		Coated																						Cermet		Coated Cermet				Carbide					
		UE6105	UE6110	UE6020	MC6015	MC6025	UH6400	MC7025	MP7035	US7020	US735	US905	MC5005	MC5015	UC5105	UC5115	MP9005	MP9015	VP05RT	VP10RT	VP15TF	UP20M	MS6015	NX2525	NX3035	MP3025	AP25N	VP25N	VP45N	UTi20T	HTi05T	HTi10	RT9010	MT9005	MT9015
P Steel		●	◐	✣	◐	✣	✣														✣	✣	◐	●	◐	◐	●	●	◐	✣					
M Stainless steel								◐	✣	○	✣									◐	✣	✣		○			○	○		✣					
K Cast iron													◐	✣	●	◐				◐	✣			●			●	●		✣	●	◐			
N Non-Ferrous Metal																																◐			
S Heat-resistant Alloy, Titanium Alloy												●					●	◐	●	◐	✣											◐	◐	●	◐
Inserts Shape	Order Number	RE (mm)																																	
FP	VCMT110302-FP	0.2		●		●	●																	●		●									
	VCMT110304-FP	0.4		●		●	●																	●		●									
	VCMT160404-FP	0.4		●		●	●																	●		●									
	VCMT160408-FP	0.8		●		●	●																	●		●									
FM	VCMT110302-FM	0.2																			●														
	VCMT110304-FM	0.4																			●														
	VCMT160404-FM	0.4																			●														
	VCMT160408-FM	0.8																			●														
FV	VCMT080202-FV	0.2			▲		●														●			●	●	●									
	VCMT080204-FV	0.4			▲		●														●			●	●	●									
	VCMT160404-FV	0.4		●	▲																			●	●		●								
	VCMT160408-FV	0.8		●	▲																			●	●		●								
AZ	VCGT160404-AZ	0.4																														●			
	VCGT160408-AZ	0.8																														●			
	VCGT160412-AZ	1.2																														●			
R/L-F	VCGT080202L-F	0.2																			●			●			●					●			
	VCGT080202R-F	0.2																			●			●			●					●			
	VCGT080204L-F	0.4																			●			●			●					●			
	VCGT080204R-F	0.4																			●			●			●					●			
LP	VCMT110304-LP	0.4		●		●	●																	●		●									
	VCMT110308-LP	0.8		●		●	●																	●		●									
	VCMT160404-LP	0.4		●		●	●																	●		●									
	VCMT160408-LP	0.8		●		●	●																	●		●									
LM 	VCMT110304-LM	0.4						●	●												●														
	VCMT110308-LM	0.8						●	●												●														
	VCMT160404-LM	0.4						●	●												●														
	VCMT160408-LM	0.8						●	●												●														
LS	VCGT110301M-LS	0.08															●	●																	
	VCGT110302M-LS	0.18															●	●																	
	VCGT110304M-LS	0.38															●	●																	
	VCGT130301M-LS	0.08															●	●																	
	VCGT130302M-LS	0.18															●	●																	
	VCGT130304M-LS	0.38															●	●																	
LS-P	VCGT110301M-LS-P	0.08																																●	
	VCGT110302M-LS-P	0.18																																●	
	VCGT110304M-LS-P	0.38																																●	
	VCGT130301M-LS-P	0.08																																●	
	VCGT130302M-LS-P	0.18																																●	
	VCGT130304M-LS-P	0.38																																●	

Stock status (10 inserts in one case)
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Work Material																																									
P	Steel	●	◐	✣	◐	✣	✣															✣	✣	◐	●	◐		◐	●	●	◐	✣								
M	Stainless steel							◐	✣	○	✣									◐	✣	✣		○				○	○		✣									
K	Cast iron												◐	✣	●	◐				◐	✣			●				●	●		✣	●	◐							
N	Non-Ferrous Metal																																◐							
S	Heat-resistant Alloy, Titanium Alloy											●					●	◐	●	◐	✣												◐	◐	●	◐				

Inserts Shape	Order Number	RE (mm)	Coated																						Cermet		Coated Cermet				Carbide					
			UE6105	UE6110	UE6020	MC6015	MC6025	UH6400	MC7025	MP7035	US7020	US735	US905	MC5005	MC5015	UC5105	UC5115	MP9005	MP9015	VP05RT	VP10RT	VP15TF	UP20M	MS6015	NX2525	NX3035	MP3025	AP25N	VP25N	VP45N	UTi20T	HTi05T	HTi10	RT9010	MT9005	MT9015
SV	VCMT080202-SV	0.2			▲		●															●				●	●									
	VCMT080204-SV	0.4			▲		●															●				●	●									
MP	VCMT160404-MP	0.4		●		●	●																		●		●									
	VCMT160408-MP	0.8		●		●	●																		●		●									
	VCMT160412-MP	1.2		●		●	●																		●		●									
MM	VCMT160404-MM	0.4							●	●												●														
	VCMT160408-MM	0.8							●	●												●														
	VCMT160412-MM	1.2							●	●												●														
MK 	VCMT160404-MK	0.4												●	●																					
	VCMT160408-MK	0.8												●	●																					
Standard	VCMT110304	0.4		●	▲							●										●			●	●	●	●			●		●			
	VCMT160404	0.4	●	●	▲							●					●					●			●	●	●	●			●		●			
	VCMT160408	0.8	●	●	▲							●					●					●			●	●	●	●			●					
	VCMT160412	1.2		●	▲							●													●	●										
MV	VCMT080202-MV	0.2			▲		●				▲	●										●			●	●	●	●		●						
	VCMT080204-MV	0.4			▲		●				▲	●			●							●			●	●	●	●		●						
Flat Top	VCMW110304	0.4																															●			
	VCMW160404	0.4												●	●	●	●																●			
	VCMW160408	0.8												●	●	●	●																●			

VD**

Rhombic 35°, 15° Posi, With hole

Product Information

APPLICABLE HOLDER PAGE (EXTERNAL TURNING TOOLS) >> 340
GRADES >> 58
SUITABLE GRADE, CHIPBREAKER >> 38
IDENTIFICATION >> 30
TECHNICAL INFO >> 1971

●: Inventory maintained in Japan. ▲: This item to be discontinued within two years.
Stock status (10 inserts in one case) □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Work Material		Coated																						Cermet		Coated Cermet				Carbide					
		UE6105	UE6110	UE6020	MC6015	MC6025	UH6400	MC7025	MP7035	US7020	US735	US905	MC5005	MC5015	UC5105	UC5115	MP9005	MP9015	VP05RT	VP10RT	VP15TF	UP20M	MS6015	NX2525	NX3035	MP3025	AP25N	VP25N	VP45N	UTi20T	HTi05T	HTi10	RT9010	MT9005	MT9015
P	Steel	●	◐	✣	◐	✣	✣														✣	✣	◐	●	◐	◐	●	●	◐	✣					
M	Stainless steel							◐	✣	●	✣									◐	✣	✣		●			●	●		✣					
K	Cast iron												◐	✣	●	◐				◐	✣			●			●	●		✣	●	◐			
N	Non-Ferrous Metal																															◐			
S	Heat-resistant Alloy, Titanium Alloy											●					●	◐	●	◐	✣											◐	◐	●	◐

Inserts Shape	Order Number	RE (mm)	UE6105	UE6110	UE6020	MC6015	MC6025	UH6400	MC7025	MP7035	US7020	US735	US905	MC5005	MC5015	UC5105	UC5115	MP9005	MP9015	VP05RT	VP10RT	VP15TF	UP20M	MS6015	NX2525	NX3035	MP3025	AP25N	VP25N	VP45N	UTi20T	HTi05T	HTi10	RT9010	MT9005	MT9015
R/L	VDGX160302L	0.2																															●			
	VDGX160302R	0.2																															●			
	VDGX160304L	0.4																															●			
	VDGX160304R	0.4																															●			

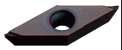
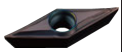
VP**

Rhombic 35°, 11° Posi, With hole

Product Information

APPLICABLE HOLDER PAGE (SMALL TOOLS) >> 354
GRADES >> 58
SUITABLE GRADE, CHIPBREAKER >> 38
IDENTIFICATION >> 30
TECHNICAL INFO >> 1971

Stock status (10 inserts in one case)
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Work Material			UE6105	UE6110	UE6020	MC6015	MC6025	UH6400	MC7025	MP7035	US7020	US735	US905	MC5005	MC5015	UC5105	UC5115	MP9005	MP9015	VP05RT	VP10RT	VP15TF	UP20M	MS6015	NX2525	NX3035	MP3025	AP25N	VP25N	VP45N	UTi20T	HTi05T	HTi10	RT9010	MT9005	MT9015
			Coated																						Cermet		Coated Cermet				Carbide					
Work Material	P	Steel	●	◐	✣	◐	✣	✣														✣	✣	◐	●	◐		◐	●	●	◐	✣					
	M	Stainless steel							◐	✣	○	✣									◐	✣	✣		○				○	○		✣					
	K	Cast iron												◐	✣	●	◐				◐	✣			●				●	●		✣	●	◐			
	N	Non-Ferrous Metal																																◐			
	S	Heat-resistant Alloy, Titanium Alloy											●					●	◐	●	◐	✣											◐	◐	●	◐
Inserts Shape	Order Number	RE (mm)																																			
R/L-SRF 	VPET080201L-SRF	0.1																				●															
	VPET080201R-SRF	0.1																				●															
	VPET080202L-SRF	0.2																				●															
	VPET080202R-SRF	0.2																				●															
	VPET110301L-SRF	0.1																				●															
	VPET110301R-SRF	0.1																				●															
	VPET110302L-SRF	0.2																				●															
	VPET110302R-SRF	0.2																				●															
	VPET1103V3L-SRF	0.03																				●															
	VPET1103V3R-SRF	0.03																				●															
SMG 	VPGT080201M-SMG	0.1																				●															
	VPGT080202M-SMG	0.2																				●															
	VPGT110301M-SMG	0.1																				●															
	VPGT110302M-SMG	0.2																				●															

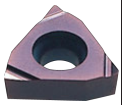
WB**

Trigon, 7° Posi, With hole

Product Information

APPLICABLE HOLDER PAGE (BORING BARS) >> 394
GRADES >> 58
SUITABLE GRADE, CHIPBREAKER >> 38
IDENTIFICATION >> 30
TECHNICAL INFO >> 1971

Stock status (10 inserts in one case)
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Work Material			UE6105	UE6110	UE6020	MC6015	MC6025	UH6400	MC7025	MP7035	US7020	US735	US905	MC5005	MC5015	UC5105	UC5115	MP9005	MP9015	VP05RT	VP10RT	VP15TF	UP20M	MS6015	NX2525	NX3035	MP3025	AP25N	VP25N	VP45N	UTi20T	HTi05T	HTi10	RT9010	MT9005	MT9015
			Coated																						Cermet		Coated Cermet				Carbide					
Work Material	P	Steel	●	◐	✣	◐	✣	✣														✣	✣	◐	●	◐	◐	●	●	◐	✣					
	M	Stainless steel							◐	✣	○	✣									◐	✣	✣		○			○	○		✣					
	K	Cast iron												◐	✣	●	◐				◐	✣			●			●	●		✣	●	◐			
	N	Non-Ferrous Metal																															◐			
	S	Heat-resistant Alloy, Titanium Alloy											●					●	◐	●	◐	✣											◐	◐	●	◐
Inserts Shape	Order Number	RE (mm)																																		
R/L-F 	WBGT020101L-F	0.1																				●			●											
	WBGT020102L-F	0.2																				●			●		●									
	WBGT020104L-F	0.4																				●			●		●									
	WBGT0201V3L-F	0.03																				●			●											
	WBGTL30201L-F	0.1																				●			●											
	WBGTL30202L-F	0.2																				●			●		●									
	WBGTL30202R-F	0.2																				●			●											
	WBGTL30204L-F	0.4																				●			●		●									
	WBGTL30204R-F	0.4																				●			●											
	WBGTL302V3L-F	0.03																				●			●											
R/L-MV	WBMTL30202L-MV	0.2			▲	●				▲												●			●	●	●			●						
	WBMTL30202R-MV	0.2			▲	●				▲												●			●	●	●			●						
	WBMTL30204L-MV	0.4			▲	●				▲												●			●	●	●			●						
	WBMTL30204R-MV	0.4			▲	●				▲												●			●	●	●			●						

WC**

Trigon, 7° Posi, With hole

Product Information

APPLICABLE HOLDER PAGE (BORING BARS) >> 422
GRADES >> 58
SUITABLE GRADE, CHIPBREAKER >> 38
IDENTIFICATION >> 30
TECHNICAL INFO >> 1971

Stock status (10 inserts in one case)
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Work Material			Coated																						Cermet		Coated Cermet				Carbide					
			UE6105	UE6110	UE6020	MC6015	MC6025	UH6400	MC7025	MP7035	US7020	US735	US905	MC5005	MC5015	UC5105	UC5115	MP9005	MP9015	VP05RT	VP10RT	VP15TF	UP20M	MS6015	NX2525	NX3035	MP3025	AP25N	VP25N	VP45N	UTi20T	HTi05T	HTi10	RT9010	MT9005	MT9015
P	Steel		●	◐	✣	◐	✣	✣														✣	✣	◐	●	◐	◐	●	●	◐	✣					
M	Stainless steel								◐	✣	○	✣									◐	✣	✣		○			○	○		✣					
K	Cast iron													◐	✣	●	◐				◐	✣			●			●	●		✣	●	◐			
N	Non-Ferrous Metal																																◐			
S	Heat-resistant Alloy, Titanium Alloy												●					●	◐	●	◐	✣											◐	◐	●	◐
Inserts Shape	Order Number	RE (mm)																																		
Standard	WCMT020102	0.2		●	▲							●													●	●	●	●			●					
	WCMT020104	0.4		●	▲							●													●	●	●	●			●					
	WCMT040202	0.2		●	▲							●													●	●	●	●			●					
	WCMT040204	0.4		●	▲							●													●	●	●	●			●					
	WCMT040208	0.8			▲																															
	WCMT06T304	0.4		●	▲							●													●	●	●	●			●					
	WCMT06T308	0.8		●	▲							●													●	●	●	●			●					
	WCMTL30202	0.2		●								●													●	●	●	●			●					
	WCMTL30204	0.4		●								●													●	●	●	●			●					
R/L	WCGT020102L	0.2																							●								●			
	WCGT020102R	0.2																							●											
	WCGT020104L	0.4																							●								●			
	WCGT020104R	0.4																							●											
	WCGTL30202L	0.2																							●											
	WCGTL30204L	0.4																							●											

WP**

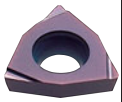
Trigon, 11° Posi, With hole

Product Information

APPLICABLE HOLDER PAGE (BORING BARS) >> 394
GRADES >> 58
SUITABLE GRADE, CHIPBREAKER >> 38
IDENTIFICATION >> 30
TECHNICAL INFO >> 1971

Stock status (10 inserts in one case)
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Work Material																																													
P	Steel	●	◐	✣	◐	✣	✣																			✣	✣	◐	●	◐		◐	●	●	◐	✣								
M	Stainless steel							◐	✣	●	✣											◐	✣	✣		●					●	●		✣									
K	Cast iron													◐	✣	●	◐					◐	✣			●					●	●		✣	●	◐							
N	Non-Ferrous Metal																																			◐							
S	Heat-resistant Alloy, Titanium Alloy												●					●	◐	●	◐	◐	✣											◐	◐	●	◐						

Inserts Shape	Order Number	RE (mm)	Coated																						Cermet		Coated Cermet				Carbide					
			UE6105	UE6110	UE6020	MC6015	MC6025	UH6400	MC7025	MP7035	US7020	US735	US905	MC5005	MC5015	UC5105	UC5115	MP9005	MP9015	VP05RT	VP10RT	VP15TF	UP20M	MS6015	NX2525	NX3035	MP3025	AP25N	VP25N	VP45N	UTi20T	HTi05T	HTi10	RT9010	MT9005	MT9015
R/L-FS 	WPGT040204L-FS	0.4																				●			●											
	WPGT040204R-FS	0.4																				●			●											
	WPGT060304L-FS	0.4																				●			●											
	WPGT060304R-FS	0.4																				●			●											
MV	WPMT040202-MV	0.2			▲		●				▲	●										●			●	●	●									
	WPMT040204-MV	0.4			▲		●				▲	●			●							●			●	●	●			●						
	WPMT060304-MV	0.4			▲		●				▲	●			●							●			●	●	●									
	WPMT060308-MV	0.8			▲		●				▲	●			●							●			●	●	●			●						

XC**

Rhombic 25°, 7° Posi, With hole

Product Information

APPLICABLE HOLDER PAGE (EXTERNAL TURNING TOOLS) >> 334
GRADES >> 58
SUITABLE GRADE, CHIPBREAKER >> 38
IDENTIFICATION >> 30
TECHNICAL INFO >> 1971

Stock status (10 inserts in one case)
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Work Material			Coated																						Cermet		Coated Cermet				Carbide					
			UE6105	UE6110	UE6020	MC6015	MC6025	UH6400	MC7025	MP7035	US7020	US735	US905	MC5005	MC5015	UC5105	UC5115	MP9005	MP9015	VP05RT	VP10RT	VP15TF	UP20M	MS6015	NX2525	NX3035	MP3025	AP25N	VP25N	VP45N	UTi20T	HTi05T	HTi10	RT9010	MT9005	MT9015
P	Steel		●	◐	✣	◐	✣	✣														✣	✣	◐	●	◐	◐	●	●	◐	✣					
M	Stainless steel								◐	✣	○	✣									◐	✣	✣		○			○	○		✣					
K	Cast iron													◐	✣	●	◐				◐	✣			●			●	●		✣	●	◐			
N	Non-Ferrous Metal																																◐			
S	Heat-resistant Alloy, Titanium Alloy												●					●	◐	●	◐	✣											◐	◐	●	◐
Inserts Shape	Order Number	RE (mm)																																		
SVX	XCMT150302-SVX	0.2																				●														
	XCMT150304-SVX	0.4			▲																	●														
	XCMT150308-SVX	0.8			▲																	●														

RTG

Round, 6° Posi, Without hole

Product Information

APPLICABLE HOLDER PAGE (EXTERNAL TURNING TOOLS) >> 341
GRADES >> 58
SUITABLE GRADE, CHIPBREAKER >> 38
IDENTIFICATION >> 30
TECHNICAL INFO >> 1971

●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. Stock status (10 inserts in one case) □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Work Material			Coated																						Cermet		Coated Cermet				Carbide					
			UE6105	UE6110	UE6020	MC6015	MC6025	UH6400	MC7025	MP7035	US7020	US735	US905	MC5005	MC5015	UC5105	UC5115	MP9005	MP9015	VP05RT	VP10RT	VP15TF	UP20M	MS6015	NX2525	NX3035	MP3025	AP25N	VP25N	VP45N	UTi20T	HTi05T	HTi10	RT9010	MT9005	MT9015
P	Steel		●	◐	✣	◐	✣	✣														✣	✣	◐	●	◐	◐	●	●	◐	✣					
M	Stainless steel								◐	✣	●	✣									◐	✣	✣		●			●	●		✣					
K	Cast iron													◐	✣	●	◐				◐	✣			●			●	●		✣	●	◐			
N	Non-Ferrous Metal																																◐			
S	Heat-resistant Alloy, Titanium Alloy												●					●	◐	●	◐	✣											◐	◐	●	◐
Inserts Shape	Order Number	RE (mm)																																		
	RTG05A																														●		●			
	RTG06A																														●		●			
	RTG07A																														●					
	RTG08A																														●		●			
	RTG10A																														●		●			

SP**

Square, 11° Posi, Without hole

Product Information

90°

IDENTIFICATION >> 30
TECHNICAL INFO >> 1971
GRADES >> 58
SUITABLE GRADE, CHIPBREAKER >> 38

Stock status (10 inserts in one case)
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Work Material		UE6105	UE6110	UE6020	MC6015	MC6025	UH6400	MC7025	MP7035	US7020	US735	US905	MC5005	MC5015	UC5105	UC5115	MP9005	MP9015	VP05RT	VP10RT	VP15TF	UP20M	MS6015	NX2525	NX3035	MP3025	AP25N	VP25N	VP45N	UTi20T	HTi05T	HTi10	RT9010	MT9005	MT9015
		Coated																						Cermet		Coated Cermet				Carbide					
Work Material	P Steel	●	◐	✣	◐	✣	✣														✣	✣	◐	●	◐	◐	●	●	◐	✣					
	M Stainless steel							◐	✣	○	✣									◐	✣	✣		○			○	○		✣					
	K Cast iron												◐	✣	●	◐				◐	✣			●			●	●		✣	●	◐			
	N Non-Ferrous Metal																															◐			
	S Heat-resistant Alloy, Titanium Alloy											●					●	◐	●	◐	✣											◐	◐	●	◐
Inserts Shape	Order Number	RE (mm)																																	
Standard	SPMR090304	0.4		●	▲																			●	●	●									
	SPMR090308	0.8		●	▲																			●	●	●									
	SPMR120304	0.4		●	▲																			●	●	●									
	SPMR120308	0.8		●	▲																			●	●	●									
R/L	SPGR090304R	0.4																												●					
Flat Top	SPGN090304	0.4																						●						●		●			
	SPGN090308	0.8																														●			
	SPGN120304	0.4																						●						●		●			
	SPGN120308	0.8																				●		●						●		●			
	SPGN120312	1.2																														●			
	SPGN120404	0.4																														●			
	SPGN120408	0.8																												●		●			
	SPGN150404	0.4																												●					
	SPGN150408	0.8																														●			
Flat Top	SPMN090304	0.4																						●						●		●			
	SPMN090308	0.8		●																				●						●		●			
	SPMN120304	0.4		●																	●									●		●			
	SPMN120304T	0.4																						●											
	SPMN120308	0.8		●																	●	●								●		●			
	SPMN120312	1.2		●	▲																●									●		●			
	SPMN120408	0.8																												●		●			
	SPMN120412	1.2																												●					
	SPMN150408	0.8																												●					
	SPMN150412	1.2																												●					
	SPMN190404	0.4																												●					
	SPMN190408	0.8																												●					
	SPMN190412	1.2																												●					

TC**

Triangular, 7° Posi,WITHOUT HOLE

Product Information

IDENTIFICATION >> 30
TECHNICAL INFO >> 1971
GRADES >> 58
SUITABLE GRADE, CHIPBREAKER >> 38

Stock status (10 inserts in one case)
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Work Material		Coated																						Cermet		Coated Cermet				Carbide					
		UE6105	UE6110	UE6020	MC6015	MC6025	UH6400	MC7025	MP7035	US7020	US735	US905	MC5005	MC5015	UC5105	UC5115	MP9005	MP9015	VP05RT	VP10RT	VP15TF	UP20M	MS6015	NX2525	NX3035	MP3025	AP25N	VP25N	VP45N	UTi20T	HTi05T	HTi10	RT9010	MT9005	MT9015
P	Steel	●	◐	✣	◐	✣	✣														✣	✣	◐	●	◐	◐	●	●	◐	✣					
M	Stainless steel							◐	✣	○	✣									◐	✣	✣		○			○	○		✣					
K	Cast iron												◐	✣	●	◐				◐	✣			●			●	●		✣	●	◐			
N	Non-Ferrous Metal																															◐			
S	Heat-resistant Alloy, Titanium Alloy											●					●	◐	●	◐	✣											◐	◐	●	◐

Inserts Shape	Order Number	RE (mm)	UE6105	UE6110	UE6020	MC6015	MC6025	UH6400	MC7025	MP7035	US7020	US735	US905	MC5005	MC5015	UC5105	UC5115	MP9005	MP9015	VP05RT	VP10RT	VP15TF	UP20M	MS6015	NX2525	NX3035	MP3025	AP25N	VP25N	VP45N	UTi20T	HTi05T	HTi10	RT9010	MT9005	MT9015
Flat Top	TCGN060104	0.4																															●			
	TCGN090204	0.4																															●			

TP**

Triangular, 11° Posi, Without hole

Product Information

60°

APPLICABLE HOLDER PAGE (BORING BARS) >> 420
GRADES >> 58
SUITABLE GRADE, CHIPBREAKER >> 38
IDENTIFICATION >> 30
TECHNICAL INFO >> 1971

Stock status (10 inserts in one case)
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Work Material		UE6105	UE6110	UE6020	MC6015	MC6025	UH6400	MC7025	MP7035	US7020	US735	US905	MC5005	MC5015	UC5105	UC5115	MP9005	MP9015	VP05RT	VP10RT	VP15TF	UP20M	MS6015	NX2525	NX3035	MP3025	AP25N	VP25N	VP45N	UTi20T	HTi05T	HTi10	RT9010	MT9005	MT9015
		Coated																						Cermet		Coated Cermet				Carbide					
P	Steel	●	◐	✣	◐	✣	✣														✣	✣	◐	●	◐	◐	●	●	◐	✣					
M	Stainless steel							◐	✣	○	✣									◐	✣	✣		○			○	○		✣					
K	Cast iron												◐	✣	●	◐				◐	✣			●			●	●		✣	●	◐			
N	Non-Ferrous Metal																															◐			
S	Heat-resistant Alloy, Titanium Alloy											●					●	◐	●	◐	✣											◐	◐	●	◐

Inserts Shape	Order Number	RE (mm)	UE6105	UE6110	UE6020	MC6015	MC6025	UH6400	MC7025	MP7035	US7020	US735	US905	MC5005	MC5015	UC5105	UC5115	MP9005	MP9015	VP05RT	VP10RT	VP15TF	UP20M	MS6015	NX2525	NX3035	MP3025	AP25N	VP25N	VP45N	UTi20T	HTi05T	HTi10	RT9010	MT9005	MT9015
Standard	TPMR090202	0.2																								●	●									
	TPMR090204	0.4																							●	●	●									
	TPMR090208	0.8																									●									
	TPMR110302	0.2																							●	●	●									
	TPMR110304	0.4		●	●																				●	●	●									
	TPMR110308	0.8		●	●																				●	●	●									
	TPMR160304	0.4		●	●																				●	●	●									
	TPMR160308	0.8		●	●																				●	●	●									
	TPMR160312	1.2		●																						●	●									
R/L	TPGR110304L	0.4																							●						●		●			
	TPGR110304R	0.4																							●								●			
	TPGR160304L	0.4																							●						●		●			
	TPGR160304R	0.4																							●						●		●			
	TPGR160308L	0.8																							●						●		●			
	TPGR160308R	0.8																							●											
Flat Top	TPGN110302	0.2																															●			
	TPGN110304	0.4																							●						●	●	●			
	TPGN110308	0.8																					●										●			
	TPGN160302	0.2																															●			
	TPGN160304	0.4																					●		●						●	●	●			
	TPGN160308	0.8																					●		●						●	●	●			
	TPGN160312	1.2																															●			
	TPGN160316	1.6																															●			
	TPGN160408	0.8																													●					
	TPGN220404	0.4																					●										●			
	TPGN220408	0.8																					●										●			
Flat Top	TPMN110304	0.4		●										●	●	●	●						●		●						●		●			
	TPMN110308	0.8		●										●	●	●	●								●						●		●			
	TPMN160304	0.4		●										●	●	●	●					●	●		●						●		●			
	TPMN160308	0.8		●										●	●	●	●					●	●		●						●	●	●			
	TPMN160312	1.2		●										●	●	●	●						●										●			
	TPMN160320	2.0																													●					
	TPMN220404	0.4		●																											●					
	TPMN220408	0.8		●	●																	●	●								●		●			

TP**

Stock status (10 inserts in one case)
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Work Material	P	Steel	●	◐	✣	◐	✣	✣																	✣	✣	◐	●	◐		◐	●	●	◐	✣							
	M	Stainless steel							◐	✣	○	✣									◐	✣	✣		○				○	○				✣								
	K	Cast iron												◐	✣	●	◐				◐	✣			●				●	●		✣	●	◐								
	N	Non-Ferrous Metal																																◐							
	S	Heat-resistant Alloy, Titanium Alloy											●					●	◐	●	◐	✣												◐	◐	●	◐				
Inserts Shape	Order Number	RE (mm)	Coated																						Cermet			Coated Cermet				Carbide									
			UE6105	UE6110	UE6020	MC6015	MC6025	UH6400	MC7025	MP7035	US7020	US735	US905	MC5005	MC5015	UC5105	UC5115	MP9005	MP9015	VP05RT	VP10RT	VP15TF	UP20M	MS6015	NX2525	NX3035		MP3025	AP25N	VP25N	VP45N	UTi20T	HTi05T	HTi10	RT9010	MT9005	MT9015				
	TPMN220412	1.2		●																		●										●		●							

RECOMMENDED CUTTING CONDITIONS (EXTERNAL TURNING)

NEGATIVE INSERTS

Breaker : **Std** : Standard **Flat** : Flat Top

Work Material	Hardness	Cutting Mode		Priority	Breaker	Grade	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
P									
Mild Steel (ASTM A36, AISI 1010)	≤180HB	●	F	1	FY	VP25N	285—445	0.09—0.23	0.20—0.80
		●	F	2	FS	NX2525	270—385	0.09—0.23	0.20—0.70
		●	L	1	SY	VP25N	260—405	0.16—0.33	0.50—1.20
		◐	F	1	FY	MP3025	275—420	0.09—0.23	0.20—0.80
		◐	F	2	FY	NX3035	260—370	0.09—0.23	0.20—0.80
		◐	F	3	FS	NX2525	270—385	0.09—0.23	0.20—0.70
		◐	L	1	SY	MP3025	250—385	0.16—0.33	0.50—1.20
		◐	L	2	SY	NX3035	235—335	0.16—0.33	0.50—1.20
		✣	F	1	FY	UE6020	285—460	0.09—0.23	0.20—0.80
		✣	F	2	FS	UE6020	285—460	0.09—0.23	0.20—0.70
		✣	L	1	SY	UE6020	260—420	0.16—0.33	0.50—1.20
Carbon Steel • Alloy Steel (AISI 1045, AISI 4140)	180 | 280HB	●	F	1	FP	NX2525	210—300	0.08—0.25	0.10—1.00
		●	F	2	FH	AP25N	215—340	0.08—0.20	0.20—1.00
		●	F	3	FH	NX2525	205—295	0.08—0.20	0.20—1.00
		●	F	4	R/L-F	MP3025	210—325	0.05—0.15	0.10—0.50
		●	F	5	PK	NX2525	195—280	0.10—0.30	0.20—1.00
		●	L	1	LP	UE6105	220—405	0.10—0.40	0.30—2.00
		●	L	2	SH	UE6105	220—405	0.10—0.40	0.30—2.00
		●	L	3	LP	MP3025	195—295	0.10—0.40	0.30—2.00
		●	L	4	SH	AP25N	200—315	0.10—0.40	0.30—2.00
		●	L	5	SH	NX2525	190—270	0.10—0.40	0.30—2.00
		●	L	6	SA	UE6105	220—405	0.10—0.40	0.30—2.00
		●	L	7	SW	UE6105	220—405	0.10—0.50	0.30—2.50
		●	L	8	SW	MP3025	195—295	0.10—0.50	0.30—2.50
		●	L	9	SW	NX2525	190—270	0.10—0.50	0.30—2.50
		●	L	10	R/L-K	MP3025	195—295	0.08—0.20	0.30—1.20
		●	M	1	MP	UE6105	200—370	0.16—0.50	0.30—4.00
		●	M	2	MP	MP3025	175—270	0.16—0.50	0.30—4.00
		●	M	3	MA	UE6105	200—370	0.20—0.50	0.30—4.00
		●	M	4	MH	UE6105	200—370	0.20—0.55	1.00—4.00
		●	M	5	Std	UE6105	200—370	0.25—0.60	1.50—5.00
		●	M	6	Std	MP3025	175—270	0.25—0.60	1.50—5.00
		●	M	7	Std	NX2525	170—245	0.25—0.60	1.50—5.00
		●	M	8	Std	UTi20T	85—125	0.25—0.60	1.50—5.00
		●	M	9	MW	UE6105	200—370	0.20—0.60	0.90—4.00
		●	M	10	R/L	MP3025	175—270	0.15—0.32	0.40—2.00
		●	R	1	RP	UE6105	190—350	0.25—0.60	1.50—6.00
		●	R	2	GH	UE6105	190—350	0.25—0.60	1.50—6.00
		●	H	1	HX	UE6110	160—275	0.50—1.26	3.00—11.00
		●	H	2	HV	UE6110	135—225	0.70—1.30	4.00—12.00
		◐	F	1	FP	MP3025	215—330	0.08—0.25	0.10—1.00
		◐	F	2	FH	MP3025	210—325	0.08—0.20	0.20—1.00
		◐	F	3	FH	NX3035	200—285	0.08—0.20	0.20—1.00
		◐	F	4	FH	UE6110	230—390	0.08—0.20	0.20—1.00
		◐	L	1	LP	MC6015	210—355	0.10—0.40	0.30—2.00
		◐	L	2	LP	UE6110	210—355	0.10—0.40	0.30—2.00
		◐	L	3	SH	UE6110	210—355	0.10—0.40	0.30—2.00

Cutting Conditions : ● : Stable Cutting ◐ : General Cutting ✣ : Unstable Cutting
Cutting Area : **F** : Finish Cutting **L** : Light Cutting **M** : Medium Cutting **R** : Rough Cutting **H** : Heavy Cutting

Work Material	Hardness	Cutting Mode		Priority	Breaker	Grade	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
P									
Carbon Steel • Alloy Steel (S45C, SCM440)	180 – 280HB		L	4	SA	UE6110	210—355	0.10—0.40	0.30—2.00
			L	5	LP	MP3025	195—295	0.10—0.40	0.30—2.00
			L	6	SH	NX3035	185—260	0.10—0.40	0.30—2.00
			L	7	SA	NX3035	185—260	0.10—0.40	0.30—2.00
			L	8	SW	UE6110	210—355	0.10—0.50	0.30—2.50
			L	9	SW	NX3035	185—260	0.10—0.50	0.30—2.50
			M	1	MP	MC6015	190—325	0.16—0.50	0.30—4.00
			M	2	MP	UE6110	190—325	0.16—0.50	0.30—4.00
			M	3	MA	MC6015	190—325	0.20—0.50	0.30—4.00
			M	4	MA	UE6110	190—325	0.20—0.50	0.30—4.00
			M	5	MA	NX3035	165—235	0.20—0.50	0.30—4.00
			M	6	MH	MC6015	190—325	0.20—0.55	1.00—4.00
			M	7	MH	UE6110	190—325	0.20—0.55	1.00—4.00
			M	8	Std	UE6110	190—325	0.25—0.60	1.50—5.00
			M	9	Std	NX3035	165—235	0.25—0.60	1.50—5.00
			M	10	MW	MC6015	190—325	0.20—0.60	0.90—4.00
			M	11	MW	UE6110	190—325	0.20—0.60	0.90—4.00
			R	1	RP	MC6015	180—310	0.25—0.60	1.50—6.00
			R	2	RP	UE6110	180—310	0.25—0.60	1.50—6.00
			R	3	GH	UE6110	180—310	0.25—0.60	1.50—6.00
			H	1	HX	MC6025	155—250	0.50—1.26	3.00—11.00
			H	2	HV	UE6020	125—205	0.70—1.30	4.00—12.00
			H	3	HZ	UE6110	160—275	0.40—1.20	2.00—10.00
			F	1	FP	MC6025	230—375	0.08—0.25	0.10—1.00
			F	2	FH	UE6110	230—390	0.08—0.20	0.20—1.00
			F	3	FH	UE6020	215—355	0.08—0.20	0.20—1.00
			L	1	LP	MC6025	210—340	0.10—0.40	0.30—2.00
			L	2	SH	UE6020	200—325	0.10—0.40	0.30—2.00
			L	3	SA	UE6020	200—325	0.10—0.40	0.30—2.00
			M	1	MP	MC6025	190—310	0.16—0.50	0.30—4.00
			M	2	MA	MC6035	190—310	0.20—0.50	0.30—4.00
			M	3	MP	UE6020	180—295	0.16—0.50	0.30—4.00
			M	4	MA	UE6020	180—295	0.20—0.50	0.30—4.00
			M	5	MA	UE6035	170—235	0.20—0.50	0.30—4.00
			M	6	MH	UE6020	180—295	0.20—0.55	1.00—4.00
			M	7	MH	UE6035	170—235	0.20—0.55	1.00—4.00
			M	8	Std	UE6035	180—295	0.25—0.60	1.50—5.00
			M	9	Std	UE6035	170—235	0.25—0.60	1.50—5.00
			M	10	MW	MC6025	190—310	0.20—0.60	0.90—4.00
			M	11	MW	UE6020	180—295	0.20—0.60	0.90—4.00
			R	1	RP	MC6025	180—295	0.25—0.60	1.50—6.00
			R	2	GH	UE6020	170—280	0.25—0.60	1.50—6.00
			H	1	HX	UH6400	135—195	0.50—1.26	3.00—11.00
			H	2	HV	UH6400	110—160	0.70—1.30	4.00—12.00
			H	3	HZ	UH6400	135—195	0.40—1.20	2.00—10.00
			H	4	HZ	UE6020	155—250	0.40—1.20	2.00—10.00

NEGATIVE INSERTS

Breaker : **Std** : Standard **Flat** : Flat Top

Work Material	Hardness	Cutting Mode		Priority	Breaker	Grade	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
M									
Austenitic Stainless Steel (AISI 304, AISI 316)	≤200HB	●	L	1	LM	MC7015	180—285	0.10—0.30	0.30—2.00
		●	L	2	SH	US735	95—185	0.10—0.40	0.30—2.00
		●	L	3	SH	NX2525	65—135	0.10—0.40	0.30—2.00
		●	L	4	SW	US7020	105—270	0.10—0.50	0.30—2.50
		●	M	1	MM	MC7015	160—255	0.15—0.45	0.70—5.00
		●	M	2	GM	MC7015	160—255	0.16—0.50	0.50—4.00
		●	M	3	MS	US7020	95—245	0.16—0.50	0.50—4.00
		●	M	4	MA	US7020	95—245	0.20—0.50	0.30—4.00
		●	M	5	MH	US7020	95—245	0.20—0.55	1.00—4.00
		●	M	6	MW	US7020	95—245	0.20—0.60	0.90—4.00
		●	R	1	RM	MC7015	155—245	0.25—0.55	1.50—6.00
		●	R	2	GH	US7020	90—235	0.25—0.60	1.50—6.00
		◐	L	1	LM	MC7025	160—215	0.10—0.30	0.30—2.00
		◐	L	2	SH	US735	95—185	0.10—0.40	0.30—2.00
		◐	M	1	MM	MC7025	145—195	0.15—0.45	0.70—5.00
		◐	M	2	GM	MC7025	145—195	0.16—0.50	0.50—4.00
		◐	M	3	MA	MC7025	145—195	0.20—0.50	0.30—4.00
		◐	M	4	MS	US735	85—165	0.16—0.50	0.50—4.00
		◐	M	5	MA	US735	85—165	0.20—0.50	0.30—4.00
		◐	R	1	RM	MC7025	140—185	0.25—0.55	1.50—6.00
		◐	R	2	GH	US735	85—160	0.25—0.60	1.50—6.00
		✣	L	1	LM	MP7035	95—155	0.10—0.30	0.30—2.00
		✣	L	2	SH	US735	95—185	0.10—0.40	0.30—2.00
		✣	M	1	MM	MP7035	85—140	0.15—0.45	0.70—5.00
		✣	M	2	GM	MP7035	85—140	0.16—0.50	0.50—4.00
		✣	M	3	MA	MP7035	85—140	0.20—0.50	0.30—4.00
		✣	M	4	MS	US735	85—165	0.16—0.50	0.50—4.00
		✣	M	5	MS	VP15TF	75—130	0.16—0.50	0.50—4.00
		✣	M	6	MS	UP20M	95—145	0.16—0.50	0.50—4.00
		✣	M	7	MS	UTi20T	75—110	0.16—0.50	0.50—4.00
		✣	M	8	MA	VP15TF	75—130	0.20—0.50	0.30—4.00
		✣	M	9	Std	VP15TF	75—130	0.25—0.60	1.50—5.00
		✣	R	1	RM	MP7035	85—135	0.25—0.55	1.50—6.00
		✣	R	2	GH	US735	85—160	0.25—0.60	1.50—6.00
Austenitic Stainless Steel (AISI 304LN, AISI 316LN)	>200HB	●	L	1	LM	MC7015	150—240	0.10—0.30	0.30—2.00
		●	L	2	SH	US735	80—155	0.10—0.40	0.30—2.00
		●	L	3	SH	NX2525	55—115	0.10—0.40	0.30—2.00
		●	L	4	SW	US7020	90—230	0.10—0.50	0.30—2.50
		●	M	1	MM	MC7015	135—215	0.15—0.45	0.70—5.00
		●	M	2	GM	MC7015	135—215	0.16—0.50	0.50—4.00
		●	M	3	MS	US7020	80—205	0.16—0.50	0.50—4.00
		●	M	4	MA	US7020	80—205	0.20—0.50	0.30—4.00
		●	M	5	MH	US7020	80—205	0.20—0.55	1.00—4.00
		●	M	6	MW	US7020	80—205	0.20—0.60	0.90—4.00
		●	R	1	RM	MC7015	130—205	0.25—0.55	1.50—6.00
		●	R	2	GH	US7020	75—195	0.25—0.60	1.50—6.00
		◐	L	1	LM	MC7025	135—180	0.10—0.30	0.30—2.00

Cutting Conditions : ● : Stable Cutting ◐ : General Cutting ✣ : Unstable Cutting
Cutting Area : **F** : Finish Cutting **L** : Light Cutting **M** : Medium Cutting **R** : Rough Cutting **H** : Heavy Cutting

Work Material	Hardness	Cutting Mode		Priority	Breaker	Grade	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
M									
Austenitic Stainless Steel (AISI 304LN, AISI 316LN)	>200HB		L	2	SH	US735	80—155	0.10—0.40	0.30—2.00
			M	1	MM	MC7025	125—165	0.15—0.45	0.70—5.00
			M	2	GM	MC7025	125—165	0.16—0.50	0.50—4.00
			M	3	MA	MC7025	125—165	0.20—0.50	0.30—4.00
			M	4	MS	US735	75—140	0.16—0.50	0.50—4.00
			M	5	MA	US735	75—140	0.20—0.50	0.30—4.00
			R	1	RM	MC7025	115—155	0.25—0.55	1.50—6.00
			R	2	GH	US735	70—135	0.25—0.60	1.50—6.00
			L	1	LM	MP7035	80—130	0.10—0.30	0.30—2.00
			L	2	SH	US735	80—155	0.10—0.40	0.30—2.00
			M	1	MM	MP7035	75—120	0.15—0.45	0.70—5.00
			M	2	GM	MP7035	75—120	0.16—0.50	0.50—4.00
			M	3	MA	MP7035	75—120	0.20—0.50	0.30—4.00
			M	4	MS	US735	75—140	0.16—0.50	0.50—4.00
			M	5	MS	VP15TF	65—110	0.16—0.50	0.50—4.00
			M	6	MS	UP20M	80—125	0.16—0.50	0.50—4.00
			M	7	MS	UTi20T	65—95	0.16—0.50	0.50—4.00
			M	8	MA	VP15TF	65—110	0.20—0.50	0.30—4.00
			M	9	Std	VP15TF	65—110	0.25—0.60	1.50—5.00
			R	1	RM	MP7035	70—115	0.25—0.55	1.50—6.00
			R	2	GH	US735	70—135	0.25—0.60	1.50—6.00
Two-phase Stainless Steel (AISI 329)	≤280HB		L	1	LM	MC7015	120—195	0.10—0.30	0.30—2.00
			L	2	SH	US735	65—125	0.10—0.40	0.30—2.00
			L	3	SH	NX2525	45—90	0.10—0.40	0.30—2.00
			L	4	SW	US7020	75—185	0.10—0.50	0.30—2.50
			M	1	MM	MC7015	110—175	0.15—0.45	0.70—5.00
			M	2	GM	MC7015	110—175	0.16—0.50	0.50—4.00
			M	3	MS	US7020	65—170	0.16—0.50	0.50—4.00
			M	4	MA	US7020	65—170	0.20—0.50	0.30—4.00
			M	5	MH	US7020	65—170	0.20—0.55	1.00—4.00
			M	6	MW	US7020	65—170	0.20—0.60	0.90—4.00
			R	1	RM	MC7015	105—165	0.25—0.55	1.50—6.00
			R	2	GH	US7020	60—160	0.25—0.60	1.50—6.00
			L	1	LM	MC7025	110—150	0.10—0.30	0.30—2.00
			L	2	SH	US735	65—125	0.10—0.40	0.30—2.00
			M	1	MM	MC7025	100—135	0.15—0.45	0.70—5.00
			M	2	GM	MC7025	100—135	0.16—0.50	0.50—4.00
			M	3	MA	MC7025	100—135	0.20—0.50	0.30—4.00
			M	4	MS	US735	60—115	0.16—0.50	0.50—4.00
			M	5	MA	US735	60—115	0.20—0.50	0.30—4.00
			R	1	RM	MC7025	95—125	0.25—0.55	1.50—6.00
			R	2	GH	US735	55—110	0.25—0.60	1.50—6.00
			L	1	LM	MP7035	65—105	0.10—0.30	0.30—2.00
			L	2	SH	US735	65—125	0.10—0.40	0.30—2.00
			M	1	MM	MP7035	60—95	0.15—0.45	0.70—5.00
			M	2	GM	MP7035	60—95	0.16—0.50	0.50—4.00
			M	3	MA	MP7035	60—95	0.20—0.50	0.30—4.00

NEGATIVE INSERTS

Breaker : **Std** : Standard **Flat** : Flat Top

Work Material	Hardness	Cutting Mode		Priority	Breaker	Grade	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
M									
Two-phase Stainless Steel (AISI 329)	≤280HB	✠	M	4	MS	US735	60—115	0.16—0.50	0.50—4.00
		✠	M	5	MS	VP15TF	50—90	0.16—0.50	0.50—4.00
		✠	M	6	MS	UP20M	65—100	0.16—0.50	0.50—4.00
		✠	M	7	MS	UTi20T	50—75	0.16—0.50	0.50—4.00
		✠	M	8	MA	VP15TF	50—90	0.20—0.50	0.30—4.00
		✠	M	9	Std	VP15TF	50—90	0.25—0.60	1.50—5.00
		✠	R	1	RM	MP7035	55—90	0.25—0.55	1.50—6.00
		✠	R	2	GH	US735	55—110	0.25—0.60	1.50—6.00
Ferritic and Martensitic Stainless Steel (AISI 410, AISI 430)	≤200HB	●	L	1	LM	MC7015	180—285	0.10—0.30	0.30—2.00
		●	L	2	SH	US735	95—185	0.10—0.40	0.30—2.00
		●	L	3	SH	NX2525	65—135	0.10—0.40	0.30—2.00
		●	L	4	SW	US7020	105—270	0.10—0.50	0.30—2.50
		●	M	1	MM	MC7015	160—255	0.15—0.45	0.70—5.00
		●	M	2	GM	MC7015	160—255	0.16—0.50	0.50—4.00
		●	M	3	MS	US7020	95—245	0.16—0.50	0.50—4.00
		●	M	4	MA	US7020	95—245	0.20—0.50	0.30—4.00
		●	M	5	MH	US7020	95—245	0.20—0.55	1.00—4.00
		●	M	6	MW	US7020	95—245	0.20—0.60	0.90—4.00
		●	R	1	RM	MC7015	155—245	0.25—0.55	1.50—6.00
		●	R	2	GH	US7020	90—235	0.25—0.60	1.50—6.00
		◐	L	1	LM	MC7025	160—215	0.10—0.30	0.30—2.00
		◐	L	2	SH	US735	95—185	0.10—0.40	0.30—2.00
		◐	M	1	MM	MC7025	145—195	0.15—0.45	0.70—5.00
		◐	M	2	GM	MC7025	145—195	0.16—0.50	0.50—4.00
		◐	M	3	MA	MC7025	145—195	0.20—0.50	0.30—4.00
		◐	M	4	MS	US735	85—165	0.16—0.50	0.50—4.00
		◐	M	5	MA	US735	85—165	0.20—0.50	0.30—4.00
		◐	R	1	RM	MC7025	140—185	0.25—0.55	1.50—6.00
		◐	R	2	GH	US735	85—160	0.25—0.60	1.50—6.00
		✠	L	1	LM	MP7035	95—155	0.10—0.30	0.30—2.00
		✠	L	2	SH	US735	95—185	0.10—0.40	0.30—2.00
		✠	M	1	MM	MP7035	85—140	0.15—0.45	0.70—5.00
		✠	M	2	GM	MP7035	85—140	0.16—0.50	0.50—4.00
		✠	M	3	MA	MP7035	85—140	0.20—0.50	0.30—4.00
		✠	M	4	MS	US735	85—165	0.16—0.50	0.50—4.00
		✠	M	5	MS	VP15TF	75—130	0.16—0.50	0.50—4.00
		✠	M	6	MS	UP20M	95—145	0.16—0.50	0.50—4.00
		✠	M	7	MS	UTi20T	75—110	0.16—0.50	0.50—4.00
		✠	M	8	MA	VP15TF	75—130	0.20—0.50	0.30—4.00
		✠	M	9	Std	VP15TF	75—130	0.25—0.60	1.50—5.00
		✠	R	1	RM	MP7035	85—135	0.25—0.55	1.50—6.00
		✠	R	2	GH	US735	85—160	0.25—0.60	1.50—6.00
Ferritic and Martensitic Stainless Steel (AISI 431, AISI 420)	>200HB	●	L	1	LM	MC7015	150—240	0.10—0.30	0.30—2.00
		●	L	2	SH	US735	80—155	0.10—0.40	0.30—2.00
		●	L	3	SH	NX2525	55—115	0.10—0.40	0.30—2.00
		●	L	4	SW	US7020	90—230	0.10—0.50	0.30—2.50
		●	M	1	MM	MC7015	135—215	0.15—0.45	0.70—5.00

Cutting Conditions : ● : Stable Cutting ◐ : General Cutting ✠ : Unstable Cutting
Cutting Area : **F** : Finish Cutting **L** : Light Cutting **M** : Medium Cutting **R** : Rough Cutting **H** : Heavy Cutting

Work Material	Hardness	Cutting Mode		Priority	Breaker	Grade	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
M									
Ferritic and Martensitic Stainless Steel (AISI 431, AISI 420)	>200HB	●	M	2	GM	MC7015	135—215	0.16—0.50	0.50—4.00
		●	M	3	MS	US7020	80—205	0.16—0.50	0.50—4.00
		●	M	4	MA	US7020	80—205	0.20—0.50	0.30—4.00
		●	M	5	MH	US7020	80—205	0.20—0.55	1.00—4.00
		●	M	6	MW	US7020	80—205	0.20—0.60	0.90—4.00
		●	R	1	RM	MC7015	130—205	0.25—0.55	1.50—6.00
		●	R	2	GH	US7020	75—195	0.25—0.60	1.50—6.00
		●	L	1	LM	MC7025	135—180	0.10—0.30	0.30—2.00
		◐	L	2	SH	US735	80—155	0.10—0.40	0.30—2.00
		◐	M	1	MM	MC7025	125—165	0.15—0.45	0.70—5.00
		◐	M	2	MS	MC7025	125—165	0.16—0.50	0.50—4.00
		◐	M	3	MA	MC7025	125—165	0.20—0.50	0.30—4.00
		◐	M	4	MS	US735	75—140	0.16—0.50	0.50—4.00
		◐	M	5	MA	US735	75—140	0.20—0.50	0.30—4.00
		◐	R	1	RM	MC7025	115—155	0.25—0.55	1.50—6.00
		◐	R	2	GH	US735	70—135	0.25—0.60	1.50—6.00
		✠	L	1	LM	MP7035	80—130	0.10—0.30	0.30—2.00
		✠	L	2	SH	US735	80—155	0.10—0.40	0.30—2.00
		✠	M	1	MM	MP7035	75—120	0.15—0.45	0.70—5.00
		✠	M	2	GM	MP7035	75—120	0.16—0.50	0.50—4.00
		✠	M	3	MA	MP7035	75—120	0.20—0.50	0.30—4.00
		✠	M	4	MS	US735	75—140	0.16—0.50	0.50—4.00
		✠	M	5	MS	VP15TF	65—110	0.16—0.50	0.50—4.00
		✠	M	6	MS	UP20M	80—125	0.16—0.50	0.50—4.00
		✠	M	7	MS	UTi20T	65—95	0.16—0.50	0.50—4.00
		✠	M	8	MA	VP15TF	65—110	0.20—0.50	0.30—4.00
		✠	M	9	Std	VP15TF	65—110	0.25—0.60	1.50—5.00
		✠	R	1	RM	MP7035	70—115	0.25—0.55	1.50—6.00
		✠	R	2	GH	US735	70—135	0.25—0.60	1.50—6.00
Hardened Stainless Steel (AISI 630, AISI 631)	<450HB	●	L	1	LM	MC7015	100—160	0.10—0.30	0.30—2.00
		●	L	2	SH	US735	55—105	0.10—0.40	0.30—2.00
		●	L	3	SH	NX2525	35—75	0.10—0.40	0.30—2.00
		●	L	4	SW	US7020	60—155	0.10—0.50	0.30—2.50
		●	M	1	MM	MC7015	90—145	0.15—0.45	0.70—5.00
		●	M	2	GM	MC7015	90—145	0.16—0.50	0.50—4.00
		●	M	3	MS	US7020	55—140	0.16—0.50	0.50—4.00
		●	M	4	MA	US7020	55—140	0.20—0.50	0.30—4.00
		●	M	5	MH	US7020	55—140	0.20—0.55	1.00—4.00
		●	M	6	MW	US7020	55—140	0.20—0.60	0.90—4.00
		●	R	1	RM	MC7015	85—135	0.25—0.55	1.50—6.00
		●	R	2	GH	US7020	50—130	0.25—0.60	1.50—6.00
		◐	L	1	LM	MC7025	90—120	0.10—0.30	0.30—2.00
		◐	L	2	SH	US735	55—105	0.10—0.40	0.30—2.00
		◐	M	1	MM	MC7025	80—110	0.15—0.45	0.70—5.00
		◐	M	2	GM	MC7025	80—110	0.16—0.50	0.50—4.00
		◐	M	3	MA	MC7025	80—110	0.20—0.50	0.30—4.00
		◐	M	4	MS	US735	50—95	0.16—0.50	0.50—4.00

NEGATIVE INSERTS

Breaker : **Std** : Standard **Flat** : Flat Top

Work Material	Hardness	Cutting Mode		Priority	Breaker	Grade	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
M									
Hardened Stainless Steel (AISI 630, AISI 631)	<450HB	◐	**M**	5	**MA**	**US735**	50—95	0.20—0.50	0.30—4.00
		◐	**R**	1	**RM**	**MC7025**	80—105	0.25—0.55	1.50—6.00
		◐	**R**	2	**GH**	**US735**	45—90	0.25—0.60	1.50—6.00
		✠	**L**	1	**LM**	**MP7035**	55—85	0.10—0.30	0.30—2.00
		✠	**L**	2	**SH**	**US735**	55—105	0.10—0.40	0.30—2.00
		✠	**M**	1	**MM**	**MP7035**	50—80	0.15—0.45	0.70—5.00
		✠	**M**	2	**GM**	**MP7035**	50—80	0.16—0.50	0.50—4.00
		✠	**M**	3	**MA**	**MP7035**	50—80	0.20—0.50	0.30—4.00
		✠	**M**	4	**MS**	**US735**	50—95	0.16—0.50	0.50—4.00
		✠	**M**	5	**MS**	**VP15TF**	45—75	0.16—0.50	0.50—4.00
		✠	**M**	6	**MS**	**UP20M**	55—80	0.16—0.50	0.50—4.00
		✠	**M**	7	**MS**	**UTi20T**	45—60	0.16—0.50	0.50—4.00
		✠	**M**	8	**MA**	**VP15TF**	45—75	0.20—0.50	0.30—4.00
		✠	**M**	9	**Std**	**VP15TF**	45—75	0.25—0.60	1.50—5.00
		✠	**R**	1	**RM**	**MP7035**	45—75	0.25—0.55	1.50—6.00
		✠	**R**	2	**GH**	**US735**	45—90	0.25—0.60	1.50—6.00

Cutting Conditions : ● : Stable Cutting ◐ : General Cutting ✠ : Unstable Cutting
Cutting Area : **F** : Finish Cutting **L** : Light Cutting **M** : Medium Cutting **R** : Rough Cutting **H** : Heavy Cutting

Work Material	Hardness	Cutting Mode		Priority	Breaker	Grade	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
K									
Gray Cast Iron (FC300)	≤350MPa	●	L	1	LK	MC5005	235—375	0.10—0.40	0.30—2.00
		●	L	2	MA	MC5005	210—335	0.20—0.50	0.30—4.00
		●	L	3	MA	UC5105	170—315	0.20—0.50	0.30—4.00
		●	M	1	MK	MC5005	210—335	0.20—0.55	1.00—4.00
		●	M	2	GK	MC5005	210—335	0.25—0.60	1.50—5.00
		●	M	3	Std	UC5105	170—315	0.25—0.60	1.50—5.00
		●	M	4	Std	NX2525	155—210	0.25—0.60	1.50—5.00
		●	M	5	MW	UC5105	170—315	0.20—0.60	0.90—4.00
		●	R	1	RK	MC5005	195—315	0.25—0.60	1.50—6.00
		●	R	2	Flat	MC5005	195—315	0.25—0.60	2.50—6.00
		●	R	3	GH	UC5105	165—300	0.25—0.60	1.50—6.00
		●	R	4	Flat	UC5105	165—300	0.20—0.60	2.50—6.00
		●	R	5	Flat	HTi10	100—145	0.20—0.60	2.50—6.00
		●	R	6	Flat	HTi05T	110—185	0.20—0.60	2.50—6.00
		●	H	1	Flat	MC5005	195—315	0.20—0.60	2.50—6.00
		●	H	2	Flat	UC5105	165—300	0.20—0.60	2.50—6.00
		◐	L	1	LK	MC5015	205—335	0.10—0.40	0.30—2.00
		◐	L	2	MA	MC5015	190—305	0.20—0.50	0.30—4.00
		◐	L	3	MA	UC5115	165—305	0.20—0.50	0.30—4.00
		◐	L	4	MP	UC5115	165—305	0.16—0.50	0.30—4.00
		◐	L	5	SW	UC5115	185—335	0.10—0.50	0.30—2.50
		◐	M	1	MK	MC5015	190—305	0.20—0.55	1.00—4.00
		◐	M	2	GK	MC5015	190—305	0.25—0.60	1.50—5.00
		◐	M	3	Std	UC5115	165—305	0.25—0.60	1.50—5.00
		◐	M	4	Std	HTi10	105—150	0.25—0.60	1.50—5.00
		◐	M	5	MH	UC5115	165—305	0.20—0.55	1.00—4.00
		◐	M	6	MW	UC5115	165—305	0.20—0.60	0.90—4.00
		◐	R	1	RK	MC5015	180—285	0.25—0.60	1.50—6.00
		◐	R	2	Flat	MC5015	180—285	0.20—0.60	2.50—6.00
		◐	R	3	GH	UC5115	160—290	0.25—0.60	1.50—6.00
		◐	R	4	Flat	UC5115	160—290	0.20—0.60	2.50—6.00
		◐	H	1	Flat	MC5015	180—285	0.20—0.60	2.50—6.00
		◐	H	2	Flat	UC5115	160—290	0.20—0.60	2.50—6.00
		✠	L	1	LK	MC5015	205—335	0.10—0.40	0.30—2.00
		✠	L	2	MA	MC5015	190—305	0.20—0.50	0.30—4.00
		✠	L	3	MA	UC5115	165—305	0.20—0.50	0.30—4.00
		✠	M	1	MK	MC5015	190—305	0.20—0.55	1.50—4.00
		✠	M	2	GK	MC5015	190—305	0.25—0.60	1.50—5.00
		✠	M	3	Std	UC5115	165—305	0.25—0.60	1.50—5.00
		✠	M	4	Std	UTi20T	85—120	0.25—0.60	1.50—5.00
		✠	R	1	RK	MC5015	180—285	0.25—0.60	1.50—6.00
		✠	R	2	Flat	MC5015	180—285	0.20—0.60	2.50—6.00
		✠	R	3	GH	UC5115	160—290	0.25—0.60	1.50—6.00
		✠	R	4	Flat	UC5115	160—290	0.20—0.60	2.50—6.00
		✠	R	5	Flat	UTi20T	80—115	0.20—0.60	2.50—6.00
		✠	H	1	Flat	MC5015	180—285	0.20—0.60	2.50—6.00
		✠	H	2	Flat	UC5115	160—290	0.20—0.60	2.50—6.00

NEGATIVE INSERTS

Breaker : **Std** : Standard **Flat** : Flat Top

Work Material	Hardness	Cutting Mode		Priority	Breaker	Grade	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
K									
Ductile Cast Iron (FCD450)	≤450MPa	●	L	1	LK	MC5005	220—355	0.10—0.40	0.30—2.00
		●	L	2	MA	MC5005	210—335	0.20—0.50	0.30—4.00
		●	L	3	MA	UC5105	160—295	0.20—0.50	0.30—4.00
		●	M	1	MK	MC5005	210—335	0.20—0.55	1.00—4.00
		●	M	2	GK	MC5005	210—335	0.25—0.60	1.50—5.00
		●	M	3	Std	UC5105	160—295	0.25—0.60	1.50—5.00
		●	M	4	Std	NX2525	145—200	0.25—0.60	1.50—5.00
		●	R	1	RK	MC5005	195—315	0.25—0.60	1.50—6.00
		●	R	2	Flat	MC5005	195—315	0.20—0.60	2.50—6.00
		●	R	3	GH	UC5105	155—280	0.25—0.60	1.50—6.00
		●	R	4	Flat	UC5105	155—280	0.20—0.60	2.50—6.00
		●	R	5	Flat	HTi10	95—135	0.20—0.60	2.50—6.00
		●	R	6	Flat	HTi05T	105—175	0.20—0.60	2.50—6.00
		●	H	1	Flat	MC5005	195—315	0.20—0.60	2.50—6.00
		●	H	2	Flat	UC5105	155—280	0.20—0.60	2.50—6.00
		◐	L	1	LK	MC5015	205—335	0.10—0.40	0.30—2.00
		◐	L	2	MA	MC5015	190—305	0.20—0.50	0.30—4.00
		◐	L	3	MA	UC5115	155—285	0.20—0.50	0.30—4.00
		◐	L	4	MP	UC5115	155—285	0.16—0.50	0.30—4.00
		◐	L	5	SW	UC5115	175—315	0.10—0.50	0.30—2.50
		◐	M	1	MK	MC5015	190—305	0.20—0.55	1.00—4.00
		◐	M	2	GK	MC5015	190—305	0.25—0.60	1.50—5.00
		◐	M	3	Std	UC5115	155—285	0.25—0.60	1.50—5.00
		◐	M	4	Std	HTi10	100—140	0.25—0.60	1.50—5.00
		◐	R	1	RK	MC5015	180—285	0.25—0.60	1.50—6.00
		◐	R	2	Flat	MC5015	180—285	0.20—0.60	2.50—6.00
		◐	R	3	GH	UC5115	150—275	0.25—0.60	1.50—6.00
		◐	R	4	Flat	UC5115	150—275	0.20—0.60	2.50—6.00
		◐	H	1	Flat	MC5015	180—285	0.20—0.60	2.50—6.00
		◐	H	2	Flat	UC5115	150—275	0.20—0.60	2.50—6.00
		✠	L	1	LK	MC5015	205—335	0.10—0.40	0.30—2.00
		✠	L	2	MA	MC5015	190—305	0.20—0.50	0.30—4.00
		✠	L	3	MA	UC5115	165—305	0.20—0.50	0.30—4.00
		✠	M	1	MK	MC5015	190—305	0.20—0.55	1.50—4.00
		✠	M	2	GK	MC5015	190—305	0.25—0.60	1.50—5.00
		✠	M	3	Std	UC5115	165—305	0.25—0.60	1.50—5.00
		✠	M	4	Std	UTi20T	85—120	0.25—0.60	1.50—5.00
		✠	R	1	RK	MC5015	180—285	0.25—0.60	1.50—6.00
		✠	R	2	Flat	MC5015	180—285	0.20—0.60	2.50—6.00
		✠	R	3	GH	UC5115	160—290	0.25—0.60	1.50—6.00
		✠	R	4	Flat	UC5115	160—290	0.20—0.60	2.50—6.00
		✠	R	5	Flat	UTi20T	80—115	0.20—0.60	2.50—6.00
		✠	H	1	Flat	MC5015	180—285	0.20—0.60	2.50—6.00
		✠	H	2	Flat	UC5115	160—290	0.20—0.60	2.50—6.00
Ductile Cast Iron (FCD700)	≤800MPa	●	L	1	LK	MC5005	195—315	0.10—0.40	0.30—2.00
		●	L	2	MA	MC5005	210—335	0.20—0.50	0.30—4.00
		●	L	3	MA	UC5105	160—295	0.20—0.50	0.30—4.00

Cutting Conditions : ● : Stable Cutting ◐ : General Cutting ✠ : Unstable Cutting
Cutting Area : **F** : Finish Cutting **L** : Light Cutting **M** : Medium Cutting **R** : Rough Cutting **H** : Heavy Cutting

Work Material	Hardness	Cutting Mode		Priority	Breaker	Grade	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
K									
Ductile Cast Iron (FCD700)	≤800MPa	●	M	1	MK	MC5005	210—335	0.20—0.55	1.00—4.00
		●	M	2	GK	MC5005	210—335	0.25—0.60	1.50—5.00
		●	M	3	Std	UC5105	160—295	0.25—0.60	1.50—5.00
		●	M	4	Std	NX2525	145—200	0.25—0.60	1.50—5.00
		●	R	1	RK	MC5005	195—315	0.25—0.60	1.50—6.00
		●	R	2	Flat	MC5005	195—315	0.20—0.60	2.50—6.00
		●	R	3	GH	UC5105	155—280	0.25—0.60	1.50—6.00
		●	R	4	Flat	UC5105	155—280	0.20—0.60	2.50—6.00
		●	R	5	Flat	HTi10	95—135	0.20—0.60	2.50—6.00
		●	R	6	Flat	HTi05T	105—175	0.20—0.60	2.50—6.00
		●	H	1	Flat	MC5005	195—315	0.20—0.60	2.50—6.00
		●	H	2	Flat	UC5105	155—280	0.20—0.60	2.50—6.00
		◐	L	1	LK	MC5015	205—335	0.10—0.40	0.30—2.00
		◐	L	2	MA	MC5015	190—305	0.20—0.50	0.30—4.00
		◐	L	3	MA	UC5115	155—285	0.20—0.50	0.30—4.00
		◐	L	4	MP	UC5115	155—285	0.16—0.50	0.30—4.00
		◐	L	5	SW	UC5115	175—315	0.10—0.50	0.30—2.50
		◐	M	1	MK	MC5015	190—305	0.20—0.55	1.00—4.00
		◐	M	2	GK	MC5015	190—305	0.25—0.60	1.50—5.00
		◐	M	3	Std	UC5115	155—285	0.25—0.60	1.50—5.00
		◐	M	4	Std	HTi10	100—140	0.25—0.60	1.50—5.00
		◐	R	1	RK	MC5015	180—285	0.25—0.60	1.50—6.00
		◐	R	2	Flat	MC5015	180—285	0.20—0.60	2.50—6.00
		◐	R	3	GH	UC5115	150—275	0.25—0.60	1.50—6.00
		◐	R	4	Flat	UC5115	150—275	0.20—0.60	2.50—6.00
		◐	H	1	Flat	MC5015	180—285	0.20—0.60	2.50—6.00
		◐	H	2	Flat	UC5115	150—275	0.20—0.60	2.50—6.00
		✢	L	1	LK	MC5015	205—335	0.10—0.40	0.30—2.00
		✢	L	2	MA	MC5015	190—305	0.20—0.50	0.30—4.00
		✢	L	3	MA	UC5115	165—305	0.20—0.50	0.30—4.00
		✢	M	1	MK	MC5015	190—305	0.20—0.55	1.00—4.00
		✢	M	2	GK	MC5015	190—305	0.25—0.60	1.50—5.00
		✢	M	3	Std	UC5115	165—305	0.25—0.60	1.50—5.00
		✢	M	4	Std	UTi20T	85—120	0.25—0.60	1.50—5.00
		✢	R	1	RK	MC5015	180—285	0.25—0.60	1.50—6.00
		✢	R	2	Flat	MC5015	180—285	0.20—0.60	2.50—6.00
		✢	R	3	GH	UC5115	160—290	0.25—0.60	1.50—6.00
		✢	R	4	Flat	UC5115	160—290	0.20—0.60	2.50—6.00
		✢	R	5	Flat	UTi20T	80—115	0.20—0.60	2.50—6.00
		✢	H	1	Flat	MC5015	180—285	0.20—0.60	2.50—6.00
		✢	H	2	Flat	UC5115	160—290	0.20—0.60	2.50—6.00

NEGATIVE INSERTS

Breaker : **Std** : Standard **Flat** : Flat Top

Work Material	Hardness	Cutting Mode		Priority	Breaker	Grade	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
S									
Titanium Alloy (Ti-6Al-4V)	–	●	F	1	FJ	RT9010	45—95	0.07—0.20	0.10—1.00
		●	L	1	LS	MT9015	40—85	0.10—0.25	0.20—0.80
		●	L	2	MJ(M)	RT9010	40—80	0.07—0.25	0.40—1.50
		●	M	1	MS	MT9015	40—80	0.10—0.25	0.50—4.00
		●	M	2	MS	RT9010	40—80	0.10—0.25	0.50—4.00
		●	R	1	RS	MT9015	35—75	0.20—0.35	1.00—4.00
		●	R	2	GJ	RT9010	35—75	0.16—0.35	1.00—3.00
		◐	F	1	FJ	RT9010	45—95	0.07—0.20	0.10—1.00
		◐	L	1	LS	MT9015	40—85	0.10—0.25	0.20—0.80
		◐	L	2	MJ(M)	RT9010	40—80	0.07—0.25	0.40—1.50
		◐	L	3	MJ(G)	RT9010	40—80	0.07—0.25	0.40—1.50
		◐	M	1	MS	MT9015	40—80	0.10—0.25	0.50—4.00
		◐	M	2	MS	RT9010	40—80	0.10—0.25	0.50—4.00
		◐	R	1	RS	MT9015	35—75	0.20—0.35	1.00—4.00
		◐	R	2	GJ	RT9010	35—75	0.16—0.35	1.00—3.00
		✣	F	1	FJ	RT9010	45—95	0.07—0.20	0.10—1.00
		✣	L	1	MJ(M)	RT9010	40—80	0.07—0.25	0.40—1.50
		✣	L	2	MJ(G)	RT9010	40—80	0.07—0.25	0.40—1.50
		✣	M	1	MS	RT9010	40—80	0.10—0.25	0.50—4.00
		✣	R	1	GJ	RT9010	35—75	0.16—0.35	1.00—3.00
S									
Heat Resistant Alloy (Inconel®718)	–	●	F	1	FJ	VP10RT	30—60	0.07—0.20	0.10—1.00
		●	L	1	LS	MP9005	30—110	0.10—0.25	0.20—0.80
		●	L	2	MJ(M)	VP05RT	30—60	0.07—0.25	0.40—1.50
		●	L	3	MJ(M)	US905	50—100	0.07—0.25	0.40—1.50
		●	L	4	MJ(G)	VP10RT	25—50	0.07—0.25	0.40—1.50
		●	M	1	MS	MP9005	30—100	0.10—0.25	0.50—4.00
		●	M	2	MS	VP05RT	30—60	0.10—0.25	0.50—4.00
		●	M	3	MS	US905	50—100	0.10—0.25	0.50—4.00
		●	R	1	RS	MP9015	20—75	0.20—0.35	1.00—4.00
		●	R	2	GJ	VP10RT	20—45	0.16—0.35	1.00—3.00
		●	R	3	GJ	US905	45—95	0.16—0.35	1.00—3.00
		◐	F	1	FJ	VP10RT	30—60	0.07—0.20	0.10—1.00
		◐	L	1	LS	MP9015	25—85	0.10—0.25	0.20—0.80
		◐	L	2	MJ(M)	VP10RT	25—50	0.07—0.25	0.40—1.50
		◐	M	1	MS	MP9015	25—80	0.10—0.25	0.50—4.00
		◐	M	2	MS	VP10RT	25—50	0.10—0.25	0.50—4.00
		◐	R	1	RS	MP9015	20—75	0.20—0.35	1.00—4.00
		◐	R	2	GJ	VP10RT	20—45	0.16—0.35	1.00—3.00
		✣	F	1	FJ	VP15TF	20—40	0.07—0.20	0.10—1.00
		✣	L	1	MJ(M)	VP15TF	20—35	0.07—0.25	0.40—1.50
		✣	L	2	MJ(G)	VP15TF	20—35	0.07—0.25	0.40—1.50
		✣	M	1	MS	VP15TF	20—35	0.10—0.25	0.50—4.00
		✣	R	1	GJ	VP15TF	15—30	0.16—0.35	1.00—3.00

Cutting Conditions : ● : Stable Cutting ◐ : General Cutting ✣ : Unstable Cutting
Cutting Area : **F** : Finish Cutting **L** : Light Cutting **M** : Medium Cutting **R** : Rough Cutting **H** : Heavy Cutting

7° POSITIVE INSERT TYPE

Work Material	Hardness	Cutting Mode		Priority	Breaker	Grade	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
P									
Mild Steel (ASTM A36, AISI 1010)	≤180HB	●	F	1	FP	NX2525	225—320	0.04—0.20	0.20—0.90
		●	F	2	FV	NX2525	225—320	0.04—0.20	0.20—0.90
		●	F	3	R/L-F	MP3025	230—350	0.05—0.12	0.10—0.50
		●	L	1	LP	NX2525	225—320	0.06—0.25	0.20—1.00
		●	L	2	Std	UE6110	205—350	0.08—0.30	0.30—2.00
		●	L	3	MV	MP3025	190—295	0.08—0.30	0.30—2.00
		●	L	4	Std	MP3025	190—295	0.08—0.30	0.30—2.00
		●	M	1	MP	NX2525	185—265	0.08—0.30	0.30—2.00
		◐	F	1	FP	MC6015	250—425	0.04—0.20	0.20—0.90
		◐	F	2	FP	UE6110	250—425	0.04—0.20	0.20—0.90
		◐	F	3	FP	MP3025	230—350	0.04—0.20	0.20—0.90
		◐	F	4	FV	MP3025	230—350	0.04—0.20	0.20—0.90
		◐	F	5	FV	NX3035	215—305	0.04—0.20	0.20—0.90
		◐	L	1	LP	MC6015	250—425	0.06—0.25	0.20—1.00
		◐	L	2	LP	UE6110	250—425	0.06—0.25	0.20—1.00
		◐	L	3	LP	MP3025	230—350	0.06—0.25	0.20—1.00
		◐	L	4	Std	UE6110	205—350	0.08—0.30	0.30—2.00
		◐	M	1	MP	MC6015	205—350	0.08—0.30	0.30—2.00
		◐	M	2	MP	UE6110	205—350	0.08—0.30	0.30—2.00
		◐	M	3	MP	MP3025	190—295	0.08—0.30	0.30—2.00
		✠	F	1	FP	MC6025	250—405	0.04—0.20	0.20—0.90
		✠	F	2	FV	UE6020	235—385	0.04—0.20	0.20—0.90
		✠	L	1	LP	MC6025	250—405	0.06—0.25	0.20—1.00
		✠	L	2	Std	UE6020	195—320	0.08—0.30	0.30—2.00
		✠	M	1	MP	MC6025	205—335	0.08—0.30	0.30—2.00
Carbon Steel • Alloy Steel (AISI 1045, AISI 4140)	180 — 280HB	●	F	1	FP	NX2525	165—235	0.04—0.20	0.20—0.90
		●	F	2	FV	NX2525	165—235	0.04—0.20	0.20—0.90
		●	F	3	R/L-F	MP3025	170—260	0.05—0.12	0.10—0.50
		●	L	1	LP	NX2525	165—235	0.06—0.25	0.20—1.00
		●	L	2	Std	UE6110	150—260	0.08—0.30	0.30—2.00
		●	L	3	MV	MP3025	140—215	0.08—0.30	0.30—2.00
		●	L	4	Std	MP3025	140—215	0.08—0.30	0.30—2.00
		●	L	5	SV	MP3025	170—260	0.06—0.25	0.20—1.00
		●	L	6	MW	MP3025	140—215	0.10—0.35	0.80—2.50
		●	M	1	MP	NX2525	135—195	0.08—0.30	0.30—2.00
		◐	F	1	FP	MC6015	185—310	0.04—0.20	0.20—0.90
		◐	F	2	FP	UE6110	185—310	0.04—0.20	0.20—0.90
		◐	F	3	FP	MP3025	170—260	0.04—0.20	0.20—0.90
		◐	F	4	FV	MP3025	170—260	0.04—0.20	0.20—0.90
		◐	F	5	FV	NX3035	160—225	0.04—0.20	0.20—0.90
		◐	F	6	SW	MP3025	170—260	0.06—0.24	0.20—1.50
		◐	L	1	LP	MC6015	185—310	0.06—0.25	0.20—1.00
		◐	L	2	LP	UE6110	185—310	0.06—0.25	0.20—1.00
		◐	L	3	LP	MP3025	170—260	0.06—0.25	0.20—1.00
		◐	L	4	Std	UE6110	150—260	0.08—0.30	0.30—2.00
		◐	M	1	MP	MC6015	150—260	0.08—0.30	0.30—2.00
		◐	M	2	MP	UE6110	150—260	0.08—0.30	0.30—2.00

7° POSITIVE INSERT TYPE

Breaker : **Std** : Standard **Flat** : Flat Top

Work Material	Hardness	Cutting Mode		Priority	Breaker	Grade	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
P									
Carbon Steel • Alloy Steel (AISI 1045, AISI 4140)	180 – 280HB	◐	**M**	3	**MP**	**MP3025**	140—215	0.08—0.30	0.30—2.00
		✠	**F**	1	**FP**	**MC6025**	185—295	0.04—0.20	0.20—0.90
		✠	**F**	2	**FV**	**UE6020**	175—285	0.04—0.20	0.20—0.90
		✠	**L**	1	**LP**	**MC6025**	185—295	0.06—0.25	0.20—1.00
		✠	**L**	2	**Std**	**UE6020**	145—235	0.08—0.30	0.30—2.00
		✠	**M**	1	**MP**	**MC6025**	150—245	0.08—0.30	0.30—2.00
Carbon Steel • Alloy Steel (AISI 4340)	280 – 350HB	●	**M**	1	**MP**	**NX2525**	95—140	0.08—0.30	0.30—2.00
		◐	**M**	1	**MP**	**MC6015**	110—185	0.08—0.30	0.30—2.00
		◐	**M**	2	**MP**	**UE6110**	110—185	0.08—0.30	0.30—2.00
		◐	**M**	3	**MP**	**MP3025**	100—155	0.08—0.30	0.30—2.00
		✠	**M**	1	**MP**	**MC6025**	110—175	0.08—0.30	0.30—2.00

Cutting Conditions : ● : Stable Cutting ◐ : General Cutting ✠ : Unstable Cutting
Cutting Area : **F** : Finish Cutting **L** : Light Cutting **M** : Medium Cutting **R** : Rough Cutting **H** : Heavy Cutting

Work Material	Hardness	Cutting Mode		Priority	Breaker	Grade	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
M									
Austenitic Stainless Steel (AISI 304, AISI 316)	≤200HB	●	F	1	FM	VP15TF	75—125	0.04—0.20	0.20—0.90
		●	F	2	Std	US735	70—135	0.08—0.30	0.30—2.00
		●	L	1	LM	MC7025	140—190	0.06—0.25	0.20—1.00
		●	L	2	Std	US735	70—135	0.08—0.30	0.30—2.00
		●	M	1	MM	MC7025	115—155	0.08—0.30	0.30—2.00
		◐	F	1	FM	VP15TF	75—125	0.04—0.20	0.20—0.90
		◐	F	2	Std	US735	70—135	0.08—0.30	0.30—2.00
		◐	L	1	LM	MC7025	140—190	0.06—0.25	0.20—1.00
		◐	L	2	Std	US735	70—135	0.08—0.30	0.30—2.00
		◐	M	1	MM	MC7025	115—155	0.08—0.30	0.30—2.00
		✠	F	1	FM	VP15TF	75—125	0.04—0.20	0.20—0.90
		✠	F	2	Std	US735	70—135	0.08—0.30	0.30—2.00
		✠	L	1	LM	MP7035	85—135	0.06—0.25	0.20—1.00
		✠	L	2	LM	VP15TF	75—125	0.06—0.25	0.20—1.00
		✠	L	3	Std	US735	70—135	0.08—0.30	0.30—2.00
		✠	M	1	MM	MP7035	70—115	0.08—0.30	0.30—2.00
		✠	M	2	MM	VP15TF	60—105	0.08—0.30	0.30—2.00
Austenitic Stainless Steel (AISI 304LN, AISI 316LN)	>200HB	●	F	1	FM	VP15TF	60—105	0.04—0.20	0.20—0.90
		●	F	2	Std	US735	60—110	0.08—0.30	0.30—2.00
		●	L	1	LM	MC7025	120—160	0.06—0.25	0.20—1.00
		●	L	2	Std	US735	60—110	0.08—0.30	0.30—2.00
		●	M	1	MM	MC7025	100—130	0.08—0.30	0.30—2.00
		◐	F	1	FM	VP15TF	60—105	0.04—0.20	0.20—0.90
		◐	F	2	Std	US735	60—110	0.08—0.30	0.30—2.00
		◐	L	1	LM	MC7025	120—160	0.06—0.25	0.20—1.00
		◐	L	2	Std	US735	60—110	0.08—0.30	0.30—2.00
		◐	M	1	MM	MC7025	100—130	0.08—0.30	0.30—2.00
		✠	F	1	FM	VP15TF	60—105	0.04—0.20	0.20—0.90
		✠	F	2	Std	US735	60—110	0.08—0.30	0.30—2.00
		✠	L	1	LM	MP7035	70—115	0.06—0.25	0.20—1.00
		✠	L	2	LM	VP15TF	60—105	0.06—0.25	0.20—1.00
		✠	L	3	Std	US735	60—110	0.08—0.30	0.30—2.00
		✠	M	1	MM	MP7035	60—95	0.08—0.30	0.30—2.00
		✠	M	2	MM	VP15TF	50—90	0.08—0.30	0.30—2.00
Two-phase Stainless Steel (AISI 329)	≤280HB	●	F	1	FM	VP15TF	50—85	0.04—0.20	0.20—0.90
		●	F	2	Std	US735	45—90	0.08—0.30	0.30—2.00
		●	L	1	LM	MC7025	95—130	0.06—0.25	0.20—1.00
		●	L	2	Std	US735	45—90	0.08—0.30	0.30—2.00
		●	M	1	MM	MC7025	80—105	0.08—0.30	0.30—2.00
		◐	F	1	FM	VP15TF	50—85	0.04—0.20	0.20—0.90
		◐	F	2	Std	US735	45—90	0.08—0.30	0.30—2.00
		◐	L	1	LM	MC7025	95—130	0.06—0.25	0.20—1.00
		◐	L	2	Std	US735	45—90	0.08—0.30	0.30—2.00
		◐	M	1	MM	MC7025	80—105	0.08—0.30	0.30—2.00
		✠	F	1	FM	VP15TF	50—85	0.04—0.20	0.20—0.90
		✠	F	2	Std	US735	45—90	0.08—0.30	0.30—2.00
		✠	L	1	LM	MP7035	55—95	0.06—0.25	0.20—1.00

7° POSITIVE INSERT TYPE

Breaker : **Std** : Standard **Flat** : Flat Top

Work Material	Hardness	Cutting Mode		Priority	Breaker	Grade	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
M									
Two-phase Stainless Steel (AISI 329)	≤280HB	✠	L	2	LM	VP15TF	50—85	0.06—0.25	0.20—1.00
		✠	L	3	Std	US735	45—90	0.08—0.30	0.30—2.00
		✠	M	1	MM	MP7035	45—75	0.08—0.30	0.30—2.00
		✠	M	2	MM	VP15TF	40—70	0.08—0.30	0.30—2.00
Ferritic and Martensitic Stainless Steel (AISI 410, AISI 430)	≤200HB	●	F	1	FM	VP15TF	75—125	0.04—0.20	0.20—0.90
		●	F	2	Std	US735	70—135	0.08—0.30	0.30—2.00
		●	L	1	LM	MC7025	140—190	0.06—0.25	0.20—1.00
		●	L	2	Std	US735	70—135	0.08—0.30	0.30—2.00
		●	M	1	MM	MC7025	115—155	0.08—0.30	0.30—2.00
		◐	F	1	FM	VP15TF	75—125	0.04—0.20	0.20—0.90
		◐	F	2	Std	US735	70—135	0.08—0.30	0.30—2.00
		◐	L	1	LM	MC7025	140—190	0.06—0.25	0.20—1.00
		◐	L	2	Std	US735	70—135	0.08—0.30	0.30—2.00
		◐	M	1	MM	MC7025	115—155	0.08—0.30	0.30—2.00
		✠	F	1	FM	VP15TF	75—125	0.04—0.20	0.20—0.90
		✠	F	2	Std	US735	70—135	0.08—0.30	0.30—2.00
		✠	L	1	LM	MP7035	85—135	0.06—0.25	0.20—1.00
		✠	L	2	LM	VP15TF	75—125	0.06—0.25	0.20—1.00
		✠	L	3	Std	US735	70—135	0.08—0.30	0.30—2.00
		✠	M	1	MM	MP7035	70—115	0.08—0.30	0.30—2.00
		✠	M	2	MM	VP15TF	60—105	0.08—0.30	0.30—2.00
Ferritic and Martensitic Stainless Steel (AISI 431, AISI 420)	>200HB	●	F	1	FM	VP15TF	60—105	0.04—0.20	0.20—0.90
		●	F	2	Std	US735	60—110	0.08—0.30	0.30—2.00
		●	L	1	LM	MC7025	120—160	0.06—0.25	0.20—1.00
		●	L	2	Std	US735	60—110	0.08—0.30	0.30—2.00
		●	M	1	MM	MC7025	100—130	0.08—0.30	0.30—2.00
		◐	F	1	FM	VP15TF	60—105	0.04—0.20	0.20—0.90
		◐	F	2	Std	US735	60—110	0.08—0.30	0.30—2.00
		◐	L	1	LM	MC7025	120—160	0.06—0.25	0.20—1.00
		◐	L	2	Std	US735	60—110	0.08—0.30	0.30—2.00
		◐	M	1	MM	MC7025	100—130	0.08—0.30	0.30—2.00
		✠	F	1	FM	VP15TF	60—105	0.04—0.20	0.20—0.90
		✠	F	2	Std	US735	60—110	0.08—0.30	0.30—2.00
		✠	L	1	LM	MP7035	70—115	0.06—0.25	0.20—1.00
		✠	L	2	LM	VP15TF	60—105	0.06—0.25	0.20—1.00
		✠	L	3	Std	US735	60—110	0.08—0.30	0.30—2.00
		✠	M	1	MM	MP7035	60—95	0.08—0.30	0.30—2.00
		✠	M	2	MM	VP15TF	50—90	0.08—0.30	0.30—2.00
Hardened Stainless Steel (AISI 630, AISI 631)	<450HB	●	F	1	FM	VP15TF	40—70	0.04—0.20	0.20—0.90
		●	F	2	Std	US735	40—75	0.08—0.30	0.30—2.00
		●	L	1	LM	MC7025	80—105	0.06—0.25	0.20—1.00
		●	L	2	Std	US735	40—75	0.08—0.30	0.30—2.00
		●	M	1	MM	MC7025	65—90	0.08—0.30	0.30—2.00
		◐	F	1	FM	VP15TF	40—70	0.04—0.20	0.20—0.90
		◐	F	2	Std	US735	40—75	0.08—0.30	0.30—2.00
		◐	L	1	LM	MC7025	80—105	0.06—0.25	0.20—1.00
		◐	L	2	Std	US735	40—75	0.08—0.30	0.30—2.00

Cutting Conditions : ● : Stable Cutting ◐ : General Cutting ✠ : Unstable Cutting
Cutting Area : **F** : Finish Cutting **L** : Light Cutting **M** : Medium Cutting **R** : Rough Cutting **H** : Heavy Cutting

Work Material	Hardness	Cutting Mode		Priority	Breaker	Grade	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
M									
Hardened Stainless Steel (AISI 630, AISI 631)	<450HB		**M**	1	**MM**	**MC7025**	65—90	0.08—0.30	0.30—2.00
			F	1	**FM**	**VP15TF**	40—70	0.04—0.20	0.20—0.90
			F	2	**Std**	**US735**	40—75	0.08—0.30	0.30—2.00
			L	1	**LM**	**MP7035**	45—75	0.06—0.25	0.20—1.00
			L	2	**LM**	**VP15TF**	40—70	0.06—0.25	0.20—1.00
			L	3	**Std**	**US735**	40—75	0.08—0.30	0.30—2.00
			M	1	**MM**	**MP7035**	40—65	0.08—0.30	0.30—2.00
			M	2	**MM**	**VP15TF**	35—60	0.08—0.30	0.30—2.00

7° POSITIVE INSERT TYPE

Breaker : **Std** : Standard **Flat** : Flat Top

Work Material	Hardness	Cutting Mode		Priority	Breaker	Grade	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
K									
Gray Cast Iron (FC300)	≤350MPa	●	F	1	MK	MC5005	170—270	0.08—0.30	0.30—2.00
		●	F	2	Std	UC5115	130—245	0.08—0.30	0.30—2.00
		●	L	1	MK	MC5005	170—270	0.08—0.30	0.30—2.00
		●	L	2	Std	UC5115	130—245	0.08—0.30	0.30—2.00
		●	M	1	Flat	MC5005	170—270	0.08—0.30	0.30—2.00
		●	M	2	Flat	UC5115	130—245	0.08—0.30	0.30—2.00
		◐	F	1	MK	MC5015	155—245	0.08—0.30	0.30—2.00
		◐	F	2	Std	UC5115	130—245	0.08—0.30	0.30—2.00
		◐	L	1	MK	MC5015	155—245	0.08—0.30	0.30—2.00
		◐	L	2	Std	UC5115	130—245	0.08—0.30	0.30—2.00
		◐	M	1	Flat	MC5015	155—245	0.08—0.30	0.30—2.00
		◐	M	2	Flat	UC5115	130—245	0.08—0.30	0.30—2.00
		✠	F	1	MK	MC5015	155—245	0.08—0.30	0.30—2.00
		✠	F	2	Std	UC5115	130—245	0.08—0.30	0.30—2.00
		✠	L	1	MK	MC5015	155—245	0.08—0.30	0.30—2.00
		✠	L	2	Std	UC5115	130—245	0.08—0.30	0.30—2.00
		✠	M	1	Flat	MC5015	155—245	0.08—0.30	0.30—2.00
		✠	M	2	Flat	UC5115	130—245	0.08—0.30	0.30—2.00
Ductile Cast Iron (FCD450)	≤450MPa	●	F	1	MK	MC5005	160—255	0.08—0.30	0.30—2.00
		●	F	2	Std	UC5115	125—230	0.08—0.30	0.30—2.00
		●	L	1	MK	MC5005	160—255	0.08—0.30	0.30—2.00
		●	L	2	Std	UC5115	125—230	0.08—0.30	0.30—2.00
		●	M	1	Flat	MC5005	160—255	0.08—0.30	0.30—2.00
		●	M	2	Flat	UC5115	125—230	0.08—0.30	0.30—2.00
		◐	F	1	MK	MC5015	145—235	0.08—0.30	0.30—2.00
		◐	F	2	Std	UC5115	125—230	0.08—0.30	0.30—2.00
		◐	L	1	MK	MC5015	145—235	0.08—0.30	0.30—2.00
		◐	L	2	Std	UC5115	125—230	0.08—0.30	0.30—2.00
		◐	M	1	Flat	MC5015	145—235	0.08—0.30	0.30—2.00
		◐	M	2	Flat	UC5115	125—230	0.08—0.30	0.30—2.00
		✠	F	1	MK	MC5015	140—225	0.08—0.30	0.30—2.00
		✠	F	2	Std	UC5115	125—230	0.08—0.30	0.30—2.00
		✠	L	1	MK	MC5015	140—225	0.08—0.30	0.30—2.00
		✠	L	2	Std	UC5115	125—230	0.08—0.30	0.30—2.00
		✠	M	1	Flat	MC5015	140—225	0.08—0.30	0.30—2.00
		✠	M	2	Flat	UC5115	125—230	0.08—0.30	0.30—2.00
Ductile Cast Iron (FCD700)	≤800MPa	●	F	1	MK	MC5005	140—225	0.08—0.30	0.30—2.00
		●	F	2	Std	UC5115	110—205	0.08—0.30	0.30—2.00
		●	L	1	MK	MC5005	140—225	0.08—0.30	0.30—2.00
		●	L	2	Std	UC5115	110—205	0.08—0.30	0.30—2.00
		●	M	1	Flat	MC5005	140—225	0.08—0.30	0.30—2.00
		●	M	2	Flat	UC5115	110—205	0.08—0.30	0.30—2.00
		◐	F	1	MK	MC5015	130—205	0.08—0.30	0.30—2.00
		◐	F	2	Std	UC5115	110—205	0.08—0.30	0.30—2.00
		◐	L	1	MK	MC5015	130—205	0.08—0.30	0.30—2.00
		◐	L	2	Std	UC5115	110—205	0.08—0.30	0.30—2.00
		◐	M	1	Flat	MC5015	130—205	0.08—0.30	0.30—2.00

Cutting Conditions : ● : Stable Cutting ◐ : General Cutting ✠ : Unstable Cutting
Cutting Area : **F** : Finish Cutting **L** : Light Cutting **M** : Medium Cutting **R** : Rough Cutting **H** : Heavy Cutting

Work Material	Hardness	Cutting Mode		Priority	Breaker	Grade	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
K									
Ductile Cast Iron (FCD700)	≤800MPa		**M**	2	**Flat**	**UC5115**	110—205	0.08—0.30	0.30—2.00
			F	1	**MK**	**MC5015**	130—205	0.08—0.30	0.30—2.00
			F	2	**Std**	**UC5115**	110—205	0.08—0.30	0.30—2.00
			L	1	**MK**	**MC5015**	130—205	0.08—0.30	0.30—2.00
			L	2	**Std**	**UC5115**	110—205	0.08—0.30	0.30—2.00
			M	1	**Flat**	**MC5015**	130—205	0.08—0.30	0.30—2.00
			M	2	**Flat**	**UC5115**	110—205	0.08—0.30	0.30—2.00

7° POSITIVE INSERT TYPE

Work Material	Hardness	Cutting Mode		Priority	Breaker	Grade	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
N									
Aluminium Alloy (A6061, A7075)	Si<5%	●	F	1	AZ	HTi10	300—700	0.10—0.40	0.20—3.00
		◐	F	1	AZ	HTi10	300—700	0.10—0.40	0.20—3.00
		✣	F	1	AZ	HTi10	300—700	0.10—0.40	0.20—3.00
Aluminium Alloy (AC4B)	5%≤Si≤10%	●	F	1	AZ	HTi10	300—700	0.10—0.40	0.20—3.00
		◐	F	1	AZ	HTi10	300—700	0.10—0.40	0.20—3.00
		✣	F	1	AZ	HTi10	300—700	0.10—0.40	0.20—3.00
Aluminium Alloy (ADC12, A390)	Si>10%	●	F	1	AZ	HTi10	300—700	0.10—0.40	0.20—3.00
		◐	F	1	AZ	HTi10	300—700	0.10—0.40	0.20—3.00
		✣	F	1	AZ	HTi10	300—700	0.10—0.40	0.20—3.00

Work Material	Hardness	Cutting Mode		Priority	Breaker	Grade	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
S									
Titanium Alloy (Ti-6Al-4V)	—	●	F	1	FJ	RT9010	35—75	0.04—0.12	0.20—1.40
		◐	F	1	FJ	RT9010	35—75	0.04—0.12	0.20—1.40
		✣	F	1	FJ	RT9010	35—75	0.04—0.12	0.20—1.40
S									
Heat Resistant Alloy (Inconel®718)	—	●	F	1	FS	MP9005	25—95	0.04—0.12	0.20—1.40
		●	L	1	LS	MP9005	25—95	0.06—0.20	0.30—3.00
		◐	F	1	FS	MP9015	20—75	0.04—0.12	0.20—1.40
		◐	L	1	LS	MP9015	20—75	0.06—0.20	0.30—3.00
		✣	F	1	FS	MP9015	20—75	0.04—0.12	0.20—1.40
		✣	L	1	LS	MP9015	20—75	0.06—0.20	0.30—3.00

Cutting Conditions : ● : Stable Cutting ◐ : General Cutting ✣ : Unstable Cutting
Cutting Area : **F** : Finish Cutting **L** : Light Cutting

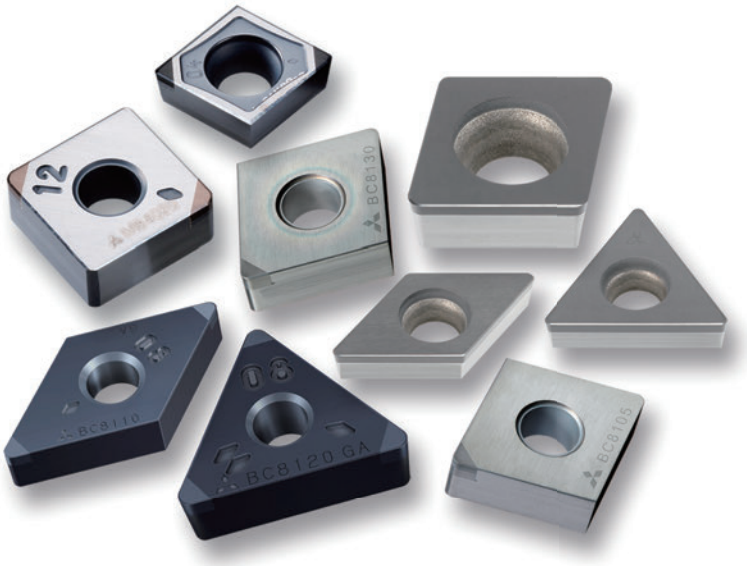
11° POSITIVE INSERT TYPE

Breaker : **Std** : Standard **Flat** : Flat Top

Work Material	Hardness	Cutting Mode		Priority	Breaker	Grade	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
P									
Mild Steel (ASTM A36, AISI 1010)	≤180HB	●	F	1	R-R/L	NX2525	225—320	0.05—0.12	0.20—0.60
		●	L	1	R-Std	NX2525	185—265	0.08—0.30	0.30—2.00
		●	M	1	R-Std	NX2525	185—265	0.08—0.30	0.30—2.00
		◐	F	1	R-R/L	NX2525	225—320	0.05—0.12	0.20—0.60
		◐	L	1	R-Std	UE6110	205—350	0.08—0.30	0.30—2.00
		◐	L	2	R-Std	MP3025	190—295	0.08—0.30	0.30—2.00
		◐	L	3	R-Std	NX3035	180—255	0.08—0.30	0.30—2.00
		◐	M	1	R-Std	UE6110	205—350	0.08—0.30	0.30—2.00
		◐	M	2	R-Std	MP3025	190—295	0.08—0.30	0.30—2.00
		◐	M	3	R-Std	NX3035	180—255	0.08—0.30	0.30—2.00
		✣	F	1	R-R/L	UTi20T	115—165	0.05—0.12	0.20—0.60
		✣	L	1	R-Std	UE6020	195—320	0.08—0.30	0.30—2.00
		✣	L	2	N-Flat	UE6020	195—320	0.08—0.30	0.30—2.00
		✣	L	3	N-Flat	UP20M	105—160	0.08—0.30	0.30—2.00
		✣	M	1	R-Std	UE6020	195—320	0.08—0.30	0.30—2.00
		✣	M	2	N-Flat	UE6020	195—320	0.08—0.30	0.30—2.00
		✣	M	3	N-Flat	UP20M	105—160	0.08—0.30	0.30—2.00
Carbon Steel • Alloy Steel (AISI 1045, AISI 4140)	180 | 280HB	●	F	1	R-R/L	NX2525	165—235	0.05—0.12	0.20—0.60
		●	L	1	R-Std	NX2525	135—195	0.08—0.30	0.30—2.00
		●	M	1	R-Std	NX2525	135—195	0.08—0.30	0.30—2.00
		◐	F	1	R-R/L	NX2525	165—235	0.05—0.12	0.20—0.60
		◐	L	1	R-Std	UE6110	150—260	0.08—0.30	0.30—2.00
		◐	L	2	R-Std	MP3025	140—215	0.08—0.30	0.30—2.00
		◐	L	3	R-Std	NX3035	130—190	0.08—0.30	0.30—2.00
		◐	M	1	R-Std	UE6110	150—260	0.08—0.30	0.30—2.00
		◐	M	2	R-Std	MP3025	140—215	0.08—0.30	0.30—2.00
		◐	M	3	R-Std	NX3035	130—190	0.08—0.30	0.30—2.00
		✣	F	1	R-R/L	UTi20T	85—120	0.05—0.12	0.20—0.60
		✣	L	1	R-Std	UE6020	145—235	0.08—0.30	0.30—2.00
		✣	L	2	N-Flat	UE6020	145—235	0.08—0.30	0.30—2.00
		✣	L	3	N-Flat	UP20M	75—115	0.08—0.30	0.30—2.00
		✣	M	1	R-Std	UE6020	145—235	0.08—0.30	0.30—2.00
		✣	M	2	N-Flat	UE6020	145—235	0.08—0.30	0.30—2.00
		✣	M	3	N-Flat	UP20M	75—115	0.08—0.30	0.30—2.00

Cutting Conditions : ● : Stable Cutting ◐ : General Cutting ✣ : Unstable Cutting
Cutting Area : **F** : Finish Cutting **L** : Light Cutting **M** : Medium Cutting **R** : Rough Cutting **H** : Heavy Cutting

Work Material	Hardness	Cutting Mode		Priority	Breaker	Grade	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
K									
Gray Cast Iron (FC300)	≤350MPa	●	F	1	R-R/L	NX2525	150—205	0.05—0.12	0.20—0.60
		●	L	1	N-Flat	UC5105	135—250	0.08—0.30	0.30—2.00
		●	L	2	N-Flat	NX2525	125—170	0.08—0.30	0.30—2.00
		●	L	3	R-Std	NX2525	125—170	0.08—0.30	0.30—2.00
		●	M	1	N-Flat	UC5105	135—250	0.08—0.30	0.30—2.00
		●	M	2	N-Flat	NX2525	125—170	0.08—0.30	0.30—2.00
		◐	M	3	R-Std	NX2525	125—170	0.08—0.30	0.30—2.00
		◐	F	1	R-R/L	NX2525	150—205	0.05—0.12	0.20—0.60
		◐	F	2	R-R/L	HTi10	100—145	0.05—0.12	0.20—0.60
		◐	L	1	N-Flat	UC5115	130—245	0.08—0.30	0.30—2.00
		◐	L	2	N-Flat	UE6110	130—200	0.08—0.30	0.30—2.00
		◐	M	1	N-Flat	UC5115	130—245	0.08—0.30	0.30—2.00
		◐	M	2	N-Flat	UE6110	130—200	0.08—0.30	0.30—2.00
		✠	F	1	R-R/L	UTi20T	80—115	0.05—0.12	0.20—0.60
		✠	L	1	N-Flat	VP15TF	115—160	0.08—0.30	0.30—2.00
		✠	M	1	N-Flat	VP15TF	115—160	0.08—0.30	0.30—2.00
Ductile Cast Iron (FCD450)	≤450MPa	●	F	1	R-R/L	NX2525	140—190	0.05—0.12	0.20—0.60
		●	L	1	N-Flat	UC5105	130—235	0.08—0.30	0.30—2.00
		●	L	2	N-Flat	NX2525	115—160	0.08—0.30	0.30—2.00
		●	L	3	R-Std	NX2525	115—160	0.08—0.30	0.30—2.00
		●	M	1	N-Flat	UC5105	130—235	0.08—0.30	0.30—2.00
		●	M	2	N-Flat	NX2525	115—160	0.08—0.30	0.30—2.00
		●	M	3	R-Std	NX2525	115—160	0.08—0.30	0.30—2.00
		◐	F	1	R-R/L	NX2525	140—190	0.05—0.12	0.20—0.60
		◐	F	2	R-R/L	HTi10	95—135	0.05—0.12	0.20—0.60
		◐	L	1	N-Flat	UC5115	125—230	0.08—0.30	0.30—2.00
		◐	L	2	N-Flat	UE6110	120—190	0.08—0.30	0.30—2.00
		◐	M	1	N-Flat	UC5115	125—230	0.08—0.30	0.30—2.00
		◐	M	2	N-Flat	UE6110	120—190	0.08—0.30	0.30—2.00
		✠	F	1	R-R/L	UTi20T	75—110	0.05—0.12	0.20—0.60
		✠	L	1	N-Flat	VP15TF	110—150	0.08—0.30	0.30—2.00
		✠	M	1	N-Flat	VP15TF	110—150	0.08—0.30	0.30—2.00
Ductile Cast Iron (FCD700)	≤800MPa	●	F	1	R-R/L	NX2525	125—170	0.05—0.12	0.20—0.60
		●	L	1	N-Flat	UC5105	115—210	0.08—0.30	0.30—2.00
		●	L	2	N-Flat	NX2525	105—140	0.08—0.30	0.30—2.00
		●	L	3	R-Std	NX2525	105—140	0.08—0.30	0.30—2.00
		●	M	1	N-Flat	UC5105	115—210	0.08—0.30	0.30—2.00
		●	M	2	N-Flat	NX2525	105—140	0.08—0.30	0.30—2.00
		●	M	3	R-Std	NX2525	105—140	0.08—0.30	0.30—2.00
		◐	F	1	R-R/L	NX2525	125—170	0.05—0.12	0.20—0.60
		◐	F	2	R-R/L	HTi10	85—120	0.05—0.12	0.20—0.60
		◐	L	1	N-Flat	UC5115	110—205	0.08—0.30	0.30—2.00
		◐	L	2	N-Flat	UE6110	105—170	0.08—0.30	0.30—2.00
		◐	M	1	N-Flat	UC5115	110—205	0.08—0.30	0.30—2.00
		◐	M	2	N-Flat	UE6110	105—170	0.08—0.30	0.30—2.00
		✠	F	1	R-R/L	UTi20T	65—95	0.05—0.12	0.20—0.60
		✠	L	1	N-Flat	VP15TF	95—135	0.08—0.30	0.30—2.00
		✠	M	1	N-Flat	VP15TF	95—135	0.08—0.30	0.30—2.00


12
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BC8120 GA
BC8105

CBN&PCD INSERT STANDARDS
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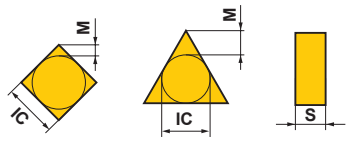
IDENTIFICATION



Symbol	Tolerance of Nose Height **M** (mm)	Tolerance of Inscribed Circle **IC** (mm)	Tolerance of Thickness **S** (mm)
G	±0.025	±0.025	±0.13
M*	±0.08–±0.18	±0.05–±0.15	±0.13

The surface of insert with * mark is sintered.

Detail of M Class Insert Tolerance

● Tolerance of Nose Height **M** (mm)

D.I.C.	Triangular	Square	Rhombic 80°	Rhombic 55°	Rhombic 35°	Round
6.35	±0.08	±0.08	±0.08	±0.11	±0.16	–
9.525	±0.08	±0.08	±0.08	±0.11	±0.16	–
12.70	±0.13	±0.13	±0.13	±0.15	–	–

● Tolerance of Inscribed Circle **IC** (mm)

D.I.C.	Triangular	Square	Rhombic 80°	Rhombic 55°	Rhombic 35°	Round
6.35	±0.05	±0.05	±0.05	±0.05	±0.05	–
9.525	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05
12.70	±0.08	±0.08	±0.08	±0.08	–	±0.08

⑤ Tolerance Class

T	10-inserts Package
No mark	1-insert Package

① Insert Case

BM	With Breaker
BF	With Breaker
NP	New Petit Cut
No mark	Standard Type

② Insert Geometry

①	②		③	④	⑤	⑥
T	**NP**	**-**	**C**	**N**	**G**	**A**

③ Insert Shape

Symbol	Insert Shape
S	Square
T	Triangular
C	Rhombic 80°
D	Rhombic 55°
V	Rhombic 35°
W	Trigon
R	Round

④ Normal Clearance

Symbol	Normal Clearance
B	5°
C	7°
D	15°
E	20°
N	0°
P	11°

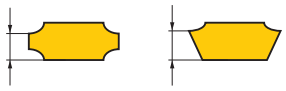
⑥ Fixing and/or for Chip Breaker

Metric

Symbol	Hole	Hole Configuration	Chip Breaker	Figure
W	With Hole	Cylindrical Hole + One Countersink (40–60°)	No	
T	With Hole		One Sided	
B	With Hole	Cylindrical Hole + One Countersink (70–90°)	No	
H	With Hole		One Sided	
A	With Hole	Cylindrical Hole	No	
M	With Hole	Cylindrical Hole	One Sided	
N	Without Hole	–	No	
X	–	–	–	Special Design

Diameter of Inscribed Circle (mm)	Symbol						
	R	W	V	D	C	S	T
3.97		02		04	03	03	06
4.76		L3	08	05	04	04	08
5.56		03	09	06	05	05	09
6.35		04	11	07	06	06	11
7.94		05	13	09	08	07	13
9.525	09	06	16	11	09	09	16
12.70	12	08	22	15	12	12	22

⑦ Insert Size



*Thickness is from the bottom of the insert to the top of the cutting edge.

Symbol	Thickness (mm)
S1	1.39
01	1.59
T0	1.79
02	2.38
T2	2.78
03	3.18
T3	3.97
04	4.76

⑧ Insert Thickness

Symbol	Corner Radius (mm)
02	0.2
04	0.4
08	0.8
12	1.2
16	1.6

⑨ Insert Corner Configuration

⑦	⑧	⑨	⑩	⑪	⑫	⑬	⑭
12	04	04	G	WS	2	J	R

⑩ Application (Honing)

Symbol	Honing
GH GA GS GN G	General Cutting
FA FS FN F	Continuous Cutting
TH TA TS TN T	Interrupted Cutting

Refer to the Honing page for details.

⑪ Wiper

WS	With Wiper
No mark	Without Wiper

⑫ Number of Teeth

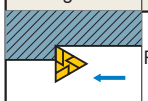
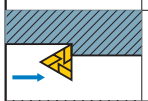
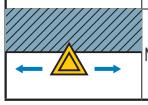
2	2
3	3
4	4
6	6
No mark	1

⑬ Cutting Edge Angle

F	91°
J	93°
No mark	Non Restriction

Please pay special attention when using an indexable insert.

⑭ Cutting Direction

Figure	Hand	Symbol
	Right	R
	Left	L
	Neutral	N

COATED CBN SERIES

BC8100 Series

FEATURES

The BC8100 series of CBN coated materials for machining hardened steel uses a newly-developed CBN substrate together with a special coating. The CBN substrate employs new "Ultra Micro-particle Binder" technology to successfully prevent sudden fractures during cutting and achieve long tool life. The coating consists of a special PVD coating suitable for various cutting types, which exhibits outstanding fracture resistance and wear resistance.

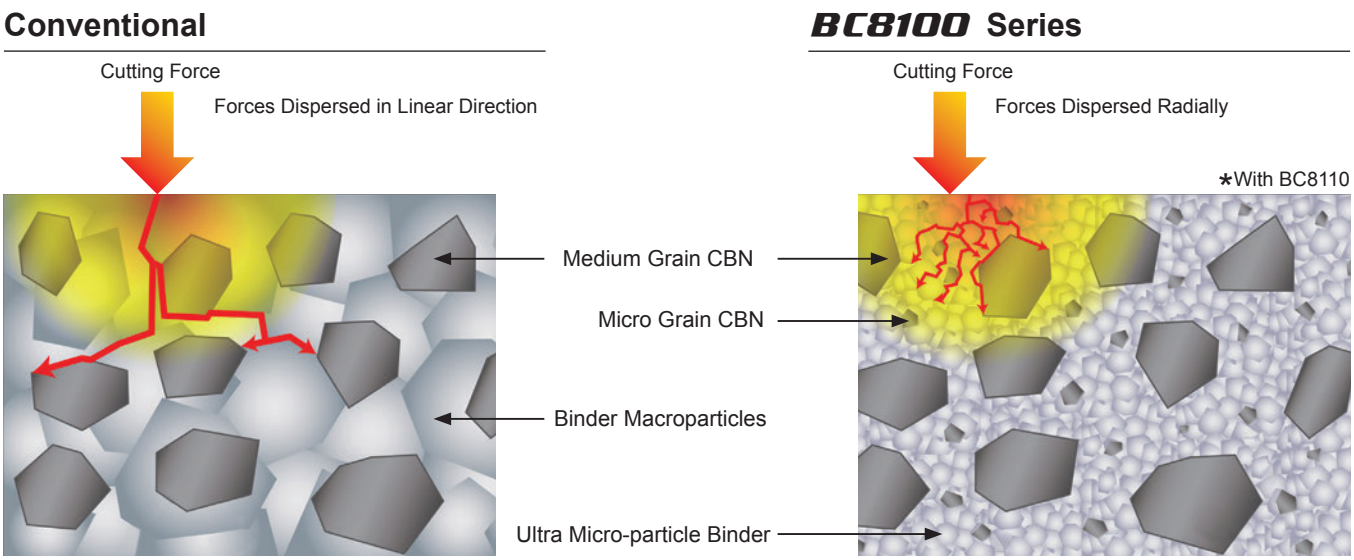
New technology

New Advanced Ceramic Coating

Uses a newly-developed special PVD ceramic coating suitable for various cutting types. Furthermore, optimization of the coating conditions has improved the adhesive strength of the CBN sintered body to the coating, to provide stable machining.Uses a newly-developed special PVD ceramic coating suitable for various cutting types. Furthermore, optimization of the coating conditions has improved the adhesive strength of the CBN sintered body to the coating, to provide stable machining.

*Graphical representation.

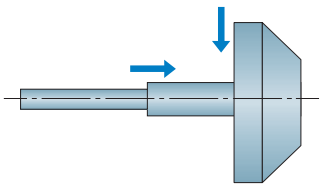
Optimised Substrate Technology



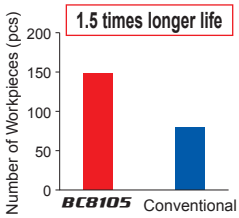
The new ultra micro-particle binder prevents linear crack development to avoid sudden fracturing.

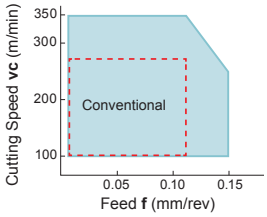
NEW BC8105

For machining focused on finished surface roughness
For Super Finish Cutting
Excellent surface finishes and close tolerances with long tool life
For surface finishes up to Rz 2.4μm (Ra 0.6μm)



Rz max 4.8

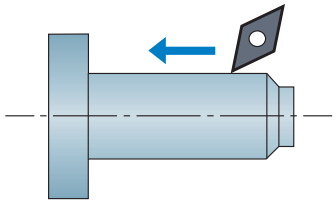


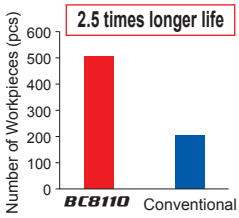


Insert : NP-CNGA120408GSWS2
Component : Pinion gear
Cutting Speed : 160 m/min
Feed : 0.35 mm/rev
Depth of Cut : 0.15 mm
Cutting Mode : Dry Cutting

BC8110

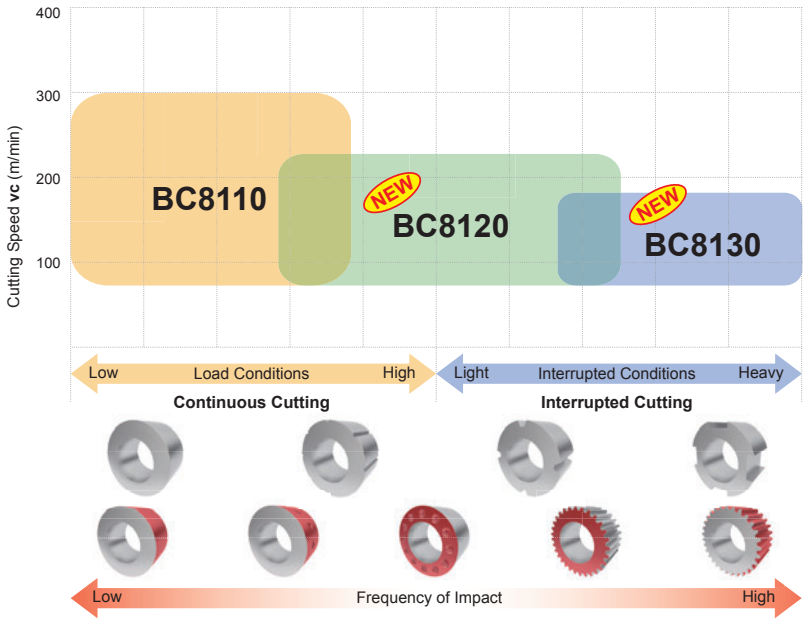
For Continous Cutting
Highest wear resistance of the series, suitable for continuous cutting.





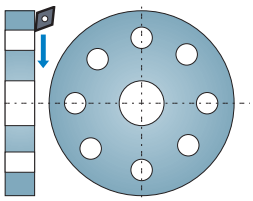
Insert : NP-DNGA150404FS2
Component : Shaft
Cutting Speed : 160 m/min
Feed : 0.2 mm/rev
Depth of Cut : 0.2 mm
Cutting Mode : Wet Cutting

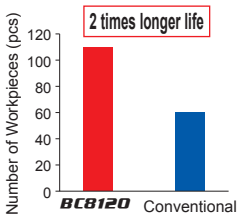
*BC8110 is recommended to improve wear resistance.



NEW BC8120

For Continuous to Medium Interrupted Cutting
1st choice for roughing and pre-finishing

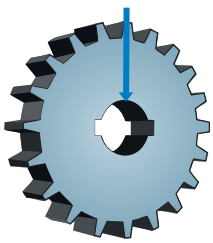


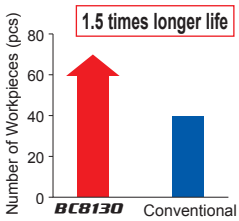


Insert : NP-CNGA120408TA2
Component : Clamp cylinder
Cutting Speed : 130m/min
Feed : 0.08mm/rev
Depth of Cut : 0.5mm
Cutting Mode : Wet Cutting

NEW BC8130

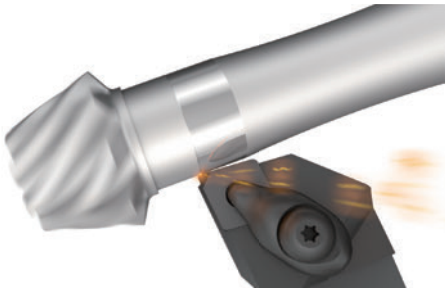
For Unstable Applications and Heavy Interrupted Cutting
Tolerance accuracy held over a high no. of impacts





Insert : NP-CNGA120408TH2
Component : Gear
Cutting Speed : 130m/min
Feed : 0.08mm/rev
Depth of Cut : 0.15mm
Cutting Mode : Wet Cutting

NEW BC8105 Highest Accuracy

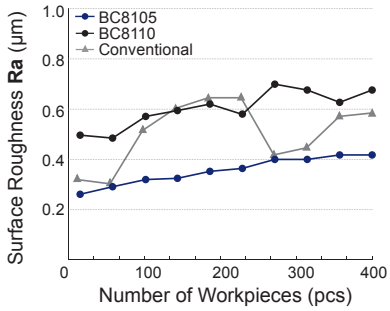


FEATURES

Use of a CBN substrate with excellent wear resistance and chipping resistance, together with a high-lubricity coating film, controls the occurrence of boundary wear and exhibits outstanding surface roughness.

Surface Finish

Insert	NP-DNGA150608GS2
Work Material	JIS SMn433 (60HRC)
Machining Methods	External Continuous Cutting
Cutting Speed **vc** (m/min)	176
Feed **f** (mm/rev)	0.09
Depth of Cut **ap** (mm)	0.15
Cutting Mode	Wet (Emulsion)

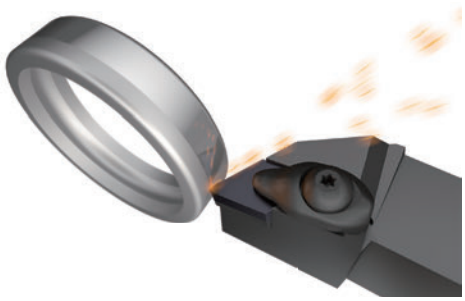


BC8105 can maintain excellent surface roughness.

RECOMMENDED CUTTING CONDITIONS

Work Material	Machining Methods	Cutting Speed vc (m/min)	f (mm/rev)	ap (mm)	Cutting Mode
Hardened Steel (Heat Treated Steel etc)	External Continuous Cutting	50 – 100 – 200 – 300 – 400	≦ 0.15	≦ 0.2	Dry, Wet

BC8110 High Speed Turning



FEATURES

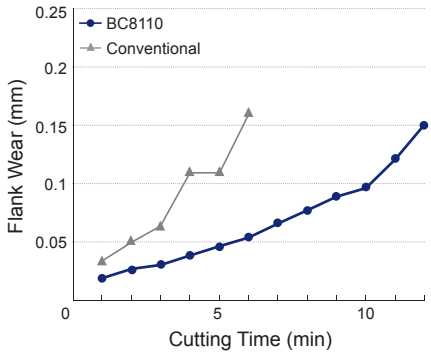
Use of a CBN substrate with excellent wear resistance and chipping resistance, together with an extremely hard coating film, provides the highest flank wear resistance of the entire BC81 series.

For Continuous Cutting

Covers a wide application range for continuous cutting

Tool Life (Flank Wear)

Insert	NP-CNGA120408GS2
Work Material	JIS SCr420 (60HRC)
Machining Methods	External Continuous Cutting
Cutting Speed **vc** (m/min)	250
Feed **f** (mm/rev)	0.10
Depth of Cut **ap** (mm)	0.2
Cutting Mode	Dry



Achieves long tool life for continuous cutting of hardened steel.

RECOMMENDED CUTTING CONDITIONS

Work Material	Machining Methods	Cutting Speed vc (m/min)	f (mm/rev)	ap (mm)	Cutting Mode
Hardened Steel (Heat Treated Steel etc)	External Continuous Cutting	50 – 100 – 200 – 300 – 400	≦ 0.20	≦ 0.35	Dry, Wet

NEW BC8120 General Application

FEATURES

Use of a CBN substrate with excellent fracture resistance and crater wear resistance, together with a coating film having superior wear resistance, combines both fracture resistance and wear resistance while exhibiting outstanding crater wear resistance.

For Continuous and Light Interrupted Cutting

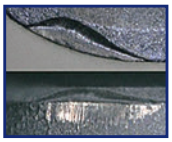
1st choice for roughing and pre-finishing

Covers a wide application range between continuous and light-interrupted machining

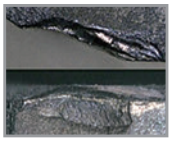
Test of Interrupted Cutting

Insert	NP-CNGA120408GA2
Work Material	JIS SCr420 (60HRC)
Machining Methods	External Interrupted Cutting
Cutting Speed **vc** (m/min)	250
Feed **f** (mm/rev)	0.15
Depth of Cut **ap** (mm)	0.1
Cutting Mode	Dry

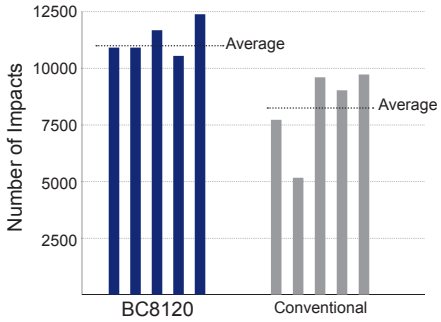
Cutting edge condition after 8000 impacts



BC8120



Conventional



Number of Impacts Before Fracturing

RECOMMENDED CUTTING CONDITIONS

Work Material	Machining Methods	Cutting Speed vc (m/min) (50 – 100 – 200 – 300)	f (mm/rev)	ap (mm)	Cutting Mode
Hardened Steel (Heat Treated Steel etc)	External Continuous Cutting		≦ 0.3	≦ 0.5	Dry, Wet
	External Interrupted Cutting		≦ 0.2	≦ 0.3	Dry, Wet

NEW BC8130 Tough Machining

FEATURES

Use of a CBN substrate with excellent cutting edge strength, together with a coating film that combines hardness with impact resistance, allows it to exhibit outstanding cutting edge strength and fracture resistance.

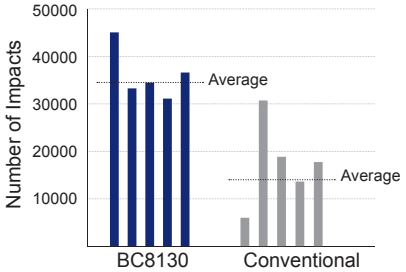
For Unstable Applications and Heavy Interrupted Cutting

Tolerance accuracy maintained over a high number of impacts

Heavy Interrupted Cutting (Laboratory Test)

Insert	NP-CNGA120408GA2
Work Material	JIS SCr420 (60HRC)
Machining Methods	External Heavy Interrupted Cutting
Cutting Speed **vc** (m/min)	250
Feed **f** (mm/rev)	0.05
Depth of Cut **ap** (mm)	0.1
Cutting Mode	Wet

BC8130 provides stability up to 30000 impacts



Number of Impacts Before Fracturing

RECOMMENDED CUTTING CONDITIONS

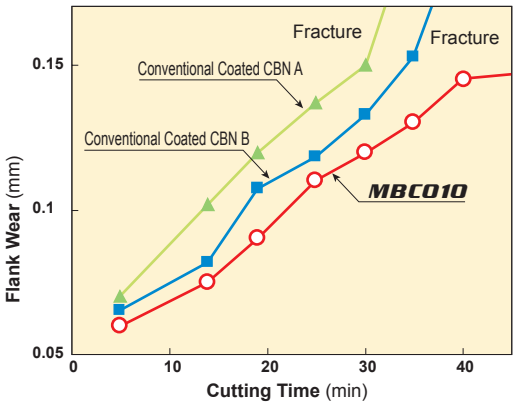
Work Material	Machining Methods	Cutting Speed vc (m/min) (0 – 50 – 100 – 150 – 200)	f (mm/rev)	ap (mm)	Cutting Mode
Hardened Steel (Heat Treated Steel etc)	External Interrupted Cutting		≦ 0.20	≦ 0.30	Dry, Wet

MBC010/MBC020

Grade	Grade Features and Application	Main Component	Coating Layer
MBC010	**Coated CBN for High Speed Continuous Cutting** MBC010 makes the best use of special ceramic binder structure, actualizing high wear resistance. High wear resistance enables continuous machining at high speed of over 300m/min.	CBN (Micro Grain) TiN Al_2O_3	TiN
MBC020	**Coated CBN for general cutting** Uses a CBN substrate that has high cutting edge toughness. The TiAlN based coating delivers superb wear resistance. It covers a wide range of applications from continuous to light interrupted cutting.	CBN (Micro Grain) TiN Al_2O_3	TiAlN

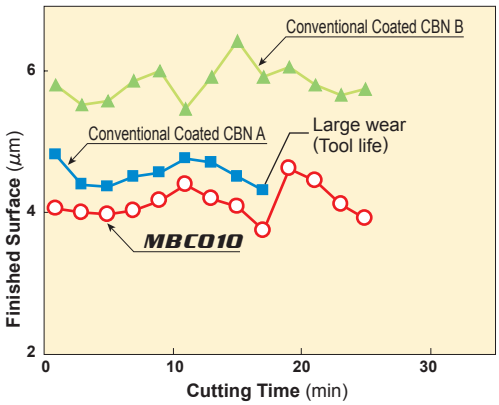
MBC010

WEAR RESISTANCE



<Cutting Conditions>
Workpiece : JIS SCM415 (60HRC)
Insert : NP-CNGA120408GS2
Cutting Speed : 300m/min
Feed : 0.05mm/rev
Depth of Cut : 0.1mm
Dry Continuous Cutting

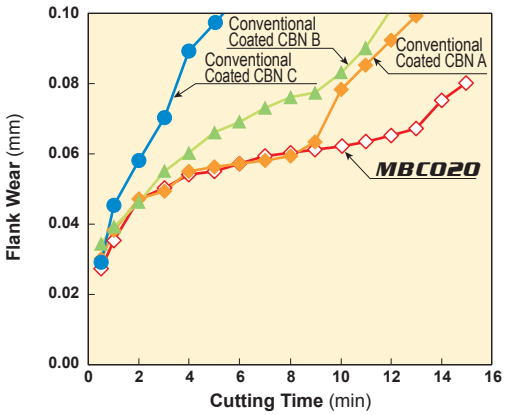
FINISHED SURFACE

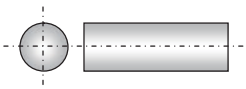


<Cutting Conditions>
Workpiece : JIS SCM415 (60HRC)
Insert : NP-CNGA120408GS2
Cutting Speed : 150m/min
Feed : 0.15mm/rev
Depth of Cut : 0.2mm
Dry Continuous Cutting

MBC020

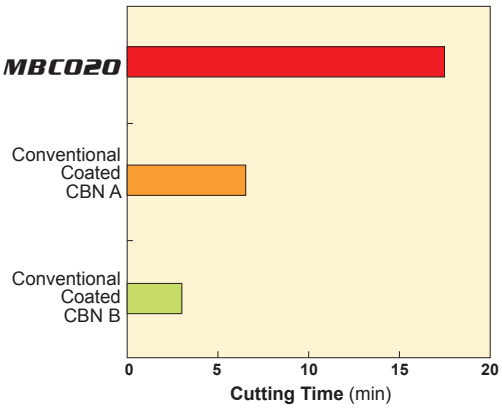
WEAR RESISTANCE

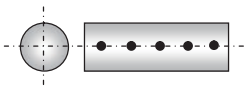




<Cutting Conditions>
Workpiece : JIS SCr420 (60HRC)
Round bar
Insert : NP-CNGA120408GA4
Cutting Speed : 220m/min
Feed : 0.1mm/rev
Depth of Cut : 0.1mm
Dry Continuous Cutting

TOUGHNESS





<Cutting Conditions>
Workpiece : JIS SCr420 (60HRC)
Insert : NP-CNGA120408GA4
Cutting Speed : 120m/min
Feed : 0.15mm/rev
Depth of Cut : 0.15mm
Dry Interrupted Cutting

Memo

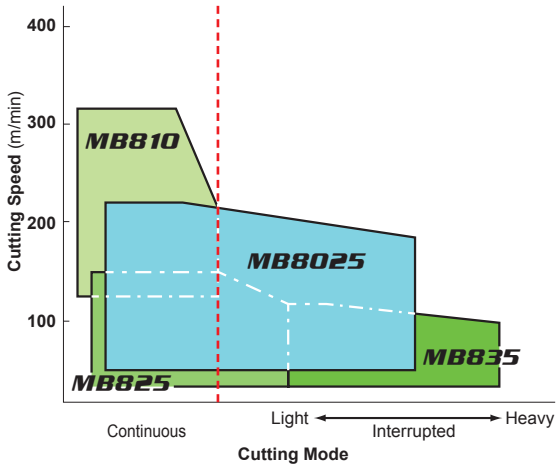
UNCOATED CBN SERIES

FEATURES

• CBN tool material is produced by mixing the main component CBN (cubic boron nitride), which has a hardness second only to diamond, with a special ceramic or metal binder. It is then sintered at a pressure of over 5GPa and at a temperature of 1200°C or higher.
• CBN has lower affinity to iron than diamond. The low affinity and high hardness properties means that sintered CBN delivers a superior cutting performance especially during high speed machining of materials such hardened steel, cast iron and sintered alloys etc.

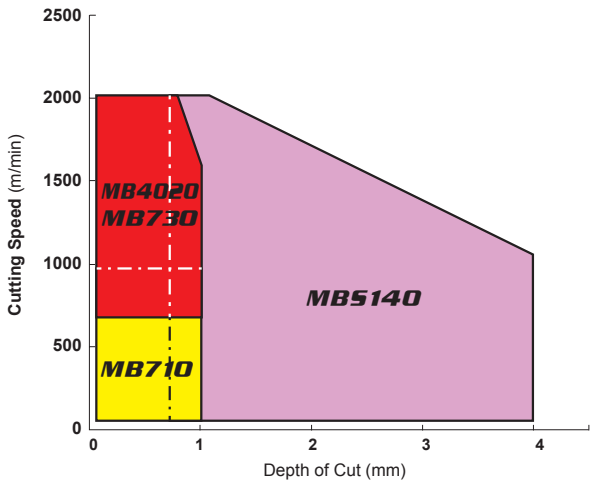
HARDENED STEEL MACHINING

Grade	Grade Features and Application	Main Component
MB8025	**For General Purpose Turning** By employing a "Particle-activated Sintering Method", the new sintered CBN technology is recommended for continuous cutting from medium to high speeds.	CBN (Micro Grain) TiN Al_2O_3
MB810	**For High Speed Continuous Cutting** It features improved wear resistance due to impregnation with larger CBN particles.	CBN (Coarse grain) TiN Al_2O_3
MB825	**For Continuous to Medium Interrupted Cutting** Excellent balance of wear resistance and fracture resistance due to introduction of micro-grain CBN particles.	CBN (Micro Grain) TiC Al_2O_3
MB835	**For Heavy Interrupted Cutting** Improved grade employing micro-grain CBN particles. Excellent fracture resistance for use in heavy interrupted cutting.	CBN (Micro Grain) TiN Al_2O_3



CAST IRON MACHINING

Grade	Grade Features and Application	Main Component
MB710	**For General Cutting** General purpose grade with well balanced wear and fracture resistance.	CBN TiC Al_2O_3
MB730	**For Continuous to Interrupted Cutting** Has the larger CBN content and therefore displays good thermal conductivity. It is suitable for the high temperatures that are generated in high speed cutting.	CBN (High Content) Co Base Alloy
MB4020	**For High Speed Cutting** Has the larger CBN content and therefore displays good thermal conductivity. From high-speed cutting to interrupted cutting are possible.	CBN (High Content) Co Base Alloy
MB5140	**For High Speed Cutting and Roughing of Cast Iron** Highest CBN content, high thermal conductivity. Enables deep depth of cut.	CBN AlN (Solid)
MB5015	MB5015 is exclusive grade for boring of Centrifugal casting Cylinder liners in semi finishing or finishing applications with high with high wear resistance.	



MB5140 Solid CBN grade for machining cast iron and sintered alloys

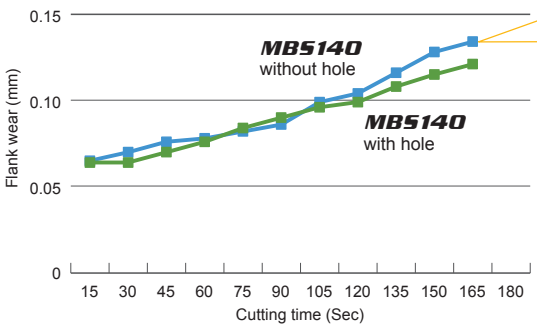
FEATURES

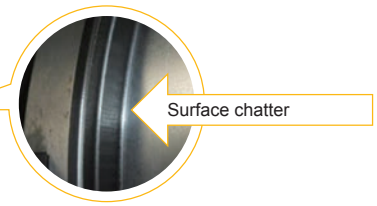
Supports high-efficiency machining with large depths of cut.

- Since all inserts are CBN sintered bodies, there are no limits to the depths of cut as with CBN brazing tools, allowing machining with large depths of cut.
- For rough machining of cast iron, high-speed, high-efficiency machining, which is a characteristic of CBN tools, can be achieved.

Combines wear resistance and fracture resistance

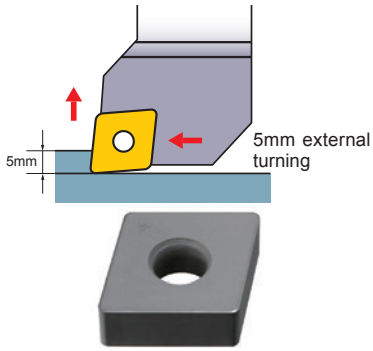
- Use of micro-grain CBN with a newly-developed special binder provides high wear resistance.
- Use of Mitsubishi's original high-efficiency sintering technology provides high fracture resistance and supports machining with large depths of cut.





<Cutting Conditions>
Workpiece : FC250 (DIN GG25)
Insert : CNGA120408/CNGN120408
Holder : Double Clamp Holder
Cutting Speed : 400 m/min
Feed : 0.05 mm/rev
Depth of Cut : 5.0 mm
Dry Cutting

Addition of insert series equipped with holes
Comparison of depth of cut
5mm face turning



MB5015 For Cylinder liner *Poduced to order only.

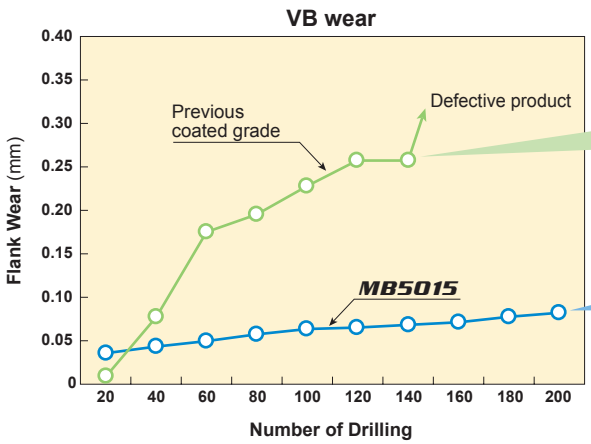
FEATURES

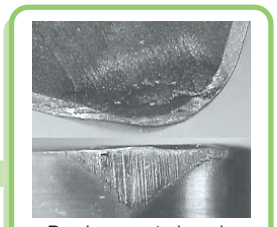
- **MB5015** is exclusive grade for boring of Centrifugal casting Cylinder liners in semi finishing or finishing applications with high with high wear resistance.

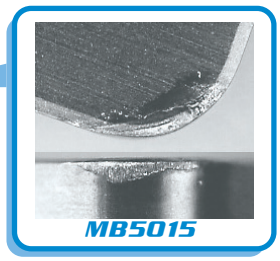
RECOMMENDED CUTTING CONDITIONS

Work Material		Cutting Mode	Cutting Speed (m/min) 100 500 1000 1500	Feed (mm/rev)	Depth of Cut (mm)	Coolant
Centrifugal casting	Cast Iron	Continuous cutting		–0.3(Finishing) –0.8(Semi-finishing)	–0.05(Finishing) –0.2(Semi-finishing)	Wet

CUTTING PERFORMANCE





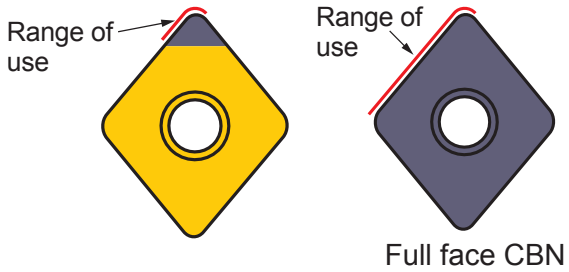


<Cutting Conditions>
Workpiece : FC200 (Centrifugal casting) ϕ63.0
Cutting Speed : 800m/min Feed : 0.35mm/rev Depth of Cut : 0.03mm
Work : Centrifugal casting Cylinder liner Hole Depth : 100mm

MB4020 SINTERED ALLOY MACHINING

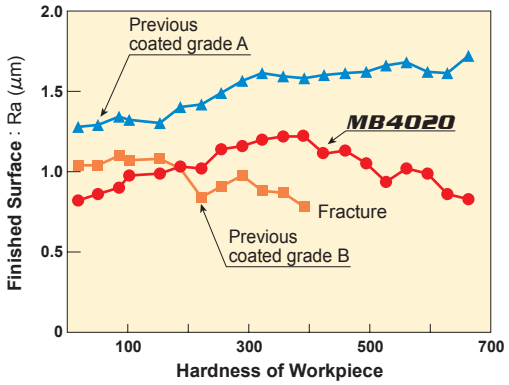
Full face CBN

Full face CBN insert can be used for chamfering that use higher depth of cut



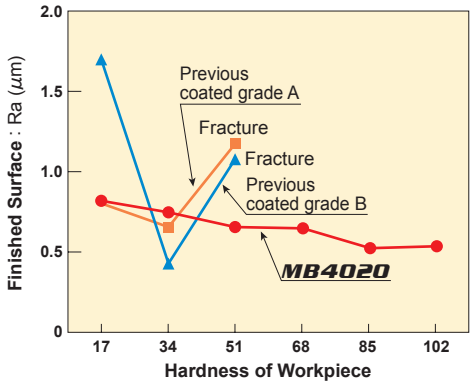
CUTTING PERFORMANCE

Continuous cutting of high density sintered alloy



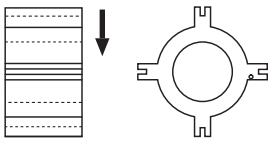
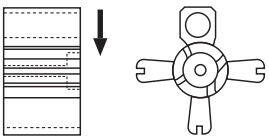
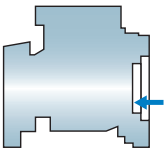
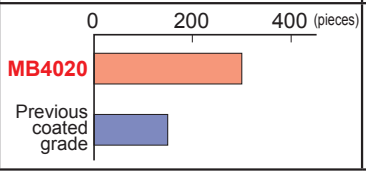
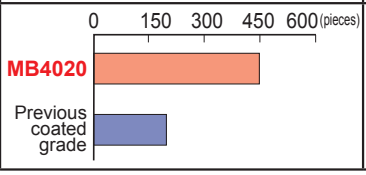
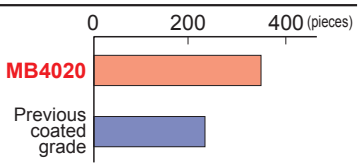
<Cutting Conditions>
Workpiece : High density sintered alloy Insert : NP-CNGA120408
Cutting Speed : 190m/min Feed : 0.15mm/rev
Depth of Cut : 0.1mm
Wet Cutting

Continuous cutting of sintered alloy



<Cutting Conditions>
Workpiece : Sintered alloy Insert : NP-CNGA120408
Cutting Speed : 100m/min Feed : 0.15mm/rev
Depth of Cut : 0.1mm
Wet Cutting

APPLICATION EXAMPLE

Insert		NP-TNGA160404SF3	NP-CNGA120404SE2	CCGW060204FS
Workpiece		 Carburized and quenched alloy	 Carburized and quenched alloy	 FC250
Component		Variable valve parts	Variable valve parts	Crankcase
Cutting Conditions	Cutting Speed (m/min)	250	250	400→450
	Feed (mm/rev)	0.1	0.12	0.03→0.37
	Depth of Cut (mm)	0.2	0.2	0.13
	Coolant	Wet cutting	Wet cutting	Wet cutting
Result				

CBN

- Suitable for high speed finishing of heat treated steel, sintered ferrous alloy and cast iron.
- Low affinity to iron, thus good surface finishes are possible.
- Grinding can be replaced by machining.

●Heat Treated Steel

Work Material		Type	Cutting Mode	Recommended Grade	Recommended Cutting Conditions		
					Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
Structural Steel Esp. Carburized Steel (SC, SCM, SCr) High Alloy Steel (SKD, SKH)	HRC 35—65	Coated	High speed finishing cutting	NEW BC8105	250 (100—350)	—0.15	—0.2
				MBC010	250 (150—400)	—0.2	—0.2
			Continuous cutting for general purpose	BC8110	200 (100—300)	—0.2	—0.3
				MBC020	200 (80—250)	—0.2	—0.3
			Heavy interrupted cutting for general purpose	NEW BC8120	200 (80—250)	—0.3	—0.8
			Interrupted cutting for general purpose	BC8020	150 (60—200)	—0.2	—0.3
			Interrupted cutting	NEW BC8130	120 (60—150)	—0.2	—0.3
		Non-coated	Continuous cutting for general purpose	MB8025	180 (80—250)	—0.3	—5
			Interrupted cutting for general purpose		120 (60—150)	—0.2	—0.3
			High speed finishing cutting	MB810	200 (150—300)	—0.3	—0.15
			Continuous to light interrupted cutting	MB825	120 (70—150)	—0.3	—0.5
			Interrupted cutting	MB835	100 (50—120)	—0.3	—0.5

●Cast Iron

Work Material		Workpiece Structure	Cutting Speed (m/min) 250 500 750 1000 1250	Feed (mm/rev)	Depth of Cut (mm)	Coolant
Gray Cast Iron	JIS FC250	Ferritic + Pearlitic	MBS140	—0.5	—1.0 MBS140 —5.0	Dry,Wet
	JIS FC300	Pearlitic	MB710 MB730 MB4020			
Alloy Cast Iron		Pearlitic		—0.4	—0.5	Dry,Wet
Ductile Cast Iron	JIS FCD400	Ferritic	MB710 MB730	—0.4	—0.5	Dry,Wet
	JIS FCD700	Ferritic + Pearlitic Pearlitic				

●Sintered Alloy

Work Material	Recommended Grade	Recommended Cutting Conditions		
		Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
General Sintered Alloy	MB4020	250 (80—300)	—0.2	—0.3
High Density Sintered Alloy	MB4020	150 (80—250)	—0.2	—0.3
Sintered Alloy	MB4020, MB835	100 (80—150)	—0.2	—0.3

●Valve Seat

Amount of Hard Particles	None or Small ← → Large			
Hardness of Workpiece (HV)	150	250	300	350
Plunge Cut	MB4020	MB825	MB835	
Traverse Cut	MB4020	MB710	MB825	

●Roll

Work Material	Grade	Recommended Cutting Conditions		
		Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
Cast Steel Adamite Cast Steel	MB825, MB8025	80 (30—130)	0.3 (0.1—0.5)	0.2—3.0
Ductile Cast Iron Granular Cast Iron Chilled Cast Iron	MB710	80 (30—130)	0.3 (0.1—0.5)	0.2—3.0
High Chromium Steel High Alloy Steel	MB825, MB8025	80 (30—130)	0.3 (0.1—0.5)	0.2—3.0
High Speed Steel	MB730	50 (20—70)	0.25 (0.1—0.4)	0.1—3.0
Cemented Carbide	MB730, MBS140	20 (10—30)	—0.2	—0.2

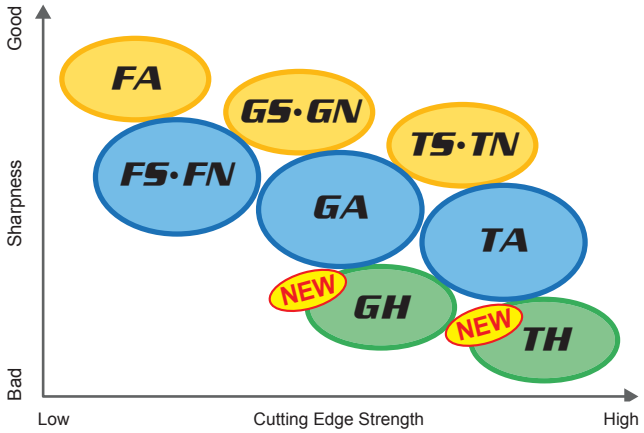
●Heat Resistant Alloy

Work Material	Grade	Recommended Cutting Conditions		
		Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
Ni Base Heat Resistant Alloy (e.g. Inconel)	MB730, MB8025	120 (100—150)	—0.2	—0.5
Co Base Heat Resistant Alloy (e.g. Stellite)	MB730, MB8025	70 (50—100)	—0.2	—0.5

HONING

Honing for machining hardened steel

For the CBN **BC8020**, **MBC010** and **MBC020** coated grades, **MB4020** and **MB710/MB730** a wide range of edge honing styles are available to cover a large range of applications and to represent Mitsubishi Materials' unique cutting tool technology.



General cutting

GA Honing : General machining
GS Honing : Vibration and burr control
GN Honing : If the crater wear is large.
GH Honing : For depths of cut of 0.15 or greater

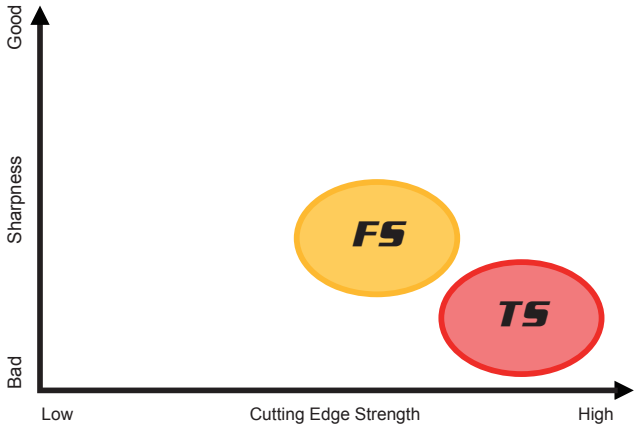
Continuous cutting, stable cutting

FS Honing : General machining
FA Honing : For improved biting compared to **FS**
FN Honing : if the crater wear is large.

Medium and heavy interrupted cutting, unstable cutting

TA Honing : General machining
TS Honing : Vibration and burr control
TN Honing : If the crater wear is large.
TH Honing : For depths of cut of 0.15 or greater

Honing for machining sintered alloys



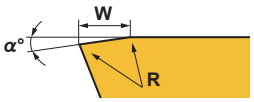
Continuous cutting, stable cutting

FS Honing : Continuous cutting, General machining

Medium and heavy interrupted cutting, unstable cutting

TS Honing : If fracturing occurs at the blade edge during interrupted cutting

NP-CNGA120408-G A 2



Main Application — Edge Honing Type

	A General			S Vibration and burr control			N Crater wear control			H High efficiency		
	α	W	R	α	W	R	α	W	R	α	W	R
F Continuous cutting	15	0.1	0	15	0.1	0.01	15	0.05	0.01	—	—	—
G General cutting	25	0.13	0.03	25	0.13	0.01	25	0.05	0.01	25	0.27	0.03
T Interrupted cutting	35	0.13	0.03	35	0.13	0.01	35	0.05	0.01	35	0.27	0.03

※ Conventional honing shapes
F honing : 0.1mm×15°+R0
G honing : 0.13mm×25°+R0.03
T honing : 0.13mm×35°+R0.03

CBN GROOVING SERIES(GY/MG)

FEATURES

A combination with a high rigidity holder ensures high accuracy and long tool life.

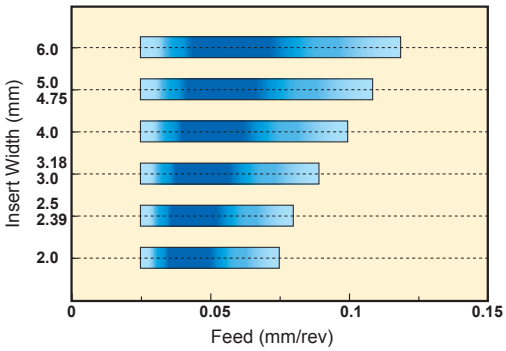
Holder rigidity is essential when grooving hardened steel. The GY series Tri Lock system offers high rigidity equivalent to a 1-piece type despite being a 2-piece type. MG has a wide insert location face for high gripping force. A combination with these holders allows it to deliver excellent performance when grooving hardened steel.

NEW

BC8110 coated materials for continuous machining of hardened steel have been added to GY inserts.

BC8110 materials with excellent wear resistance have been added. Compared to conventional materials, they display excellent wear resistance to achieve long tool life. A blade width of 6.0 has also been added to the lineup of BC8110.

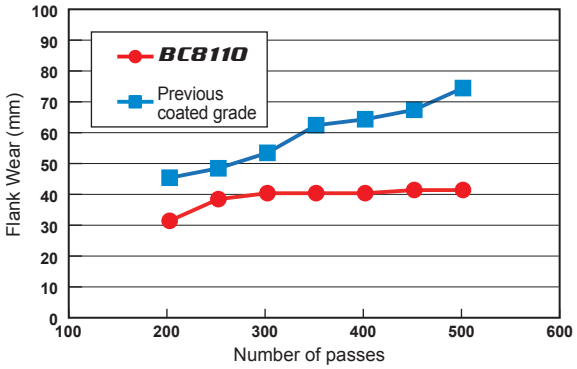
RECOMMENDED CUTTING CONDITIONS



Work Material		Hardness	Grade	Cutting Speed (m/min)	Coolant
H	Hardened Steel	35－65HRC	**BC8110** **MB8025**	100 (60－120)	Dry,Wet

CUTTING PERFORMANCE

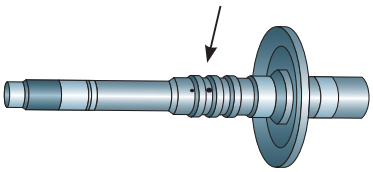
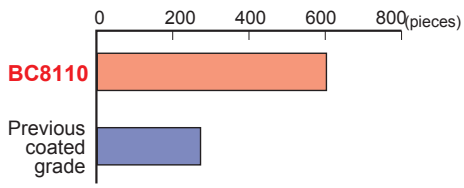
Tool life evaluation for the GY holder



<Cutting Conditions>

Insert	: GY1G0200D020N-GFGS
Workpiece	: SCr420 (60HRC)
Cutting Speed	: 120 m/min
Feed	: 0.1 mm/rev
Depth of Cut	: 0.3 mm
Cutting Mode	: Dry Cutting

APPLICATION EXAMPLE

Insert		**GY1G0300F020N-GFGS** (Grade : **BC8110**)
Workpiece		 SNCM230H (HRC58–62)
Component		Input shaft
Cutting Conditions	Cutting Speed (m/min)	130
	Feed (mm/rev)	0.1
Result		 Tool life over twice as long as conventional products

CBN BREAKER INSERT

FEATURES

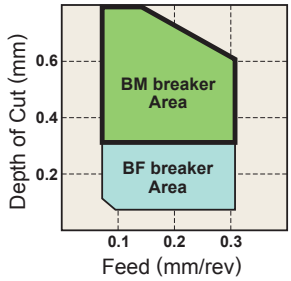
Chip Breaker Geometry Designed for Excellent Chip Control

Radial chip breaker ensures optimization of the cutting point and the chip breaker position. Enables effective chip discharge even when copy machining and prevents the chips from wrapping around the holder under finish cutting conditions.

Long Life Coated CBN Grade

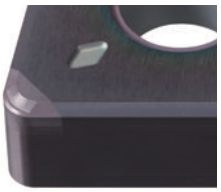
Combination of Coating grade & Breaker, high efficiency and long tool life in wide variety of applications.

APPLICATION AREA



DEEP CUTTING DEPTH

BM Breaker (Deep shoulder Milling)



Good for deep depth cutting of carburized layer.

Recommend and under ap=0.6mm

Available in BC8120 grade.

LIGHT CUTTING DEPTH

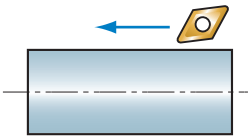
BF Breaker

Good for chip removal under light depth and feed cutting.

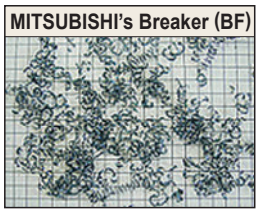
Recommend and under ap=0.3mm

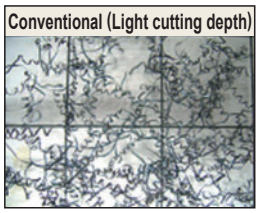
Available in BC8110,MBC020 grade.

CUTTING PERFORMANCE

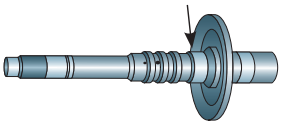


<Cutting Conditions>
Workpiece : JIS SCr420H (55HRC)
Insert : BF-CNGG120408TA4
Cutting Speed : 100m/min
Feed : 0.2mm/rev
Depth of Cut : 0.1mm
Dry Cutting

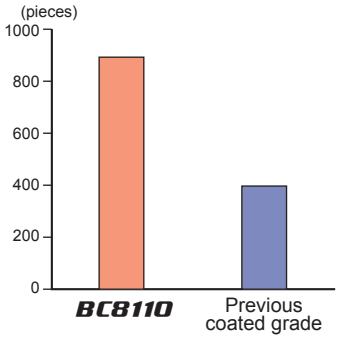




APPLICATION EXAMPLE



<Cutting Conditions>
Workpiece : SCr420H (61-65HRC)
Insert : BF-DNGM150404TA2
Cutting Speed : 150m/min
Feed : 0.12mm/rev
Depth of Cut : 0.15mm
Wet Cutting



MULTI-CORNER TYPE INSERTS

A single sided, multi-corner type insert has no cutting edges on the underside.

Double Sided, multi-corner type insert, ex.

NP-CNGA120408GA4

No. of Cutting Edge Corners

Single Sided, multi-corner type insert, ex.

NP-CNGA120408GA2

No. of Cutting Edge Corners

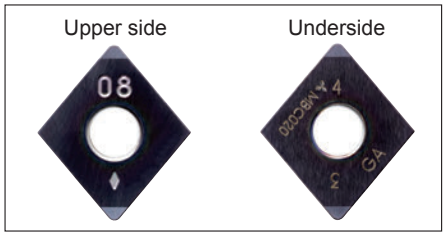
10-INSERTS PACKS

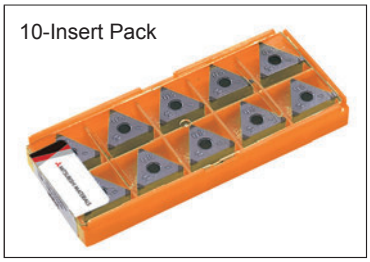
Two types of packs for ***MB8025*** Multi-corner type inserts, are available, a single insert pack and a ten insert pack. For easy storage.

TNP-CNGA120404G2

10-Insert Pack Symbol

Double sided, multi-corner type insert





WIPER INSERT

● Improving Surface Finish

Under the same machining conditions as conventional breakers, but with the feed rate increased, the surface finish of the workpiece can be improved.

● Improving Efficiency

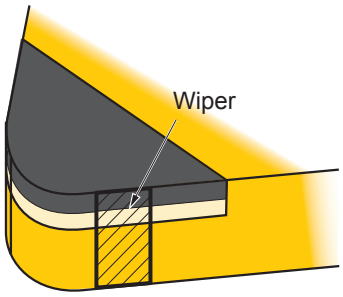
High feed rates not only shorten machining times but also make it possible to combine roughing and finishing operations.

● Increased Tool Life

When a change to high feed conditions, the time required to cut one component is decreased, thus more parts can be machined with each insert. In addition, the high feed rate prevents rubbing, therefore, delaying the progression of wear and increasing the tool life of the insert.

● Improving Chip Control

Under high feed conditions, the chips generated become thicker and are more easily broken, thus, chip control is improved.



Insert example

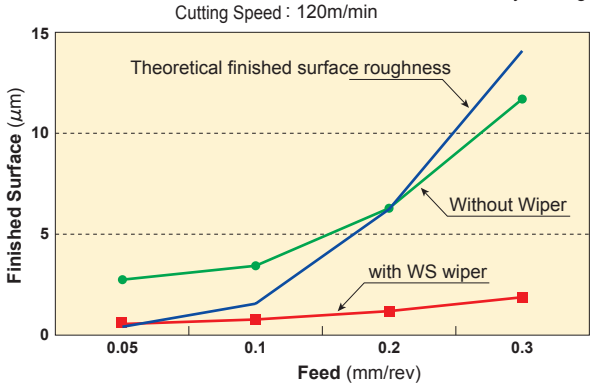
General wiper insert

NP-CNGA120408GAWS2

New wiper edge code

Cutting performance

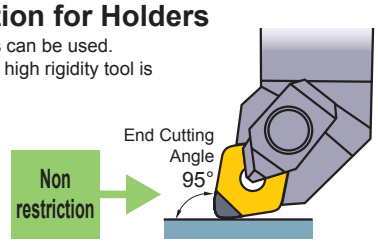
<Cutting Conditions> Workpiece : Hardened Material (HRC60) Depth of Cut : 0.1mm
Insert : NP-CNGA120408GAWS2 Dry Cutting
Cutting Speed : 120m/min



NOTES FOR USE

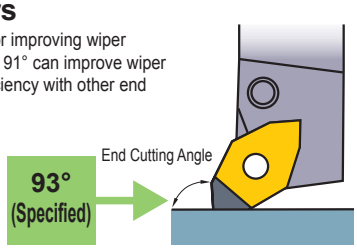
No Restriction for Holders

A standard holders can be used.
(*A double clamp, high rigidity tool is recommended.)

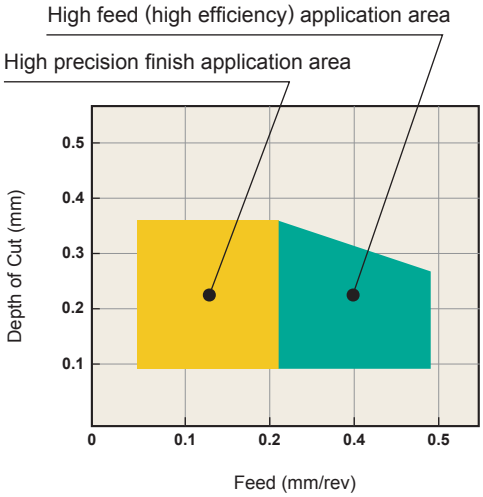


Restriction for Holders

Use a holder with end cutting angle 93° for improving wiper efficiency. A holder with end cutting angle 91° can improve wiper efficiency, however, there is no wiper efficiency with other end cutting angles (60°, 90°,107°etc.).

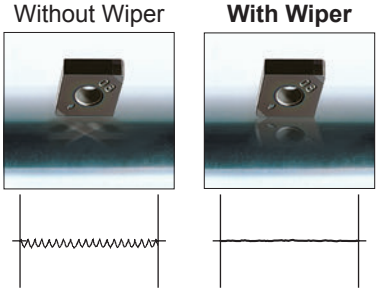


RECOMMENDED CUTTING CONDITIONS AND PERFORMANCE



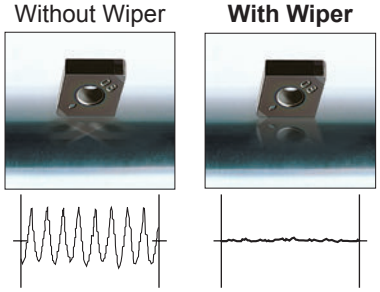
High precision finishing

Cutting Speed: 100m/min Feed: 0.1mm/rev
Depth of Cut: 0.1mm Dry Cutting



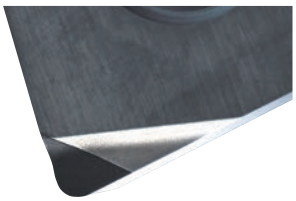
High feed, high efficiency machining

Cutting Speed: 100m/min Feed: 0.3mm/rev
Depth of Cut: 0.1mm Dry Cutting

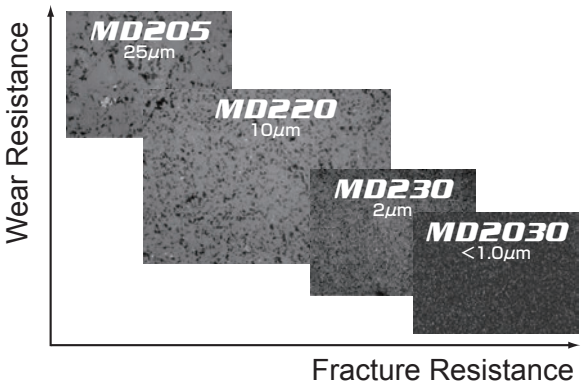


PCD(SINTERED DIAMOND)

- Suitable for materials such as aluminium alloy, non-ferrous metals, and fibre strengthened plastic.
- Suitable for extremely high speed finishing.



FEATURES



Grade	Features
MD205	**Materials focused on wear resistance** Coarse grain diamond particles are sintered and wear resistance is excellent. Use when wear resistance with MD220 is insufficient.
MD220	**Materials for general machining** Sintered medium grain diamond particles. Wear resistance and fracture resistance are superbly balanced. Applicable to general finishing of non-ferrous metals, non-metal cutting, and similar machining.
MD230	**Materials focused on fracture resistance** Fine grain diamond particles are used. Fracture resistance and cutting edge sharpness are excellent. Use when fracture and a high quality finished surface is demanded with MD220.
MD2030	**Special materials for milling** Strong sintering of ultra micro-grain PCD particles provides exceptional fracture resistance.Chipping during high-speed finish milling can be controlled.

SELECTION STANDARD

●TURNING

Work Material	Recommended Grade			Recommended Cutting Conditions		
	MD205	MD220	MD2030	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
Aluminium Alloy (Si ≤ 12%)		◎	○	800 (200—1200)	—0.2	—1.0
Aluminium Alloy (Si ≥13%)	◎	○		600 (200—1000)	—0.2	—1.0
Copper Alloy		◎		700 (200—1200)	—0.2	—1.0
Strengthened Plastic		◎		600 (100—1000)	—0.4	—1.0
Glass Fibre Reinforced Plastic		◎		500 (100—800)	—0.25	—1.0
Carbon	○	◎		400 (100—600)	—0.3	—1.0
Ceramics		○		50 (30—80)	—0.1	—1.0
Hard Rubber		◎		600 (300—800)	—0.15	—1.0
Wood Inorganic Board		◎		1300 (300—4000)	—0.4	—
Cemented Carbide	◎	○		15 (5—20)	—0.2	—0.5

(Note1) ◎ : 1st recommendation. ○ : 2nd recommendation
(Note2) Not suitable for steel.

NEW PETIT CUT INSERT SERIES

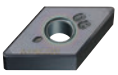
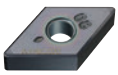
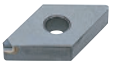
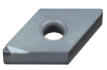
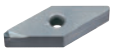
FEATURES

- **Economical** The small PCD delivers long tool life. Eliminates the need for regrinding, making tool management easier and economical.
- **With Breaker** Chip breaker formed directly on the PCD portion delivers superior chip control.
- Corner R0.05mm inserts are available, making it suitable for the machining of small work corner radii.

Memo

CLASSIFICATION

NEGATIVE INSERTS WITH HOLE

Product Name	Type	Tolerance	Breaker Name and Cross Section	Rhombic 80°	Rhombic 55°	Square 90°	Triangular 60°	Rhombic 35°	Trigon 80°
NEW PETIT CUT	Multi-corner Type Double Sided	G	Flat Top	NP-CNGA_○4 222	NP-DNGA_○4 226	NP-SNGA_○4 230	NP-TNGA_○6 232	NP-VNGA_○4 235	NP-WNGA_○6 237
	Multi-corner Type Double Sided With Wiper		Flat Top	NP-CNGA_○4 222					
	Multi-corner Type Double Sided With Breaker		BF	BF-CNGG_○4 222	BF-DNGG_○4  227				
	Multi-corner Type Double Sided With Breaker		Flat Top	NP-CNGA_○2 * 223	NP-DNGA_○2 * 227	NP-SNGA_○2 * 230	NP-TNGA_○3 * 232	NP-VNGA_○2 * 235	NP-WNGA_○3 237
	Multi-corner Type Single Sided With Wiper		Flat Top	NP-CNGA_○WS2 * 224	NP-DNGA_○WS2J_R/L 228				NP-WNGA_○WS3 237
	Multi-corner Type Single Sided With Breaker		BF	BF-CNGM_○2 224	BF-DNGM_○2  229				
	Multi-corner Type Single Sided With Breaker		BM	BM-CNGM_○2 224	BM-DNGM_○2 229		BM-TNGM_○3 233		
	One-corner Type Single Sided	M	Flat Top	NP-CNMA_○ 224	NP-DNMA_○  229	NP-SNMA_○ 231	NP-TNMA_○ 233	NP-VNMA_○ 236	
	One-corner Type Single Sided With Breaker		R/L-F	NP-CNMM_R/L-F 266	NP-DNMM_R/L-F  267	NP-SNMM_R/L-F 268	NP-TNMM_R/L-F 269	NP-VNMM_R/L-F  270	

(Note) Two types of packs for * type inserts, pack of single insert and pack of ten inserts, are available. (The single pack is standard.)
Please refer to the "Standard of inserts".

CLASSIFICATION

NEGATIVE INSERTS WITH HOLE

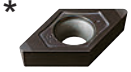
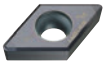
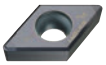
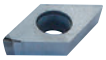
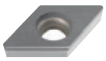
Product Name	Type	Tolerance	Breaker Name and Cross Section	Rhombic 80°	Rhombic 55°	Square 90°	Triangular 60°	Rhombic 35°	Trigon 80°
STANDARD	Multi-corner Type Double Sided (Solid CBN)	G	Flat Top	CNGA 225		SNGA 231	TNGA 234		
STANDARD	One-corner Type Single Sided	M	Flat Top	CNMA 225, 266					
STANDARD	One-corner Type Single Sided	G	Flat Top		DNGA 229, 267	SNGA 231, 268	TNGA 234, 269	VNGA 236, 270	

5° POSITIVE INSERTS WITH HOLE

Product Name	Type	Tolerance	Breaker Name and Cross Section	Rhombic 80°	Rhombic 55°	Square 90°	Triangular 60°	Rhombic 35°	Trigon 80°
NEW PETIT CUT	Multi-corner Type Single Sided	G	Flat Top					NP-VBGW_○2 257	
NEW PETIT CUT	One-corner Type Single Sided	G	Flat Top					NP-VBGW_○ 258	
NEW PETIT CUT	One-corner Type Single Sided With Breaker	G	R-F					NP-VBGT_R-F 279	

CLASSIFICATION

7° POSITIVE INSERTS WITH HOLE

Product Name	Type	Tolerance	Breaker Name and Cross Section	Rhombic 80°	Rhombic 55°	Square 90°	Triangular 60°	Rhombic 35°	Trigon 80°
NEW PETIT CUT	Multi-corner Type Single Sided	G	Flat Top	NP-CCGW/B_○2 * 244	NP-DCGW_○2 *  249		NP-TCGW_○3 252	NP-VCGW_○2 259	
	Multi-corner Type Single Sided With Wiper		Flat Top	NP-CCGW_○WS2 245					
	Multi-corner Type Single Sided With Breaker		BF	BF-CCGT_○2 245	BF-DCGT_○2  250				
	Multi-corner Type Single Sided With Breaker		BM	BM-CCGT_○2 246	BM-DCGT_○2  250				
	One-corner Type Single Sided	M	Flat Top	NP-CCMB_○ 246					
	One-corner Type Single Sided With Breaker		Standard	NP-CCMH 272					
	One-corner Type Single Sided	G	Flat Top	NP-CCGW_○ 246	NP-DCGW_○ 250				
	One-corner Type Single Sided	M	Flat Top	NP-CCMW_○ 247	NP-DCMW_○ 251				NP-WCMW_○ 260
	One-corner Type Single Sided		Flat Top	NP-CCMW 272					
	One-corner Type Single Sided With Breaker		R/L-F		NP-DCMT_R/L-F  274				
	One-corner Type Single Sided With Breaker	G	R-F					NP-VCGT_R-F 280	
STANDARD	Multi-corner Type Single Sided	G	Flat Top	CCGW 247	DCGW  251		TCGW 253		
	One-corner Type Single Sided	M G	Flat Top	CCMW 247, 272	DCMW 251, 274		TCMW TCGW 253, 276		WCMW 281

(Note) Two types of packs for * type inserts, pack of single insert and pack of ten inserts, are available. (The single pack is standard.)
Please refer to the "Standard of inserts".

CLASSIFICATION

11° POSITIVE INSERTS WITH HOLE

Product Name	Type	Tolerance	Breaker Name and Cross Section	Rhombic 80°	Rhombic 55°	Square 90°	Triangular 60°	Rhombic 35°	Trigon 80°
NEW PETIT CUT	Multi-corner Type Single Sided	G	Flat Top	NP-CPGB_○2 248			NP-TPGB_○3 254		
NEW PETIT CUT	Multi-corner Type Single Sided	G	Flat Top				NP-TPGX_○3 255		
NEW PETIT CUT	One-corner Type Single Sided	M	Flat Top	NP-CPMB_○ 248			NP-TPMB_○ 255		
NEW PETIT CUT	One-corner Type Single Sided With Breaker	M	Standard	NP-CPMH 273					
NEW PETIT CUT	One-corner Type Single Sided	G	Flat Top				NP-TPGX_○ 255		
NEW PETIT CUT	One-corner Type Single Sided With Breaker	M	R/L-F				NP-TPMX_R/L-F 277		
NEW PETIT CUT	One-corner Type Single Sided With Breaker	M	R/L-F				NP-TPMH_R/L-F 277		
STANDARD	One-corner Type Single Sided With Breaker	G	Standard	CPGT 273					WPGT 282
STANDARD	One-corner Type Single Sided	G	Flat Top			SPGX 275	TPGX 256, 278		
STANDARD	One-corner Type Single Sided With Breaker	G	R/L-F				TPGT/V_R/L-F 277, 278		

CLASSIFICATION

15° POSITIVE INSERTS WITH HOLE

Type	Tolerance	Breaker Name and Cross Section	Rhombic 35°	
One-corner Type Single Sided (For Aluminium With Breaker)	G	R/L	VDGX_R/L-F 285	

20° POSITIVE INSERTS WITH HOLE

Type	Tolerance	Breaker Name and Cross Section	Rhombic 55°	Triangular 60°
One-corner Type Single Sided (For Aluminium With Breaker)	G	R/L		TEGX_R/L 284
One-corner Type Single Sided (For Aluminium With Breaker)		R/L-F	DEGX_R/L-F 283	
One-corner Type Single Sided (For Aluminium)		Flat Top		TEGX 284

CLASSIFICATION

NEGATIVE INSERTS WITHOUT HOLE

Type	Tolerance	Breaker Name and Cross Section	Rhombic 80°	Rhombic 55°	Square 90°	Triangular 60°	Round
One-corner Type Single Sided	G	Flat Top			SNGN 242, 271	TNGN 243	
Multi-corner Type Double Sided (Solid CBN)	G	Flat Top	CNGN 239	DNGN 240	SNGN 242	TNGN 243	RNGN 241

5° POSITIVE INSERTS WITHOUT HOLE

Type	Tolerance	Breaker Name and Cross Section	Triangular 60°	
Multi-corner Type Single Sided	G	Flat Top	TBGN 262	

11° POSITIVE INSERTS WITHOUT HOLE

Type	Tolerance	Breaker Name and Cross Section	Square 90°	Triangular 60°
One-corner Type Single Sided	G	Flat Top	SPGN 261, 286	TPGN 263, 287

SPECIAL PURPOSE INSERTS

Tool Holder Type	Tolerance	Inserts
GY Type		GY_GFGS 264
MG Type		MGTR 238
TL Type		RTG-A 265

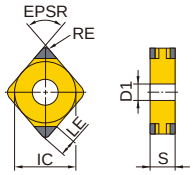
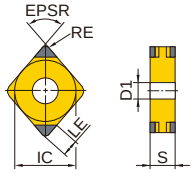
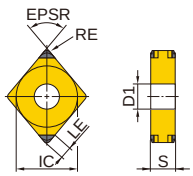
CN**

CBN — **Rhombic 80°, Neg, With hole**

Product Information

IDENTIFICATION >> 198
GRADES (UNCOATED CBN) >> 206
APPLICABLE HOLDER PAGE (BORING BARS) >> 400
ISO13399 PROPERTY >> 1966
GRADES (COATED CBN) >> 200
APPLICABLE HOLDER PAGE (EXTERNAL TURNING TOOLS) >> 296
TECHNICAL INFO >> 1971

Stock status indication (1 insert in one case TNP-**:The order number is for a 10-insert pack.) :
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✠: Unstable Cutting

Work Material			Coated CBN							CBN								Solid CBN	Dimensions (mm)						
	H	Hardened Materials	◐	●	●	◐	✠	●	◐	◐	●	◐	✠												
	K	Cast iron												●	◐		✠								
	S	Heat-resistant Alloy, Titanium Alloy													◐										
		Sintered Alloy														◐									
Inserts Shape	Order Number		BC8020	BC8105	BC8110	BC8120	BC8130	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020	MBS140		IC	S	RE	LE	D1	EPSR	Geometry
	NP-CNGA120404FS4		▲	●	●	●													12.7	4.76	0.4	1.9	5.16	80°	
	NP-CNGA120404GA4		▲			●	●		●										12.7	4.76	0.4	1.9	5.16	80°	
	NP-CNGA120404GH4				●	●	●												12.7	4.76	0.4	1.9	5.16	80°	
	NP-CNGA120404GN4								●										12.7	4.76	0.4	1.9	5.16	80°	
	NP-CNGA120404GS4			●	●														12.7	4.76	0.4	1.9	5.16	80°	
	NP-CNGA120404TA4		▲			●	●		●										12.7	4.76	0.4	1.9	5.16	80°	
	NP-CNGA120404TH4					●	●												12.7	4.76	0.4	1.9	5.16	80°	
	NP-CNGA120404TS4				●														12.7	4.76	0.4	1.9	5.16	80°	
	NP-CNGA120408FS4		▲	●	●	●													12.7	4.76	0.8	2.1	5.16	80°	
	NP-CNGA120408GA4		▲			●	●		●										12.7	4.76	0.8	2.1	5.16	80°	
	NP-CNGA120408GH4				●	●	●												12.7	4.76	0.8	2.1	5.16	80°	
	NP-CNGA120408GN4								●										12.7	4.76	0.8	2.1	5.16	80°	
	NP-CNGA120408GS4			●	●														12.7	4.76	0.8	2.1	5.16	80°	
	NP-CNGA120408TA4		▲			●	●		●										12.7	4.76	0.8	2.1	5.16	80°	
	NP-CNGA120408TH4					●	●												12.7	4.76	0.8	2.1	5.16	80°	
	NP-CNGA120408TS4				●														12.7	4.76	0.8	2.1	5.16	80°	
	NP-CNGA120412FS4		▲	●	●	●													12.7	4.76	1.2	2.3	5.16	80°	
	NP-CNGA120412GA4		▲			●	●		●										12.7	4.76	1.2	2.3	5.16	80°	
	NP-CNGA120412GH4				●	●	●												12.7	4.76	1.2	2.3	5.16	80°	
	NP-CNGA120412GN4								●										12.7	4.76	1.2	2.3	5.16	80°	
	NP-CNGA120412GS4			●	●														12.7	4.76	1.2	2.3	5.16	80°	
	NP-CNGA120412TA4		▲			●	●		●										12.7	4.76	1.2	2.3	5.16	80°	
	NP-CNGA120412TH4					●	●												12.7	4.76	1.2	2.3	5.16	80°	
	NP-CNGA120412TS4				●														12.7	4.76	1.2	2.3	5.16	80°	
WIPER	NP-CNGA120404FSWS4			●	●	●													12.7	4.76	0.4	1.9	5.16	80°	
	NP-CNGA120404GAWS4		▲			●	●												12.7	4.76	0.4	1.9	5.16	80°	
	NP-CNGA120404GSWS4			●	●														12.7	4.76	0.4	1.9	5.16	80°	
	NP-CNGA120408FSWS4			●	●	●													12.7	4.76	0.8	2.1	5.16	80°	
	NP-CNGA120408GAWS4		▲			●	●												12.7	4.76	0.8	2.1	5.16	80°	
	NP-CNGA120408GSWS4			●	●														12.7	4.76	0.8	2.1	5.16	80°	
	NP-CNGA120412FSWS4			●	●	●													12.7	4.76	1.2	2.3	5.16	80°	
	NP-CNGA120412GAWS4		▲			●	●												12.7	4.76	1.2	2.3	5.16	80°	
	NP-CNGA120412GSWS4			●	●														12.7	4.76	1.2	2.3	5.16	80°	
BF	BF-CNGG120404TA4								●										12.7	4.76	0.4	1.9	5.16	80°	
	BF-CNGG120408TA4								●										12.7	4.76	0.8	2.1	5.16	80°	
	BF-CNGG120412TA4								●										12.7	4.76	1.2	2.3	5.16	80°	

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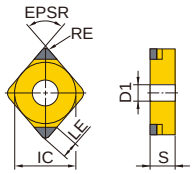
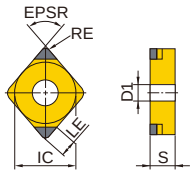
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Work Material			BC8020	BC8105	BC8110	BC8120	BC8130	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020	MBS140	IC	S	RE	LE	D1	EPSR	Geometry
	H	Hardened Materials	◐	●	●	◐	✣	●	◐	◐	●	◐	✣											
	K	Cast iron												●	◐		✣							
	S	Heat-resistant Alloy, Titanium Alloy													◐									
		Sintered Alloy														◐		Dimensions (mm)						
Inserts Shape	Order Number		Coated CBN							CBN							Solid CBN							
	NP-CNGA120402FS2				●													12.7	4.76	0.2	1.8	5.16	80°	
	NP-CNGA120402GA2					●												12.7	4.76	0.2	1.8	5.16	80°	
	NP-CNGA120402GS2				●													12.7	4.76	0.2	1.8	5.16	80°	
	NP-CNGA120404FS2		▲	●	●	●								●		●		12.7	4.76	0.4	1.9	5.16	80°	
	NP-CNGA120404G2									●								12.7	4.76	0.4	1.9	5.16	80°	
	NP-CNGA120404GA2		▲			●	●		●	●								12.7	4.76	0.4	1.9	5.16	80°	
	NP-CNGA120404GH2				●	●	●											12.7	4.76	0.4	1.9	5.16	80°	
	NP-CNGA120404GN2								●									12.7	4.76	0.4	1.9	5.16	80°	
	NP-CNGA120404GS2			●	●			●						●	●	●		12.7	4.76	0.4	1.9	5.16	80°	
	NP-CNGA120404SE2															●		12.7	4.76	0.4	1.9	5.16	80°	
	NP-CNGA120404SF2															●		12.7	4.76	0.4	1.9	5.16	80°	
	NP-CNGA120404T2									●								12.7	4.76	0.4	1.9	5.16	80°	
	NP-CNGA120404TA2		▲			●	●		●	●			●		●			12.7	4.76	0.4	1.9	5.16	80°	
	NP-CNGA120404TH2					●	●											12.7	4.76	0.4	1.9	5.16	80°	
	NP-CNGA120404TS2				●											●		12.7	4.76	0.4	1.9	5.16	80°	
	NP-CNGA120408FS2		▲	●	●	●				●				●		●		12.7	4.76	0.8	2.1	5.16	80°	
	NP-CNGA120408G2									●								12.7	4.76	0.8	2.1	5.16	80°	
	NP-CNGA120408GA2		▲			●	●		●	●								12.7	4.76	0.8	2.1	5.16	80°	
	NP-CNGA120408GH2				●	●	●											12.7	4.76	0.8	2.1	5.16	80°	
	NP-CNGA120408GN2								●									12.7	4.76	0.8	2.1	5.16	80°	
	NP-CNGA120408GS2			●	●			●		●				●	●	●		12.7	4.76	0.8	2.1	5.16	80°	
	NP-CNGA120408SE2															●		12.7	4.76	0.8	2.1	5.16	80°	
	NP-CNGA120408SF2															●		12.7	4.76	0.8	2.1	5.16	80°	
	NP-CNGA120408T2									●								12.7	4.76	0.8	2.1	5.16	80°	
	NP-CNGA120408TA2		▲			●	●		●	●			●		●			12.7	4.76	0.8	2.1	5.16	80°	
	NP-CNGA120408TH2					●	●											12.7	4.76	0.8	2.1	5.16	80°	
	NP-CNGA120408TS2				●											●		12.7	4.76	0.8	2.1	5.16	80°	
	NP-CNGA120412FS2		▲	●	●	●				●				●		●		12.7	4.76	1.2	2.3	5.16	80°	
	NP-CNGA120412G2									●								12.7	4.76	1.2	2.3	5.16	80°	
	NP-CNGA120412GA2		▲			●	●		●	●								12.7	4.76	1.2	2.3	5.16	80°	
	NP-CNGA120412GH2				●	●	●											12.7	4.76	1.2	2.3	5.16	80°	
	NP-CNGA120412GN2								●									12.7	4.76	1.2	2.3	5.16	80°	
	NP-CNGA120412GS2			●	●			●		●				●	●	●		12.7	4.76	1.2	2.3	5.16	80°	
	NP-CNGA120412SE2															●		12.7	4.76	1.2	2.3	5.16	80°	
	NP-CNGA120412SF2															●		12.7	4.76	1.2	2.3	5.16	80°	
	NP-CNGA120412T2									●								12.7	4.76	1.2	2.3	5.16	80°	
	NP-CNGA120412TA2		▲			●	●		●	●			●		●			12.7	4.76	1.2	2.3	5.16	80°	
	NP-CNGA120412TH2					●	●											12.7	4.76	1.2	2.3	5.16	80°	
	NP-CNGA120412TS2				●											●		12.7	4.76	1.2	2.3	5.16	80°	
	TNP-CNGA120404G2									●								12.7	4.76	0.4	1.9	5.16	80°	
	TNP-CNGA120404T2									●								12.7	4.76	0.4	1.9	5.16	80°	
	TNP-CNGA120408G2									●								12.7	4.76	0.8	2.1	5.16	80°	
	TNP-CNGA120408T2									●								12.7	4.76	0.8	2.1	5.16	80°	
	TNP-CNGA120412G2									●								12.7	4.76	1.2	2.3	5.16	80°	
	TNP-CNGA120412T2									●								12.7	4.76	1.2	2.3	5.16	80°	

CN**

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Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Work Material																																			
	H	Hardened Materials	◐	●	●	◐	✣	●	◐	◐	●	◐	✣																						
	K	Cast iron												●	◐		✣																		
	S	Heat-resistant Alloy, Titanium Alloy													◐																				
		Sintered Alloy														◐																			
Inserts Shape		Order Number	Coated CBN							CBN							Solid CBN	Dimensions (mm)																	
			BC8020	BC8105	BC8110	BC8120	BC8130	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020	MBS140	IC	S	RE	LE	D1	EPSR	Geometry											
WIPER		NP-CNGA120404FSWS2		●	●	●												12.7	4.76	0.4	1.9	5.16	80°												
		NP-CNGA120404GAWS2				●	●		●	●								12.7	4.76	0.4	1.9	5.16	80°												
		NP-CNGA120404GSWS2		●	●			●										12.7	4.76	0.4	1.9	5.16	80°												
		NP-CNGA120408FSWS2		●	●	●												12.7	4.76	0.8	2.1	5.16	80°												
		NP-CNGA120408GAWS2	▲			●	●		●	●								12.7	4.76	0.8	2.1	5.16	80°												
		NP-CNGA120408GSWS2		●	●			●										12.7	4.76	0.8	2.1	5.16	80°												
		NP-CNGA120412FSWS2		●	●	●												12.7	4.76	1.2	2.3	5.16	80°												
		NP-CNGA120412GAWS2	▲			●	●		●	●								12.7	4.76	1.2	2.3	5.16	80°												
		NP-CNGA120412GSWS2		●	●			●										12.7	4.76	1.2	2.3	5.16	80°												
BF		BF-CNGM120404TA2							●									12.7	4.76	0.4	1.9	5.0	80°												
		BF-CNGM120404TS2			●													12.7	4.76	0.4	1.9	5.16	80°												
		BF-CNGM120408TA2							●									12.7	4.76	0.8	2.1	5.16	80°												
		BF-CNGM120408TS2			●													12.7	4.76	0.8	2.1	5.16	80°												
		BF-CNGM120412TA2							●									12.7	4.76	1.2	2.3	5.16	80°												
		BF-CNGM120412TS2			●													12.7	4.76	1.2	2.3	5.16	80°												
BM		BM-CNGM120404TA2				●												12.7	4.76	0.4	1.9	5.16	80°												
		BM-CNGM120408TA2	▲			●												12.7	4.76	0.8	2.1	5.16	80°												
		BM-CNGM120412TA2	▲			●												12.7	4.76	1.2	2.3	5.16	80°												
		NP-CNMA120404F								□	●			●				12.7	4.76	0.4	1.9	5.16	80°												
		NP-CNMA120404G								●		●						12.7	4.76	0.4	1.9	5.16	80°												
		NP-CNMA120404GS												●	●			12.7	4.76	0.4	1.9	5.16	80°												
		NP-CNMA120404T								□		●	●		●			12.7	4.76	0.4	1.9	5.16	80°												
		NP-CNMA120408F								□	●			●				12.7	4.76	0.8	2.1	5.16	80°												
		NP-CNMA120408G								●		●						12.7	4.76	0.8	2.1	5.16	80°												
		NP-CNMA120408GS												●	●			12.7	4.76	0.8	2.1	5.16	80°												
		NP-CNMA120408T								□		●	●		●			12.7	4.76	0.8	2.1	5.16	80°												
		NP-CNMA120412F								□	●			●				12.7	4.76	1.2	2.3	5.16	80°												
		NP-CNMA120412G								●		●						12.7	4.76	1.2	2.3	5.16	80°												
		NP-CNMA120412GS												●	●			12.7	4.76	1.2	2.3	5.16	80°												
		NP-CNMA120412T								□		●	●		●			12.7	4.76	1.2	2.3	5.16	80°												

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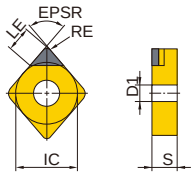
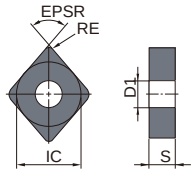
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Work Material			BC8020	BC8105	BC8110	BC8120	BC8130	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020	MBS140
	H	Hardened Materials	◐	●	●	◐	✣	●	◐	◐	●	◐	✣				
	K	Cast iron												●	◐		✣
	S	Heat-resistant Alloy, Titanium Alloy													◐		
		Sintered Alloy														◐	

Inserts Shape	Order Number	IC	S	RE	LE	D1	EPSR	Geometry
	CNMA120404	12.7	4.76	0.4	3.7	5.16	80°	
	CNMA120408	12.7	4.76	0.8	3.6	5.16	80°	
	CNMA120412	12.7	4.76	1.2	3.6	5.16	80°	
	CNGA120408	12.7	4.76	0.8	3.6	5.16	80°	
	CNGA120412	12.7	4.76	1.2	3.6	5.16	80°	

DN**

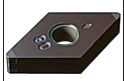
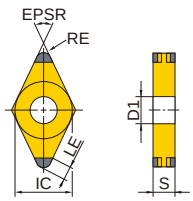
CBN

Rhombic 55°, Neg, With hole

Product Information

IDENTIFICATION >> 198
ISO13399 PROPERTY >> 1966
GRADES (UNCOATED CBN) >> 206
APPLICABLE HOLDER PAGE (BORING BARS) >> 401
GRADES (COATED CBN) >> 200
APPLICABLE HOLDER PAGE (EXTERNAL TURNING TOOLS) >> 300
TECHNICAL INFO >> 1971

Stock status indication (1 insert in one case TNP-**:The order number is for a 10-insert pack.) :
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✠: Unstable Cutting

Work Material			Coated CBN							CBN							Solid CBN	Dimensions (mm)						
	H	Hardened Materials	◐	●	●	◐	✠	●	◐	◐	●	◐	✠											
	K	Cast iron												●	◐		✠							
	S	Heat-resistant Alloy, Titanium Alloy													◐									
		Sintered Alloy														◐								
Inserts Shape	Order Number		BC8020	BC8105	BC8110	BC8120	BC8130	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020	MBS140	IC	S	RE	LE	D1	EPSR	Geometry
	NP-DNGA150404FS4		▲	●	●	●												12.7	4.76	0.4	2.1	5.16	55°	
	NP-DNGA150404GA4		▲			●	●		●									12.7	4.76	0.4	2.1	5.16	55°	
	NP-DNGA150404GH4				●	●	●											12.7	4.76	0.4	2.1	5.16	55°	
	NP-DNGA150404GN4								●									12.7	4.76	0.4	2.1	5.16	55°	
	NP-DNGA150404GS4			●	●													12.7	4.76	0.4	2.1	5.16	55°	
	NP-DNGA150404TA4		▲			●	●		●									12.7	4.76	0.4	2.1	5.16	55°	
	NP-DNGA150404TH4					●	●											12.7	4.76	0.4	2.1	5.16	55°	
	NP-DNGA150404TS4				●													12.7	4.76	0.4	2.1	5.16	55°	
	NP-DNGA150408FS4		▲	●	●	●												12.7	4.76	0.8	2	5.16	55°	
	NP-DNGA150408GA4		▲			●	●		●									12.7	4.76	0.8	2	5.16	55°	
	NP-DNGA150408GH4				●	●	●											12.7	4.76	0.8	2	5.16	55°	
	NP-DNGA150408GN4								●									12.7	4.76	0.8	2	5.16	55°	
	NP-DNGA150408GS4			●	●													12.7	4.76	0.8	2	5.16	55°	
	NP-DNGA150408TA4		▲			●	●		●									12.7	4.76	0.8	2	5.16	55°	
	NP-DNGA150408TH4					●	●											12.7	4.76	0.8	2	5.16	55°	
	NP-DNGA150408TS4				●													12.7	4.76	0.8	2	5.16	55°	
	NP-DNGA150412FS4		▲	●	●	●												12.7	4.76	1.2	1.9	5.16	55°	
	NP-DNGA150412GA4		▲			●	●		●									12.7	4.76	1.2	1.9	5.16	55°	
	NP-DNGA150412GH4				●	●	●											12.7	4.76	1.2	1.9	5.16	55°	
	NP-DNGA150412GN4								●									12.7	4.76	1.2	1.9	5.16	55°	
	NP-DNGA150412GS4			●	●													12.7	4.76	1.2	1.9	5.16	55°	
	NP-DNGA150412TA4		▲			●	●		●									12.7	4.76	1.2	1.9	5.16	55°	
	NP-DNGA150412TH4					●	●											12.7	4.76	1.2	1.9	5.16	55°	
	NP-DNGA150412TS4				●													12.7	4.76	1.2	1.9	5.16	55°	
	NP-DNGA150604FS4			●	●													12.7	6.35	0.4	2.1	5.16	55°	
	NP-DNGA150604GA4					●	●											12.7	6.35	0.4	2.1	5.16	55°	
	NP-DNGA150604GH4				●	●	●											12.7	6.35	0.4	2.1	5.16	55°	
	NP-DNGA150604GS4			●	●													12.7	6.35	0.4	2.1	5.16	55°	
	NP-DNGA150604TA4					●	●											12.7	6.35	0.4	2.1	5.16	55°	
	NP-DNGA150604TH4					●	●											12.7	6.35	0.4	2.1	5.16	55°	
	NP-DNGA150604TS4				●													12.7	6.35	0.4	2.1	5.16	55°	
	NP-DNGA150608FS4			●	●													12.7	6.35	0.8	2	5.16	55°	
	NP-DNGA150608GA4					●	●											12.7	6.35	0.8	2	5.16	55°	
	NP-DNGA150608GH4				●	●	●											12.7	6.35	0.8	2	5.16	55°	
	NP-DNGA150608GS4			●	●													12.7	6.35	0.8	2	5.16	55°	
	NP-DNGA150608TA4					●	●											12.7	6.35	0.8	2	5.16	55°	
	NP-DNGA150608TH4					●	●											12.7	6.35	0.8	2	5.16	55°	
	NP-DNGA150608TS4				●													12.7	6.35	0.8	2	5.16	55°	
	NP-DNGA150612FS4			●	●													12.7	6.35	1.2	1.9	5.16	55°	
	NP-DNGA150612GA4					●	●											12.7	6.35	1.2	1.9	5.16	55°	
	NP-DNGA150612GH4				●	●	●											12.7	6.35	1.2	1.9	5.16	55°	

Stock status indication (1 insert in one case TNP-**:The order number is for a 10-insert pack.) :
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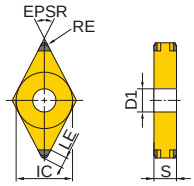
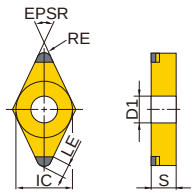
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✠: Unstable Cutting

Work Material			BC8020	BC8105	BC8110	BC8120	BC8130	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020	MBS140
	H	Hardened Materials	◐	●	●	◐	✠	●	◐	◐	●	◐	✠				
	K	Cast iron												●	◐		✠
	S	Heat-resistant Alloy, Titanium Alloy													◐		
		Sintered Alloy														◐	
Inserts Shape			Coated CBN							CBN							Solid CBN

Order Number	IC	S	RE	LE	D1	EPSR	Geometry
	Dimensions (mm)						
NP-DNGA150612GS4	12.7	6.35	1.2	1.9	5.16	55°	
NP-DNGA150612TA4	12.7	6.35	1.2	1.9	5.16	55°	
NP-DNGA150612TH4	12.7	6.35	1.2	1.9	5.16	55°	
NP-DNGA150612TS4	12.7	6.35	1.2	1.9	5.16	55°	
BF-DNGG150404TA4	12.7	4.76	0.4	2.1	5.16	55°	
BF-DNGG150408TA4	12.7	4.76	0.8	2	5.16	55°	
BF-DNGG150412TA4	12.7	4.76	1.2	1.9	5.16	55°	
NP-DNGA110408GA2	9.525	4.76	0.8	2	3.81	55°	
NP-DNGA150402FS2	12.7	4.76	0.2	2.3	5.16	55°	
NP-DNGA150402GA2	12.7	4.76	0.2	2.3	5.16	55°	
NP-DNGA150402GS2	12.7	4.76	0.2	2.3	5.16	55°	
NP-DNGA150404FS2	12.7	4.76	0.4	2.1	5.16	55°	
NP-DNGA150404G2	12.7	4.76	0.4	2.1	5.16	55°	
NP-DNGA150404GA2	12.7	4.76	0.4	2.1	5.16	55°	
NP-DNGA150404GH2	12.7	4.76	0.4	2.1	5.16	55°	
NP-DNGA150404GN2	12.7	4.76	0.4	2.1	5.16	55°	
NP-DNGA150404GS2	12.7	4.76	0.4	2.1	5.16	55°	
NP-DNGA150404SE2	12.7	4.76	0.4	2.1	5.16	55°	
NP-DNGA150404SF2	12.7	4.76	0.4	2.1	5.16	55°	
NP-DNGA150404T2	12.7	4.76	0.4	2.1	5.16	55°	
NP-DNGA150404TA2	12.7	4.76	0.4	2.1	5.16	55°	
NP-DNGA150404TH2	12.7	4.76	0.4	2.1	5.16	55°	
NP-DNGA150404TS2	12.7	4.76	0.4	2.1	5.16	55°	
NP-DNGA150408FS2	12.7	4.76	0.8	2	5.16	55°	
NP-DNGA150408G2	12.7	4.76	0.8	2	5.16	55°	
NP-DNGA150408GA2	12.7	4.76	0.8	2	5.16	55°	
NP-DNGA150408GH2	12.7	4.76	0.8	2	5.16	55°	
NP-DNGA150408GN2	12.7	4.76	0.8	2	5.16	55°	
NP-DNGA150408GS2	12.7	4.76	0.8	2	5.16	55°	
NP-DNGA150408SE2	12.7	4.76	0.8	2	5.16	55°	
NP-DNGA150408SF2	12.7	4.76	0.8	2	5.16	55°	
NP-DNGA150408T2	12.7	4.76	0.8	2	5.16	55°	
NP-DNGA150408TA2	12.7	4.76	0.8	2	5.16	55°	
NP-DNGA150408TH2	12.7	4.76	0.8	2	5.16	55°	
NP-DNGA150408TS2	12.7	4.76	0.8	2	5.16	55°	
NP-DNGA150412FS2	12.7	4.76	1.2	1.9	5.16	55°	
NP-DNGA150412G2	12.7	4.76	1.2	1.9	5.16	55°	
NP-DNGA150412GA2	12.7	4.76	1.2	1.9	5.16	55°	
NP-DNGA150412GH2	12.7	4.76	1.2	1.9	5.16	55°	
NP-DNGA150412GN2	12.7	4.76	1.2	1.9	5.16	55°	
NP-DNGA150412GS2	12.7	4.76	1.2	1.9	5.16	55°	
NP-DNGA150412SE2	12.7	4.76	1.2	1.9	5.16	55°	

DN**

Stock status indication (1 insert in one case TNP-**:The order number is for a 10-insert pack.) :
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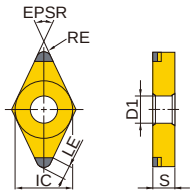
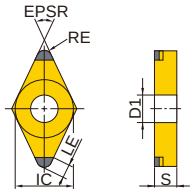
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✠: Unstable Cutting

Work Material																																		
H	Hardened Materials	◐	●	●	◐	✠	●	◐	◐	●	◐	✠																						
K	Cast iron														●	◐			✠															
S	Heat-resistant Alloy, Titanium Alloy															◐																		
	Sintered Alloy																◐																	

Inserts Shape	Order Number	Coated CBN							CBN							Solid CBN	IC	S	RE	LE	D1	EPSR	Geometry
		BC8020	BC8105	BC8110	BC8120	BC8130	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020	MBS140							
	NP-DNGA150412SF2														●		12.7	4.76	1.2	1.9	5.16	55°	
	NP-DNGA150412T2								●								12.7	4.76	1.2	1.9	5.16	55°	
	NP-DNGA150412TA2	▲			●	●		●									12.7	4.76	1.2	1.9	5.16	55°	
	NP-DNGA150412TH2				●	●											12.7	4.76	1.2	1.9	5.16	55°	
	NP-DNGA150412TS2			●											●		12.7	4.76	1.2	1.9	5.16	55°	
	NP-DNGA150602GA2				●												12.7	6.35	0.2	2.3	5.16	55°	
	NP-DNGA150604FS2		●	●	●												12.7	6.35	0.4	2.1	5.16	55°	
	NP-DNGA150604GA2				●	●											12.7	6.35	0.4	2.1	5.16	55°	
	NP-DNGA150604GH2			●	●	●											12.7	6.35	0.4	2.1	5.16	55°	
	NP-DNGA150604GS2		●	●													12.7	6.35	0.4	1.5	5.16	55°	
	NP-DNGA150604TA2				●	●											12.7	6.35	0.4	2.1	5.16	55°	
	NP-DNGA150604TH2				●	●											12.7	6.35	0.4	2.1	5.16	55°	
	NP-DNGA150604TS2			●													12.7	6.35	0.4	2.1	5.16	55°	
	NP-DNGA150608FS2		●	●	●												12.7	6.35	0.8	2	5.16	55°	
	NP-DNGA150608GA2				●	●											12.7	6.35	0.8	2	5.16	55°	
	NP-DNGA150608GH2			●	●	●											12.7	6.35	0.8	2	5.16	55°	
	NP-DNGA150608GS2		●	●													12.7	6.35	0.8	1.7	5.16	55°	
	NP-DNGA150608TA2				●	●											12.7	6.35	0.8	2	5.16	55°	
	NP-DNGA150608TH2				●	●											12.7	6.35	0.8	2	5.16	55°	
	NP-DNGA150608TS2			●													12.7	6.35	0.8	2	5.16	55°	
	NP-DNGA150612FS2		●	●	●												12.7	6.35	1.2	1.9	5.16	55°	
	NP-DNGA150612GA2				●	●											12.7	6.35	1.2	1.9	5.16	55°	
	NP-DNGA150612GH2			●	●	●											12.7	6.35	1.2	1.9	5.16	55°	
	NP-DNGA150612GS2		●	●													12.7	6.35	1.2	1.9	5.16	55°	
	NP-DNGA150612TA2				●	●											12.7	6.35	1.2	1.9	5.16	55°	
	NP-DNGA150612TH2				●	●											12.7	6.35	1.2	1.9	5.16	55°	
	NP-DNGA150612TS2			●													12.7	6.35	1.2	1.9	5.16	55°	
	TNP-DNGA150404G2								●								12.7	4.76	0.4	2.1	5.16	55°	
	TNP-DNGA150404T2								●								12.7	4.76	0.4	2.1	5.16	55°	
	TNP-DNGA150408G2								●								12.7	4.76	0.8	2	5.16	55°	
	TNP-DNGA150408T2								●								12.7	4.76	0.8	2	5.16	55°	
	TNP-DNGA150412G2								●								12.7	4.76	1.2	1.9	5.16	55°	
	TNP-DNGA150412T2								●								12.7	4.76	1.2	1.9	5.16	55°	
WIPER	NP-DNGA150404GAWS2JL				●			●	●								12.7	4.76	0.4	1.9	5.16	55°	
	NP-DNGA150404GAWS2JR				●			●	●								12.7	4.76	0.4	1.9	5.16	55°	
	NP-DNGA150404GSWS2JL						●										12.7	4.76	0.4	1.9	5.16	55°	
	NP-DNGA150404GSWS2JR						●										12.7	4.76	0.4	1.9	5.16	55°	
	NP-DNGA150408GAWS2JL				●			●	●								12.7	4.76	0.8	1.7	5.16	55°	
	NP-DNGA150408GAWS2JR				●			●	●								12.7	4.76	0.8	1.7	5.16	55°	
	NP-DNGA150408GSWS2JL						●										12.7	4.76	0.8	1.7	5.16	55°	
	NP-DNGA150408GSWS2JR						●										12.7	4.76	0.8	1.7	5.16	55°	
	NP-DNGA150604GAWS2JL				●												12.7	6.35	0.4	1.9	5.16	55°	
	NP-DNGA150604GAWS2JR				●												12.7	6.35	0.4	1.9	5.16	55°	
	NP-DNGA150608GAWS2JL				●												12.7	6.35	0.8	1.7	5.16	55°	
	NP-DNGA150608GAWS2JR				●												12.7	6.35	0.8	1.7	5.16	55°	

Stock status indication (1 insert in one case TNP-**:The order number is for a 10-insert pack.) :
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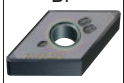
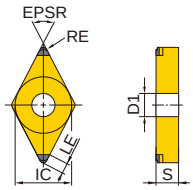
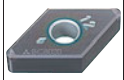
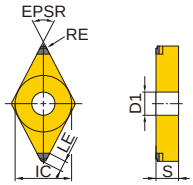
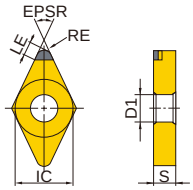
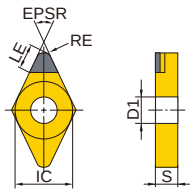
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✠: Unstable Cutting

Work Material			BC8020	BC8105	BC8110	BC8120	BC8130	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020	MBS140	IC	S	RE	LE	D1	EPSR	Geometry
	H	Hardened Materials	◐	●	●	◐	✠	●	◐	◐	●	◐	✠											
	K	Cast iron												●	◐		✠							
	S	Heat-resistant Alloy, Titanium Alloy													◐									
		Sintered Alloy														◐								
Inserts Shape		Order Number	Coated CBN							CBN							Solid CBN	Dimensions (mm)						
BF 		BF-DNGM150404TA2							●									12.7	4.76	0.4	2.1	5.16	55°	
		BF-DNGM150404TS2			●													12.7	4.76	0.4	2.1	5.16	55°	
		BF-DNGM150408TA2							●									12.7	4.76	0.8	2	5.16	55°	
		BF-DNGM150408TS2			●													12.7	4.76	0.8	2	5.16	55°	
		BF-DNGM150412TA2							●									12.7	4.76	1.2	1.9	5.16	55°	
		BF-DNGM150412TS2			●													12.7	4.76	1.2	1.9	5.16	55°	
BM 		BM-DNGM150404TA2				●												12.7	4.76	0.4	2.1	5.16	55°	
		BM-DNGM150408TA2	▲			●												12.7	4.76	0.8	2	5.16	55°	
		BM-DNGM150412TA2	▲			●												12.7	4.76	1.2	1.9	5.16	55°	
		BM-DNGM150604TA2				●												12.7	6.35	0.4	2.1	5.16	55°	
		BM-DNGM150608TA2				●												12.7	6.35	0.8	2	5.16	55°	
		BM-DNGM150612TA2				●												12.7	6.35	1.2	1.9	5.16	55°	
		NP-DNMA150404F								□	●			●				12.7	4.76	0.4	1.5	5.16	55°	
		NP-DNMA150404G								●		●						12.7	4.76	0.4	1.5	5.16	55°	
		NP-DNMA150404GS												●	●			12.7	4.76	0.4	1.5	5.16	55°	
		NP-DNMA150404T								□		●	●		●			12.7	4.76	0.4	1.5	5.16	55°	
		NP-DNMA150408F								□	●			●				12.7	4.76	0.8	1.7	5.16	55°	
		NP-DNMA150408G								●		●						12.7	4.76	0.8	1.7	5.16	55°	
		NP-DNMA150408GS												●	●			12.7	4.76	0.8	1.7	5.16	55°	
		NP-DNMA150408T								□		●	●		●			12.7	4.76	0.8	1.7	5.16	55°	
		NP-DNMA150412F								□								12.7	4.76	1.2	1.9	5.16	55°	
		NP-DNMA150412G								●								12.7	4.76	1.2	1.9	5.16	55°	
		NP-DNMA150412T								□								12.7	4.76	1.2	1.9	5.16	55°	
		DNGA150404												□	□			12.7	4.76	0.4	3.6	5.16	55°	
		DNGA150408												□	□			12.7	4.76	0.8	3.2	5.16	55°	
		DNGA150412												□	□			12.7	4.76	1.2	2.8	5.16	55°	

SN**

CBN

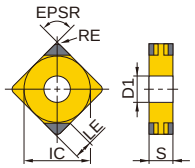
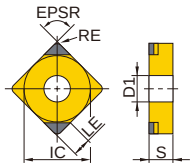
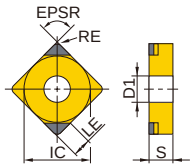
Square, Neg, With hole

Product Information

90°

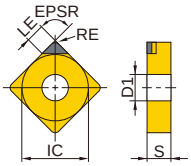
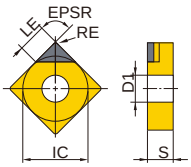
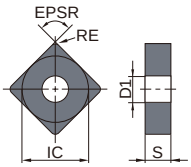
IDENTIFICATION >> 198
GRADES (UNCOATED CBN) >> 206
APPLICABLE HOLDER PAGE (BORING BARS) >> 402
ISO13399 PROPERTY >> 1966
GRADES (COATED CBN) >> 200
APPLICABLE HOLDER PAGE (EXTERNAL TURNING TOOLS) >> 303
TECHNICAL INFO >> 1971

Stock status indication (1 insert in one case TNP-**:The order number is for a 10-insert pack.) :
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✠: Unstable Cutting

Work Material			Coated CBN							CBN							Solid CBN	Dimensions (mm)						
	H	Hardened Materials	◐	●	●	◐	✠	●	◐	◐	●	◐	✠											
	K	Cast iron												●	◐		✠							
	S	Heat-resistant Alloy, Titanium Alloy													◐									
		Sintered Alloy														◐								
Inserts Shape	Order Number		BC8020	BC8105	BC8110	BC8120	BC8130	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020	MBS140	IC	S	RE	LE	D1	EPSR	Geometry
	NP-SNGA120404GA4								●									12.7	4.76	0.4	2.1	5.16	90°	
	NP-SNGA120408GA4								●									12.7	4.76	0.8	2.3	5.16	90°	
	NP-SNGA120412GA4								●									12.7	4.76	1.2	2.5	5.16	90°	
	NP-SNGA120404FS2															●		12.7	4.76	0.4	2.1	5.16	90°	
	NP-SNGA120404G2									●								12.7	4.76	0.4	2.1	5.16	90°	
	NP-SNGA120404GS2							●										12.7	4.76	0.4	2.1	5.16	90°	
	NP-SNGA120404SE2															●		12.7	4.76	0.4	2.1	5.16	90°	
	NP-SNGA120404SF2															●		12.7	4.76	0.4	2.1	5.16	90°	
	NP-SNGA120404T2									●								12.7	4.76	0.4	2.1	5.16	90°	
	NP-SNGA120404TS2															●		12.7	4.76	0.4	2.1	5.16	90°	
	NP-SNGA120408FS2															●		12.7	4.76	0.8	2.3	5.16	90°	
	NP-SNGA120408G2									●								12.7	4.76	0.8	2.3	5.16	90°	
	NP-SNGA120408GA2				●	●												12.7	4.76	0.8	2.3	5.16	90°	
	NP-SNGA120408GS2							●						●	●			12.7	4.76	0.8	2.3	5.16	90°	
	NP-SNGA120408SE2															●		12.7	4.76	0.8	2.3	5.16	90°	
	NP-SNGA120408SF2															●		12.7	4.76	0.8	2.3	5.16	90°	
	NP-SNGA120408T2									●								12.7	4.76	0.8	2.3	5.16	90°	
	NP-SNGA120408TS2															●		12.7	4.76	0.8	2.3	5.16	90°	
	NP-SNGA120412FS2															●		12.7	4.76	1.2	2.5	5.16	90°	
	NP-SNGA120412G2									●								12.7	4.76	1.2	2.5	5.16	90°	
	NP-SNGA120412GA2				●	●												12.7	4.76	1.2	2.5	5.16	90°	
	NP-SNGA120412GS2							●						●	●			12.7	4.76	1.2	2.5	5.16	90°	
	NP-SNGA120412SE2															●		12.7	4.76	1.2	2.5	5.16	90°	
	NP-SNGA120412SF2															●		12.7	4.76	1.2	2.5	5.16	90°	
	NP-SNGA120412T2									●								12.7	4.76	1.2	2.5	5.16	90°	
	NP-SNGA120412TS2															●		12.7	4.76	1.2	2.5	5.16	90°	
	TNP-SNGA120404G2									●								12.7	4.76	0.4	2.1	5.16	90°	
	TNP-SNGA120404T2									●								12.7	4.76	0.4	2.1	5.16	90°	
	TNP-SNGA120408G2									●								12.7	4.76	0.8	2.3	5.16	90°	
	TNP-SNGA120408T2									●								12.7	4.76	0.8	2.3	5.16	90°	
	TNP-SNGA120412G2									●								12.7	4.76	1.2	2.5	5.16	90°	
	TNP-SNGA120412T2									●								12.7	4.76	1.2	2.5	5.16	90°	

Stock status indication (1 insert in one case TNP-**:The order number is for a 10-insert pack.) :
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Work Material			BC8020	BC8105	BC8110	BC8120	BC8130	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020	MBS140
	H	Hardened Materials	◐	●	●	◐	✣	●	◐	◐	●	◐	✣				
	K	Cast iron												●	◐		✣
	S	Heat-resistant Alloy, Titanium Alloy													◐		
		Sintered Alloy														◐	

Inserts Shape	Order Number	IC	S	RE	LE	D1	EPSR	Geometry
	NP-SNMA120404F	12.7	4.76	0.4	2.1	5.16	90°	
	NP-SNMA120404G	12.7	4.76	0.4	2.1	5.16	90°	
	NP-SNMA120404GS	12.7	4.76	0.4	2.1	5.16	90°	
	NP-SNMA120404T	12.7	4.76	0.4	2.1	5.16	90°	
	NP-SNMA120408F	12.7	4.76	0.8	2.3	5.16	90°	
	NP-SNMA120408G	12.7	4.76	0.8	2.3	5.16	90°	
	NP-SNMA120408GS	12.7	4.76	0.8	2.3	5.16	90°	
	NP-SNMA120408T	12.7	4.76	0.8	2.3	5.16	90°	
	NP-SNMA120412F	12.7	4.76	1.2	2.5	5.16	90°	
	NP-SNMA120412G	12.7	4.76	1.2	2.5	5.16	90°	
	NP-SNMA120412T	12.7	4.76	1.2	2.5	5.16	90°	
	SNGA120404	12.7	4.76	0.4	4	5.16	90°	
	SNGA120408	12.7	4.76	0.8	4.1	5.16	90°	
	SNGA120412	12.7	4.76	1.2	4.1	5.16	90°	
	SNGA120408	12.7	4.76	0.8		5.16	90°	
	SNGA120412	12.7	4.76	1.2		5.16	90°	

TN**

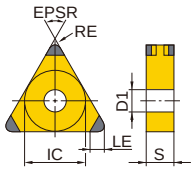
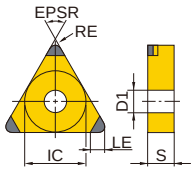
CBN — **Triangular, Neg, With hole**

Product Information

IDENTIFICATION >> 198
GRADES (UNCOATED CBN) >> 206
APPLICABLE HOLDER PAGE (BORING BARS) >> 403
ISO13399 PROPERTY >> 1966
GRADES (COATED CBN) >> 200
APPLICABLE HOLDER PAGE (EXTERNAL TURNING TOOLS) >> 310
TECHNICAL INFO >> 1971

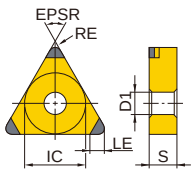
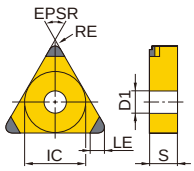
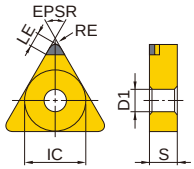
Stock status indication (1 insert in one case TNP-**:The order number is for a 10-insert pack.) :
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✠: Unstable Cutting

Work Material			BC8020	BC8105	BC8110	BC8120	BC8130	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020	MBS140
	H	Hardened Materials	◐	●	●	◐	✠	●	◐	◐	●	◐	✠				
	K	Cast iron												●	◐		✠
	S	Heat-resistant Alloy, Titanium Alloy													◐		
		Sintered Alloy														◐	
			Coated CBN							CBN							Solid CBN

Inserts Shape	Order Number	IC	S	RE	LE	D1	EPSR	Geometry
	NP-TNGA160404FS6	9.525	4.76	0.4	1.6	3.81	60°	
	NP-TNGA160404GA6	9.525	4.76	0.4	1.6	3.81	60°	
	NP-TNGA160404GH6	9.525	4.76	0.4	1.6	3.81	60°	
	NP-TNGA160404GN6	9.525	4.76	0.4	1.6	3.81	60°	
	NP-TNGA160404GS6	9.525	4.76	0.4	1.6	3.81	60°	
	NP-TNGA160404TA6	9.525	4.76	0.4	1.6	3.81	60°	
	NP-TNGA160404TH6	9.525	4.76	0.4	1.6	3.81	60°	
	NP-TNGA160404TS6	9.525	4.76	0.4	1.6	3.81	60°	
	NP-TNGA160408FS6	9.525	4.76	0.8	1.8	3.81	60°	
	NP-TNGA160408GA6	9.525	4.76	0.8	1.8	3.81	60°	
	NP-TNGA160408GH6	9.525	4.76	0.8	1.8	3.81	60°	
	NP-TNGA160408GN6	9.525	4.76	0.8	1.8	3.81	60°	
	NP-TNGA160408GS6	9.525	4.76	0.8	1.8	3.81	60°	
	NP-TNGA160408TA6	9.525	4.76	0.8	1.8	3.81	60°	
	NP-TNGA160408TH6	9.525	4.76	0.8	1.8	3.81	60°	
	NP-TNGA160408TS6	9.525	4.76	0.8	1.8	3.81	60°	
	NP-TNGA160412FS6	9.525	4.76	1.2	1.9	3.81	60°	
	NP-TNGA160412GA6	9.525	4.76	1.2	1.9	3.81	60°	
	NP-TNGA160412GH6	9.525	4.76	1.2	1.9	3.81	60°	
	NP-TNGA160412GN6	9.525	4.76	1.2	1.9	3.81	60°	
	NP-TNGA160412GS6	9.525	4.76	1.2	1.9	3.81	60°	
	NP-TNGA160412TA6	9.525	4.76	1.2	1.9	3.81	60°	
	NP-TNGA160412TH6	9.525	4.76	1.2	1.9	3.81	60°	
	NP-TNGA160412TS6	9.525	4.76	1.2	1.9	3.81	60°	
	NP-TNGA160402FS3	9.525	4.76	0.2	1.5	3.81	60°	
	NP-TNGA160402GA3	9.525	4.76	0.2	1.5	3.81	60°	
	NP-TNGA160402GN3	9.525	4.76	0.2	1.5	3.81	60°	
	NP-TNGA160402GS3	9.525	4.76	0.2	1.5	3.81	60°	
	NP-TNGA160404FS3	9.525	4.76	0.4	1.6	3.81	60°	
	NP-TNGA160404G3	9.525	4.76	0.4	1.6	3.81	60°	
	NP-TNGA160404GA3	9.525	4.76	0.4	1.6	3.81	60°	
	NP-TNGA160404GH3	9.525	4.76	0.4	1.6	3.81	60°	
	NP-TNGA160404GN3	9.525	4.76	0.4	1.6	3.81	60°	
	NP-TNGA160404GS3	9.525	4.76	0.4	1.6	3.81	60°	
	NP-TNGA160404SE3	9.525	4.76	0.4	1.6	3.81	60°	
	NP-TNGA160404SF3	9.525	4.76	0.4	1.6	3.81	60°	
	NP-TNGA160404T3	9.525	4.76	0.4	1.6	3.81	60°	
	NP-TNGA160404TA3	9.525	4.76	0.4	1.6	3.81	60°	
	NP-TNGA160404TH3	9.525	4.76	0.4	1.6	3.81	60°	
	NP-TNGA160404TS3	9.525	4.76	0.4	1.6	3.81	60°	
	NP-TNGA160408FS3	9.525	4.76	0.8	1.8	3.81	60°	

Stock status indication (1 insert in one case TNP-**:The order number is for a 10-insert pack.) :
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

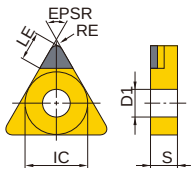
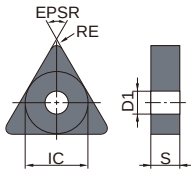
Work Material			BC8020	BC8105	BC8110	BC8120	BC8130	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020	MBS140
	H	Hardened Materials	◐	●	●	◐	✣	●	◐	◐	●	◐	✣				
	K	Cast iron												●	◐		✣
	S	Heat-resistant Alloy, Titanium Alloy													◐		
		Sintered Alloy														◐	
Inserts Shape		Order Number	Coated CBN							CBN							Solid CBN

Order Number	IC	S	RE	LE	D1	EPSR	Geometry
NP-TNGA160408G3	9.525	4.76	0.8	1.8	3.81	60°	
NP-TNGA160408GA3	9.525	4.76	0.8	1.8	3.81	60°	
NP-TNGA160408GH3	9.525	4.76	0.8	1.8	3.81	60°	
NP-TNGA160408GN3	9.525	4.76	0.8	1.8	3.81	60°	
NP-TNGA160408GS3	9.525	4.76	0.8	1.8	3.81	60°	
NP-TNGA160408SE3	9.525	4.76	0.8	1.8	3.81	60°	
NP-TNGA160408SF3	9.525	4.76	0.8	1.8	3.81	60°	
NP-TNGA160408T3	9.525	4.76	0.8	1.8	3.81	60°	
NP-TNGA160408TA3	9.525	4.76	0.8	1.8	3.81	60°	
NP-TNGA160408TH3	9.525	4.76	0.8	1.8	3.81	60°	
NP-TNGA160408TS3	9.525	4.76	0.8	1.8	3.81	60°	
NP-TNGA160412FS3	9.525	4.76	1.2	1.9	3.81	60°	
NP-TNGA160412G3	9.525	4.76	1.2	1.9	3.81	60°	
NP-TNGA160412GA3	9.525	4.76	1.2	1.9	3.81	60°	
NP-TNGA160412GH3	9.525	4.76	1.2	1.9	3.81	60°	
NP-TNGA160412GN3	9.525	4.76	1.2	1.9	3.81	60°	
NP-TNGA160412GS3	9.525	4.76	1.2	1.9	3.81	60°	
NP-TNGA160412SE3	9.525	4.76	1.2	1.9	3.81	60°	
NP-TNGA160412SF3	9.525	4.76	1.2	1.9	3.81	60°	
NP-TNGA160412T3	9.525	4.76	1.2	1.9	3.81	60°	
NP-TNGA160412TA3	9.525	4.76	1.2	1.9	3.81	60°	
NP-TNGA160412TH3	9.525	4.76	1.2	1.9	3.81	60°	
NP-TNGA160412TS3	9.525	4.76	1.2	1.9	3.81	60°	
TNP-TNGA160404G3	9.525	4.76	0.4	1.6	3.81	60°	
TNP-TNGA160404T3	9.525	4.76	0.4	1.6	3.81	60°	
TNP-TNGA160408G3	9.525	4.76	0.8	1.8	3.81	60°	
TNP-TNGA160408T3	9.525	4.76	0.8	1.8	3.81	60°	
TNP-TNGA160412G3	9.525	4.76	1.2	1.9	3.81	60°	
TNP-TNGA160412T3	9.525	4.76	1.2	1.9	3.81	60°	
BM-TNGM160408TA3	9.525	4.76	0.8	1.8	3.81	60°	
BM-TNGM160412TA3	9.525	4.76	1.2	1.9	3.81	60°	
NP-TNMA160404F	9.525	4.76	0.4	1.6	3.81	60°	
NP-TNMA160404G	9.525	4.76	0.4	1.6	3.81	60°	
NP-TNMA160404GS	9.525	4.76	0.4	1.6	3.81	60°	
NP-TNMA160404T	9.525	4.76	0.4	1.6	3.81	60°	
NP-TNMA160408F	9.525	4.76	0.8	1.8	3.81	60°	
NP-TNMA160408G	9.525	4.76	0.8	1.8	3.81	60°	
NP-TNMA160408GS	9.525	4.76	0.8	1.8	3.81	60°	
NP-TNMA160408T	9.525	4.76	0.8	1.8	3.81	60°	
NP-TNMA160412F	9.525	4.76	1.2	1.9	3.81	60°	
NP-TNMA160412G	9.525	4.76	1.2	1.9	3.81	60°	

TN**

Stock status indication (1 insert in one case TNP-**:The order number is for a 10-insert pack.) :
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Work Material																								
	H	Hardened Materials	◐	●	●	◐	✣	●	◐	◐	●	◐	✣											
	K	Cast iron												●	◐		✣							
	S	Heat-resistant Alloy, Titanium Alloy													◐									
		Sintered Alloy														◐								

Inserts Shape	Order Number	Coated CBN							CBN							Solid CBN	Dimensions (mm)						Geometry
		BC8020	BC8105	BC8110	BC8120	BC8130	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020	MBS140	IC	S	RE	LE	D1	EPSR	
	NP-TNMA160412GS												●	●			9.525	4.76	1.2	1.9	3.81	60°	
	NP-TNMA160412T								□		●	●		□			9.525	4.76	1.2	1.9	3.81	60°	
	TNGA160404									●			●	●			9.525	4.76	0.4	3.7	3.81	60°	
	TNGA160408									●			●	●			9.525	4.76	0.8	3.4	3.81	60°	
	TNGA220404												●	□			12.7	4.76	0.4	3.7	5.16	60°	
	TNGA220408												●	□			12.7	4.76	0.8	3.4	5.16	60°	
	TNGA220412												●	□			12.7	4.76	1.2	3.1	5.16	60°	
	TNGA160408															●	9.525	4.76	0.8		3.81	60°	
	TNGA160412															●	9.525	4.76	1.2		3.81	60°	

VN**

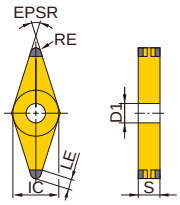
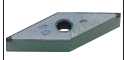
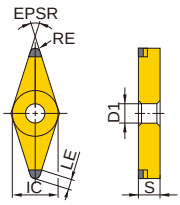
CBN

Rhombic 35°, Neg, With hole

Product Information

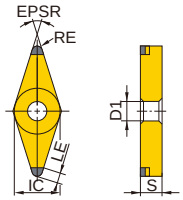
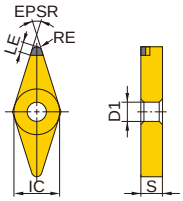
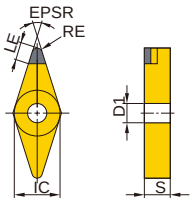
IDENTIFICATION >> 198
GRADES (UNCOATED CBN) >> 206
APPLICABLE HOLDER PAGE (BORING BARS) >> 404
ISO13399 PROPERTY >> 1966
GRADES (COATED CBN) >> 200
APPLICABLE HOLDER PAGE (EXTERNAL TURNING TOOLS) >> 314
TECHNICAL INFO >> 1971

Stock status indication (1 insert in one case TNP-**:The order number is for a 10-insert pack.) :
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Work Material			Coated CBN							CBN							Solid CBN	Dimensions (mm)						
	H	Hardened Materials	◐	●	●	◐	✣	●	◐	◐	●	◐	✣											
	K	Cast iron												●	◐		✣							
	S	Heat-resistant Alloy, Titanium Alloy													◐									
		Sintered Alloy														◐								
Inserts Shape	Order Number		BC8020	BC8105	BC8110	BC8120	BC8130	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020	MBS140	IC	S	RE	LE	D1	EPSR	Geometry
	NP-VNGA160404FS4		▲	●	●	●												9.525	4.76	0.4	2.5	3.81	35°	
	NP-VNGA160404GA4		▲			●	●		●									9.525	4.76	0.4	2.5	3.81	35°	
	NP-VNGA160404GH4				●	●	●											9.525	4.76	0.4	2.5	3.81	35°	
	NP-VNGA160404GS4			●	●													9.525	4.76	0.4	2.5	3.81	35°	
	NP-VNGA160404TA4		▲			●	●											9.525	4.76	0.4	2.5	3.81	35°	
	NP-VNGA160404TH4					●	●											9.525	4.76	0.4	2.5	3.81	35°	
	NP-VNGA160404TS4				●													9.525	4.76	0.4	2.5	3.81	35°	
	NP-VNGA160408FS4		▲	●	●	●												9.525	4.76	0.8	2	3.81	35°	
	NP-VNGA160408GA4		▲			●	●		●									9.525	4.76	0.8	2	3.81	35°	
	NP-VNGA160408GH4				●	●	●											9.525	4.76	0.8	2	3.81	35°	
	NP-VNGA160408GS4			●	●													9.525	4.76	0.8	2	3.81	35°	
	NP-VNGA160408TA4		▲			●	●											9.525	4.76	0.8	2	3.81	35°	
	NP-VNGA160408TH4					●	●											9.525	4.76	0.8	2	3.81	35°	
	NP-VNGA160408TS4				●													9.525	4.76	0.8	2	3.81	35°	
	NP-VNGA160412FS4		▲			●												9.525	4.76	1.2	1.6	3.81	35°	
	NP-VNGA160412GA4		▲			●	●											9.525	4.76	1.2	1.6	3.81	35°	
	NP-VNGA160412GH4				●	●	●											9.525	4.76	1.2	1.6	3.81	35°	
	NP-VNGA160412GS4				●													9.525	4.76	1.2	1.6	3.81	35°	
	NP-VNGA160412TA4		▲			●	●											9.525	4.76	1.2	1.6	3.81	35°	
	NP-VNGA160412TH4					●	●											9.525	4.76	1.2	1.6	3.81	35°	
	NP-VNGA160402FS2				●													9.525	4.76	0.2	2.5	3.81	35°	
	NP-VNGA160402GA2					●			●									9.525	4.76	0.2	2.5	3.81	35°	
	NP-VNGA160402GN2								●									9.525	4.76	0.2	2.5	3.81	35°	
	NP-VNGA160402GS2				●													9.525	4.76	0.2	2.5	3.81	35°	
	NP-VNGA160404FS2		▲	●	●	●										●		9.525	4.76	0.4	2.5	3.81	35°	
	NP-VNGA160404G2									●								9.525	4.76	0.4	2.5	3.81	35°	
	NP-VNGA160404GA2		▲			●	●		●	●								9.525	4.76	0.4	2.5	3.81	35°	
	NP-VNGA160404GH2				●	●	●											9.525	4.76	0.4	2.5	3.81	35°	
	NP-VNGA160404GS2			●	●			●								●		9.525	4.76	0.4	2.5	3.81	35°	
	NP-VNGA160404SE2															●		9.525	4.76	0.4	2.5	3.81	35°	
	NP-VNGA160404SF2															●		9.525	4.76	0.4	2.5	3.81	35°	
	NP-VNGA160404T2									●								9.525	4.76	0.4	2.5	3.81	35°	
	NP-VNGA160404TA2		▲			●	●											9.525	4.76	0.4	2.5	3.81	35°	
	NP-VNGA160404TH2					●	●											9.525	4.76	0.4	2.5	3.81	35°	
	NP-VNGA160404TS2				●											●		9.525	4.76	0.4	2.5	3.81	35°	
	NP-VNGA160408FS2		▲	●	●	●										●		9.525	4.76	0.8	2	3.81	35°	
	NP-VNGA160408G2									●								9.525	4.76	0.8	2	3.81	35°	
	NP-VNGA160408GA2		▲			●	●		●	●								9.525	4.76	0.8	2	3.81	35°	
	NP-VNGA160408GH2				●	●	●											9.525	4.76	0.8	2	3.81	35°	
	NP-VNGA160408GS2			●	●			●								●		9.525	4.76	0.8	2	3.81	35°	
	NP-VNGA160408SE2															●		9.525	4.76	0.8	2	3.81	35°	

VN**

Stock status indication (1 insert in one case TNP-**:The order number is for a 10-insert pack.) :
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Work Material			BC8020	BC8105	BC8110	BC8120	BC8130	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020	MBS140	IC	S	RE	LE	D1	EPSR	Geometry
	H	Hardened Materials	◐	●	●	◐	✣	●	◐	◐	●	◐	✣											
	K	Cast iron												●	◐		✣							
	S	Heat-resistant Alloy, Titanium Alloy													◐									
		Sintered Alloy														◐								
Inserts Shape	Order Number		Coated CBN							CBN							Solid CBN	Dimensions (mm)						
	NP-VNGA160408SF2															●		9.525	4.76	0.8	2	3.81	35°	
	NP-VNGA160408T2									●								9.525	4.76	0.8	2	3.81	35°	
	NP-VNGA160408TA2		▲			●	●											9.525	4.76	0.8	2	3.81	35°	
	NP-VNGA160408TH2					●	●											9.525	4.76	0.8	2	3.81	35°	
	NP-VNGA160408TS2				●											●		9.525	4.76	0.8	2	3.81	35°	
	NP-VNGA160412FS2					●												9.525	4.76	1.2	1.6	3.81	35°	
	NP-VNGA160412GA2					●	●											9.525	4.76	1.2	1.6	3.81	35°	
	NP-VNGA160412GH2				●	●	●											9.525	4.76	1.2	1.6	3.81	35°	
	NP-VNGA160412GS2				●													9.525	4.76	1.2	1.6	3.81	35°	
	NP-VNGA160412TA2					●	●											9.525	4.76	1.2	1.6	3.81	35°	
	NP-VNGA160412TH2					●	●											9.525	4.76	1.2	1.6	3.81	35°	
	TNP-VNGA160404G2									●								9.525	4.76	0.4	2.5	3.81	35°	
	TNP-VNGA160404T2									●								9.525	4.76	0.4	2.5	3.81	35°	
	TNP-VNGA160408G2									●								9.525	4.76	0.8	2	3.81	35°	
	TNP-VNGA160408T2									●								9.525	4.76	0.8	2	3.81	35°	
	NP-VNMA160404F									□	●			●				9.525	4.76	0.4	1.4	3.81	35°	
	NP-VNMA160404G									●		●						9.525	4.76	0.4	1.4	3.81	35°	
	NP-VNMA160404GS													●	●			9.525	4.76	0.4	1.4	3.81	35°	
	NP-VNMA160404T									□		●	●		●			9.525	4.76	0.4	1.4	3.81	35°	
	NP-VNMA160408F									□	●			●				9.525	4.76	0.8	1.5	3.81	35°	
	NP-VNMA160408G									●		●						9.525	4.76	0.8	1.5	3.81	35°	
	NP-VNMA160408GS													●	●			9.525	4.76	0.8	1.5	3.81	35°	
	NP-VNMA160408T									□		●	●		●			9.525	4.76	0.8	1.5	3.81	35°	
	VNGA160404													□	□			9.525	4.76	0.4	2.8	3.81	35°	
	VNGA160408													□	□			9.525	4.76	0.8	1.9	3.81	35°	

WN**

CBN

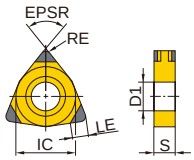
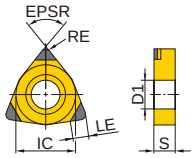
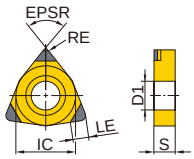
Trigon, Neg, With hole

Product Information

IDENTIFICATION >> 198
GRADES (UNCOATED CBN) >> 206
APPLICABLE HOLDER PAGE (BORING BARS) >> 444
ISO13399 PROPERTY >> 1966
GRADES (COATED CBN) >> 200
APPLICABLE HOLDER PAGE (EXTERNAL TURNING TOOLS) >> 320
TECHNICAL INFO >> 1971

Stock status indication (1 insert in one case) :
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Work Material			BC8020	BC8105	BC8110	BC8120	BC8130	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020	MBS140
	H	Hardened Materials	◐	●	●	◐	✣	●	◐	◐	●	◐	✣				
	K	Cast iron												●	◐		✣
	S	Heat-resistant Alloy, Titanium Alloy													◐		
		Sintered Alloy														◐	

Inserts Shape	Order Number	BC8020	BC8105	BC8110	BC8120	BC8130	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020	MBS140	IC	S	RE	LE	D1	EPSR	Geometry
		Coated CBN							CBN							Solid CBN	Dimensions (mm)						
	NP-WNGA080408FS6		●	●													12.7	4.76	0.8	2.1	5.16	80°	
	NP-WNGA080408GA6	▲						●									12.7	4.76	0.8	2.1	5.16	80°	
	NP-WNGA080408GS6		●	●													12.7	4.76	0.8	2.1	5.16	80°	
	NP-WNGA080408TS6			●													12.7	4.76	0.8	2.1	5.16	80°	
	NP-WNGA080408FS3		●	●	●										●		12.7	4.76	0.8	2.1	5.16	80°	
	NP-WNGA080408GA3	▲			●	●		●									12.7	4.76	0.8	2.1	5.16	80°	
	NP-WNGA080408GH3			●	●	●											12.7	4.76	0.8	2.1	5.16	80°	
	NP-WNGA080408GS3		●	●													12.7	4.76	0.8	2.1	5.16	80°	
	NP-WNGA080408SE3														●		12.7	4.76	0.8	2.1	5.16	80°	
	NP-WNGA080408SF3														●		12.7	4.76	0.8	2.1	5.16	80°	
	NP-WNGA080408TA3				●	●											12.7	4.76	0.8	2.1	5.16	80°	
	NP-WNGA080408TH3				●	●											12.7	4.76	0.8	2.1	5.16	80°	
	NP-WNGA080408TS3			●											●		12.7	4.76	0.8	2.1	5.16	80°	
WIPER	NP-WNGA080408GAWS3							●	●								12.7	4.76	0.8	2.1	5.16	80°	
	NP-WNGA080408GSWS3			●			●										12.7	4.76	0.8	2.1	5.16	80°	

MGTR

CBN

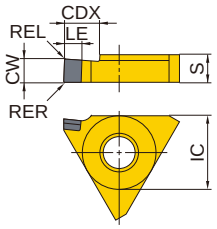
With hole

Product Information

IDENTIFICATION >> 198
GRADES (UNCOATED CBN) >> 206
TECHNICAL INFO >> 1971
GRADES (COATED CBN) >> 200
APPLICABLE HOLDER PAGE (MG) >> 557
ISO13399 PROPERTY >> 1966

Stock status indication (1 insert in one case) :
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✠: Unstable Cutting

Work Material			BC8020	BC8110	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020
	H	Hardened Materials	◐	●	●	◐	◐	●	◐	✠			
	K	Cast iron									●	◐	
	S	Heat-resistant Alloy, Titanium Alloy										◐	
		Sintered Alloy											◐

Inserts Shape	Order Number	Coated CBN				CBN							CW	CDX	IC	S	LE	RER REL	Geometry
		BC8020	BC8110	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020	Dimensions (mm)						
	MGTR43125					●							1.25	1.2	12.7	4.76	2.7	0.2	
	MGTR43150					●							1.50	3.0	12.7	4.76	2.7	0.2	
	MGTR43200					●							2.00	3.0	12.7	4.76	2.7	0.2	
	MGTR43250					●							2.50	4.5	12.7	4.76	2.7	0.2	
	MGTR43300					●							3.00	4.5	12.7	4.76	2.7	0.2	
	MGTR43350					●							3.50	4.5	12.7	4.76	2.7	0.2	
	MGTR43400					●							4.00	4.5	12.7	4.76	2.7	0.2	

CN**

CBN

Rhombic 80°, Neg, Without hole

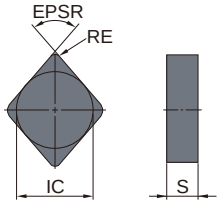
Product Information

80°

IDENTIFICATION >> 198
GRADES (UNCOATED CBN) >> 206
ISO13399 PROPERTY >> 1966
GRADES (COATED CBN) >> 200
TECHNICAL INFO >> 1971

Stock status indication (1 insert in one case) :
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Work Material			BC8020	BC8105	BC8110	BC8120	BC8130	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020	MBS140
	H	Hardened Materials	◐	●	●	◐	✣	●	◐	◐	●	◐	✣				
	K	Cast iron												●	◐		✣
	S	Heat-resistant Alloy, Titanium Alloy													◐		
		Sintered Alloy														◐	

Inserts Shape	Order Number	IC	S	RE	EPSR	Geometry
	CNGN120404	12.7	4.76	0.4	80°	
	CNGN120408	12.7	4.76	0.8	80°	
	CNGN120412	12.7	4.76	1.2	80°	

Dimensions (mm)

DN**

CBN

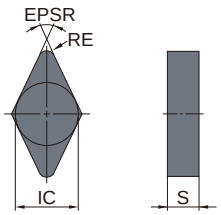
Rhombic 55°, Neg, Without hole

Product Information

55°

IDENTIFICATION >> 198
GRADES (UNCOATED CBN) >> 206
ISO13399 PROPERTY >> 1966
GRADES (COATED CBN) >> 200
TECHNICAL INFO >> 1971

Stock status indication (1 insert in one case) :
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✠: Unstable Cutting

Work Material			Coated CBN							CBN							Solid CBN		Dimensions (mm)				
	H	Hardened Materials	◐	●	●	◐	✠	●	◐	◐	●	◐	✠										
	K	Cast iron												●	◐		✠						
	S	Heat-resistant Alloy, Titanium Alloy													◐								
		Sintered Alloy														◐							
Inserts Shape	**Order Number**		**BC8020**	**BC8105**	**BC8110**	**BC8120**	**BC8130**	**MBC010**	**MBC020**	**MB8025**	**MB810**	**MB825**	**MB835**	**MB710**	**MB730**	**MB4020**	**MBS140**		**IC**	**S**	**RE**	**EPSR**	**Geometry**
	DNGN110308																●		9.525	3.18	0.8	55°	
	DNGN110312																●		9.525	3.18	1.2	55°	

RN**

CBN

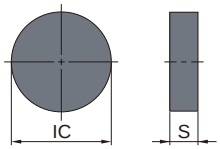
Round, Without hole

Product Information

IDENTIFICATION >> 198
GRADES (UNCOATED CBN) >> 206
ISO13399 PROPERTY >> 1966
GRADES (COATED CBN) >> 200
TECHNICAL INFO >> 1971

Stock status indication (1 insert in one case) :
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✠: Unstable Cutting

Work Material			BC8020	BC8105	BC8110	BC8120	BC8130	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020	MBS140
	H	Hardened Materials	◐	●	●	◐	✠	●	◐	◐	●	◐	✠				
	K	Cast iron												●	◐		✠
	S	Heat-resistant Alloy, Titanium Alloy													◐		
		Sintered Alloy														◐	

Inserts Shape	Order Number	Coated CBN							CBN							Solid CBN	IC	S	Geometry
		BC8020	BC8105	BC8110	BC8120	BC8130	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020	MBS140	Dimensions (mm)		
	RNGN090300															●	9.525	3.18	
	RNGN120300															●	12.7	3.18	
	RNGN120400															●	12.7	4.76	

SN**

CBN

Square, Neg, Without hole

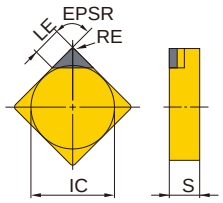
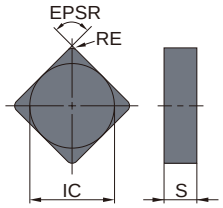
Product Information

90°

IDENTIFICATION >> 198
GRADES (UNCOATED CBN) >> 206
ISO13399 PROPERTY >> 1966
GRADES (COATED CBN) >> 200
TECHNICAL INFO >> 1971

Stock status indication (1 insert in one case) :
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✠: Unstable Cutting

Work Material			Coated CBN							CBN							Solid CBN							
	H	Hardened Materials	◐	●	●	◐	✠	●	◐	◐	●	◐	✠					✠						
	K	Cast iron												●	◐									
	S	Heat-resistant Alloy, Titanium Alloy													◐									
		Sintered Alloy														◐								

Inserts Shape	Order Number	BC8020	BC8105	BC8110	BC8120	BC8130	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020	MBS140	IC	S	RE	LE	EPSR	Geometry
	SNGN090304												□	□			9.525	3.18	0.4	4	90°	
	SNGN090308												□	□			9.525	3.18	0.8	4.1	90°	
	SNGN120404												□	□			12.7	4.76	0.4	4	90°	
	SNGN120408												●	□			12.7	4.76	0.8	4.1	90°	
	SNGN120412												●	□			12.7	4.76	1.2	4.1	90°	
	SNGN090308															●	9.525	3.18	0.8		90°	
	SNGN090312															●	9.525	3.18	1.2		90°	
	SNGN090316															●	9.525	3.18	1.6		90°	
	SNGN090408															●	9.525	4.76	0.8		90°	
	SNGN090412															●	9.525	4.76	1.2		90°	
	SNGN120408															●	12.7	4.76	0.8		90°	
	SNGN120412															●	12.7	4.76	1.2		90°	
	SNGN120416															●	12.7	4.76	1.6		90°	

TN**

CBN

Triangular, Neg, Without hole

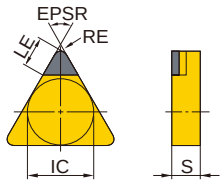
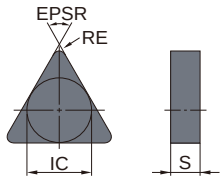
Product Information

60°

IDENTIFICATION >> 198
GRADES (UNCOATED CBN) >> 206
ISO13399 PROPERTY >> 1966
GRADES (COATED CBN) >> 200
TECHNICAL INFO >> 1971

Stock status indication (1 insert in one case) :
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✠: Unstable Cutting

Work Material			BC8020	BC8105	BC8110	BC8120	BC8130	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020	MBS140
	H	Hardened Materials	◐	●	●	◐	✠	●	◐	◐	●	◐	✠				
	K	Cast iron												●	◐		✠
	S	Heat-resistant Alloy, Titanium Alloy													◐		
		Sintered Alloy														◐	

Inserts Shape	Order Number	Coated CBN / CBN / Solid CBN	IC	S	RE	LE	EPSR	Geometry
	TNGN160404	MB710 ● MB730 □	9.525	4.76	0.4	3.7	60°	
	TNGN160408	MB710 ● MB730 □	9.525	4.76	0.8	3.4	60°	
	TNGN160408	MBS140 ●	9.525	4.76	0.8		60°	
	TNGN160412	MBS140 ●	9.525	4.76	1.2		60°	
	TNGN160416	MBS140 ●	9.525	4.76	1.6		60°	

CC**

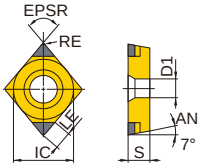
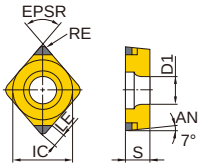
CBN — **Rhombic 80°, 7° Posi, With hole**

Product Information

IDENTIFICATION >> 198
GRADES (UNCOATED CBN) >> 206
APPLICABLE HOLDER PAGE (SMALL TOOLS) >> 350
TECHNICAL INFO >> 1971
GRADES (COATED CBN) >> 200
APPLICABLE HOLDER PAGE (EXTERNAL TURNING TOOLS) >> 322
APPLICABLE HOLDER PAGE (BORING BARS) >> 386
ISO13399 PROPERTY >> 1966

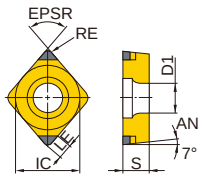
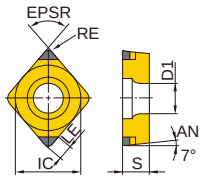
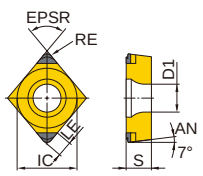
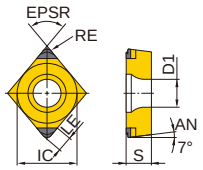
Stock status indication (1 insert in one case TNP-**:The order number is for a 10-insert pack.) :
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✠: Unstable Cutting

Work Material			BC8020	BC8105	BC8110	BC8120	BC8130	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020
	H	Hardened Materials	◐	●	●	◐	✠	●	◐	◐	●	◐	✠			
	K	Cast iron												●	◐	
	S	Heat-resistant Alloy, Titanium Alloy													◐	
		Sintered Alloy														◐

Inserts Shape	Order Number	BC8020	BC8105	BC8110	BC8120	BC8130	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020	IC	S	RE	LE	D1	EPSR	Geometry
		Coated CBN							CBN							Dimensions (mm)						
	NP-CCGB060204GA2							●	●							6.35	2.38	0.4	1.9	2.8	80°	
	NP-CCGW060202FA2												●	●		6.35	2.38	0.2	1.8	2.8	80°	
	NP-CCGW060202FS2	▲		●											●	6.35	2.38	0.2	1.8	2.8	80°	
	NP-CCGW060202GA2	▲			●			●	●							6.35	2.38	0.2	1.8	2.8	80°	
	NP-CCGW060202GS2		●	●									●	●		6.35	2.38	0.2	1.8	2.8	80°	
	NP-CCGW060202SE2														●	6.35	2.38	0.2	1.8	2.8	80°	
	NP-CCGW060202SF2														●	6.35	2.38	0.2	1.8	2.8	80°	
	NP-CCGW060202TA2											●				6.35	2.38	0.2	1.8	2.8	80°	
	NP-CCGW060202TS2														●	6.35	2.38	0.2	1.8	2.8	80°	
	NP-CCGW060204FA2												●	●		6.35	2.38	0.4	1.9	2.8	80°	
	NP-CCGW060204FS2	▲		●											●	6.35	2.38	0.4	1.9	2.8	80°	
	NP-CCGW060204GA2	▲			●	●		●	●							6.35	2.38	0.4	1.9	2.8	80°	
	NP-CCGW060204GS2		●	●			●						●	●		6.35	2.38	0.4	1.9	2.8	80°	
	NP-CCGW060204SE2														●	6.35	2.38	0.4	1.9	2.8	80°	
	NP-CCGW060204SF2														●	6.35	2.38	0.4	1.9	2.8	80°	
	NP-CCGW060204TA2					●						●				6.35	2.38	0.4	1.9	2.8	80°	
	NP-CCGW060204TS2														●	6.35	2.38	0.4	1.9	2.8	80°	
	NP-CCGW060208FA2												●	●		6.35	2.38	0.8	2.1	2.8	80°	
	NP-CCGW060208FS2			●											●	6.35	2.38	0.8	2.1	2.8	80°	
	NP-CCGW060208GA2	▲			●	●		●	●							6.35	2.38	0.8	2.1	2.8	80°	
	NP-CCGW060208GS2		●	●									●	●		6.35	2.38	0.8	2.1	2.8	80°	
	NP-CCGW060208SE2														●	6.35	2.38	0.8	2.1	2.8	80°	
	NP-CCGW060208SF2														●	6.35	2.38	0.8	2.1	2.8	80°	
	NP-CCGW060208TA2					●										6.35	2.38	0.8	2.1	2.8	80°	
	NP-CCGW060208TS2														●	6.35	2.38	0.8	2.1	2.8	80°	
	NP-CCGW09T302FS2	▲	●	●											●	9.525	3.97	0.2	1.8	4.4	80°	
	NP-CCGW09T302GA2	▲			●			●	●							9.525	3.97	0.2	1.8	4.4	80°	
	NP-CCGW09T302GN2							●								9.525	3.97	0.2	1.8	4.4	80°	
	NP-CCGW09T302GS2		●	●												9.525	3.97	0.2	1.8	4.4	80°	
	NP-CCGW09T302SE2														●	9.525	3.97	0.2	1.8	4.4	80°	
	NP-CCGW09T302SF2														●	9.525	3.97	0.2	1.8	4.4	80°	
	NP-CCGW09T302TS2														●	9.525	3.97	0.2	1.8	4.4	80°	
	NP-CCGW09T304FA2												●	●		9.525	3.97	0.4	1.9	4.4	80°	
	NP-CCGW09T304FS2	▲	●	●	●										●	9.525	3.97	0.4	1.9	4.4	80°	
	NP-CCGW09T304G2								●							9.525	3.97	0.4	1.9	4.4	80°	
	NP-CCGW09T304GA2	▲			●	●		●	●							9.525	3.97	0.4	1.9	4.4	80°	

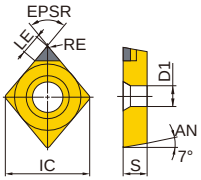
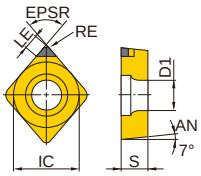
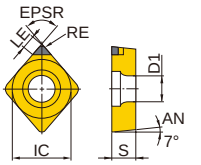
Stock status indication (1 insert in one case TNP-**:The order number is for a 10-insert pack.) :
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Work Material			BC8020	BC8105	BC8110	BC8120	BC8130	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020
	H	Hardened Materials	◐	●	●	◐	✣	●	◐	◐	●	◐	✣			
	K	Cast iron												●	◐	
	S	Heat-resistant Alloy, Titanium Alloy													◐	
		Sintered Alloy														◐

Inserts Shape	Order Number	BC8020	BC8105	BC8110	BC8120	BC8130	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020	IC	S	RE	LE	D1	EPSR	Geometry
		Coated CBN							CBN							Dimensions (mm)						
	NP-CCGW09T304GH2			●	●	●										9.525	3.97	0.4	1.9	4.4	80°	
	NP-CCGW09T304GN2							●								9.525	3.97	0.4	1.9	4.4	80°	
	NP-CCGW09T304GS2		●	●			●						●	●		9.525	3.97	0.4	1.9	4.4	80°	
	NP-CCGW09T304SE2														●	9.525	3.97	0.4	1.9	4.4	80°	
	NP-CCGW09T304SF2														●	9.525	3.97	0.4	1.9	4.4	80°	
	NP-CCGW09T304TA2				●	●						●				9.525	3.97	0.4	1.9	4.4	80°	
	NP-CCGW09T304TH2				●	●										9.525	3.97	0.4	1.9	4.4	80°	
	NP-CCGW09T304TS2														●	9.525	3.97	0.4	1.9	4.4	80°	
	NP-CCGW09T308FA2												●	●		9.525	3.97	0.8	2.1	4.4	80°	
	NP-CCGW09T308FS2	▲	●	●	●										●	9.525	3.97	0.8	2.1	4.4	80°	
	NP-CCGW09T308G2								●							9.525	3.97	0.8	2.1	4.4	80°	
	NP-CCGW09T308GA2	▲			●	●		●	●							9.525	3.97	0.8	2.1	4.4	80°	
	NP-CCGW09T308GH2			●	●	●										9.525	3.97	0.8	2.1	4.4	80°	
	NP-CCGW09T308GN2							●								9.525	3.97	0.8	2.1	4.4	80°	
	NP-CCGW09T308GS2		●	●			●						●	●		9.525	3.97	0.8	2.1	4.4	80°	
	NP-CCGW09T308SE2														●	9.525	3.97	0.8	2.1	4.4	80°	
	NP-CCGW09T308SF2														●	9.525	3.97	0.8	2.1	4.4	80°	
	NP-CCGW09T308TA2				●	●						●				9.525	3.97	0.8	2.1	4.4	80°	
	NP-CCGW09T308TH2				●	●										9.525	3.97	0.8	2.1	4.4	80°	
	NP-CCGW09T308TS2														●	9.525	3.97	0.8	2.1	4.4	80°	
	TNP-CCGW09T304G2								●							9.525	3.97	0.4	1.9	4.4	80°	
	TNP-CCGW09T308G2								●							9.525	3.97	0.8	2.1	4.4	80°	
WIPER	NP-CCGW09T304FSWS2		●	●	●											9.525	3.97	0.4	1.9	4.4	80°	
	NP-CCGW09T304GAWS2				●	●										9.525	3.97	0.4	1.9	4.4	80°	
	NP-CCGW09T304GSWS2		●	●												9.525	3.97	0.4	1.9	4.4	80°	
	NP-CCGW09T308FSWS2		●	●	●											9.525	3.97	0.8	2.1	4.4	80°	
	NP-CCGW09T308GAWS2				●	●		●	●							9.525	3.97	0.8	2.1	4.4	80°	
	NP-CCGW09T308GSWS2		●	●			●									9.525	3.97	0.8	2.1	4.4	80°	
BF	BF-CCGT09T304TA2							●								9.525	3.97	0.4	1.8	4.4	80°	
	BF-CCGT09T304TS2			●												9.525	3.97	0.4	1.8	4.4	80°	
	BF-CCGT09T308TA2							●								9.525	3.97	0.8	2	4.4	80°	
	BF-CCGT09T308TS2			●												9.525	3.97	0.8	2	4.4	80°	
BM	BM-CCGT09T304TA2				●											9.525	3.97	0.4	1.9	4.4	80°	
	BM-CCGT09T308TA2				●											9.525	3.97	0.8	2.1	4.4	80°	

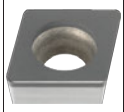
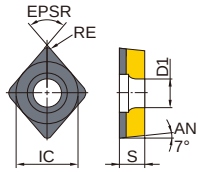
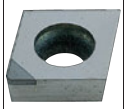
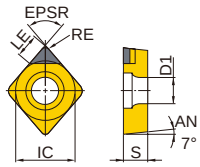
CC**

Stock status indication (1 insert in one case TNP-**:The order number is for a 10-insert pack.) :
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Work Material			BC8020	BC8105	BC8110	BC8120	BC8130	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020	IC	S	RE	LE	D1	EPSR	Geometry
	H	Hardened Materials	◐	●	●	◐	✣	●	◐	◐	●	◐	✣										
	K	Cast iron												●	◐								
	S	Heat-resistant Alloy, Titanium Alloy													◐								
		Sintered Alloy														◐	Dimensions (mm)						
Inserts Shape	Order Number		Coated CBN							CBN													
	NP-CCMB060204G											●					6.35	2.38	0.4	1.9	2.8	80°	
	NP-CCGW03S102FA									●							3.57	1.39	0.2	1.1	2.0	80°	
	NP-CCGW03S102FS				●												3.57	1.39	0.2	1.1	2.0	80°	
	NP-CCGW03S102GS			●													3.57	1.39	0.2	1.1	2.0	80°	
	NP-CCGW03S104FS				●					●							3.57	1.39	0.4	1.1	2.0	80°	
	NP-CCGW03S104GS			●													3.57	1.39	0.4	1.1	2.0	80°	
	NP-CCGW04T002FA									●							4.37	1.79	0.2	1.5	2.4	80°	
	NP-CCGW04T002FS				●												4.37	1.79	0.2	1.5	2.4	80°	
	NP-CCGW04T002GS			●													4.37	1.79	0.2	1.5	2.4	80°	
	NP-CCGW04T004FS				●					●							4.37	1.79	0.4	1.5	2.4	80°	
	NP-CCGW04T004GS			●													4.37	1.79	0.4	1.5	2.4	80°	
	NP-CCGW060202F										●						6.35	2.38	0.2	1.8	2.8	80°	
	NP-CCGW060202G									●		●					6.35	2.38	0.2	1.8	2.8	80°	
	NP-CCGW060202T												●				6.35	2.38	0.2	1.8	2.8	80°	
	NP-CCGW060204F										●						6.35	2.38	0.4	1.9	2.8	80°	
	NP-CCGW060204G									●		●					6.35	2.38	0.4	1.9	2.8	80°	
	NP-CCGW060204T												●				6.35	2.38	0.4	1.9	2.8	80°	
	NP-CCGW060208G									●							6.35	2.38	0.8	2.1	2.8	80°	
	NP-CCGW09T302F										●						9.525	3.97	0.2	1.8	4.4	80°	
	NP-CCGW09T302G									●		●					9.525	3.97	0.2	1.8	4.4	80°	
	NP-CCGW09T302GS													●	●		9.525	3.97	0.2	1.8	4.4	80°	
	NP-CCGW09T302T												●				9.525	3.97	0.2	1.8	4.4	80°	
	NP-CCGW09T304F									□	●						9.525	3.97	0.4	1.9	4.4	80°	
	NP-CCGW09T304G									●		●					9.525	3.97	0.4	1.9	4.4	80°	
	NP-CCGW09T304GS													●	●		9.525	3.97	0.4	1.9	4.4	80°	
	NP-CCGW09T304T									□			●				9.525	3.97	0.4	1.9	4.4	80°	
	NP-CCGW09T308F									□							9.525	3.97	0.8	2.1	4.4	80°	
	NP-CCGW09T308G									●							9.525	3.97	0.8	2.1	4.4	80°	
	NP-CCGW09T308T									□							9.525	3.97	0.8	2.1	4.4	80°	
	NP-CCMW03S102F										●						3.57	1.39	0.2	1.1	2.0	80°	
	NP-CCMW03S104F										●						3.57	1.39	0.4	1.1	2.0	80°	
	NP-CCMW04T002F										●						4.37	1.79	0.2	1.5	2.4	80°	
	NP-CCMW04T004F										●						4.37	1.79	0.4	1.5	2.4	80°	

Stock status indication (1 insert in one case TNP-**:The order number is for a 10-insert pack.) :
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Work Material			BC8020	BC8105	BC8110	BC8120	BC8130	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020
	H	Hardened Materials	◐	●	●	◐	✣	●	◐	◐	●	◐	✣			
	K	Cast iron												●	◐	
	S	Heat-resistant Alloy, Titanium Alloy													◐	
		Sintered Alloy														◐

Inserts Shape	Order Number	BC8020	BC8105	BC8110	BC8120	BC8130	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020	IC	S	RE	LE	D1	EPSR	Geometry
		Coated CBN							CBN							Dimensions (mm)						
	CCGW060202FS														●	6.35	2.38	0.2		2.8	80°	
	CCGW060204FS														●	6.35	2.38	0.4		2.8	80°	
	CCGW060208FS														●	6.35	2.38	0.8		2.8	80°	
	CCGW09T304FS														●	9.525	3.97	0.4		4.4	80°	
	CCGW09T308FS														●	9.525	3.97	0.8		4.4	80°	
	CCMW060202												□	□		6.35	2.38	0.2	2.8	2.8	80°	
	CCMW060204												□	□		6.35	2.38	0.4	2.8	2.8	80°	
	CCMW09T302												□	□		9.525	3.97	0.2	3.7	4.4	80°	
	CCMW09T304												□	□		9.525	3.97	0.4	3.7	4.4	80°	
	CCMW09T308												□	□		9.525	3.97	0.8	3.6	4.4	80°	
	CCMW120404												□	□		12.7	4.76	0.4	3.7	5.5	80°	
	CCMW120408												□	□		12.7	4.76	0.8	3.6	5.5	80°	
	CCMW120412												□	□		12.7	4.76	1.2	3.6	5.5	80°	

CP**

CBN — **Rhombic 80°, 11° Posi, With hole**

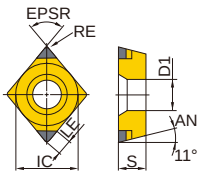
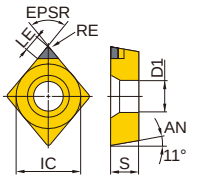
Product Information

80°

IDENTIFICATION >> 198
GRADES (UNCOATED CBN) >> 206
TECHNICAL INFO >> 1971
GRADES (COATED CBN) >> 200
APPLICABLE HOLDER PAGE (BORING BARS) >> 386
ISO13399 PROPERTY >> 1966

Stock status indication (1 insert in one case) :
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Work Material			BC8020	BC8105	BC8110	BC8120	BC8130	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020
	H	Hardened Materials	◐	●	●	◐	✣	●	◐	◐	●	◐	✣			
	K	Cast iron												●	◐	
	S	Heat-resistant Alloy, Titanium Alloy													◐	
		Sintered Alloy														◐

Inserts Shape	Order Number	BC8020	BC8105	BC8110	BC8120	BC8130	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020	IC	S	RE	LE	D1	EPSR	Geometry
		Coated CBN							CBN							Dimensions (mm)						
	NP-CPGB080202FS2														●	7.94	2.38	0.2	1.8	3.5	80°	
	NP-CPGB080202SE2														●	7.94	2.38	0.2	1.8	3.5	80°	
	NP-CPGB080204FS2	▲		●											●	7.94	2.38	0.4	1.9	3.5	80°	
	NP-CPGB080204GA2	▲			●	●		●								7.94	2.38	0.4	1.9	3.5	80°	
	NP-CPGB080204GS2		●	●												7.94	2.38	0.4	1.9	3.5	80°	
	NP-CPGB080204SE2														●	7.94	2.38	0.4	1.9	3.5	80°	
	NP-CPGB080204TA2					●										7.94	2.38	0.4	1.9	3.5	80°	
	NP-CPGB080208FS2	▲		●												7.94	2.38	0.8	2.1	3.5	80°	
	NP-CPGB080208GA2	▲			●	●		●								7.94	2.38	0.8	2.1	3.5	80°	
	NP-CPGB080208GS2		●	●												7.94	2.38	0.8	2.1	3.5	80°	
	NP-CPGB080208TA2					●										7.94	2.38	0.8	2.1	3.5	80°	
	NP-CPGB080212GA2				●	●										7.94	2.38	1.2	2.3	3.5	80°	
	NP-CPGB080212TA2					●										7.94	2.38	1.2	2.3	3.5	80°	
	NP-CPGB090302FS2		●	●											●	9.525	3.18	0.2	1.8	4.5	80°	
	NP-CPGB090302GA2				●											9.525	3.18	0.2	1.8	4.5	80°	
	NP-CPGB090302GS2		●	●												9.525	3.18	0.2	1.8	4.5	80°	
	NP-CPGB090302SE2														●	9.525	3.18	0.2	1.8	4.5	80°	
	NP-CPGB090304FS2		●		●										●	9.525	3.18	0.4	1.9	4.5	80°	
	NP-CPGB090304GA2				●	●		●	●							9.525	3.18	0.4	1.9	4.5	80°	
	NP-CPGB090304GS2		●	●												9.525	3.18	0.4	1.9	4.5	80°	
	NP-CPGB090304SE2														●	9.525	3.18	0.4	1.9	4.5	80°	
	NP-CPGB090304TA2				●	●										9.525	3.18	0.4	1.9	4.5	80°	
	NP-CPGB090308FS2		●		●										●	9.525	3.18	0.8	2.1	4.5	80°	
	NP-CPGB090308GA2				●	●		●								9.525	3.18	0.8	2.1	4.5	80°	
	NP-CPGB090308GS2		●	●												9.525	3.18	0.8	2.1	4.5	80°	
	NP-CPGB090308SE2														●	9.525	3.18	0.8	2.1	4.5	80°	
	NP-CPGB090308TA2				●	●										9.525	3.18	0.8	2.1	4.5	80°	
	NP-CPGB090312FS2				●											9.525	3.18	1.2	2.3	4.5	80°	
	NP-CPGB090312GA2				●	●										9.525	3.18	1.2	2.3	4.5	80°	
	NP-CPGB090312TA2				●	●										9.525	3.18	1.2	2.3	4.5	80°	
	NP-CPMB080204G										●					7.94	2.38	0.4	1.9	3.5	80°	
	NP-CPMB090304G										●					9.525	3.18	0.4	1.9	4.5	80°	

DC**

CBN

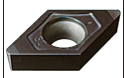
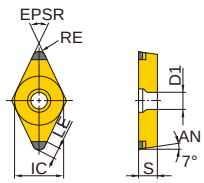
Rhombic 55°, 7° Posi, With hole

Product Information

IDENTIFICATION >> 198
GRADES (UNCOATED CBN) >> 206
APPLICABLE HOLDER PAGE (SMALL TOOLS) >> 352
TECHNICAL INFO >> 1971
GRADES (COATED CBN) >> 200
APPLICABLE HOLDER PAGE (EXTERNAL TURNING TOOLS) >> 323
APPLICABLE HOLDER PAGE (BORING BARS) >> 390
ISO13399 PROPERTY >> 1966

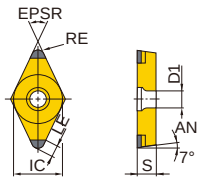
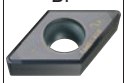
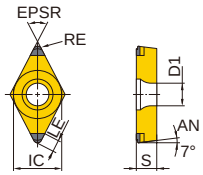
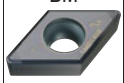
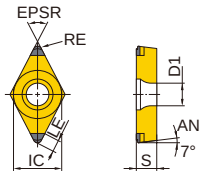
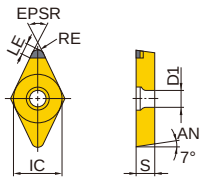
Stock status indication (1 insert in one case TNP-**:The order number is for a 10-insert pack.) :
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Work Material			BC8020	BC8105	BC8110	BC8120	BC8130	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020
	H	Hardened Materials	◐	●	●	◐	✣	●	◐	◐	●	◐	✣			
	K	Cast iron												●	◐	
	S	Heat-resistant Alloy, Titanium Alloy													◐	
		Sintered Alloy														◐

Inserts Shape	Order Number	BC8020	BC8105	BC8110	BC8120	BC8130	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020	IC	S	RE	LE	D1	EPSR	Geometry
		Coated CBN							CBN							Dimensions (mm)						
	NP-DCGW070202FS2	▲		●												6.35	2.38	0.2	2.3	2.8	55°	
	NP-DCGW070202GA2	▲			●			●	●							6.35	2.38	0.2	2.3	2.8	55°	
	NP-DCGW070202GN2							●								6.35	2.38	0.2	2.3	2.8	55°	
	NP-DCGW070202GS2		●	●												6.35	2.38	0.2	2.3	2.8	55°	
	NP-DCGW070204FS2	▲		●	●										●	6.35	2.38	0.4	1.5	2.8	55°	
	NP-DCGW070204GA2	▲			●	●		●	●							6.35	2.38	0.4	2.1	2.8	55°	
	NP-DCGW070204GN2							●								6.35	2.38	0.4	2.1	2.8	55°	
	NP-DCGW070204GS2		●	●			●									6.35	2.38	0.4	2.1	2.8	55°	
	NP-DCGW070204SE2														●	6.35	2.38	0.4	2.1	2.8	55°	
	NP-DCGW070204SF2														●	6.35	2.38	0.4	2.1	2.8	55°	
	NP-DCGW070204TA2				●	●						●				6.35	2.38	0.4	2.1	2.8	55°	
	NP-DCGW070204TS2														●	6.35	2.38	0.4	2.1	2.8	55°	
	NP-DCGW070208FS2			●											●	6.35	2.38	0.8	2	2.8	55°	
	NP-DCGW070208GA2					●		●	●							6.35	2.38	0.8	2	2.8	55°	
	NP-DCGW070208GN2							●								6.35	2.38	0.8	2	2.8	55°	
	NP-DCGW070208GS2		●	●												6.35	2.38	0.8	2	2.8	55°	
	NP-DCGW070208SE2														●	6.35	2.38	0.8	2	2.8	55°	
	NP-DCGW070208SF2														●	6.35	2.38	0.8	2	2.8	55°	
	NP-DCGW070208TA2					●										6.35	2.38	0.8	2	2.8	55°	
	NP-DCGW070208TS2														●	6.35	2.38	0.8	2	2.8	55°	
	NP-DCGW11T302FS2	▲	●	●											●	9.525	3.97	0.2	2.3	4.4	55°	
	NP-DCGW11T302GA2	▲			●			●	●							9.525	3.97	0.2	2.3	4.4	55°	
	NP-DCGW11T302GN2							●								9.525	3.97	0.2	2.3	4.4	55°	
	NP-DCGW11T302GS2		●	●			●									9.525	3.97	0.2	2.3	4.4	55°	
	NP-DCGW11T302SE2														●	9.525	3.97	0.2	1.5	4.4	55°	
	NP-DCGW11T302SF2														●	9.525	3.97	0.2	1.5	4.4	55°	
	NP-DCGW11T302TA2											●				9.525	3.97	0.2	2.3	4.4	55°	
	NP-DCGW11T302TS2														●	9.525	3.97	0.2	2.3	4.4	55°	
	NP-DCGW11T304FA2												●	●		9.525	3.97	0.4	1.5	4.4	55°	
	NP-DCGW11T304FS2	▲	●	●	●										●	9.525	3.97	0.4	2.1	4.4	55°	
	NP-DCGW11T304G2								●							9.525	3.97	0.4	2.1	4.4	55°	
	NP-DCGW11T304GA2	▲			●	●		●	●							9.525	3.97	0.4	2.1	4.4	55°	
	NP-DCGW11T304GH2			●	●	●										9.525	3.97	0.4	2.1	4.4	55°	
	NP-DCGW11T304GN2							●								9.525	3.97	0.4	2.1	4.4	55°	
	NP-DCGW11T304GS2		●	●			●		●				●	●		9.525	3.97	0.4	2.1	4.4	55°	
	NP-DCGW11T304SE2														●	9.525	3.97	0.4	2.1	4.4	55°	
	NP-DCGW11T304SF2														●	9.525	3.97	0.4	2.1	4.4	55°	
	NP-DCGW11T304TA2				●	●						●				9.525	3.97	0.4	2.1	4.4	55°	
	NP-DCGW11T304TH2				●	●										9.525	3.97	0.4	2.1	4.4	55°	
	NP-DCGW11T304TS2														●	9.525	3.97	0.4	2.1	4.4	55°	
	NP-DCGW11T308FA2												●	●		9.525	3.97	0.8	1.7	4.4	55°	

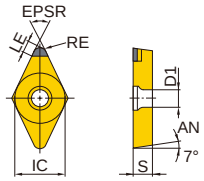
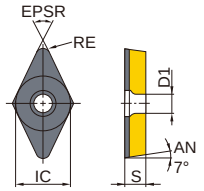
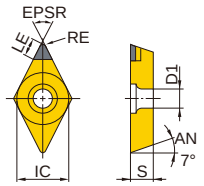
DC**

Stock status indication (1 insert in one case TNP-**:The order number is for a 10-insert pack.) :
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Work Material			BC8020	BC8105	BC8110	BC8120	BC8130	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020	IC	S	RE	LE	D1	EPSR	Geometry
	H	Hardened Materials	◐	●	●	◐	✣	●	◐	◐	●	◐	✣										
	K	Cast iron												●	◐								
	S	Heat-resistant Alloy, Titanium Alloy													◐								
		Sintered Alloy														◐	Dimensions (mm)						
Inserts Shape	Order Number		Coated CBN							CBN													
	NP-DCGW11T308FS2		▲	●	●	●										●	9.525	3.97	0.8	2	4.4	55°	
	NP-DCGW11T308G2									●							9.525	3.97	0.8	2	4.4	55°	
	NP-DCGW11T308GA2		▲			●	●		●	●							9.525	3.97	0.8	2	4.4	55°	
	NP-DCGW11T308GH2				●	●	●										9.525	3.97	0.8	2	4.4	55°	
	NP-DCGW11T308GN2								●								9.525	3.97	0.8	2	4.4	55°	
	NP-DCGW11T308GS2			●	●			●		●				●	●		9.525	3.97	0.8	2	4.4	55°	
	NP-DCGW11T308SE2															●	9.525	3.97	0.8	2	4.4	55°	
	NP-DCGW11T308SF2															●	9.525	3.97	0.8	2	4.4	55°	
	NP-DCGW11T308TA2					●	●						●				9.525	3.97	0.8	2	4.4	55°	
	NP-DCGW11T308TH2					●	●										9.525	3.97	0.8	2	4.4	55°	
	NP-DCGW11T308TS2															●	9.525	3.97	0.8	2	4.4	55°	
	TNP-DCGW11T304G2									●							9.525	3.97	0.4	2.1	4.4	55°	
	TNP-DCGW11T308G2									●							9.525	3.97	0.8	2.1	4.4	55°	
BF 	BF-DCGT11T304TA2								●								9.525	3.97	0.4	2.1	4.4	55°	
	BF-DCGT11T304TS2				●												9.525	3.97	0.4	2.1	4.4	55°	
	BF-DCGT11T308TA2								●								9.525	3.97	0.8	2	4.4	55°	
	BF-DCGT11T308TS2				●												9.525	3.97	0.8	2	4.4	55°	
BM 	BM-DCGT11T304TA2					●											9.525	3.97	0.4	2.1	4.4	55°	
	BM-DCGT11T308TA2					●											9.525	3.97	0.8	2	4.4	55°	
	NP-DCGW070202F										●						6.35	2.38	0.2	1.5	2.8	55°	
	NP-DCGW070202G									●							6.35	2.38	0.2	2.3	2.8	55°	
	NP-DCGW070202T												●				6.35	2.38	0.2	1.5	2.8	55°	
	NP-DCGW070204F										●						6.35	2.38	0.4	1.5	2.8	55°	
	NP-DCGW070204G									●							6.35	2.38	0.4	2.1	2.8	55°	
	NP-DCGW070204T												●				6.35	2.38	0.4	1.5	2.8	55°	
	NP-DCGW070208G									●							6.35	2.38	0.8	2	2.8	55°	
	NP-DCGW11T302F										●						9.525	3.97	0.2	1.5	4.4	55°	
	NP-DCGW11T302G									●		●					9.525	3.97	0.2	2.3	4.4	55°	
	NP-DCGW11T302GS													●	●		9.525	3.97	0.2	1.5	4.4	55°	
	NP-DCGW11T302T												●				9.525	3.97	0.2	1.5	4.4	55°	
	NP-DCGW11T304F									□	●						9.525	3.97	0.4	1.5	4.4	55°	
	NP-DCGW11T304G									●		●					9.525	3.97	0.4	1.5	4.4	55°	
	NP-DCGW11T304GS													●	●		9.525	3.97	0.4	1.5	4.4	55°	
	NP-DCGW11T304T									□			●				9.525	3.97	0.4	1.5	4.4	55°	

Stock status indication (1 insert in one case TNP-**:The order number is for a 10-insert pack.) :
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Work Material			BC8020	BC8105	BC8110	BC8120	BC8130	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020
	H	Hardened Materials	◐	●	●	◐	✣	●	◐	◐	●	◐	✣			
	K	Cast iron												●	◐	
	S	Heat-resistant Alloy, Titanium Alloy													◐	
		Sintered Alloy														◐

Inserts Shape	Order Number	BC8020	BC8105	BC8110	BC8120	BC8130	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020	IC	S	RE	LE	D1	EPSR	Geometry
		Coated CBN							CBN							Dimensions (mm)						
	NP-DCGW11T308F								□							9.525	3.97	0.8	2	4.4	55°	
	NP-DCGW11T308G								●							9.525	3.97	0.8	1.7	4.4	55°	
	NP-DCGW11T308T								□			□				9.525	3.97	0.8	1.7	4.4	55°	
	NP-DCMW070204G										●					6.35	2.38	0.4	1.5	2.8	55°	
	NP-DCMW11T304G										●					9.525	3.97	0.4	1.5	4.4	55°	
	DCGW070204FS														●	6.35	2.38	0.4		2.8	55°	
	DCGW070208FS														●	6.35	2.38	0.8		2.8	55°	
	DCMW070202												□	□		6.35	2.38	0.2	3.7	2.8	55°	
	DCMW070204												□	□		6.35	2.38	0.4	3.5	2.8	55°	
	DCMW11T302												□	□		9.525	3.97	0.2	3.7	4.4	55°	
	DCMW11T304												□	□		9.525	3.97	0.4	3.5	4.4	55°	

TC**

CBN

Triangular, 7° Posi, With hole

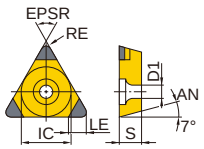
Product Information

60°

IDENTIFICATION >> 198
GRADES (UNCOATED CBN) >> 206
APPLICABLE HOLDER PAGE (BORING BARS) >> 424
ISO13399 PROPERTY >> 1966
GRADES (COATED CBN) >> 200
APPLICABLE HOLDER PAGE (EXTERNAL TURNING TOOLS) >> 330
TECHNICAL INFO >> 1971

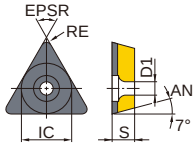
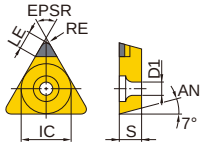
Stock status indication (1 insert in one case TNP-**:The order number is for a 10-insert pack.) :
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✠: Unstable Cutting

Work Material			BC8020	BC8105	BC8110	BC8120	BC8130	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020
	H	Hardened Materials	◐	●	●	◐	✠	●	◐	◐	●	◐	✠			
	K	Cast iron												●	◐	
	S	Heat-resistant Alloy, Titanium Alloy													◐	
		Sintered Alloy														◐

Inserts Shape	Order Number	BC8020	BC8105	BC8110	BC8120	BC8130	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020	IC	S	RE	LE	D1	EPSR	Geometry
		Coated CBN							CBN							Dimensions (mm)						
	NP-TCGW090202GA3							●								5.56	2.38	0.2	1.5	2.5	60°	
	NP-TCGW090204GA3							●								5.56	2.38	0.4	1.6	2.5	60°	
	NP-TCGW090204GS3			●												5.56	2.38	0.4	1.6	2.5	60°	
	NP-TCGW090208GA3							●								5.56	2.38	0.8	1.8	2.5	60°	
	NP-TCGW090208GS3			●												5.56	2.38	0.8	1.8	2.5	60°	
	NP-TCGW110202GA3							●								6.35	2.38	0.2	1.5	2.8	60°	
	NP-TCGW110202GS3			●												6.35	2.38	0.2	1.5	2.8	60°	
	NP-TCGW110204FA3												●	●		6.35	2.38	0.4	1.6	2.8	60°	
	NP-TCGW110204FS3														●	6.35	2.38	0.4	1.6	2.8	60°	
	NP-TCGW110204GA3							●								6.35	2.38	0.4	1.6	2.8	60°	
	NP-TCGW110204GS3			●												6.35	2.38	0.4	1.6	2.8	60°	
	NP-TCGW110204SE3														●	6.35	2.38	0.4	1.6	2.8	60°	
	NP-TCGW110204SF3														●	6.35	2.38	0.4	1.6	2.8	60°	
	NP-TCGW110204TS3														●	6.35	2.38	0.4	1.6	2.8	60°	
	NP-TCGW110208FA3												●	●		6.35	2.38	0.8	1.8	2.8	60°	
	NP-TCGW110208FS3														●	6.35	2.38	0.8	1.8	2.8	60°	
	NP-TCGW110208GA3							●								6.35	2.38	0.8	1.8	2.8	60°	
	NP-TCGW110208GS3			●												6.35	2.38	0.8	1.8	2.8	60°	
	NP-TCGW110208SE3														●	6.35	2.38	0.8	1.8	2.8	60°	
	NP-TCGW110208SF3														●	6.35	2.38	0.8	1.8	2.8	60°	
	NP-TCGW110208TS3														●	6.35	2.38	0.8	1.8	2.8	60°	
	NP-TCGW130304GA3							●								7.94	3.18	0.4	1.6	3.4	60°	
	NP-TCGW130304GS3			●												7.94	3.18	0.4	1.6	3.4	60°	
	NP-TCGW130308GA3							●								7.94	3.18	0.8	1.8	3.4	60°	
	NP-TCGW130308GS3			●												7.94	3.18	0.8	1.8	3.4	60°	
	NP-TCGW16T304GA3							●								9.525	3.97	0.4	1.6	4.4	60°	
	NP-TCGW16T304GS3			●												9.525	3.97	0.4	1.6	4.4	60°	
	NP-TCGW16T308GA3							●								9.525	3.97	0.8	1.8	4.4	60°	
	NP-TCGW16T308GS3			●												9.525	3.97	0.8	1.8	4.4	60°	

Stock status indication (1 insert in one case TNP-**:The order number is for a 10-insert pack.) :
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Work Material			BC8020	BC8105	BC8110	BC8120	BC8130	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020
	H	Hardened Materials	◐	●	●	◐	✣	●	◐	◐	●	◐	✣			
	K	Cast iron												●	◐	
	S	Heat-resistant Alloy, Titanium Alloy													◐	
		Sintered Alloy														◐

Inserts Shape	Order Number	BC8020	BC8105	BC8110	BC8120	BC8130	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020	IC	S	RE	LE	D1	EPSR	Geometry
		Coated CBN							CBN							Dimensions (mm)						
	TCGW090204FS														●	5.56	2.38	0.4		2.5	60°	
	TCGW090208FS														●	5.56	2.38	0.8		2.5	60°	
	TCGW110204FS														●	6.35	2.38	0.4		2.8	60°	
	TCGW110208FS														●	6.35	2.38	0.8		2.8	60°	
	TCMW110202												□	□		6.35	2.38	0.2	2.8	2.8	60°	
	TCMW110204												□	□		6.35	2.38	0.4	2.6	2.8	60°	

TP**

CBN — **Triangular, 11° Posi, With hole**

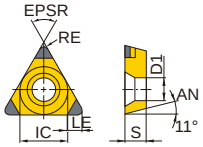
Product Information

60°

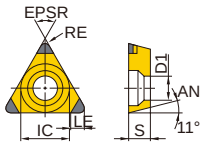
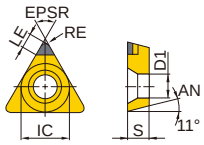
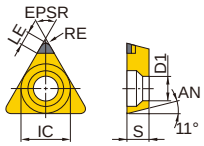
IDENTIFICATION >> 198
GRADES (UNCOATED CBN) >> 206
TECHNICAL INFO >> 1971
GRADES (COATED CBN) >> 200
APPLICABLE HOLDER PAGE (BORING BARS) >> 388
ISO13399 PROPERTY >> 1966

Stock status indication (1 insert in one case TNP-**:The order number is for a 10-insert pack.) :
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✠: Unstable Cutting

Work Material			BC8020	BC8105	BC8110	BC8120	BC8130	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020
	H	Hardened Materials	◐	●	●	◐	✠	●	◐	◐	●	◐	✠			
	K	Cast iron												●	◐	
	S	Heat-resistant Alloy, Titanium Alloy													◐	
		Sintered Alloy														◐

Inserts Shape	Order Number	BC8020	BC8105	BC8110	BC8120	BC8130	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020	IC	S	RE	LE	D1	EPSR	Geometry
		Coated CBN							CBN							Dimensions (mm)						
	NP-TPGB080204GA3					●		●	●							4.76	2.38	0.4	1.6	2.4	60°	
	NP-TPGB080204GS3		●	●												4.76	2.38	0.4	1.6	2.4	60°	
	NP-TPGB080204TA3					●										4.76	2.38	0.4	1.6	2.4	60°	
	NP-TPGB080208GA3					●		●								4.76	2.38	0.8	1.8	2.4	60°	
	NP-TPGB080208GS3		●	●												4.76	2.38	0.8	1.8	2.4	60°	
	NP-TPGB080208TA3					●										4.76	2.38	0.8	1.8	2.4	60°	
	NP-TPGB090202FS3														●	5.56	2.38	0.2	1.5	2.9	60°	
	NP-TPGB090202SE3														●	5.56	2.38	0.2	1.5	2.9	60°	
	NP-TPGB090202SF3														●	5.56	2.38	0.2	1.5	2.9	60°	
	NP-TPGB090204FS3														●	5.56	2.38	0.4	1.6	2.9	60°	
	NP-TPGB090204GA3				●	●		●	●							5.56	2.38	0.4	1.6	2.9	60°	
	NP-TPGB090204GS3		●	●												5.56	2.38	0.4	1.6	2.9	60°	
	NP-TPGB090204SE3														●	5.56	2.38	0.4	1.6	2.9	60°	
	NP-TPGB090204SF3														●	5.56	2.38	0.4	1.6	2.9	60°	
	NP-TPGB090204TA3					●										5.56	2.38	0.4	1.6	2.9	60°	
	NP-TPGB090208GA3				●	●		●								5.56	2.38	0.8	1.8	2.9	60°	
	NP-TPGB090208GS3		●	●												5.56	2.38	0.8	1.8	2.9	60°	
	NP-TPGB090208TA3					●										5.56	2.38	0.8	1.8	2.9	60°	
	NP-TPGB110302FS3		●	●											●	6.35	3.18	0.2	1.5	3.4	60°	
	NP-TPGB110302GA3				●											6.35	3.18	0.2	1.5	3.4	60°	
	NP-TPGB110302GS3		●	●												6.35	3.18	0.2	1.5	3.4	60°	
	NP-TPGB110302SE3														●	6.35	3.18	0.2	1.5	3.4	60°	
	NP-TPGB110302SF3														●	6.35	3.18	0.2	1.5	3.4	60°	
	NP-TPGB110304FS3	▲	●	●	●										●	6.35	3.18	0.4	1.6	3.4	60°	
	NP-TPGB110304GA3	▲			●	●		●								6.35	3.18	0.4	1.6	3.4	60°	
	NP-TPGB110304GS3		●	●												6.35	3.18	0.4	1.6	3.4	60°	
	NP-TPGB110304SE3														●	6.35	3.18	0.4	1.6	3.4	60°	
	NP-TPGB110304SF3														●	6.35	3.18	0.4	1.6	3.4	60°	
	NP-TPGB110304TA3				●	●										6.35	3.18	0.4	1.6	3.4	60°	
	NP-TPGB110308FS3	▲	●	●	●										●	6.35	3.18	0.8	1.8	3.4	60°	
	NP-TPGB110308GA3	▲			●	●		●								6.35	3.18	0.8	1.8	3.4	60°	
	NP-TPGB110308GS3		●	●												6.35	3.18	0.8	1.8	3.4	60°	
	NP-TPGB110308SE3														●	6.35	3.18	0.8	1.8	3.4	60°	
	NP-TPGB110308SF3														●	6.35	3.18	0.8	1.8	3.4	60°	
	NP-TPGB110308TA3				●	●										6.35	3.18	0.8	1.8	3.4	60°	
	NP-TPGB160304FS3	▲			●											9.525	3.18	0.4	1.6	4.4	60°	
	NP-TPGB160304GA3	▲			●	●		●	●							9.525	3.18	0.4	1.6	4.4	60°	
	NP-TPGB160304GH3			●	●	●										9.525	3.18	0.4	1.6	4.4	60°	
	NP-TPGB160304GS3		●	●												9.525	3.18	0.4	1.6	4.4	60°	
	NP-TPGB160304TA3				●	●										9.525	3.18	0.4	1.6	4.4	60°	
	NP-TPGB160304TH3				●	●										9.525	3.18	0.4	1.6	4.4	60°	

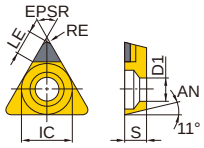
Stock status indication (1 insert in one case TNP-**:The order number is for a 10-insert pack.) :
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✠: Unstable Cutting

Work Material			BC8020	BC8105	BC8110	BC8120	BC8130	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020	IC	S	RE	LE	D1	EPSR	Geometry
	H	Hardened Materials	◐	●	●	◐	✠	●	◐	◐	●	◐	✠										
	K	Cast iron												●	◐								
	S	Heat-resistant Alloy, Titanium Alloy													◐								
		Sintered Alloy														◐	Dimensions (mm)						
Inserts Shape	Order Number		Coated CBN							CBN													
	NP-TPGB160308FS3		▲			●											9.525	3.18	0.8	1.8	4.4	60°	
	NP-TPGB160308GA3		▲			●	●		●								9.525	3.18	0.8	1.8	4.4	60°	
	NP-TPGB160308GH3				●	●	●										9.525	3.18	0.8	1.8	4.4	60°	
	NP-TPGB160308GS3			●	●												9.525	3.18	0.8	1.8	4.4	60°	
	NP-TPGB160308TA3					●	●										9.525	3.18	0.8	1.8	4.4	60°	
	NP-TPGB160308TH3					●	●										9.525	3.18	0.8	1.8	4.4	60°	
	NP-TPGX080202GA3								□								4.76	2.38	0.2	1.5	2.5	60°	
	NP-TPGX080202GS3							●									4.76	2.38	0.2	1.5	2.5	60°	
	NP-TPGX080204GA3								□								4.76	2.38	0.4	1.6	2.5	60°	
	NP-TPGX080204GS3							●									4.76	2.38	0.4	1.6	2.5	60°	
	NP-TPGX080208GA3								□								4.76	2.38	0.8	1.8	2.5	60°	
	NP-TPGX090202GS3							●									5.56	2.38	0.2	1.5	3.0	60°	
	NP-TPGX090204GA3								□								5.56	2.38	0.4	1.6	3.0	60°	
	NP-TPGX090204GS3							●									5.56	2.38	0.4	1.6	3.0	60°	
	NP-TPGX090208GA3								□								5.56	2.38	0.8	1.8	3.0	60°	
	NP-TPGX110304GA3								□								6.35	3.18	0.4	1.6	3.5	60°	
	NP-TPGX110304GS3							●									6.35	3.18	0.4	1.6	3.5	60°	
	NP-TPGX110308GA3								□								6.35	3.18	0.8	1.8	3.5	60°	
	NP-TPGX110308GS3							●									6.35	3.18	0.8	1.8	3.5	60°	
	NP-TPMB080204G											●					4.76	2.38	0.4	1.6	2.4	60°	
	NP-TPMB090204G											●					5.56	2.38	0.4	1.6	2.9	60°	
	NP-TPMB110304G											●					6.35	3.18	0.4	1.6	3.4	60°	
	NP-TPMB160304G											●					9.525	3.18	0.4	1.6	4.4	60°	
	NP-TPGX080202F										●						4.76	2.38	0.2	1.5	2.5	60°	
	NP-TPGX080202T												●				4.76	2.38	0.2	1.5	2.5	60°	
	NP-TPGX080204F										●						4.76	2.38	0.4	1.6	2.5	60°	
	NP-TPGX080204T												●				4.76	2.38	0.4	1.6	2.5	60°	
	NP-TPGX090202F										●						5.56	2.38	0.2	1.5	3.0	60°	
	NP-TPGX090202T												●				5.56	2.38	0.2	1.5	3.0	60°	
	NP-TPGX090204F										●						5.56	2.38	0.4	1.6	3.0	60°	
	NP-TPGX090204G									●							5.56	2.38	0.4	1.6	3.0	60°	
	NP-TPGX090204T												●				5.56	2.38	0.4	1.6	3.0	60°	
	NP-TPGX090208G									●							5.56	2.38	0.8	1.8	3.0	60°	
	NP-TPGX110304F										●			●			6.35	3.18	0.4	1.6	3.5	60°	
	NP-TPGX110304G									●							6.35	3.18	0.4	1.6	3.5	60°	
	NP-TPGX110304T											●	●		●		6.35	3.18	0.4	1.6	3.5	60°	
	NP-TPGX110308F										●			●			6.35	3.18	0.8	1.8	3.5	60°	
	NP-TPGX110308G									●							6.35	3.18	0.8	1.8	3.5	60°	
	NP-TPGX110308T											●	●		●		6.35	3.18	0.8	1.8	3.5	60°	

TP**

Stock status indication (1 insert in one case TNP-**:The order number is for a 10-insert pack.) :
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Work Material			BC8020	BC8105	BC8110	BC8120	BC8130	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020
	H	Hardened Materials	◐	●	●	◐	✣	●	◐	◐	●	◐	✣			
	K	Cast iron												●	◐	
	S	Heat-resistant Alloy, Titanium Alloy													◐	
		Sintered Alloy														◐

Inserts Shape	Order Number	BC8020	BC8105	BC8110	BC8120	BC8130	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020	IC	S	RE	LE	D1	EPSR	Geometry
		Coated CBN							CBN							Dimensions (mm)						
	TPGX080202												●	●		4.76	2.38	0.2	1.9	2.5	60°	
	TPGX080204									●			●	●		4.76	2.38	0.4	1.7	2.5	60°	
	TPGX080208												□	□		4.76	2.38	0.8	1.4	2.5	60°	
	TPGX090202												●	●		5.56	2.38	0.2	2.8	3.0	60°	
	TPGX090204									●			●	●		5.56	2.38	0.4	2.6	3.0	60°	
	TPGX090208												□	□		5.56	2.38	0.8	2.3	3.0	60°	
	TPGX110302												□	□		6.35	3.18	0.2	2.8	3.5	60°	
	TPGX110304									●			●	●		6.35	3.18	0.4	2.6	3.5	60°	
	TPGX110308									●			●	●		6.35	3.18	0.8	2.3	3.5	60°	
	TPGX160304												●	□		9.525	3.18	0.4	3.7	4.8	60°	
	TPGX160308												●	□		9.525	3.18	0.8	3.4	4.8	60°	
	TPGX160404												□	□		9.525	4.76	0.4	3.7	4.8	60°	
	TPGX160408												□	□		9.525	4.76	0.8	3.4	4.8	60°	

VB**

CBN

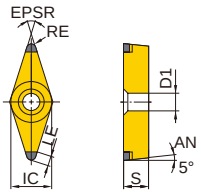
Rhombic 35°, 5° Posi, With hole

Product Information

IDENTIFICATION >> 198
GRADES (UNCOATED CBN) >> 206
APPLICABLE HOLDER PAGE (BORING BARS) >> 396
ISO13399 PROPERTY >> 1966
GRADES (COATED CBN) >> 200
APPLICABLE HOLDER PAGE (SMALL TOOLS) >> 355
TECHNICAL INFO >> 1971

Stock status indication (1 insert in one case TNP-**:The order number is for a 10-insert pack.) :
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✠: Unstable Cutting

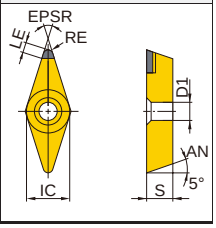
Work Material			BC8020	BC8105	BC8110	BC8120	BC8130	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020	IC	S	RE	LE	D1	EPSR	Geometry
	H	Hardened Materials	◐	●	●	◐	✠	●	◐	◐	●	◐	✠										
	K	Cast iron												●	◐								
	S	Heat-resistant Alloy, Titanium Alloy													◐								
		Sintered Alloy														◐	Dimensions (mm)						
Inserts Shape	Order Number		Coated CBN							CBN													
	NP-VBGW110302FS2				●												6.35	3.18	0.2	2.5	2.85	35°	
	NP-VBGW110302GA2					●											6.35	3.18	0.2	2.5	2.85	35°	
	NP-VBGW110302GS2		●	●													6.35	3.18	0.2	2.5	2.85	35°	
	NP-VBGW110304FS2				●											●	6.35	3.18	0.4	2.5	2.85	35°	
	NP-VBGW110304GA2					●	●										6.35	3.18	0.4	2.5	2.85	35°	
	NP-VBGW110304GS2		●	●											●		6.35	3.18	0.4	2.5	2.85	35°	
	NP-VBGW110304SE2															●	6.35	3.18	0.4	2.5	2.85	35°	
	NP-VBGW110304SF2															●	6.35	3.18	0.4	2.5	2.85	35°	
	NP-VBGW110304TA2						●										6.35	3.18	0.4	2.5	2.85	35°	
	NP-VBGW110304TS2															●	6.35	3.18	0.4	2.5	2.85	35°	
	NP-VBGW110308FS2				●											●	6.35	3.18	0.8	2	2.85	35°	
	NP-VBGW110308GA2					●	●										6.35	3.18	0.8	2	2.85	35°	
	NP-VBGW110308GS2		●	●											●		6.35	3.18	0.8	2	2.85	35°	
	NP-VBGW110308SE2															●	6.35	3.18	0.8	2	2.85	35°	
	NP-VBGW110308SF2															●	6.35	3.18	0.8	2	2.85	35°	
	NP-VBGW110308TA2						●										6.35	3.18	0.8	2	2.85	35°	
	NP-VBGW110308TS2															●	6.35	3.18	0.8	2	2.85	35°	
	NP-VBGW160402FS2				●												9.525	4.76	0.2	2.5	4.43	35°	
	NP-VBGW160402GA2					●											9.525	4.76	0.2	2.5	4.43	35°	
	NP-VBGW160402GS2		●	●													9.525	4.76	0.2	2.5	4.43	35°	
	NP-VBGW160404FS2	▲				●										●	9.525	4.76	0.4	2.5	4.43	35°	
	NP-VBGW160404GA2	▲				●	●		●	●							9.525	4.76	0.4	2.5	4.43	35°	
	NP-VBGW160404GH2				●	●	●										9.525	4.76	0.4	2.5	4.43	35°	
	NP-VBGW160404GS2		●	●										●	●		9.525	4.76	0.4	2.5	4.43	35°	
	NP-VBGW160404SE2															●	9.525	4.76	0.4	2.5	4.43	35°	
	NP-VBGW160404SF2															●	9.525	4.76	0.4	2.5	4.43	35°	
	NP-VBGW160404TA2					●	●										9.525	4.76	0.4	1.4	4.43	35°	
	NP-VBGW160404TH2					●	●										9.525	4.76	0.4	2.5	4.43	35°	
	NP-VBGW160404TS2															●	9.525	4.76	0.4	2.5	4.43	35°	
	NP-VBGW160408FS2	▲				●										●	9.525	4.76	0.8	2	4.43	35°	
	NP-VBGW160408GA2	▲				●	●		●	●							9.525	4.76	0.8	2	4.43	35°	
	NP-VBGW160408GH2				●	●	●										9.525	4.76	0.8	2	4.43	35°	
	NP-VBGW160408GS2		●	●										●	●		9.525	4.76	0.8	2	4.43	35°	
	NP-VBGW160408SE2															●	9.525	4.76	0.8	2	4.43	35°	
	NP-VBGW160408SF2															●	9.525	4.76	0.8	2	4.43	35°	
	NP-VBGW160408TA2					●	●										9.525	4.76	0.8	1.5	4.43	35°	
	NP-VBGW160408TH2					●	●										9.525	4.76	0.8	2	4.43	35°	
	NP-VBGW160408TS2															●	9.525	4.76	0.8	2	4.43	35°	



VB**

Stock status indication (1 insert in one case TNP-**:The order number is for a 10-insert pack.) :
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Work Material			BC8020	BC8105	BC8110	BC8120	BC8130	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020
	H	Hardened Materials	◐	●	●	◐	✣	●	◐	◐	●	◐	✣			
	K	Cast iron												●	◐	
	S	Heat-resistant Alloy, Titanium Alloy													◐	
		Sintered Alloy														◐

Inserts Shape	Order Number	Coated CBN							CBN							IC	S	RE	LE	D1	EPSR	Geometry
		BC8020	BC8105	BC8110	BC8120	BC8130	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020							
	NP-VBGW160404G								●							9.525	4.76	0.4	2.5	4.43	35°	
	NP-VBGW160408G								●							9.525	4.76	0.8	2	4.43	35°	

VC**

CBN

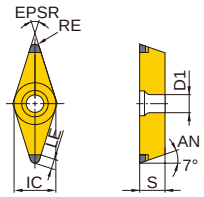
Rhombic 35°, 7° Posi, With hole

Product Information

IDENTIFICATION >> 198
GRADES (UNCOATED CBN) >> 206
APPLICABLE HOLDER PAGE (BORING BARS) >> 432
ISO13399 PROPERTY >> 1966
GRADES (COATED CBN) >> 200
APPLICABLE HOLDER PAGE (EXTERNAL TURNING TOOLS) >> 331
TECHNICAL INFO >> 1971

Stock status indication (1 insert in one case TNP-**:The order number is for a 10-insert pack.) :
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✠: Unstable Cutting

Work Material			BC8020	BC8105	BC8110	BC8120	BC8130	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020
Work Material	H	Hardened Materials	◐	●	●	◐	✠	●	◐	◐	●	◐	✠			
Work Material	K	Cast iron												●	◐	
Work Material	S	Heat-resistant Alloy, Titanium Alloy													◐	
Work Material		Sintered Alloy														◐

Inserts Shape	Order Number	BC8020	BC8105	BC8110	BC8120	BC8130	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020	IC	S	RE	LE	D1	EPSR	Geometry
		Coated CBN							CBN							Dimensions (mm)						
	NP-VCGW160404FS2	▲		●	●											9.525	4.76	0.4	2.5	4.4	35°	
	NP-VCGW160404GA2	▲			●	●		●	●							9.525	4.76	0.4	2.5	4.4	35°	
	NP-VCGW160404GH2			●	●	●										9.525	4.76	0.4	2.5	4.4	35°	
	NP-VCGW160404GS2		●	●												9.525	4.76	0.4	2.5	4.4	35°	
	NP-VCGW160404TA2				●	●										9.525	4.76	0.4	2.5	4.4	35°	
	NP-VCGW160404TH2				●	●										9.525	4.76	0.4	2.5	4.4	35°	
	NP-VCGW160404TS2			●												9.525	4.76	0.4	2.5	4.4	35°	
	NP-VCGW160408FS2	▲		●	●											9.525	4.76	0.8	2	4.4	35°	
	NP-VCGW160408GA2	▲			●	●		●	●							9.525	4.76	0.8	2	4.4	35°	
	NP-VCGW160408GH2			●	●	●										9.525	4.76	0.8	2	4.4	35°	
	NP-VCGW160408GS2		●	●												9.525	4.76	0.8	2	4.4	35°	
	NP-VCGW160408TA2				●	●										9.525	4.76	0.8	2	4.4	35°	
	NP-VCGW160408TH2				●	●										9.525	4.76	0.8	2	4.4	35°	
	NP-VCGW160408TS2			●												9.525	4.76	0.8	2	4.4	35°	

WC**

CBN

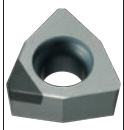
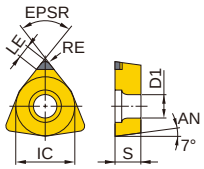
Trigon, 7° Posi, With hole

Product Information

80°

IDENTIFICATION >> 198
GRADES (UNCOATED CBN) >> 206
TECHNICAL INFO >> 1971
GRADES (COATED CBN) >> 200
APPLICABLE HOLDER PAGE (BORING BARS) >> 422
ISO13399 PROPERTY >> 1966

Stock status indication (1 insert in one case TNP-**:The order number is for a 10-insert pack.) :
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✠: Unstable Cutting

Work Material																								
	H	Hardened Materials	◐	●	●	◐	✠	●	◐	◐	●	◐	✠											
	K	Cast iron													●	◐								
	S	Heat-resistant Alloy, Titanium Alloy														◐								
		Sintered Alloy															◐	Dimensions (mm)						
Inserts Shape	Order Number		Coated CBN							CBN								IC	S	RE	LE	D1	EPSR	Geometry
			BC8020	BC8105	BC8110	BC8120	BC8130	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020								
	NP-WCMWL30204FA														●			4.76	2.38	0.4	1.9	2.3	80°	
	NP-WCMWL30208FA														●			4.76	2.38	0.8	2.1	2.3	80°	

SP**

CBN

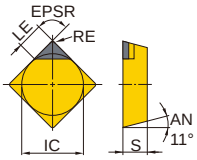
Square, 11° Posi, Without hole

Product Information

90°

IDENTIFICATION >> 198
GRADES (UNCOATED CBN) >> 206
ISO13399 PROPERTY >> 1966
GRADES (COATED CBN) >> 200
TECHNICAL INFO >> 1971

Stock status indication (1 insert in one case TNP-**:The order number is for a 10-insert pack.) :
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✠: Unstable Cutting

Work Material																							
	H	Hardened Materials	◐	●	●	◐	✠	●	◐	◐	●	◐	✠										
	K	Cast iron												●	◐								
	S	Heat-resistant Alloy, Titanium Alloy													◐								
		Sintered Alloy														◐	Dimensions (mm)						
Inserts Shape	Order Number		Coated CBN							CBN							IC	S	RE	LE	EPSR	Geometry	
			BC8020	BC8105	BC8110	BC8120	BC8130	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020							
	SPGN090302													□	□		9.525	3.18	0.2	4.1	90°		
	SPGN090304													●	□		9.525	3.18	0.4	4	90°		
	SPGN090308													●	□		9.525	3.18	0.8	4.1	90°		
	SPGN090312													□	□		9.525	3.18	1.2	4.1	90°		
	SPGN120304													●	●		12.7	3.18	0.4	4	90°		
	SPGN120308													●	●		12.7	3.18	0.8	4.1	90°		
	SPGN120312													□	□		12.7	3.18	1.2	4.1	90°		
	SPGN120408													□	□		12.7	4.76	0.8	4.1	90°		
	SPGN120412													□	□		12.7	4.76	1.2	4.1	90°		

TB**

CBN **Triangular, 5° Posi, Without hole**

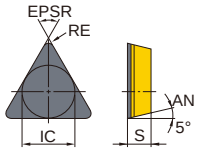
Product Information

60°

IDENTIFICATION >> 198
GRADES (UNCOATED CBN) >> 206
ISO13399 PROPERTY >> 1966
GRADES (COATED CBN) >> 200
TECHNICAL INFO >> 1971

Stock status indication (1 insert in one case TNP-**:The order number is for a 10-insert pack.) :
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✠: Unstable Cutting

Work Material			BC8020	BC8105	BC8110	BC8120	BC8130	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020
	H	Hardened Materials	◐	●	●	◐	✠	●	◐	◐	●	◐	✠			
	K	Cast iron												●	◐	
	S	Heat-resistant Alloy, Titanium Alloy													◐	
		Sintered Alloy														◐

Inserts Shape	Order Number	BC8020	BC8105	BC8110	BC8120	BC8130	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020	IC	S	RE	EPSR	Geometry
		Coated CBN							CBN							Dimensions (mm)				
	TBGN060104									●			●	□		3.97	1.59	0.4	60°	
	TBGN060108									●			●	□		3.97	1.59	0.8	60°	

TP**

CBN

Triangular, 11° Posi, Without hole

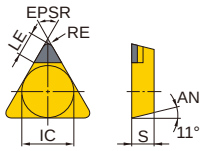
Product Information

60°

IDENTIFICATION >> 198
GRADES (UNCOATED CBN) >> 206
TECHNICAL INFO >> 1971
GRADES (COATED CBN) >> 200
APPLICABLE HOLDER PAGE (BORING BARS) >> 420
ISO13399 PROPERTY >> 1966

Stock status indication (1 insert in one case TNP-**:The order number is for a 10-insert pack.) :
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✠: Unstable Cutting

Work Material			BC8020	BC8105	BC8110	BC8120	BC8130	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020
	H	Hardened Materials	◐	●	●	◐	✠	●	◐	◐	●	◐	✠			
	K	Cast iron												●	◐	
	S	Heat-resistant Alloy, Titanium Alloy													◐	
		Sintered Alloy														◐

Inserts Shape	Order Number	BC8020	BC8105	BC8110	BC8120	BC8130	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020	IC	S	RE	LE	EPSR	Geometry
		Coated CBN							CBN							Dimensions (mm)					
	TPGN090204												□	□		5.56	2.38	0.4	2.6	60°	
	TPGN110302												□	□		6.35	3.18	0.2	2.8	60°	
	TPGN110304												●	●		6.35	3.18	0.4	2.6	60°	
	TPGN110308												□	□		6.35	3.18	0.8	2.3	60°	
	TPGN160304												●	●		9.525	3.18	0.4	3.7	60°	
	TPGN160308												●	●		9.525	3.18	0.8	3.4	60°	
	TPGN160312												□	□		9.525	3.18	1.2	3.1	60°	
	TPGN160408												□	□		9.525	4.76	0.8	3.4	60°	
	TPGN220408												□	□		12.7	4.76	0.8	3.4	60°	

GY**

CBN

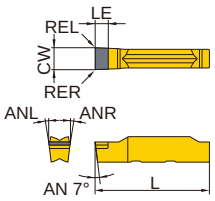
Without hole

Product Information

IDENTIFICATION >> 198
GRADES (UNCOATED CBN) >> 206
TECHNICAL INFO >> 1971
GRADES (COATED CBN) >> 200
APPLICABLE HOLDER PAGE (GY) >>
ISO13399 PROPERTY >> 1966

Stock status indication (1 insert in one case TNP-**:The order number is for a 10-insert pack.) :
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✠: Unstable Cutting

Work Material			BC8020	BC8105	BC8110	BC8120	BC8130	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020
	H	Hardened Materials	◐	●	●	◐	✠	●	◐	◐	●	◐	✠			
	K	Cast iron												●	◐	
	S	Heat-resistant Alloy, Titanium Alloy													◐	
		Sintered Alloy														◐

Inserts Shape	Order Number	BC8020	BC8105	BC8110	BC8120	BC8130	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020	CW	RER REL	L	LE	ANR ANL	Geometry
		Coated CBN							CBN							Dimensions (mm)					
GFGS	GY1G0200D020N-GFGS			●					●							2.0	0.2	20.7	2.7	3°	
	GY1G0239E020N-GFGS			●					●							2.39	0.2	20.7	2.7	7°	
	GY1G0250E020N-GFGS			●					●							2.5	0.2	20.7	2.7	7°	
	GY1G0300F020N-GFGS			●					●							3.0	0.2	20.7	2.7	7°	
	GY1G0318F020N-GFGS			●					●							3.18	0.2	20.7	2.7	7°	
	GY1G0400G020N-GFGS			●					●							4.0	0.2	25.65	2.7	7°	
	GY1G0475H020N-GFGS			●					●							4.75	0.2	25.65	2.7	7°	
	GY1G0500H020N-GFGS			●					●							5.0	0.2	25.65	2.7	7°	
	GY1G0600J020N-GFGS			●												6.0	0.2	25.65	2.7	7°	

RTG

CBN

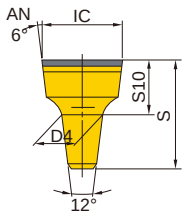
Round, 6° Posi, Without hole

Product Information

IDENTIFICATION >> 198
GRADES (UNCOATED CBN) >> 206
TECHNICAL INFO >> 1971
GRADES (COATED CBN) >> 200
APPLICABLE HOLDER PAGE (EXTERNAL TURNING TOOLS) >> 341
ISO13399 PROPERTY >> 1966

Stock status indication (1 insert in one case TNP-**:The order number is for a 10-insert pack.) :
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Work Material			BC8020	BC8105	BC8110	BC8120	BC8130	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020
			Coated CBN							CBN						
	H	Hardened Materials	◐	●	●	◐	✣	●	◐	◐	●	◐	✣			
	K	Cast iron												●	◐	
	S	Heat-resistant Alloy, Titanium Alloy													◐	
		Sintered Alloy														◐

Inserts Shape	Order Number	BC8020	BC8105	BC8110	BC8120	BC8130	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020	IC	S10	S	D4	Geometry
																Dimensions (mm)				
	RTG05A										●					5	3.5	7.5	2.5	
	RTG06A										●					6	3.5	7.5	3.5	
	RTG07A										●					7	5	11	3.5	
	RTG08A										●					8	5	11	4.5	
	RTG10A										●					10	6.5	14	5.5	

CN**

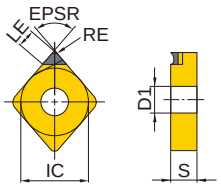
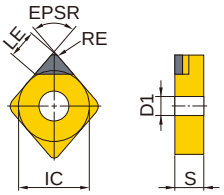
PCD

Rhombic 80°, Neg, With hole

Product Information

IDENTIFICATION >> 198
APPLICABLE HOLDER PAGE (EXTERNAL TURNING TOOLS) >> 296
TECHNICAL INFO >> 1971
GRADES >> 214
APPLICABLE HOLDER PAGE (BORING BARS) >> 440
ISO13399 PROPERTY >> 1966

Stock status indication (1 insert in one case) :
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✠: Unstable Cutting

Work Material	N	Non-Ferrous Metal	●	Dimensions (mm)						
Inserts Shape	Order Number	PCD MD220	IC	S	RE	LE	D1	EPSR	Geometry
R/L-F	NP-CNMM120402L-F	□	12.7	4.76	0.2	1.8	5.16	80°	
	NP-CNMM120402R-F	●	12.7	4.76	0.2	1.8	5.16	80°	
	NP-CNMM120404L-F	□	12.7	4.76	0.4	1.9	5.16	80°	
	NP-CNMM120404R-F	●	12.7	4.76	0.4	1.9	5.16	80°	
	NP-CNMM120408L-F	□	12.7	4.76	0.8	2.1	5.16	80°	
	NP-CNMM120408R-F	●	12.7	4.76	0.8	2.1	5.16	80°	
	CNMA120404	●	12.7	4.76	0.4	3.7	5.16	80°	
	CNMA120408	●	12.7	4.76	0.8	3.6	5.16	80°	

DN**

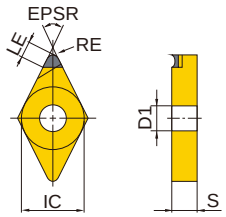
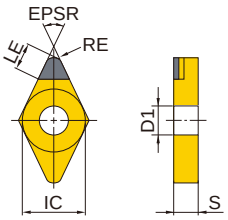
PCD

Rhombic 55°, Neg, With hole

Product Information

IDENTIFICATION >> 198
APPLICABLE HOLDER PAGE (EXTERNAL TURNING TOOLS) >> 300
TECHNICAL INFO >> 1971
GRADES >> 214
APPLICABLE HOLDER PAGE (BORING BARS) >> 401
ISO13399 PROPERTY >> 1966

Stock status indication (1 insert in one case) :
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Work Material	N	Non-Ferrous Metal	●	Dimensions (mm)						
Inserts Shape	Order Number	PCD MD220	IC	S	RE	LE	D1	EPSR	Geometry
R/L-F	NP-DNMM150402L-F	□	12.7	4.76	0.2	1.5	5.16	55°	
	NP-DNMM150402R-F	●	12.7	4.76	0.2	1.5	5.16	55°	
	NP-DNMM150404L-F	□	12.7	4.76	0.4	1.5	5.16	55°	
	NP-DNMM150404R-F	●	12.7	4.76	0.4	1.5	5.16	55°	
	NP-DNMM150408L-F	□	12.7	4.76	0.8	1.7	5.16	55°	
	NP-DNMM150408R-F	●	12.7	4.76	0.8	1.7	5.16	55°	
	DNGA150404	●	12.7	4.76	0.4	2.9	5.16	55°	
	DNGA150408	●	12.7	4.76	0.8	2.5	5.16	55°	

SN**

PCD

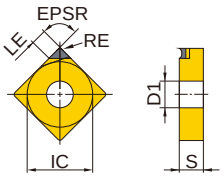
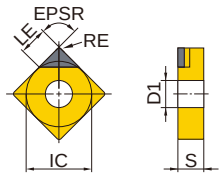
Square, Neg, With hole

Product Information

90°

IDENTIFICATION >> 198
APPLICABLE HOLDER PAGE (EXTERNAL TURNING TOOLS) >> 303
TECHNICAL INFO >> 1971
GRADES >> 214
APPLICABLE HOLDER PAGE (BORING BARS) >> 402
ISO13399 PROPERTY >> 1966

Stock status indication (1 insert in one case) :
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Work Material	N	Non-Ferrous Metal	●	Dimensions (mm)						
Inserts Shape	Order Number		PCD MD220	IC	S	RE	LE	D1	EPSR	Geometry
R/L-F	NP-SNMM120404L-F		□	12.7	4.76	0.4	2.1	5.16	90°	
	NP-SNMM120404R-F		●	12.7	4.76	0.4	2.1	5.16	90°	
	NP-SNMM120408L-F		□	12.7	4.76	0.8	2.3	5.16	90°	
	NP-SNMM120408R-F		●	12.7	4.76	0.8	2.3	5.16	90°	
	SNGA120404		□	12.7	4.76	0.4	3.8	5.16	90°	
	SNGA120408		●	12.7	4.76	0.8	3.8	5.16	90°	

TN**

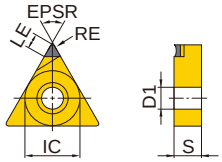
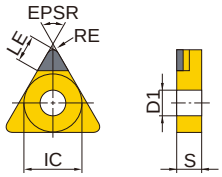
PCD

Triangular, Neg, With hole

Product Information

IDENTIFICATION >> 198
APPLICABLE HOLDER PAGE (EXTERNAL TURNING TOOLS) >> 310
TECHNICAL INFO >> 1971
GRADES >> 214
APPLICABLE HOLDER PAGE (BORING BARS) >> 403
ISO13399 PROPERTY >> 1966

Stock status indication (1 insert in one case) :
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Work Material	N	Non-Ferrous Metal	●	Dimensions (mm)						
Inserts Shape	Order Number	PCD MD220	IC	S	RE	LE	D1	EPSR	Geometry
R/L-F	NP-TNMM160402L-F	□	9.525	4.76	0.2	1.5	3.81	60°	
	NP-TNMM160402R-F	●	9.525	4.76	0.2	1.5	3.81	60°	
	NP-TNMM160404L-F	□	9.525	4.76	0.4	1.6	3.81	60°	
	NP-TNMM160404R-F	●	9.525	4.76	0.4	1.6	3.81	60°	
	NP-TNMM160408L-F	□	9.525	4.76	0.8	1.8	3.81	60°	
	NP-TNMM160408R-F	●	9.525	4.76	0.8	1.8	3.81	60°	
	TNGA160402	●	9.525	4.76	0.2	3.1	3.81	60°	
	TNGA160404	●	9.525	4.76	0.4	3	3.81	60°	
	TNGA160408	●	9.525	4.76	0.8	2.8	3.81	60°	

VN**

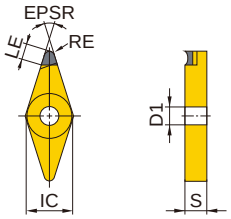
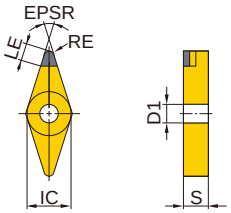
PCD

Rhombic 35°, Neg, With hole

Product Information

IDENTIFICATION >> 198
APPLICABLE HOLDER PAGE (EXTERNAL TURNING TOOLS) >> 314
TECHNICAL INFO >> 1971
GRADES >> 214
APPLICABLE HOLDER PAGE (BORING BARS) >> 404
ISO13399 PROPERTY >> 1966

Stock status indication (1 insert in one case) :
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✠: Unstable Cutting

Work Material	N	Non-Ferrous Metal	●	Dimensions (mm)						
Inserts Shape	Order Number	PCD MD220	IC	S	RE	LE	D1	EPSR	Geometry
R/L-F	NP-VNMM160402L-F	□	9.525	4.76	0.2	1.3	3.81	35°	
	NP-VNMM160402R-F	●	9.525	4.76	0.2	1.3	3.81	35°	
	NP-VNMM160404L-F	□	9.525	4.76	0.4	1.4	3.81	35°	
	NP-VNMM160404R-F	●	9.525	4.76	0.4	1.4	3.81	35°	
	NP-VNMM160408L-F	□	9.525	4.76	0.8	1.5	3.81	35°	
	NP-VNMM160408R-F	●	9.525	4.76	0.8	1.5	3.81	35°	
	VNGA160404	●	9.525	4.76	0.4	2.6	3.81	35°	
	VNGA160408	●	9.525	4.76	0.8	1.8	3.81	35°	

SN**

PCD

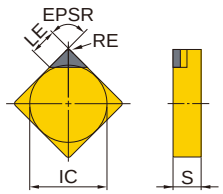
Square, Neg, Without hole

Product Information

90°

IDENTIFICATION >> 198
TECHNICAL INFO >> 1971
GRADES >> 214
ISO13399 PROPERTY >> 1966

Stock status indication (1 insert in one case) :
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Work Material	N	Non-Ferrous Metal	●	Dimensions (mm)					
Inserts Shape	Order Number		PCD MD220	IC	S	RE	LE	EPSR	Geometry
	SNGN120404		□	12.7	4.76	0.4	3.8	90°	
	SNGN120408		●	12.7	4.76	0.8	3.8	90°	

CC**

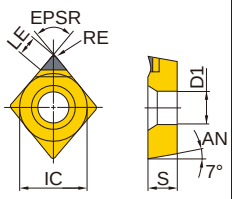
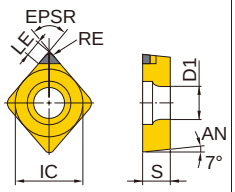
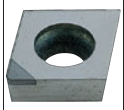
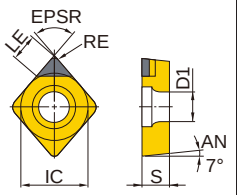
PCD

Rhombic 80°, 7° Posi, With hole

Product Information

IDENTIFICATION >> 198
APPLICABLE HOLDER PAGE (EXTERNAL TURNING TOOLS) >> 322
APPLICABLE HOLDER PAGE (BORING BARS) >> 386
ISO13399 PROPERTY >> 1966
GRADES >> 214
APPLICABLE HOLDER PAGE (SMALL TOOLS) >> 350
TECHNICAL INFO >> 1971

Stock status indication (1 insert in one case) :
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Work Material	N	Non-Ferrous Metal	●	Dimensions (mm)						
Inserts Shape	Order Number	PCD MD220		IC	S	RE	LE	D1	EPSR	Geometry
	NP-CCMH060202	●		6.35	2.38	0.2	1.8	2.8	80°	
	NP-CCMH060204	●		6.35	2.38	0.4	1.9	2.8	80°	
	NP-CCMW03S102	●		3.57	1.39	0.2	1.8	2.0	80°	
	NP-CCMW03S104	●		3.57	1.39	0.4	1.9	2.0	80°	
	NP-CCMW04T002	●		4.37	1.79	0.2	1.8	2.4	80°	
	NP-CCMW04T004	●		4.37	1.79	0.4	1.9	2.4	80°	
	CCMW060202	●		6.35	2.38	0.2	2.9	2.8	80°	
	CCMW060204	●		6.35	2.38	0.4	2.9	2.8	80°	
	CCMW09T302	●		9.525	3.97	0.2	3.3	4.4	80°	
	CCMW09T304	●		9.525	3.97	0.4	3.3	4.4	80°	

CP**

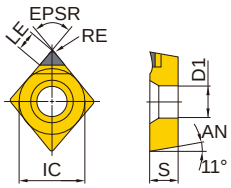
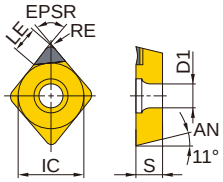
PCD

Rhombic 80°, 11° Posi, With hole

Product Information

IDENTIFICATION >> 198
APPLICABLE HOLDER PAGE (BORING BARS) >> 386
ISO13399 PROPERTY >> 1966
GRADES >> 214
TECHNICAL INFO >> 1971

Stock status indication (1 insert in one case) :
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Work Material	N	Non-Ferrous Metal	●	Dimensions (mm)						
Inserts Shape	Order Number	PCD MD220	IC	S	RE	LE	D1	EPSR	Geometry
	NP-CPMH080202	●	7.94	2.38	0.2	1.8	3.5	80°	
	NP-CPMH080204	●	7.94	2.38	0.4	1.9	3.5	80°	
	NP-CPMH090302	●	9.525	3.18	0.2	1.8	4.5	80°	
	NP-CPMH090304	●	9.525	3.18	0.4	1.9	4.5	80°	
	CPGT080202	●	7.94	2.38	0.2	3.7	3.4	80°	
	CPGT080204	●	7.94	2.38	0.4	3.7	3.4	80°	
	CPGT090302	●	9.525	3.18	0.2	3.3	4.4	80°	
	CPGT090304	●	9.525	3.18	0.4	3.3	4.4	80°	

DC**

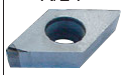
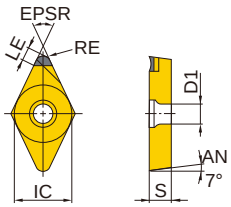
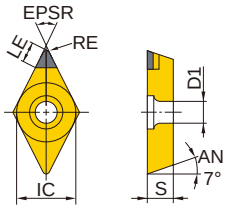
PCD

Rhombic 55°, 7° Posi, With hole

Product Information

IDENTIFICATION >> 198
APPLICABLE HOLDER PAGE (EXTERNAL TURNING TOOLS) >> 323
APPLICABLE HOLDER PAGE (BORING BARS) >> 390
ISO13399 PROPERTY >> 1966
GRADES >> 214
APPLICABLE HOLDER PAGE (SMALL TOOLS) >> 352
TECHNICAL INFO >> 1971

Stock status indication (1 insert in one case) :
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✠: Unstable Cutting

Work Material	N	Non-Ferrous Metal	●	Dimensions (mm)						
Inserts Shape	Order Number		PCD MD220	IC	S	RE	LE	D1	EPSR	Geometry
R/L-F 	NP-DCMT070202L-F		●	6.35	2.38	0.2	1.5	2.8	55°	
	NP-DCMT070202R-F		●	6.35	2.38	0.2	1.5	2.8	55°	
	NP-DCMT070204L-F		●	6.35	2.38	0.4	1.5	2.8	55°	
	NP-DCMT070204R-F		●	6.35	2.38	0.4	1.5	2.8	55°	
	NP-DCMT11T302L-F		●	9.525	3.97	0.2	1.5	4.4	55°	
	NP-DCMT11T302R-F		●	9.525	3.97	0.2	1.5	4.4	55°	
	NP-DCMT11T304L-F		●	9.525	3.97	0.4	1.5	4.4	55°	
	NP-DCMT11T304R-F		●	9.525	3.97	0.4	1.5	4.4	55°	
	DCMW070202		●	6.35	2.38	0.2	2.7	2.8	55°	
	DCMW070204		●	6.35	2.38	0.4	2.6	2.8	55°	
	DCMW11T302		●	9.525	3.97	0.2	3	4.4	55°	
	DCMW11T304		●	9.525	3.97	0.4	2.9	4.4	55°	

SP**

PCD

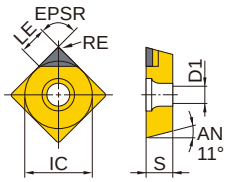
Square, 11° Posi, With hole

Product Information

90°

IDENTIFICATION >> 198
TECHNICAL INFO >> 1971
GRADES >> 214
ISO13399 PROPERTY >> 1966

Stock status indication (1 insert in one case) :
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✠: Unstable Cutting

Work Material	N	Non-Ferrous Metal	●	Dimensions (mm)						
Inserts Shape	Order Number		PCD MD220	IC	S	RE	LE	D1	EPSR	Geometry
	SPGX090304		●	9.525	3.18	0.4	3.8	4.8	90°	
	SPGX090308		●	9.525	3.18	0.8	3.8	4.8	90°	

TC**

PCD

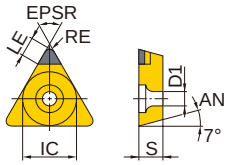
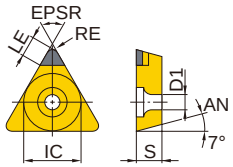
Triangular, 7° Posi, With hole

Product Information

60°

IDENTIFICATION >> 198
APPLICABLE HOLDER PAGE (EXTERNAL TURNING TOOLS) >> 330
TECHNICAL INFO >> 1971
GRADES >> 214
APPLICABLE HOLDER PAGE (BORING BARS) >> 424
ISO13399 PROPERTY >> 1966

Stock status indication (1 insert in one case) :
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✠: Unstable Cutting

Work Material	N	Non-Ferrous Metal	●	Dimensions (mm)						
Inserts Shape	Order Number	PCD MD220	IC	S	RE	LE	D1	EPSR	Geometry
	TCMW110202	●	6.35	2.38	0.2	2.8	2.8	60°	
	TCMW110204	●	6.35	2.38	0.4	2.6	2.8	60°	
	TCGW060102	●	3.97	1.59	0.2	1.5	2.3	60°	
	TCGW060104	●	3.97	1.59	0.4	1.6	2.3	60°	
	TCGW060108	●	3.97	1.59	0.8	1.4	2.3	60°	

TP**

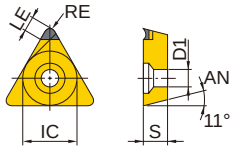
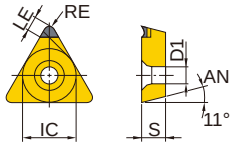
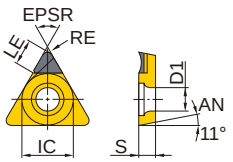
PCD

Triangular, 11° Posi, With hole

Product Information

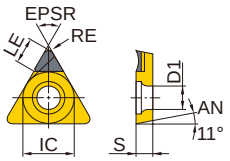
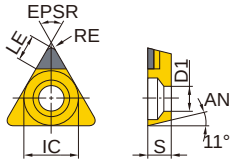
IDENTIFICATION >> 198
APPLICABLE HOLDER PAGE (BORING BARS) >> 418
ISO13399 PROPERTY >> 1966
GRADES >> 214
TECHNICAL INFO >> 1971

Stock status indication (1 insert in one case) :
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✠: Unstable Cutting

Work Material	N	Non-Ferrous Metal	●	Dimensions (mm)						
Inserts Shape	Order Number	PCD MD220		IC	S	RE	LE	D1	EPSR	Geometry
R/L-F	NP-TPMX090202L-F	●		5.56	2.38	0.2	1.5	3.0	60°	
	NP-TPMX090202R-F	●		5.56	2.38	0.2	1.5	3.0	60°	
	NP-TPMX090204L-F	●		5.56	2.38	0.4	1.6	3.0	60°	
	NP-TPMX090204R-F	□		5.56	2.38	0.4	1.6	3.0	60°	
	NP-TPMX090208L-F	●		5.56	2.38	0.8	1.8	3.0	60°	
	NP-TPMX090208R-F	□		5.56	2.38	0.8	1.8	3.0	60°	
	NP-TPMX110302L-F	●		6.35	3.18	0.2	1.5	3.5	60°	
	NP-TPMX110302R-F	□		6.35	3.18	0.2	1.5	3.5	60°	
	NP-TPMX110304L-F	●		6.35	3.18	0.4	1.6	3.5	60°	
	NP-TPMX110304R-F	□		6.35	3.18	0.4	1.6	3.5	60°	
	NP-TPMX110308L-F	●		6.35	3.18	0.8	1.8	3.5	60°	
	NP-TPMX110308R-F	□		6.35	3.18	0.8	1.8	3.5	60°	
	NP-TPMX160302L-F	●		9.525	3.18	0.2	1.5	4.8	60°	
	NP-TPMX160302R-F	□		9.525	3.18	0.2	1.5	4.8	60°	
	NP-TPMX160304L-F	●		9.525	3.18	0.4	1.6	4.8	60°	
	NP-TPMX160304R-F	□		9.525	3.18	0.4	1.6	4.8	60°	
	NP-TPMX160308L-F	●		9.525	3.18	0.8	1.8	4.8	60°	
	NP-TPMX160308R-F	□		9.525	3.18	0.8	1.8	4.8	60°	
R/L-F	NP-TPMH080202L-F	●		4.76	2.38	0.2	1.5	2.4	60°	
	NP-TPMH080202R-F	●		4.76	2.38	0.2	1.5	2.4	60°	
	NP-TPMH080204L-F	●		4.76	2.38	0.4	1.6	2.4	60°	
	NP-TPMH080204R-F	●		4.76	2.38	0.4	1.6	2.4	60°	
	NP-TPMH090202L-F	●		5.56	2.38	0.2	1.5	2.9	60°	
	NP-TPMH090202R-F	●		5.56	2.38	0.2	1.5	2.9	60°	
	NP-TPMH090204L-F	●		5.56	2.38	0.4	1.6	2.9	60°	
	NP-TPMH090204R-F	●		5.56	2.38	0.4	1.6	2.9	60°	
	NP-TPMH110302L-F	●		6.35	3.18	0.2	1.5	3.4	60°	
	NP-TPMH110302R-F	●		6.35	3.18	0.2	1.5	3.4	60°	
	NP-TPMH110304L-F	●		6.35	3.18	0.4	1.6	3.4	60°	
	NP-TPMH110304R-F	●		6.35	3.18	0.4	1.6	3.4	60°	
	NP-TPMH160302L-F	●		9.525	3.18	0.2	1.5	4.4	60°	
	NP-TPMH160302R-F	●		9.525	3.18	0.2	1.5	4.4	60°	
	NP-TPMH160304L-F	●		9.525	3.18	0.4	1.6	4.4	60°	
	NP-TPMH160304R-F	●		9.525	3.18	0.4	1.6	4.4	60°	
R/L-F	TPGT160302L-F	●		9.525	3.18	0.2	3.1	4.4	60°	
	TPGT160302R-F	●		9.525	3.18	0.2	3.1	4.4	60°	
	TPGT160304L-F	●		9.525	3.18	0.4	3	4.4	60°	
	TPGT160304R-F	●		9.525	3.18	0.4	3	4.4	60°	

TP**

Stock status indication (1 insert in one case) :
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✠: Unstable Cutting

Work Material	N	Non-Ferrous Metal	●	Dimensions (mm)						
Inserts Shape	Order Number	PCD MD220	IC	S	RE	LE	D1	EPSR	Geometry
R/L-F	TPGV090202L-F	●	5.56	2.38	0.2	2.8	2.8	60°	
	TPGV090202R-F	●	5.56	2.38	0.2	2.8	2.8	60°	
	TPGV090204L-F	●	5.56	2.38	0.4	2.6	2.8	60°	
	TPGV090204R-F	●	5.56	2.38	0.4	2.6	2.8	60°	
	TPGV110302L-F	●	6.35	3.18	0.2	2.8	3.4	60°	
	TPGV110302R-F	●	6.35	3.18	0.2	2.8	3.4	60°	
	TPGV110304L-F	●	6.35	3.18	0.4	2.6	3.4	60°	
	TPGV110304R-F	●	6.35	3.18	0.4	2.6	3.4	60°	
	TPGX080202	●	4.76	2.38	0.2	1.9	2.5	60°	
	TPGX080204	●	4.76	2.38	0.4	1.7	2.5	60°	
	TPGX080208	●	4.76	2.38	0.8	1.4	2.5	60°	
	TPGX090202	●	5.56	2.38	0.2	2.8	3.0	60°	
	TPGX090204	●	5.56	2.38	0.4	2.6	3.0	60°	
	TPGX090208	●	5.56	2.38	0.8	2.3	3.0	60°	
	TPGX110302	●	6.35	3.18	0.2	2.8	3.5	60°	
	TPGX110304	●	6.35	3.18	0.4	2.6	3.5	60°	
	TPGX110308	●	6.35	3.18	0.8	2.3	3.5	60°	
	TPGX160304	●	9.525	3.18	0.4	3	4.8	60°	
	TPGX160308	●	9.525	3.18	0.8	2.7	4.8	60°	

VB**

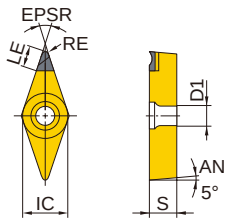
PCD

Rhombic 35°, 5° Posi, With hole

Product Information

IDENTIFICATION >> 198
APPLICABLE HOLDER PAGE (SMALL TOOLS) >> 355
TECHNICAL INFO >> 1971
GRADES >> 214
APPLICABLE HOLDER PAGE (BORING BARS) >> 396
ISO13399 PROPERTY >> 1966

Stock status indication (1 insert in one case) :
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Work Material	N	Non-Ferrous Metal	●	Dimensions (mm)						
Inserts Shape	Order Number		PCD MD220	IC	S	RE	LE	D1	EPSR	Geometry
R/L-F	NP-VBGT110301R-F		●	6.35	3.18	0.1	2.6	2.85	35°	
	NP-VBGT110302R-F		●	6.35	3.18	0.2	2.6	2.85	35°	
	NP-VBGT110304R-F		●	6.35	3.18	0.4	2.5	2.85	35°	
	NP-VBGT1103V5R-F		●	6.35	3.18	0.05	2.5	2.85	35°	

VC**

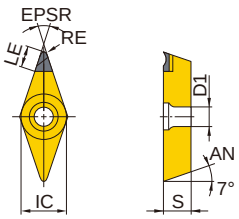
PCD

Rhombic 35°, 7° Posi, With hole

Product Information

IDENTIFICATION >> 198
APPLICABLE HOLDER PAGE (EXTERNAL TURNING TOOLS) >> 331
TECHNICAL INFO >> 1971
GRADES >> 214
APPLICABLE HOLDER PAGE (BORING BARS) >> 396
ISO13399 PROPERTY >> 1966

Stock status indication (1 insert in one case) :
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Work Material	N	Non-Ferrous Metal	●	Dimensions (mm)						
Inserts Shape	Order Number		PCD MD220	IC	S	RE	LE	D1	EPSR	Geometry
R/L-F	NP-VCGT080201R-F		●	4.76	2.38	0.1	2.6	2.4	35°	
	NP-VCGT080202R-F		●	4.76	2.38	0.2	2.6	2.4	35°	
	NP-VCGT080204R-F		●	4.76	2.38	0.4	2.5	2.4	35°	
	NP-VCGT0802V5R-F		●	4.76	2.38	0.05	2.5	2.4	35°	
	NP-VCGT110301R-F		●	6.35	3.18	0.1	2.6	2.8	35°	
	NP-VCGT110302R-F		●	6.35	3.18	0.2	2.6	2.8	35°	
	NP-VCGT110304R-F		●	6.35	3.18	0.4	2.5	2.8	35°	
	NP-VCGT1103V5R-F		●	6.35	3.18	0.05	2.5	2.8	35°	

WC**

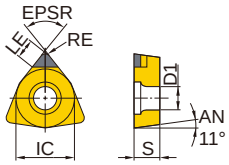
PCD

Trigon, 7° Posi, With hole

Product Information

IDENTIFICATION >> 198
APPLICABLE HOLDER PAGE (BORING BARS) >> 422
ISO13399 PROPERTY >> 1966
GRADES >> 214
TECHNICAL INFO >> 1971

Stock status indication (1 insert in one case) :
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Work Material	N	Non-Ferrous Metal	●	Dimensions (mm)						
Inserts Shape	Order Number		PCD MD220	IC	S	RE	LE	D1	EPSR	Geometry
	WCMW040202		●	6.35	2.38	0.2	2.9	2.8	80°	
	WCMW040204		□	6.35	2.38	0.4	3	2.8	80°	
	WCMW06T304		●	9.525	3.97	0.4	3	4.4	80°	
	WCMW06T308		□	9.525	3.97	0.8	3.3	4.4	80°	
	WCMWL30202		●	4.76	2.38	0.2	1.6	2.3	80°	
	WCMWL30204		□	4.76	2.38	0.4	1.7	2.3	80°	

WP**

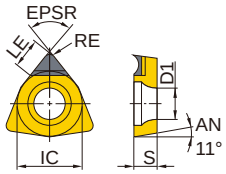
PCD

Trigon, 11° Posi, With hole

Product Information

IDENTIFICATION >> 198
APPLICABLE HOLDER PAGE (BORING BARS) >> 394
ISO13399 PROPERTY >> 1966
GRADES >> 214
TECHNICAL INFO >> 1971

Stock status indication (1 insert in one case) :
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Work Material	N	Non-Ferrous Metal	●	Dimensions (mm)						
Inserts Shape	Order Number		PCD MD220	IC	S	RE	LE	D1	EPSR	Geometry
	WPGT040202		●	6.35	2.38	0.2	2.9	2.8	80°	
	WPGT040204		●	6.35	2.38	0.4	2.9	2.8	80°	
	WPGT060302		●	9.525	3.18	0.2	3.3	4.4	80°	
	WPGT060304		●	9.525	3.18	0.4	3.3	4.4	80°	

DE**

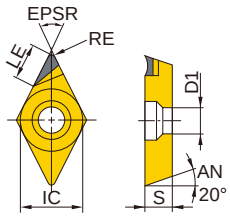
PCD

Rhombic 55°, 20° Posi, With hole

Product Information

IDENTIFICATION >> 198
APPLICABLE HOLDER PAGE (EXTERNAL TURNING TOOLS) >> 336
ISO13399 PROPERTY >> 1966
GRADES >> 214
TECHNICAL INFO >> 1971

Stock status indication (1 insert in one case) :
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Work Material	N	Non-Ferrous Metal	●	Dimensions (mm)						
Inserts Shape	Order Number		PCD MD220	IC	S	RE	LE	D1	EPSR	Geometry
R/L-F	DEGX150402L-F		●	12.7	4.76	0.2	3	5.1	55°	
	DEGX150402R-F		●	12.7	4.76	0.2	3	5.1	55°	
	DEGX150404L-F		●	12.7	4.76	0.4	2.9	5.1	55°	
	DEGX150404R-F		●	12.7	4.76	0.4	2.9	5.1	55°	

TE**

PCD

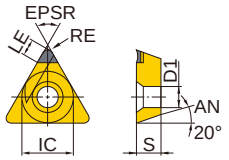
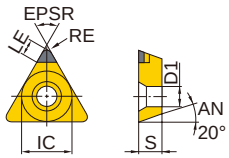
Triangular, 20° Posi, With hole

Product Information

60°

IDENTIFICATION >> 198
APPLICABLE HOLDER PAGE (EXTERNAL TURNING TOOLS) >> 338
TECHNICAL INFO >> 1971
GRADES >> 214
APPLICABLE HOLDER PAGE (BORING BARS) >> 451
ISO13399 PROPERTY >> 1966

Stock status indication (1 insert in one case) :
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Work Material	N	Non-Ferrous Metal	●	Dimensions (mm)						
Inserts Shape	Order Number	PCD MD220	IC	S	RE	LE	D1	EPSR	Geometry
R/L	TEGX160302L	●	9.525	3.18	0.2	3.8	4.4	60°	
	TEGX160302R	●	9.525	3.18	0.2	3.8	4.4	60°	
	TEGX160304L	●	9.525	3.18	0.4	3.7	4.4	60°	
	TEGX160304R	●	9.525	3.18	0.4	3.7	4.4	60°	
	TEGX160302	●	9.525	3.18	0.2	3.1	4.4	60°	
	TEGX160304	●	9.525	3.18	0.4	3	4.4	60°	

VD**

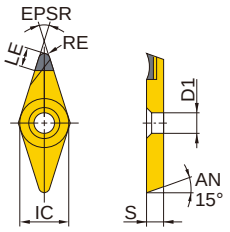
PCD

Rhombic 35°, 15° Posi, With hole

Product Information

IDENTIFICATION >> 198
APPLICABLE HOLDER PAGE (EXTERNAL TURNING TOOLS) >> 340
ISO13399 PROPERTY >> 1966
GRADES >> 214
TECHNICAL INFO >> 1971

Stock status indication (1 insert in one case) :
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting

Work Material	N	Non-Ferrous Metal	●	Dimensions (mm)						
Inserts Shape	Order Number		PCD MD220	IC	S	RE	LE	D1	EPSR	Geometry
R/L-F	VDGX160302L-F		●	9.525	3.18	0.2	3.1	4.5	35°	
	VDGX160302R-F		●	9.525	3.18	0.2	3.1	4.5	35°	
	VDGX160304L-F		●	9.525	3.18	0.4	2.7	4.5	35°	
	VDGX160304R-F		●	9.525	3.18	0.4	2.7	4.5	35°	

SP**

PCD

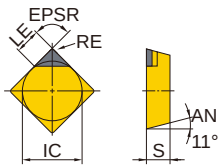
Square, 11° Posi, Without hole

Product Information

90°

IDENTIFICATION >> 198
TECHNICAL INFO >> 1971
GRADES >> 214
ISO13399 PROPERTY >> 1966

Stock status indication (1 insert in one case) :
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✠: Unstable Cutting

Work Material	N	Non-Ferrous Metal	●	Dimensions (mm)					
Inserts Shape	Order Number	PCD MD220	IC	S	RE	LE	EPSR	Geometry
	SPGN090302	●	9.525	3.18	0.2	3.8	90°	
	SPGN090304	●	9.525	3.18	0.4	3.8	90°	
	SPGN090308	●	9.525	3.18	0.8	3.8	90°	
	SPGN090312	□	9.525	3.18	1.2	3.8	90°	
	SPGN120304	●	12.7	3.18	0.4	3.8	90°	
	SPGN120308	●	12.7	3.18	0.8	3.8	90°	
	SPGN120312	●	12.7	3.18	1.2	3.8	90°	

TP**

PCD

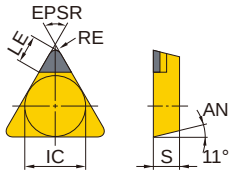
Triangular, 11° Posi, Without hole

Product Information

60°

IDENTIFICATION >> 198
APPLICABLE HOLDER PAGE (BORING BARS) >> 420
ISO13399 PROPERTY >> 1966
GRADES >> 214
TECHNICAL INFO >> 1971

Stock status indication (1 insert in one case) :
●: Inventory maintained in Japan. ▲: This item to be discontinued within two years. □: Non stock, produced to order only.
Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✠: Unstable Cutting

Work Material	N	Non-Ferrous Metal	●	Dimensions (mm)					
Inserts Shape	Order Number	PCD MD220		IC	S	RE	LE	EPSR	Geometry
	TPGN110302	●		6.35	3.18	0.2	2.8	60°	
	TPGN110304	●		6.35	3.18	0.4	2.6	60°	
	TPGN110308	●		6.35	3.18	0.8	2.3	60°	
	TPGN160302	●		9.525	3.18	0.2	3.1	60°	
	TPGN160304	●		9.525	3.18	0.4	3	60°	
	TPGN160308	●		9.525	3.18	0.8	2.7	60°	
	TPGN160312	□		9.525	3.18	1.2	2.4	60°	

TURNING TOOLS

EXTERNAL TURNING TOOLS

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DTGN	311	PSBN	303	SDNE	337
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DVVN	316	PSSN	306	SSSC	329
DWLN	321	PSTN	305	STFE	339
MCLN	298	PTFN	312	STGC	330
MSBN	304	PTGN	310	STGE	338
MSSN	307	PVJN	314	SVJC	331
MTJN	313	PVPN	319	SVJD	340
PCBN	299	PVVN	317	SVPC	333
PCLN	296	PWLN	320	SVVC	332
PDHN	302	SCLC	322	SXZC	334
PDJN	300	SDJC	323	TLHR	341

IDENTIFICATION

LL Type, Double Clamp Type, SP Type, Profile Holder, AL Type

P	C	L	N	R	25	25	M	12
①	②	③	④	⑤	⑥	⑥	⑦	⑧

①Clamp Structure	
D	Double Clamp Type
M	Wedge Lock Type Multiple Clamp Type
P	Lever Lock Type
S	Screw-on Type

②Insert Shape	
C	Rhombic 80°
D	Rhombic 55°
R	Round
S	Square
T	Triangular
V	Rhombic 35°
W	Trigon
X	Special Design

③Cutting Angle	
A	90°Without Offset
B	75°
D	45°Neutral
E	60°
F	90°
G	90°With Offset
H	107°30´
J	93°
K	75°
L	95°
N	62°30´
P	117°30´
Q	105°
S	45°
T	60°
V	72°30´
Z	Special

④Insert Clearance	
C	7°Positive
N	Negative
E	20°Positive

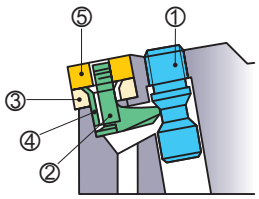
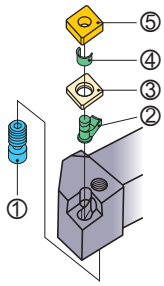
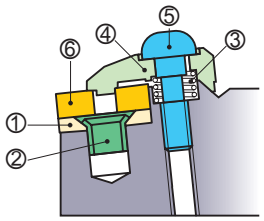
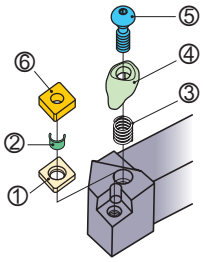
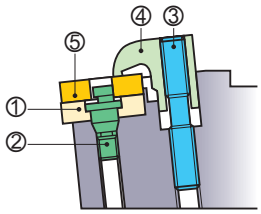
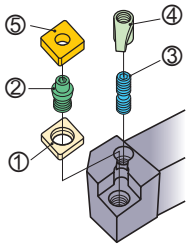
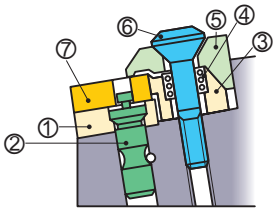
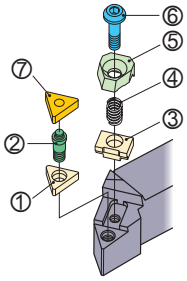
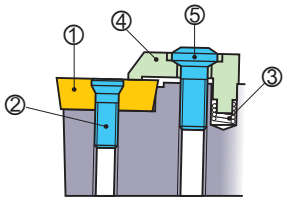
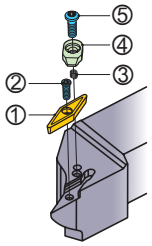
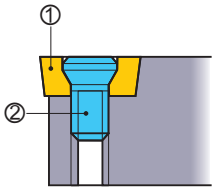
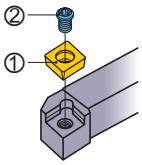
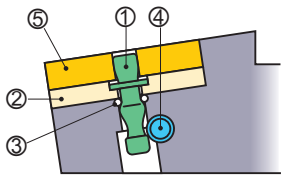
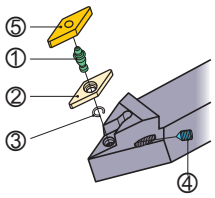
⑤Hand of Tool	
R	Right Hand
L	Left Hand
N	Neutral

⑥Tool Size (mm) (Height and Width)	
8	08
10	10
12	12
16	16
20	20
25	25
32	32

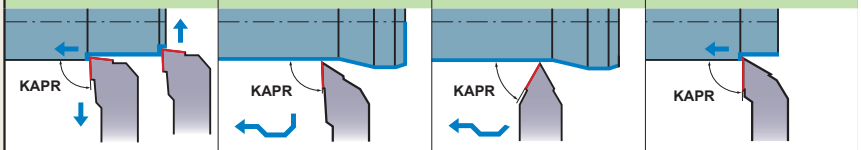
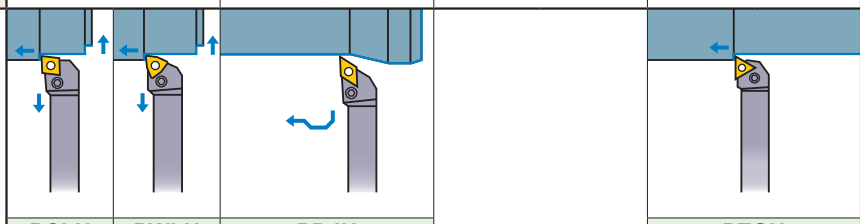
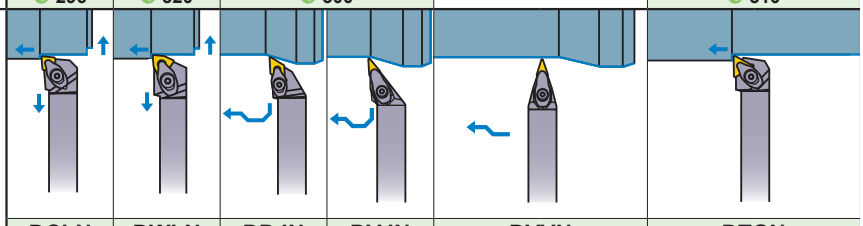
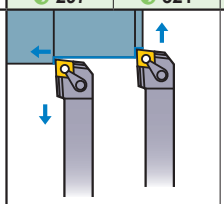
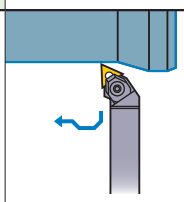
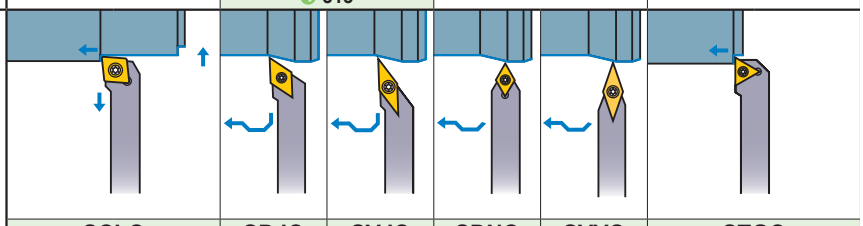
⑦Tool Length (mm)	
D	60
E	70
F	80
H	100
K	125
M	150
P	170
Q	180
R	200

⑧Cutting Edge Length (mm)						
Inscribed Circle	Insert Shape					
	Square	Triangular	Round	Rhombic 80°	Rhombic 55°	Rhombic 35°
6.00	–	–	06	–	–	–
6.35	–	11	–	06	07	11
7.94	–	13	–	–	–	–
8.00	–	–	08	–	–	–
9.525	09	16	–	09	11	16
10.00	–	–	10	–	–	–
12.00	–	–	12	–	–	–
12.70	12	22	–	12	15	–
15.875	15	27	–	16	–	–
16.00	–	–	16	–	–	–
19.05	19	–	–	19	–	–
20.00	–	–	20	–	–	–
25.00	–	–	25	–	–	–
25.40	25	–	–	–	–	–
32.00	–	–	32	–	–	–

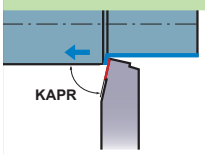
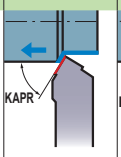
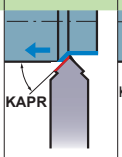
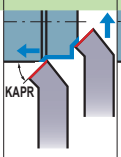
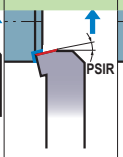
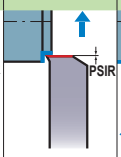
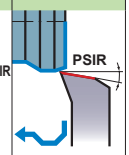
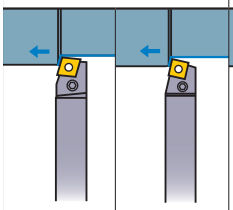
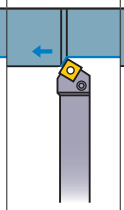
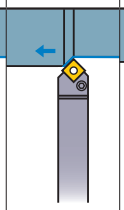
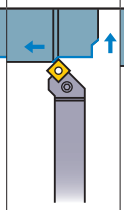
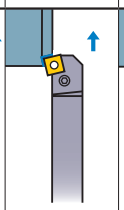
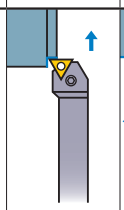
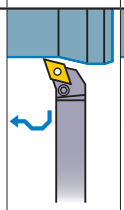
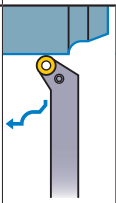
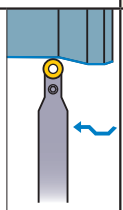
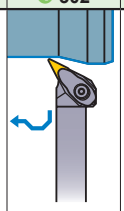
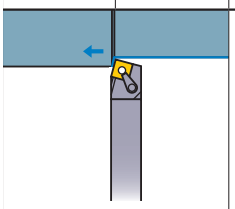
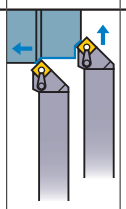
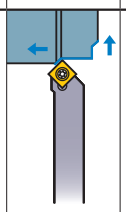
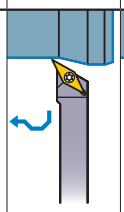
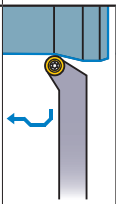
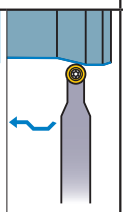
METHOD OF HOLDING

Type (Holder)	Structure		
Lever Lock (LL HOLDER)		①Clamp Screw ②Lever ③Shim ④Shim Pin ⑤Insert	
Double Clamp (DOUBLE CLAMP HOLDER)		①Shim ②Shim Pin ③Spring ④Clamp Bridge ⑤Clamp Screw ⑥Insert	
Multiple Clamp (DOUBLE CLAMP HOLDER) (For heavy cutting)		①Shim ②Shim Pin ③Clamp Screw ④Clamp Bridge ⑤Insert	
Wedge Lock (WP HOLDER)		①Shim ②Shim Pin ③Plate ④Spring ⑤Clamp Bridge ⑥Clamp Screw ⑦Insert	
Two action double clamp (PROFILE HOLDER)		①Insert ②Clamp Screw (1) ③Spring ④Clamp Bridge ⑤Clamp Screw (2)	
Screw-on (SP HOLDER AL HOLDER)		①Insert ②Clamp Screw	
Pin lock (MP HOLDER)		①Lock Pin ②Shim ③Stop Ring ④Lock Screw ⑤Insert	

CLASSIFICATION

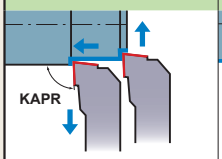
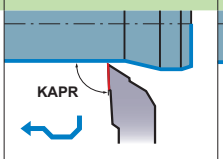
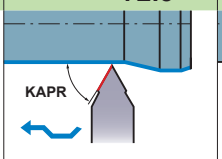
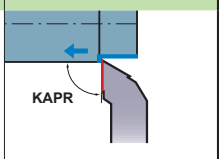
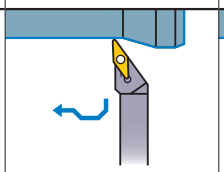
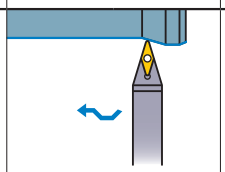
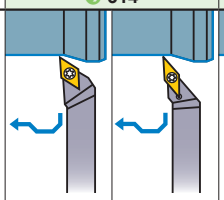
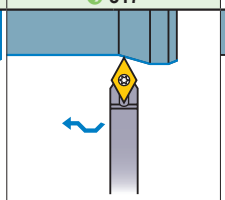
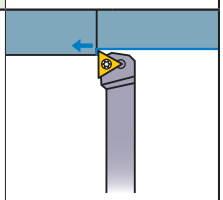
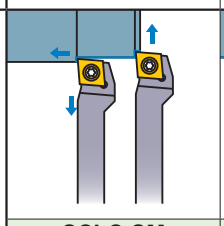
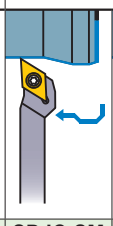
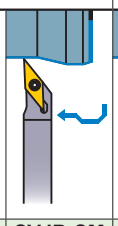
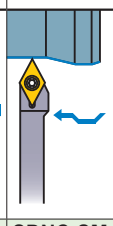
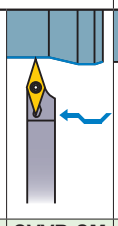
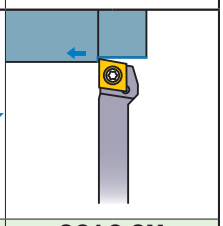
Tool Holder	Features Shank Size (H x W x L)	External Turning Facing		External Turning Copying				External Turning
		KAPR=95°		KAPR=93°		KAPR=63.5° 72.5°		KAPR=90°
								
LL Holder 	● Lever lock type. ● ISO standard. ● Various holder shapes. ● Suitable for light to heavy cutting. ● Economical negative insert. 10 x 10 x 70 / 25 x 25 x 150 12 x 12 x 80 / 32 x 25 x 170 16 x 16 x 100 / 32 x 32 x 170 20 x 20 x 125							
		PCLN ➲ 296	PWLN ➲ 320	PDJN ➲ 300				PTGN ➲ 310
DOUBLE CLAMP Holder 	● New double clamp type. ● Holds inserts securely. ● Excellent cutting edge tolerance. ● Economical negative insert. ● Small insert series. 16 x 16 x 100 / 25 x 25 x 150 20 x 20 x 125 / 32 x 25 x 170							
		DCLN ➲ 297	DWLN ➲ 321	DDJN ➲ 301	DVJN ➲ 315	DVVN ➲ 316		DTGN ➲ 311
DOUBLE CLAMP Holder (For heavy cutting) 	● Double clamp holder type. ● Holds inserts securely. ● Suitable for heavy cutting. ● Negative insert. 32 x 32 x 170 40 x 40 x 200							
		MCLN ➲ 298						
WP Holder 	● Double clamp holder type. ● Simple insert exchange. ● Economical negative insert. 20 x 20 x 125 25 x 25 x 150							
				MTJN ➲ 313				
SP Holder 	● Screw-on type. ● Miniature holder with 7°positive insert. 8 x 8 x 60 10 x 10 x 70 12 x 12 x 80 16 x 16 x 100 20 x 20 x 125 25 x 25 x 150							
		SCLC ➲ 322		SDJC ➲ 323	SVJC ➲ 331	SDNC ➲ 324	SVVC ➲ 332	STGC ➲ 330

CLASSIFICATION

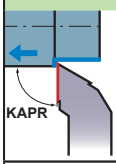
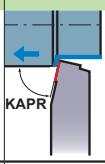
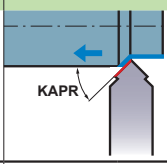
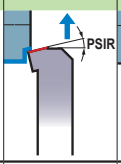
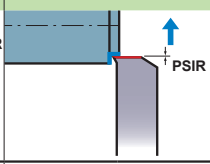
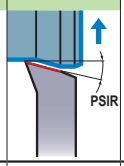
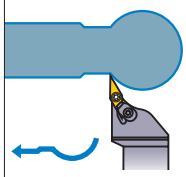
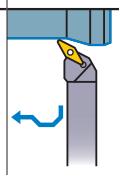
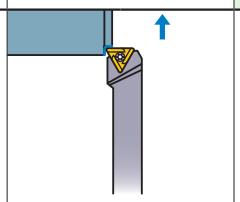
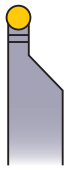
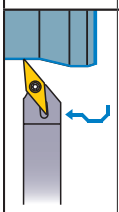
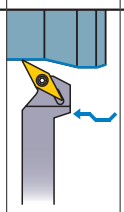
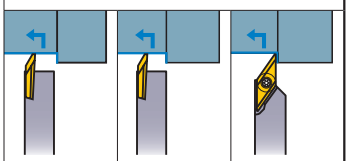
External Turning		External Turning, Chamfering		External Turning, Facing, Chamfering	Facing		Facing, Copying	External Turning, Copying		Selection Standard				
KAPR=75°		KAPR=60°	KAPR=45°	KAPR=45°	PSIR=15°	PSIR=0° –-1°	PSIR=10° –	Special Design		Economical	Low Cutting Resistance (Sharpness)	Clamp Rigidity	Operation Efficiency	Specialised
														
										◎		○	◎	
PCBN ➲ 299	PSBN ➲ 303	PSTN ➲ 305	PSDN ➲ 308	PSSN ➲ 306	PSKN ➲ 309	PTFN ➲ 312	PDHN ➲ 302	PRGC ➲ 325	PRDC ➲ 326					
										◎		◎	◎	
							DVPN ➲ 318							
												◎		
MSBN ➲ 304				MSSN ➲ 307										
										◎		◎	◎	
											○			
				SSSC ➲ 329			SVPC ➲ 333	SRGC ➲ 327	SRDC ➲ 328					

(Note) ◎ : 1st recommendation. ○ : 2nd recommendation.

CLASSIFICATION

Tool Holder	Features Shank Size (H x W x L)	External Turning, Facing	External Turning, Copying			External Turning
		KAPR=99°—95°	KAPR=93°	KAPR=62.5° 72.5°		KAPR=90°
						
Profile Holder 	● Screw-on type. ● 25° rhombic shape insert. ● Possible to machine a face relief with up to 60° inclination. 16 x 16 x 100 20 x 20 x 125 25 x 25 x 150					
MP Holder 	● Pin lock type. ● 35°rhombic shape insert. ● Suitable for recessing. 20 x 20 x 125 25 x 25 x 150		 PVJN 314	 PVVN 317		
AL Holder 	● Screw-on type. ● 20°positive insert. (35°rhombic shape insert is 15°) ● High rake and good sharpness. 16 x 16 x 100 20 x 20 x 125 25 x 25 x 150		 SDJE 336 SVJD 340	 SDNE 337		 STGE 338
TL Holder 	● Taper lock type ● Excellent finished surface with round shape insert. 20 x 20 x 125 25 x 25 x 150 32 x 25 x 170					
SMALL TOOLS (Tools for front turning) 	● Screw-on type. ● Tools to be equipped on gang type tool posts. ● Miniature holder with 7°positive insert. 8 x 8 x 125 10 x 10 x 125 12 x 12 x 150 16 x 16 x 150	 SCLC-SM 351	 SDJC-SM 352  SVJB-SM 355	 SDNC-SM 353  SVVB-SM 356		 SCAC-SM 350
SMALL TOOLS (Tools for back turning) 	● Screw-on type. ● Tools to be equipped on gang type tool posts. ● High rigidity due to designing of vertical insert. (BTA/CTB type) Back machining. ● (BTA/CTB type) 8 x 10 x 120 10 x 10 x 120 12 x 12 x 120 16 x 16 x 120					

CLASSIFICATION

External Turning		External Turning, Chamfering	Facing		Facing, Copying	External Turning, Copying	Selection Standard				
KAPR=95°	KAPR=75°	KAPR=45°	PSIR=27.5°	PSIR=0° —-1°	PSIR=10° –	Special Design	Economical	Low Cutting Resistance (Sharpness)	Clamp Rigidity	Operation Efficiency	Specialised
											
						 SXZC ➲ 334		◎	◎		
					 PVPN ➲ 319		◎			◎	
				 STFE ➲ 339				◎			◎
						 TLHR ➲ 341		○			◎
 SVLP-SM ➲ 354			 SVPP-SM ➲ 357					○			
					Special Design  BTAH ➲ 358 / CTBH ➲ 359 / BTVH ➲ 360			○			

(Note) ◎ : 1st recommendation. ○ : 2nd recommendation.

PCLN

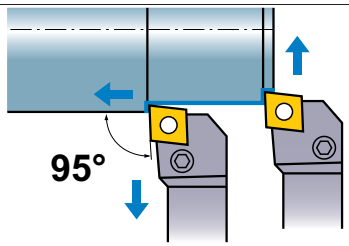
LL HOLDER

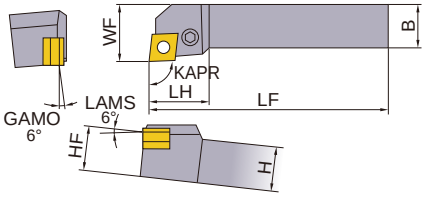
External turning, Facing

Product Information

95° KAPR

RECOMMENDED CUTTING CONDITION >> 175
TURNING INSERTS >> 102
PCD TURNING INSERTS >> 266
TECHNICAL INFO >> 1971
GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 222
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966



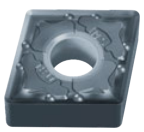


Right hand tool holder shown. Unit: mm

Order Number	Stock	L/R	Insert Number	H	B	LF	LH	HF	WF	KAPR	Shim	Shim Pin	Clamp Lever	Clamp Screw	Wrench
PCLNR1616H09	●	R	CN**09T3	16	16	100	22	16	20	95°	LLSCN3T3	LLP13	LLCL13	LLCS106	HKY25R
PCLNR2020K09	●	R	CN**09T3	20	20	125	22	20	25	95°	LLSCN3T3	LLP13	LLCL13	LLCS106	HKY25R
PCLNR2020K12	●	R	CN**1204	20	20	125	28	20	25	95°	LLSCN42	LLP14	LLCL14	LLCS108	HKY30R
PCLNR2525M09	●	R	CN**09T3	25	25	150	22	25	32	95°	LLSCN3T3	LLP13	LLCL13	LLCS106	HKY25R
PCLNR2525M12	●	R	CN**1204	25	25	150	28	25	32	95°	LLSCN42	LLP14	LLCL14	LLCS108	HKY30R
PCLNR3225P12	●	R	CN**1204	32	25	170	28	32	32	95°	LLSCN42	LLP14	LLCL14	LLCS108	HKY30R
PCLNR3232P16	●	R	CN**1606	32	32	170	32	32	40	95°	LLSCN53	LLP15	LLCL25	LLCS508	HKY30R
PCLNR3232P19	●	R	CN**1906	32	32	170	40	32	40	95°	LLSCN63	LLP16	LLCL16	LLCS310	HKY40R
PCLNL1616H09	●	L	CN**09T3	16	16	100	22	16	20	95°	LLSCN3T3	LLP13	LLCL13	LLCS106	HKY25R
PCLNL2020K09	●	L	CN**09T3	20	20	125	22	20	25	95°	LLSCN3T3	LLP13	LLCL13	LLCS106	HKY25R
PCLNL2020K12	●	L	CN**1204	20	20	125	28	20	25	95°	LLSCN42	LLP14	LLCL14	LLCS108	HKY30R
PCLNL2525M09	●	L	CN**09T3	25	25	150	22	25	32	95°	LLSCN3T3	LLP13	LLCL13	LLCS106	HKY25R
PCLNL2525M12	●	L	CN**1204	25	25	150	28	25	32	95°	LLSCN42	LLP14	LLCL14	LLCS108	HKY30R
PCLNL3225P12	●	L	CN**1204	32	25	170	28	32	32	95°	LLSCN42	LLP14	LLCL14	LLCS108	HKY30R
PCLNL3232P16	●	L	CN**1606	32	32	170	32	32	40	95°	LLSCN53	LLP15	LLCL25	LLCS508	HKY30R
PCLNL3232P19	●	L	CN**1906	32	32	170	40	32	40	95°	LLSCN63	LLP16	LLCL16	LLCS310	HKY40R

- Clamp Torque(N • m) : LLCS106=2.2, LLCS108=3.3, LLCS508=3.3, LLCS310=7.0
- ●: Inventory maintained in Japan.

·CHIP BREAKER EXAMPLE

Finish Cutting	Light Cutting	Medium Cutting	Medium Cutting	Medium Cutting	Medium to Rough Cutting	For Stainless Steel	CBN
FP	LP	MP	MK	Standard	RP	MS	
							
(12)	(12)	(12,16,19)	(12,16,19)	(09,12,16, 19)	(12)	(12,16,19)	(12)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.

DCLN

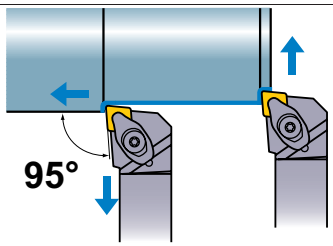
Double clamp holder

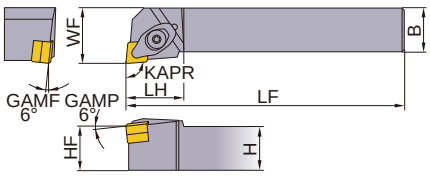
External turning, Facing

Product Information

95° KAPR

RECOMMENDED CUTTING CONDITION >> 175
TURNING INSERTS >> 102
PCD TURNING INSERTS >> 266
TECHNICAL INFO >> 1971
GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 222
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966



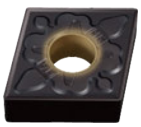
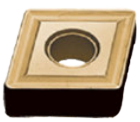
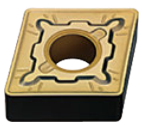
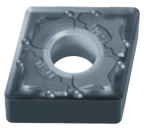


Right hand tool holder shown. Unit: mm

Order Number	Stock	L/R	Insert Number	H	B	LF	LH	HF	WF	KAPR	Shim	Shim Pin	Clamp Bridge	Spring	Clamp Screw	Wrench
DCLNR1616H09	●	R	CN**09T3	16	16	100	25	16	20	95°	LLSCN3T3 (LLSCN33)	LLP23	DCK2211	DCS2	DC0520T	TKY15F
DCLNR2020K09	●	R	CN**09T3	20	20	125	25	20	25	95°	LLSCN3T3 (LLSCN33)	LLP23	DCK2211	DCS2	DC0520T	TKY15F
DCLNR2020K12	●	R	CN**1204	20	20	125	29	20	25	95°	LLSCN42	LLP14	DCK2613	DCS1	DC0621T	TKY20F
DCLNR2525M09	●	R	CN**09T3	25	25	150	25	25	32	95°	LLSCN3T3 (LLSCN33)	LLP23	DCK2211	DCS2	DC0520T	TKY15F
DCLNR2525M12	●	R	CN**1204	25	25	150	29	25	32	95°	LLSCN42	LLP14	DCK2613	DCS1	DC0621T	TKY20F
DCLNR3225P12	●	R	CN**1204	32	25	170	29	32	32	95°	LLSCN42	LLP14	DCK2613	DCS1	DC0621T	TKY20F
DCLNL1616H09	●	L	CN**09T3	16	16	100	25	16	20	95°	LLSCN3T3 (LLSCN33)	LLP23	DCK2211	DCS2	DC0520T	TKY15F
DCLNL2020K09	●	L	CN**09T3	20	20	125	25	20	25	95°	LLSCN3T3 (LLSCN33)	LLP23	DCK2211	DCS2	DC0520T	TKY15F
DCLNL2020K12	●	L	CN**1204	20	20	125	29	20	25	95°	LLSCN42	LLP14	DCK2613	DCS1	DC0621T	TKY20F
DCLNL2525M09	●	L	CN**09T3	25	25	150	25	25	32	95°	LLSCN3T3 (LLSCN33)	LLP23	DCK2211	DCS2	DC0520T	TKY15F
DCLNL2525M12	●	L	CN**1204	25	25	150	29	25	32	95°	LLSCN42	LLP14	DCK2613	DCS1	DC0621T	TKY20F
DCLNL3225P12	●	L	CN**1204	32	25	170	29	32	32	95°	LLSCN42	LLP14	DCK2613	DCS1	DC0621T	TKY20F

- Clamp Torque(N • Clamp Torque (N • m) : DC0520T=3.5, DC0621T=5.0
- Please use shim no. LLSCN33 with 3.18 mm thick inserts. When using 3.18 mm thick inserts, shim should be ordered separately.
- ●: Inventory maintained in Japan.

·CHIP BREAKER EXAMPLE

Finish Cutting	Light Cutting	Medium Cutting	Medium Cutting	Medium Cutting	Medium to Rough Cutting	For Stainless Steel	CBN
FP	LP	MP	MK	Standard	RP	MS	
							
(12)	(12)	(12)	(12)	(09,12)	(12)	(12)	(12)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.

MCLN

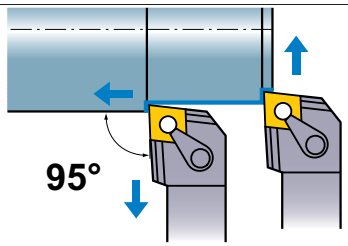
Double clamp holder for heavy cutting

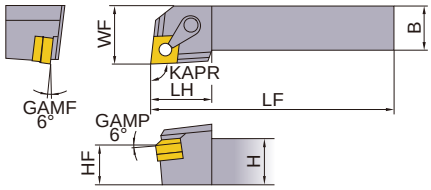
External turning, Facing

Product Information

95° KAPR

RECOMMENDED CUTTING CONDITION >> 175
TURNING INSERTS >> 102
PCD TURNING INSERTS >> 266
TECHNICAL INFO >> 1971
GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 222
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966



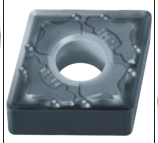
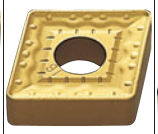


Right hand tool holder shown. Unit: mm

Order Number	Stock	L/R	Insert Number	H	B	LF	LH	HF	WF	KAPR	Shim	Shim Pin	Clamp Bridge	Clamp Screw	Wrench
MCLNR3232P19	●	R	CN**1906	32	32	170	36	32	40	95°	MSCN63	MP6	CKW6	LS25	HKY40R
MCLNR4040R19	●	R	CN**1906	40	40	200	36	40	50	95°	MSCN63	MP6	CKW6	LS25	HKY40R

- Clamp Torque(N • m) : LS25=8.2
- ●: Inventory maintained in Japan.

·CHIP BREAKER EXAMPLE

Medium Cutting	Medium Cutting	Medium Cutting	Medium to Rough Cutting	Heavy	Heavy	Heavy	M Class
MH	Standard	MS	RP	HZ	HX	HV	Flat Top
							
(19)	(19)	(19)	(19)	(19)	(19)	(19)	(19)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.

PCBN

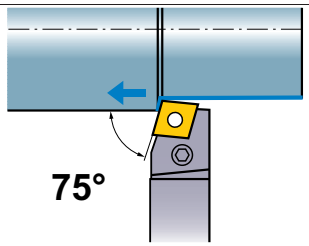
LL HOLDER

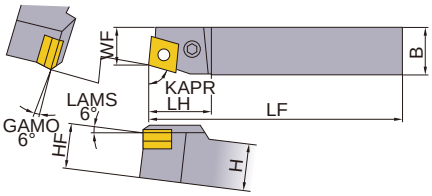
External turning

Product Information

75° KAPR

RECOMMENDED CUTTING CONDITION >> 175
TURNING INSERTS >> 102
PCD TURNING INSERTS >> 266
TECHNICAL INFO >> 1971
GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 222
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966



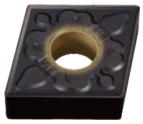
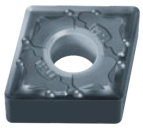


Right hand tool holder shown. Unit: mm

Order Number	Stock	L/R	Insert Number	H	B	LF	LH	HF	WF	KAPR	Shim	Shim Pin	Clamp Lever	Clamp Screw	Wrench
PCBNR2020K12	●	R	CN**1204	20	20	125	28	20	17	75°	LLSCN42	LLP14	LLCL14	LLCS108	HKY30R
PCBNR2525M12	●	R	CN**1204	25	25	150	25	25	22	75°	LLSCN42	LLP14	LLCL14	LLCS108	HKY30R
PCBNL2020K12	●	L	CN**1204	20	20	125	28	20	17	75°	LLSCN42	LLP14	LLCL14	LLCS108	HKY30R
PCBNL2525M12	●	L	CN**1204	25	25	150	25	25	22	75°	LLSCN42	LLP14	LLCL14	LLCS108	HKY30R

- Clamp Torque(N • m) : LLCS108=3.3
- ●: Inventory maintained in Japan.

·CHIP BREAKER EXAMPLE

Finish Cutting	Light Cutting	Medium Cutting	Medium Cutting	Medium Cutting	Medium to Rough Cutting	For Stainless Steel
FP	LP	MP	MK	Standard	RP	MS
						
(12)	(12)	(12)	(12)	(12)	(12)	(12)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.

PDJN

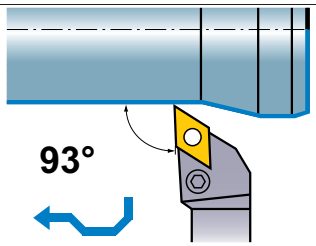
LL HOLDER

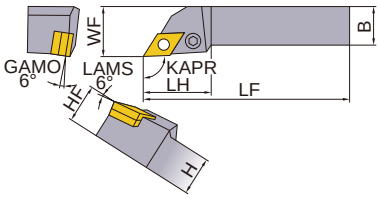
External turning, Copying

Product Information

93° KAPR

RECOMMENDED CUTTING CONDITION >> 175
TURNING INSERTS >> 108
PCD TURNING INSERTS >> 267
TECHNICAL INFO >> 1971
GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 226
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966



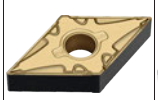
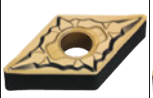
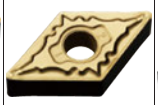
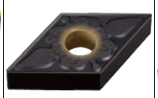
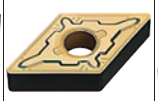
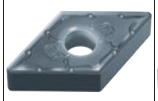
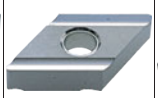
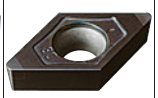


Right hand tool holder shown. Unit: mm

Order Number	Stock	L/R	Insert Number	H	B	LF	LH	HF	WF	KAPR	Shim	Shim Pin	Clamp Lever	Clamp Screw	Wrench
PDJNR2020K15	●	R	DN**1504	20	20	125	35	20	25	93°	LLSDN43 (LLSDN42)	LLP14	LLCL24	LLCS108	HKY30R
PDJNR2525M15	●	R	DN**1504	25	25	150	35	25	32	93°	LLSDN43 (LLSDN42)	LLP14	LLCL24	LLCS108	HKY30R
PDJNR3225P15	●	R	DN**1504	32	25	170	35	32	32	93°	LLSDN43 (LLSDN42)	LLP14	LLCL24	LLCS108	HKY30R
PDJNL2020K15	●	L	DN**1504	20	20	125	35	20	25	93°	LLSDN43 (LLSDN42)	LLP14	LLCL24	LLCS108	HKY30R
PDJNL2525M15	●	L	DN**1504	25	25	150	35	25	32	93°	LLSDN43 (LLSDN42)	LLP14	LLCL24	LLCS108	HKY30R
PDJNL3225P15	●	L	DN**1504	32	25	170	35	32	32	93°	LLSDN43 (LLSDN42)	LLP14	LLCL24	LLCS108	HKY30R

- Clamp Torque(N • m) : LLCS108=3.3
- Please use shim no. LLSDN42 with 6.35 mm thick inserts. When using 6.35 mm thick inserts, shim should be ordered separately.
- ●: Inventory maintained in Japan.

·CHIP BREAKER EXAMPLE

Finish Cutting	Light Cutting	Medium Cutting	Medium Cutting	Medium to Rough Cutting	For Stainless Steel	G class	CBN
FP	LP	MP	MK	RP	MS	R/L	
							
(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.

DDJN

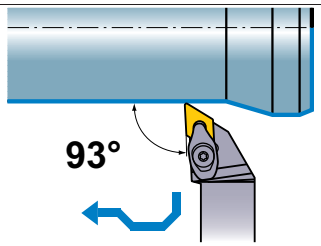
Double clamp holder

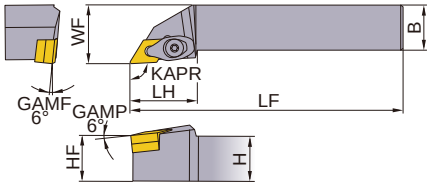
External turning, Copying

Product Information

93° KAPR

RECOMMENDED CUTTING CONDITION >> 175
TURNING INSERTS >> 108
PCD TURNING INSERTS >> 267
TECHNICAL INFO >> 1971
GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 226
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966



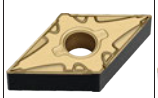
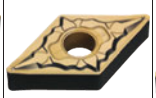
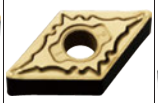
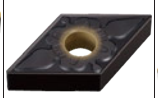
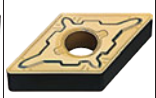
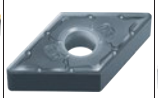
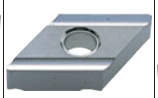
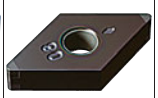


Right hand tool holder shown. Unit: mm

Order Number	Stock	L/R	Insert Number	H	B	LF	LH	HF	WF	KAPR	Shim	Shim Pin	Clamp Bridge	Spring	Clamp Screw	Wrench
DDJNR1616H11	●	R	DN**1104	16	16	100	28	16	20	93°	LLSDN32	LLP23	DCK2211	DCS2	DC0520T	TKY15F
DDJNR2020K11	●	R	DN**1104	20	20	125	28	20	25	93°	LLSDN32	LLP23	DCK2211	DCS2	DC0520T	TKY15F
DDJNR2020K15	●	R	DN**1504	20	20	125	37	20	25	93°	LLSDN43 (LLSDN42)	LLP24	DCK2613	DCS1	DC0621T	TKY20F
DDJNR2525M11	●	R	DN**1104	25	25	150	28	25	32	93°	LLSDN32	LLP23	DCK2211	DCS2	DC0520T	TKY15F
DDJNR2525M15	●	R	DN**1504	25	25	150	37	25	32	93°	LLSDN43 (LLSDN42)	LLP24	DCK2613	DCS1	DC0621T	TKY20F
DDJNR3225P11	●	R	DN**1104	32	25	170	28	32	32	93°	LLSDN32	LLP23	DCK2211	DCS2	DC0520T	TKY15F
DDJNR3225P15	●	R	DN**1504	32	25	170	37	32	32	93°	LLSDN43 (LLSDN42)	LLP24	DCK2613	DCS1	DC0621T	TKY20F
DDJNL1616H11	●	L	DN**1104	16	16	100	28	16	20	93°	LLSDN32	LLP23	DCK2211	DCS2	DC0520T	TKY15F
DDJNL2020K11	●	L	DN**1104	20	20	125	28	20	25	93°	LLSDN32	LLP23	DCK2211	DCS2	DC0520T	TKY15F
DDJNL2020K15	●	L	DN**1504	20	20	125	37	20	25	93°	LLSDN43 (LLSDN42)	LLP24	DCK2613	DCS1	DC0621T	TKY20F
DDJNL2525M11	●	L	DN**1104	25	25	150	28	25	32	93°	LLSDN32	LLP23	DCK2211	DCS2	DC0520T	TKY15F
DDJNL2525M15	●	L	DN**1504	25	25	150	37	25	32	93°	LLSDN43 (LLSDN42)	LLP24	DCK2613	DCS1	DC0621T	TKY20F
DDJNL3225P11	●	L	DN**1104	32	25	170	28	32	32	93°	LLSDN32	LLP23	DCK2211	DCS2	DC0520T	TKY15F
DDJNL3225P15	●	L	DN**1504	32	25	170	37	32	32	93°	LLSDN43 (LLSDN42)	LLP24	DCK2613	DCS1	DC0621T	TKY20F

- Clamp Torque(N • Clamp Torque (N • m) : DC0520T=3.5, DC0621T=5.0
- Please use shim no. LLSDN42 with 6.35 mm thick inserts. When using 6.35 mm thick inserts, shim should be ordered separately.
- ●: Inventory maintained in Japan.

·CHIP BREAKER EXAMPLE

Finish Cutting	Light Cutting	Medium Cutting	Medium Cutting	Medium to Rough Cutting	For Stainless Steel	G class	CBN
FP	LP	MP	MK	RP	MS	R/L	
							
(15)	(11,15)	(15)	(11,15)	(15)	(11,15)	(15)	(15)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.

PDHN

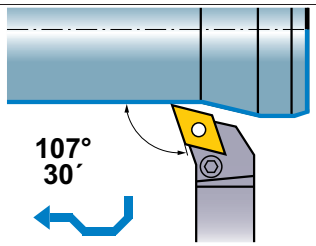
LL HOLDER

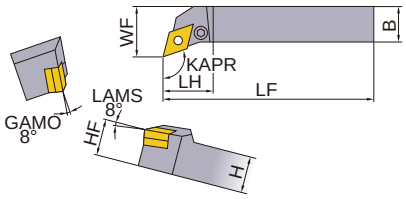
Facing, Copying

Product Information

107° 30´ KAPR

RECOMMENDED CUTTING CONDITION >> 175
TURNING INSERTS >> 108
PCD TURNING INSERTS >> 267
TECHNICAL INFO >> 1971
GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 226
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966



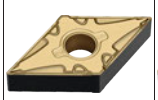
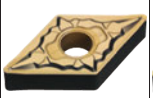
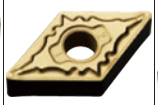
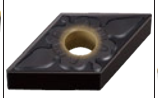
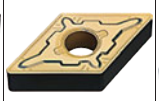
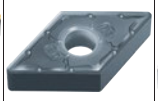
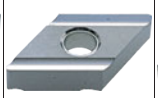
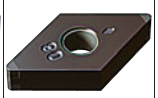


Right hand tool holder shown. Unit: mm

Order Number	Stock	L/R	Insert Number	H	B	LF	LH	HF	WF	KAPR	Shim	Shim Pin	Clamp Lever	Clamp Screw	Wrench
PDHNR2020K15	●	R	DN**1504	20	20	125	34	20	25	107.5°	LLSDN43 (LLSDN42)	LLP14	LLCL24	LLCS108	HKY30R
PDHNR2525M15	●	R	DN**1504	25	25	150	34	25	32	107.5°	LLSDN43 (LLSDN42)	LLP14	LLCL24	LLCS108	HKY30R
PDHNR3225P15	●	R	DN**1504	32	25	170	34	32	32	107.5°	LLSDN43 (LLSDN42)	LLP14	LLCL24	LLCS108	HKY30R
PDHNL2020K15	●	L	DN**1504	20	20	125	34	20	25	107.5°	LLSDN43 (LLSDN42)	LLP14	LLCL24	LLCS108	HKY30R
PDHNL2525M15	●	L	DN**1504	25	25	150	34	25	32	107.5°	LLSDN43 (LLSDN42)	LLP14	LLCL24	LLCS108	HKY30R
PDHNL3225P15	●	L	DN**1504	32	25	170	34	32	32	107.5°	LLSDN43 (LLSDN42)	LLP14	LLCL24	LLCS108	HKY30R

- Clamp Torque(N • m) : LLCS108=3.3
- Please use shim no. LLSDN42 with 6.35 mm thick inserts. When using 6.35 mm thick inserts, shim should be ordered separately.
- ●: Inventory maintained in Japan.

·CHIP BREAKER EXAMPLE

Finish Cutting	Light Cutting	Medium Cutting	Medium Cutting	Medium to Rough Cutting	For Stainless Steel	G class	CBN
FP	LP	MP	MK	RP	MS	R/L	
							
(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.

PSBN

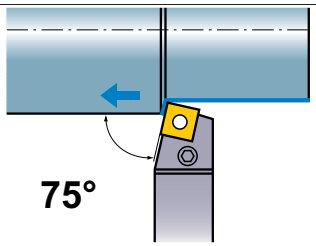
LL HOLDER

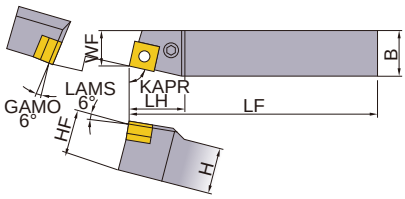
External turning

Product Information

75° KAPR

RECOMMENDED CUTTING CONDITION >> 175
TURNING INSERTS >> 115
PCD TURNING INSERTS >> 268
TECHNICAL INFO >> 1971
GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 230
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966





Right hand tool holder shown. Unit: mm

Order Number	Stock	L/R	Insert Number	H	B	LF	LH	HF	WF	KAPR	Shim	Shim Pin	Lever Spring	Clamp Lever	Clamp Screw	Wrench
PSBNR1212F09	●	R	SN**0903	12	12	80	20	12	13	75°			HLS2	LLCL13S	LLCS105	HKY20R
PSBNR1616H09	●	R	SN**0903	16	16	100	22	16	13	75°	LLSSN33	LLP23		LLCL13	LLCS106	HKY25R
PSBNR2020K12	●	R	SN**1204	20	20	125	28	20	17	75°	LLSSN42	LLP14		LLCL14	LLCS108	HKY30R
PSBNR2525M12	●	R	SN**1204	25	25	150	25	25	22	75°	LLSSN42	LLP14		LLCL14	LLCS108	HKY30R
PSBNR2525M15	●	R	SN**1506	25	25	150	33	25	22	75°	LLSSN53	LLP15		LLCL25	LLCS508	HKY30R
PSBNR3232P19	●	R	SN**1906	32	32	170	40	32	27	75°	LLSSN63	LLP16		LLCL16	LLCS310	HKY40R
PSBNL1212F09	●	L	SN**0903	12	12	80	20	12	13	75°			HLS2	LLCL13S	LLCS105	HKY20R
PSBNL1616H09	●	L	SN**0903	16	16	100	22	16	13	75°	LLSSN33	LLP23		LLCL13	LLCS106	HKY25R
PSBNL2020K12	●	L	SN**1204	20	20	125	28	20	17	75°	LLSSN42	LLP14		LLCL14	LLCS108	HKY30R
PSBNL2525M12	●	L	SN**1204	25	25	150	25	25	22	75°	LLSSN42	LLP14		LLCL14	LLCS108	HKY30R
PSBNL2525M15	●	L	SN**1506	25	25	150	33	25	22	75°	LLSSN53	LLP15		LLCL25	LLCS508	HKY30R
PSBNL3232P19	●	L	SN**1906	32	32	170	40	32	27	75°	LLSSN63	LLP16		LLCL16	LLCS310	HKY40R

- Clamp Torque(N • m) : LLCS105=1.5, LLCS106=2.2, LLCS108=3.3, LLCS508=3.3, LLCS310=7.0
- ●: Inventory maintained in Japan.

·CHIP BREAKER EXAMPLE

Finish Cutting	Light Cutting	Medium Cutting	Medium Cutting	Medium to Rough Cutting	For Stainless Steel	G class	CBN
FP	LP	MP	MK	RP	MS	R/L	
(12)	(12)	(12,15,19)	(12)	(12)	(12,15,19)	(09,12)	(12)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.

MSBN

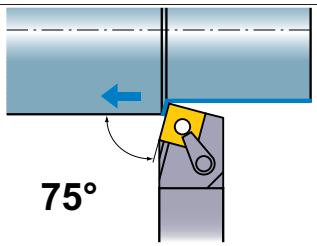
Double clamp holder for heavy cutting

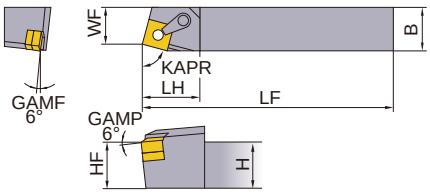
External turning

Product Information

75° KAPR

RECOMMENDED CUTTING CONDITION >> 175
TURNING INSERTS >> 115
PCD TURNING INSERTS >> 268
TECHNICAL INFO >> 1971
GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 230
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966





Right hand tool holder shown. Unit: mm

Order Number	Stock	L/R	Insert Number	H	B	LF	LH	HF	WF	KAPR	Shim	Shim Pin	Clamp Bridge	Clamp Screw	Wrench
MSBNR3232P19	●	R	SN**1906	32	32	170	41	32	27	75°	MSSN63	MP6	CKW6	LS25	HKY40R
MSBNR4040R19	●	R	SN**1906	40	40	200	41	40	35	75°	MSSN63	MP6	CKW6	LS25	HKY40R

- Clamp Torque(N • m) : LS25=8.2
- ●: Inventory maintained in Japan.

·CHIP BREAKER EXAMPLE

Medium Cutting	Medium Cutting	Medium Cutting	Medium to Rough Cutting	Heavy	Heavy	Heavy	M Class
MH	Standard	MS	RP	HZ	HX	HV	Flat Top
(19)	(19)	(19)	(19)	(19)	(19)	(19)	(19)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.

PSTN

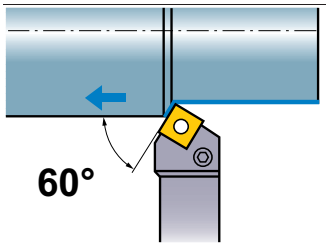
LL HOLDER

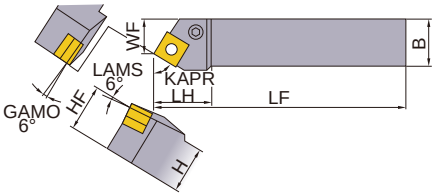
External turning, Chamfering

Product Information

60° KAPR

RECOMMENDED CUTTING CONDITION >> 175
TURNING INSERTS >> 115
PCD TURNING INSERTS >> 268
TECHNICAL INFO >> 1971
GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 230
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966





Right hand tool holder shown. Unit: mm

Order Number	Stock	L/R	Insert Number	H	B	LF	LH	HF	WF	KAPR	Shim	Shim Pin	Clamp Lever	Clamp Screw	Wrench
PSTNR1616H09	●	R	SN**0903	16	16	100	20	16	13	60°	LLSSN33	LLP23	LLCL13	LLCS106	HKY25R
PSTNR2020K12	●	R	SN**1204	20	20	125	25	20	17	60°	LLSSN42	LLP14	LLCL14	LLCS108	HKY30R
PSTNR2525M12	●	R	SN**1204	25	25	150	25	25	22	60°	LLSSN42	LLP14	LLCL14	LLCS108	HKY30R
PSTNL1616H09	●	L	SN**0903	16	16	100	20	16	13	60°	LLSSN33	LLP23	LLCL13	LLCS106	HKY25R
PSTNL2020K12	●	L	SN**1204	20	20	125	25	20	17	60°	LLSSN42	LLP14	LLCL14	LLCS108	HKY30R
PSTNL2525M12	●	L	SN**1204	25	25	150	25	25	22	60°	LLSSN42	LLP14	LLCL14	LLCS108	HKY30R

- Clamp Torque(N • m) : LLCS106=2.2, LLCS108=3.3
- ●: Inventory maintained in Japan.

·CHIP BREAKER EXAMPLE

Finish Cutting	Light Cutting	Medium Cutting	Medium Cutting	Medium to Rough Cutting	For Stainless Steel	G class	CBN
FP	LP	MP	MK	RP	MS	R/L	
(12)	(12)	(12)	(12)	(12)	(12)	(09,12)	(12)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.

PSSN

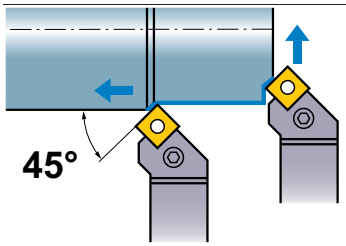
LL HOLDER

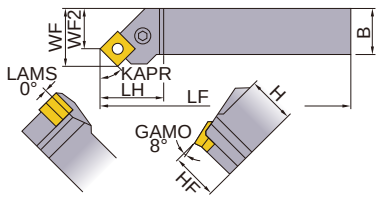
External turning, Facing, Chamfering

Product Information

45° KAPR

RECOMMENDED CUTTING CONDITION >> 175
TURNING INSERTS >> 115
PCD TURNING INSERTS >> 268
TECHNICAL INFO >> 1971
GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 230
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966





Right hand tool holder shown. Unit: mm

Order Number	Stock	L/R	Insert Number	H	B	LF	LH	HF	WF	WF2	KAPR	Shim	Shim Pin	Clamp Lever	Clamp Screw	Wrench
PSSNR1616H09	●	R	SN**0903	16	16	100	22	16	20	14	45°	LLSSN33	LLP23	LLCL13	LLCS106	HKY25R
PSSNR2020K12	●	R	SN**1204	20	20	125	31	20	25	17	45°	LLSSN42	LLP14	LLCL14	LLCS108	HKY30R
PSSNR2525M12	●	R	SN**1204	25	25	150	31	25	32	24	45°	LLSSN42	LLP14	LLCL14	LLCS108	HKY30R
PSSNR3232P15	●	R	SN**1506	32	32	170	34	32	40	29	45°	LLSSN53	LLP15	LLCL25	LLCS508	HKY30R
PSSNR3232P19	●	R	SN**1906	32	32	170	40	32	40	27	45°	LLSSN63	LLP16	LLCL16	LLCS310	HKY40R
PSSNL1616H09	●	L	SN**0903	16	16	100	22	16	20	14	45°	LLSSN33	LLP23	LLCL13	LLCS106	HKY25R
PSSNL2020K12	●	L	SN**1204	20	20	125	31	20	25	17	45°	LLSSN42	LLP14	LLCL14	LLCS108	HKY30R
PSSNL2525M12	●	L	SN**1204	25	25	150	31	25	32	24	45°	LLSSN42	LLP14	LLCL14	LLCS108	HKY30R
PSSNL3232P15	●	L	SN**1506	32	32	170	34	32	40	29	45°	LLSSN53	LLP15	LLCL25	LLCS508	HKY30R
PSSNL3232P19	●	L	SN**1906	32	32	170	40	32	40	27	45°	LLSSN63	LLP16	LLCL16	LLCS310	HKY40R

- When using insert with right or left hand breaker, please use left hand insert for right hand holder and right hand insert for left hand holder.
- Clamp Torque(N • m) : LLCS106=2.2, LLCS108=3.3, LLCS508=3.3, LLCS310=7.0
- ●: Inventory maintained in Japan.

·CHIP BREAKER EXAMPLE

Finish Cutting	Light Cutting	Medium Cutting	Medium Cutting	Medium to Rough Cutting	For Stainless Steel	G class	CBN
FP	LP	MP	MK	RP	MS	R/L	
(12)	(12)	(12,15,19)	(12)	(12)	(12,15,19)	(09,12)	(12)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.

MSSN

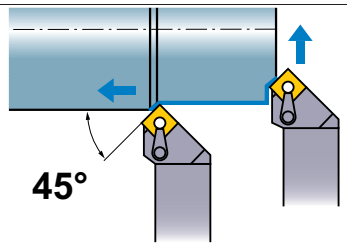
Double clamp holder for heavy cutting

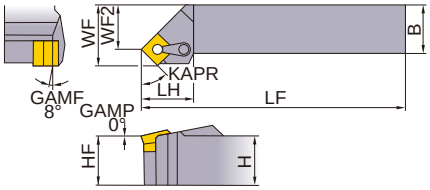
External turning, Facing, Chamfering

Product Information

45° KAPR

RECOMMENDED CUTTING CONDITION >> 175
TURNING INSERTS >> 115
PCD TURNING INSERTS >> 268
TECHNICAL INFO >> 1971
GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 230
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966





Right hand tool holder shown. Unit: mm

Order Number	Stock	L/R	Insert Number	H	B	LF	LH	HF	WF	WF2	KAPR	Shim	Shim Pin	Clamp Bridge	Clamp Screw	Wrench
MSSNR3232P19	●	R	SN**1906	32	32	170	44	32	40	27	45°	MSSN63	MP6	CKW6	LS25	HKY40R
MSSNR4040R19	●	R	SN**1906	40	40	200	44	40	50	37	45°	MSSN63	MP6	CKW6	LS25	HKY40R

- Clamp Torque(N • m) : LS25=8.2
- ●: Inventory maintained in Japan.

·CHIP BREAKER EXAMPLE

Medium Cutting	Medium Cutting	Medium Cutting	Roughing	Heavy	Heavy	Heavy	M Class
MH	Standard	MS	RP	HZ	HX	HV	Flat Top
(19)	(19)	(19)	(19)	(19)	(19)	(19)	(19)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.

PSDN

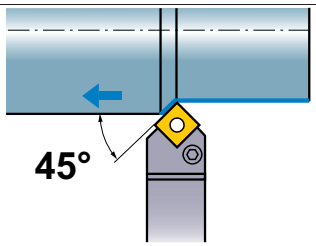
LL HOLDER

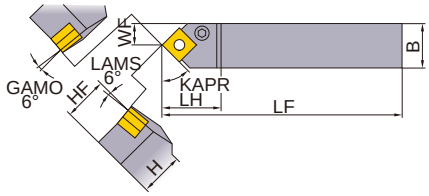
External turning, Chamfering

Product Information

45° KAPR

RECOMMENDED CUTTING CONDITION >> 175
TURNING INSERTS >> 115
PCD TURNING INSERTS >> 268
TECHNICAL INFO >> 1971
GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 230
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966





Neutral hand tool holder only. Unit: mm

Order Number	Stock	L/R	Insert Number	H	B	LF	LH	HF	WF	KAPR	Shim	Shim Pin	Lever Spring	Clamp Lever	Clamp Screw	Wrench
PSDNN1212F09	●	N	SN**0903	12	12	80	20	12	6	45°			HLS2	LLCL13S	LLCS105	HKY20R
PSDNN1616H09	●	N	SN**0903	16	16	100	22	16	8	45°	LLSSN33	LLP23		LLCL13	LLCS106	HKY25R
PSDNN2020K12	●	N	SN**1204	20	20	125	28	20	10	45°	LLSSN42	LLP14		LLCL14	LLCS108	HKY30R
PSDNN2525M12	●	N	SN**1204	25	25	150	28	25	12.5	45°	LLSSN42	LLP14		LLCL14	LLCS108	HKY30R
PSDNN3225P12	●	N	SN**1204	32	25	170	28	32	12.5	45°	LLSSN42	LLP14		LLCL14	LLCS108	HKY30R

- Clamp Torque(N • m) : LLCS105=1.5, LLCS106=2.2, LLCS108=3.3
- ●: Inventory maintained in Japan.

·CHIP BREAKER EXAMPLE

Finish Cutting	Light Cutting	Medium Cutting	Medium Cutting	Medium to Rough Cutting	For Stainless Steel	G class	CBN
FP	LP	MP	MK	RP	MS	R/L	
(12)	(12)	(12)	(12)	(12)	(12)	(09,12)	(12)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.

PSKN

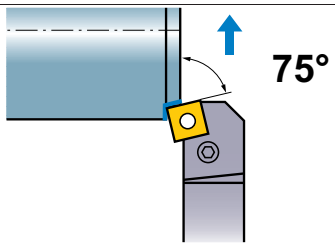
LL HOLDER

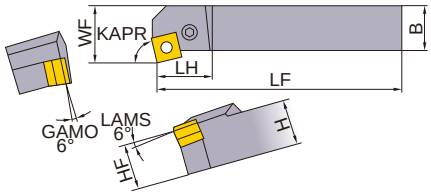
Facing

Product Information

75° KAPR

RECOMMENDED CUTTING CONDITION >> 175
TURNING INSERTS >> 115
PCD TURNING INSERTS >> 268
TECHNICAL INFO >> 1971
GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 230
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966





Right hand tool holder shown. Unit: mm

Order Number	Stock	L/R	Insert Number	H	B	LF	LH	HF	WF	KAPR	Shim	Shim Pin	Clamp Lever	Clamp Screw	Wrench
PSKNR1616H09	●	R	SN**0903	16	16	100	20	16	20	75°	LLSSN33	LLP23	LLCL13	LLCS106	HKY25R
PSKNR2020K12	●	R	SN**1204	20	20	125	25	20	25	75°	LLSSN42	LLP14	LLCL14	LLCS108	HKY30R
PSKNR2525M12	●	R	SN**1204	25	25	150	25	25	32	75°	LLSSN42	LLP14	LLCL14	LLCS108	HKY30R
PSKNL1616H09	●	L	SN**0903	16	16	100	20	16	20	75°	LLSSN33	LLP23	LLCL13	LLCS106	HKY25R
PSKNL2020K12	●	L	SN**1204	20	20	125	25	20	25	75°	LLSSN42	LLP14	LLCL14	LLCS108	HKY30R
PSKNL2525M12	●	L	SN**1204	25	25	150	25	25	32	75°	LLSSN42	LLP14	LLCL14	LLCS108	HKY30R

- When using insert with right or left hand breaker, please use left hand insert for right hand holder and right hand insert for left hand holder.
- Clamp Torque(N • m) : LLCS106=2.2, LLCS108=3.3
- ●: Inventory maintained in Japan.

·CHIP BREAKER EXAMPLE

Finish Cutting	Light Cutting	Medium Cutting	Medium Cutting	Medium to Rough Cutting	For Stainless Steel	G class	CBN
FP	LP	MP	MK	RP	MS	R/L	
(12)	(12)	(12)	(12)	(12)	(12)	(09,12)	(12)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.

PTGN

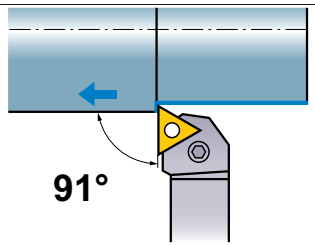
LL HOLDER

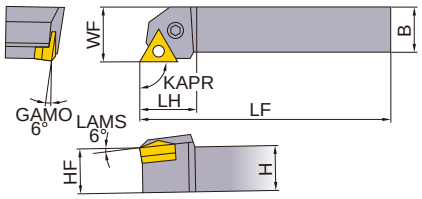
External turning

Product Information

91° KAPR

RECOMMENDED CUTTING CONDITION >> 175
TURNING INSERTS >> 121
PCD TURNING INSERTS >> 269
TECHNICAL INFO >> 1971
GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 232
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966



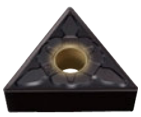
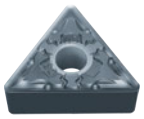
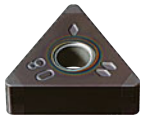


●: Inventory maintained in Japan. Right hand tool holder shown. Unit: mm

Order Number	Stock	L/R	Insert Number	H	B	LF	LH	HF	WF	KAPR	Shim	Shim Pin	Lever Spring	Clamp Lever	Clamp Screw	Wrench
PTGNR1010E11	●	R	TN**1103	10	10	70	17	10	12	91°			HLS1	LLCL12S	LLCS105	HKY20F
PTGNR1212F11	●	R	TN**1103	12	12	80	17	12	16	91°			HLS1	LLCL12S	LLCS105	HKY20F
PTGNR1616H16	●	R	TN**1604	16	16	100	22	16	20	91°	LLSTN32 (LLSTN33)	LLP13 (LLP23)		LLCL13	LLCS106	HKY25R
PTGNR2020K16	●	R	TN**1604	20	20	125	22	20	25	91°	LLSTN32 (LLSTN33)	LLP13 (LLP23)		LLCL13	LLCS106	HKY25R
PTGNR2525M16	●	R	TN**1604	25	25	150	22	25	32	91°	LLSTN32 (LLSTN33)	LLP13 (LLP23)		LLCL13	LLCS206	HKY25R
PTGNR2525M22	●	R	TN**2204	25	25	150	28	25	32	91°	LLSTN42	LLP14		LLCL14	LLCS108	HKY30R
PTGNR3225P22	●	R	TN**2204	32	25	170	28	32	32	91°	LLSTN42	LLP14		LLCL14	LLCS108	HKY30R
PTGNR3232P27	●	R	TN**2706	32	32	170	35	32	40	91°	LLSTN53	LLP15		LLCL25	LLCS508	HKY30R
PTGNL1010E11	●	L	TN**1103	10	10	70	17	10	12	91°			HLS1	LLCL12S	LLCS105	HKY20F
PTGNL1212F11	●	L	TN**1103	12	12	80	17	12	16	91°			HLS1	LLCL12S	LLCS105	HKY20F
PTGNL1616H16	●	L	TN**1604	16	16	100	22	16	20	91°	LLSTN32 (LLSTN33)	LLP13 (LLP23)		LLCL13	LLCS106	HKY25R
PTGNL2020K16	●	L	TN**1604	20	20	125	22	20	25	91°	LLSTN32 (LLSTN33)	LLP13 (LLP23)		LLCL13	LLCS106	HKY25R
PTGNL2525M16	●	L	TN**1604	25	25	150	22	25	32	91°	LLSTN32 (LLSTN33)	LLP13 (LLP23)		LLCL13	LLCS206	HKY25R
PTGNL2525M22	●	L	TN**2204	25	25	150	28	25	32	91°	LLSTN42	LLP14		LLCL14	LLCS108	HKY30R
PTGNL3225P22	●	L	TN**2204	32	25	170	28	32	32	91°	LLSTN42	LLP14		LLCL14	LLCS108	HKY30R
PTGNL3232P27	●	L	TN**2706	32	32	170	35	32	40	91°	LLSTN53	LLP15		LLCL25	LLCS508	HKY30R

- Clamp Torque(N • m) : LLCS105=1.5, LLCS106=2.2, LLCS206=2.2, LLCS108=3.3, LLCS508=3.3
- PTGNR/L1010E11 • PTGNR/L1212F11 Clamp Torque (N • m):LLCS105=1.0
- Please use shim no. LLSTN33 with 3.18mm thick inserts. When using 3.18mm thick inserts, shim should be ordered separately.

·CHIP BREAKER EXAMPLE

Finish Cutting	Light Cutting	Medium Cutting	Medium Cutting	Medium to Rough Cutting	For Stainless Steel	G class	CBN
FP	LP	MP	MK	RP	MS	R/L	
							
(16)	(16)	(16,22,27)	(16,22)	(16)	(16,22)	(11,16,22)	(16)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.

DTGN

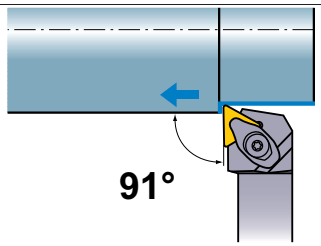
Double clamp holder

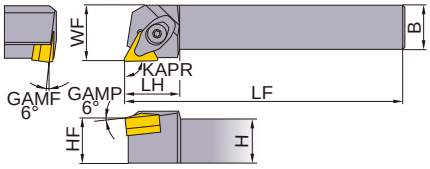
Exturnal turning

Product Information

91° KAPR

RECOMMENDED CUTTING CONDITION >> 175
TURNING INSERTS >> 121
PCD TURNING INSERTS >> 269
TECHNICAL INFO >> 1971
GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 232
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966



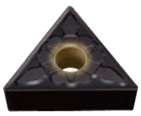
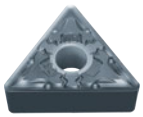
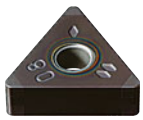


Right hand tool holder shown. Unit: mm

Order Number	Stock	L/R	Insert Number	H	B	LF	LH	HF	WF	KAPR	Shim	Shim Pin	Clamp Bridge	Spring	Clamp Screw	Wrench
DTGNR1616H16	●	R	TN**1604	16	16	100	25	16	20	91°	LLSTN32 (LLSTN33)	LLP23	DCK2211	DCS2	DC0520T	TKY15F
DTGNR2020K16	●	R	TN**1604	20	20	125	25	20	25	91°	LLSTN32 (LLSTN33)	LLP23	DCK2211	DCS2	DC0520T	TKY15F
DTGNR2525M16	●	R	TN**1604	25	25	150	25	25	32	91°	LLSTN32 (LLSTN33)	LLP23	DCK2211	DCS2	DC0520T	TKY15F
DTGNL1616H16	●	L	TN**1604	16	16	100	25	16	20	91°	LLSTN32 (LLSTN33)	LLP23	DCK2211	DCS2	DC0520T	TKY15F
DTGNL2020K16	●	L	TN**1604	20	20	125	25	20	25	91°	LLSTN32 (LLSTN33)	LLP23	DCK2211	DCS2	DC0520T	TKY15F
DTGNL2525M16	●	L	TN**1604	25	25	150	25	25	32	91°	LLSTN32 (LLSTN33)	LLP23	DCK2211	DCS2	DC0520T	TKY15F

- Clamp Torque(N • Clamp Torque (N • m) : DC0520T=3.5
- Please use shim no. LLSTN33 with 3.18 mm thick inserts. When using 3.18 mm thick inserts, shim should be ordered separately.
- ●: Inventory maintained in Japan.

·CHIP BREAKER EXAMPLE

Finish Cutting	Light Cutting	Medium Cutting	Medium Cutting	Medium to Rough Cutting	For Stainless Steel	G class	CBN
FP	LP	MP	MK	RP	MS	R/L	
							
(16)	(16)	(16)	(16)	(16)	(16)	(16)	(16)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.

PTFN

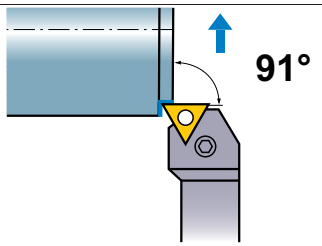
LL HOLDER

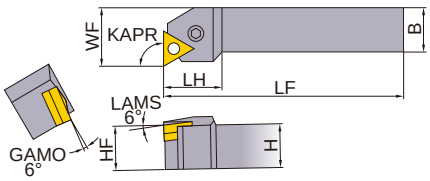
Facing

Product Information

91° KAPR

RECOMMENDED CUTTING CONDITION >> 175
TURNING INSERTS >> 121
PCD TURNING INSERTS >> 269
TECHNICAL INFO >> 1971
GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 232
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966



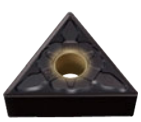
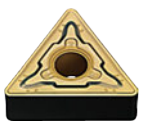
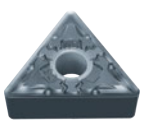
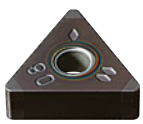


Right hand tool holder shown. Unit: mm

Order Number	Stock	L/R	Insert Number	H	B	LF	LH	HF	WF	KAPR	Shim	Shim Pin	Clamp Lever	Clamp Screw	Wrench
PTFNR1616H16	●	R	TN**1604	16	16	100	22	16	20	91°	LLSTN32 (LLSTN33)	LLP13 (LLP23)	LLCL13	LLCS106	HKY25R
PTFNR2020K16	●	R	TN**1604	20	20	125	22	20	25	91°	LLSTN32 (LLSTN33)	LLP13 (LLP23)	LLCL13	LLCS106	HKY25R
PTFNR2525M16	●	R	TN**1604	25	25	150	22	25	32	91°	LLSTN32 (LLSTN33)	LLP13 (LLP23)	LLCL13	LLCS206	HKY25R
PTFNR2525M22	●	R	TN**2204	25	25	150	28	25	32	91°	LLSTN42	LLP14	LLCL14	LLCS108	HKY30R
PTFNL1616H16	●	L	TN**1604	16	16	100	22	16	20	91°	LLSTN32 (LLSTN33)	LLP13 (LLP23)	LLCL13	LLCS106	HKY25R
PTFNL2020K16	●	L	TN**1604	20	20	125	22	20	25	91°	LLSTN32 (LLSTN33)	LLP13 (LLP23)	LLCL13	LLCS106	HKY25R
PTFNL2525M16	●	L	TN**1604	25	25	150	22	25	32	91°	LLSTN32 (LLSTN33)	LLP13 (LLP23)	LLCL13	LLCS206	HKY25R
PTFNL2525M22	●	L	TN**2204	25	25	150	28	25	32	91°	LLSTN42	LLP14	LLCL14	LLCS108	HKY30R

- When using insert with right or left hand breaker, please use left hand insert for right hand holder and right hand insert for left hand holder.
- Clamp Torque(N • m) : LLCS106=2.2, LLCS206=2.2, LLCS108=3.3
- Please use shim no. LLSTN33 with 3.18 mm thick inserts. When using 3.18 mm thick inserts, shim should be ordered separately.
- ●: Inventory maintained in Japan.

·CHIP BREAKER EXAMPLE

Finish Cutting	Light Cutting	Medium Cutting	Medium Cutting	Medium to Rough Cutting	For Stainless Steel	G class	CBN
FP	LP	MP	MK	RP	MS	R/L	
							
(16)	(16)	(16,22)	(16,22)	(16)	(16,22)	(16,22)	(16)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.

MTJN

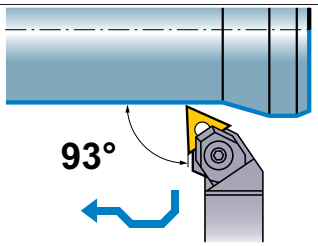
WP HOLDER

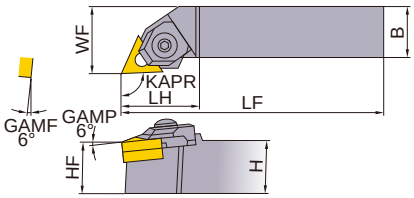
External turning, Copying

Product Information

93° KAPR

RECOMMENDED CUTTING CONDITION >> 175
TURNING INSERTS >> 121
PCD TURNING INSERTS >> 269
TECHNICAL INFO >> 1971
GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 232
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966



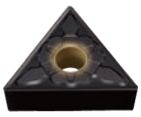
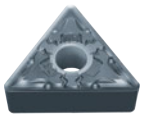
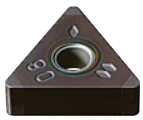


Right hand tool holder shown. Unit: mm

Order Number	Stock	L/R	Insert Number	H	B	LF	LH	HF	WF	KAPR	Shim	Shim Pin	Clamp Bridge	Side Lock Plate	Spring	Clamp Screw	Wrench
MTJNR2020K16N	●	R	TN**1604	20	20	125	31	20	25	93°	WPSTN33	CCP33	CCK13	CPT13	MES2	SLCS105	HKY25R HKY40R
MTJNR2525M16N	●	R	TN**1604	25	25	150	31	25	32	93°	WPSTN33	CCP33	CCK13	CPT13	MES2	SLCS105	HKY25R HKY40R
MTJNR2525M22N	●	R	TN**2204	25	25	150	38	25	32	93°	WPSTN43	CCP34	CCK14	CPT14	MES3	SLCS106	HKY30R HKY40R
MTJNL2020K16N	●	L	TN**1604	20	20	125	31	20	25	93°	WPSTN33	CCP33	CCK13	CPT13	MES2	SLCS105	HKY25R HKY40R
MTJNL2525M16N	●	L	TN**1604	25	25	150	31	25	32	93°	WPSTN33	CCP33	CCK13	CPT13	MES2	SLCS105	HKY25R HKY40R
MTJNL2525M22N	●	L	TN**2204	25	25	150	38	25	32	93°	WPSTN43	CCP34	CCK14	CPT14	MES3	SLCS106	HKY30R HKY40R

- Clamp Torque(N • m) : SLCS105=7.0, SLCS106=7.0
- ●: Inventory maintained in Japan.

·CHIP BREAKER EXAMPLE

Finish Cutting	Light Cutting	Medium Cutting	Medium Cutting	Medium to Rough Cutting	For Stainless Steel	G class	CBN
FP	LP	MP	MK	RP	MS	R/L	
							
(16)	(16)	(16,22)	(16,22)	(16)	(16,22)	(16,22)	(16)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.

PVJN

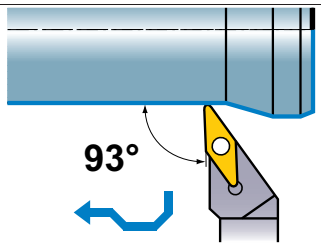
MP HOLDER

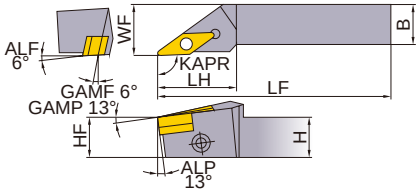
External turning, Copying

Product Information

93° KAPR

RECOMMENDED CUTTING CONDITION >> 175
TURNING INSERTS >> 128
PCD TURNING INSERTS >> 270
TECHNICAL INFO >> 1971
GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 235
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966



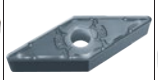


Right hand tool holder shown. Unit: mm

Order Number	Stock	L/R	Insert Number	H	B	LF	LH	HF	WF	KAPR	Shim	Lock Pin	Lock Screw	Stop Ring	Wrench
PVJNR2020K16	●	R	VN**1604	20	20	125	32	20	25	93°	PV322 (PV321) (PV323)	P11S	HSP05008C	E03	HKY25R
PVJNR2525M16	●	R	VN**1604	25	25	150	38	25	32	93°	PV322 (PV321) (PV323)	P11S	HSP05008C	E03	HKY25R
PVJNL2020K16	●	L	VN**1604	20	20	125	32	20	25	93°	PV322 (PV321) (PV323)	P11S	HSP05008C	E03	HKY25R
PVJNL2525M16	●	L	VN**1604	25	25	150	38	25	32	93°	PV322 (PV321) (PV323)	P11S	HSP05008C	E03	HKY25R

- Clamp Torque(N • m) : HSP05008C=2.5
- Please use shim no. PV321 with corner radius=0.4 mm inserts and shim no. PV323 with corner radius=1.2 mm inserts. When using corner radius=0.4 mm or 1.2 mm inserts, shim should be ordered separately.
- ●: Inventory maintained in Japan.

·CHIP BREAKER EXAMPLE

Finish Cutting	Light Cutting	Medium Cutting	Medium Cutting	Medium Cutting	For Stainless Steel	G class	CBN
FP (16)	LP (16)	MP (16)	MK (16)	Standard (16)	MS  (16)	R/L (16)	(16)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.

DVJN

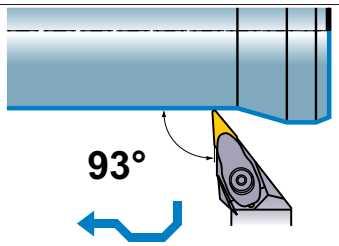
Double clamp holder

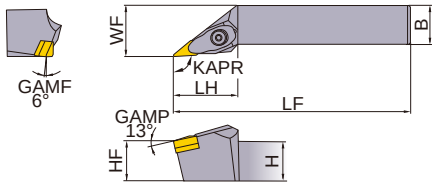
External turning, Copying

Product Information

93° KAPR

RECOMMENDED CUTTING CONDITION >> 175
TURNING INSERTS >> 128
PCD TURNING INSERTS >> 270
TECHNICAL INFO >> 1971
GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 235
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966



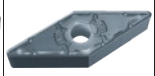


Right hand tool holder shown. Unit: mm

Order Number	Stock	L/R	Insert Number	H	B	LF	LH	HF	WF	KAPR	Shim	Shim Pin	Clamp Bridge	Spring	Clamp Screw	Wrench
DVJNR2020K16	●	R	VN**1604	20	20	125	41	20	25	93°	DCSVN32	LLP13	DCK3113	DCS2	DC0520T	TKY15F
DVJNR2525M16	●	R	VN**1604	25	25	150	41	25	32	93°	DCSVN32	LLP13	DCK3113	DCS2	DC0520T	TKY15F
DVJNL2020K16	●	L	VN**1604	20	20	125	41	20	25	93°	DCSVN32	LLP13	DCK3113	DCS2	DC0520T	TKY15F
DVJNL2525M16	●	L	VN**1604	25	25	150	41	25	32	93°	DCSVN32	LLP13	DCK3113	DCS2	DC0520T	TKY15F

- Clamp Torque(N • Clamp Torque (N • m) : DC0520T=3.5
- ●: Inventory maintained in Japan.

·CHIP BREAKER EXAMPLE

Finish Cutting	Light Cutting	Medium Cutting	Medium Cutting	Medium Cutting	For Stainless Steel	G class	CBN
FP	LP	MP	MK	Standard	MS	R/L	
							
(16)	(16)	(16)	(16)	(16)	(16)	(16)	(16)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.

DVVN

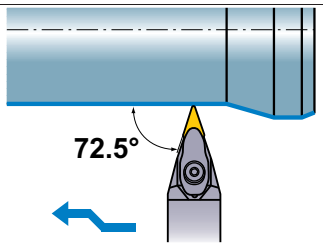
Double clamp holder

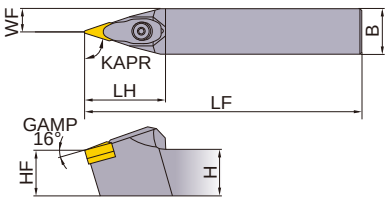
External turning, Copying

Product Information

72° 30′ KAPR

RECOMMENDED CUTTING CONDITION >> 175
TURNING INSERTS >> 128
PCD TURNING INSERTS >> 270
TECHNICAL INFO >> 1971
GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 235
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966



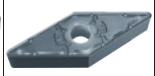


Neutral hand tool holder only. Unit: mm

Order Number	Stock	L/R	Insert Number	H	B	LF	LH	HF	WF	KAPR	Shim	Shim Pin	Clamp Bridge	Spring	Clamp Screw	Wrench
DVVNN2020K16	●	N	VN**1604	20	20	125	44	20	10	72.5°	DCSVN32	LLP13	DCK3113	DCS2	DC0520T	TKY15F
DVVNN2525M16	●	N	VN**1604	25	25	150	44	25	12.5	72.5°	DCSVN32	LLP13	DCK3113	DCS2	DC0520T	TKY15F

- Clamp Torque (N • Clamp Torque (N • m) : DC0520T=3.5
- ●: Inventory maintained in Japan.

·CHIP BREAKER EXAMPLE

Finish Cutting	Light Cutting	Medium Cutting	Medium Cutting	Medium Cutting	For Stainless Steel	G class	CBN
FP	LP	MP	MK	Standard	MS	R/L	
							
(16)	(16)	(16)	(16)	(16)	(16)	(16)	(16)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.

PVVN

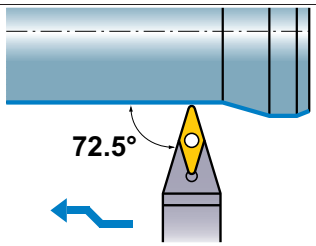
MP HOLDER

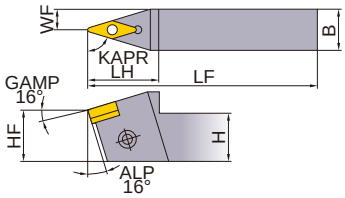
External turning, Copying

Product Information

72° 30′ KAPR

RECOMMENDED CUTTING CONDITION >> 175
TURNING INSERTS >> 128
PCD TURNING INSERTS >> 270
TECHNICAL INFO >> 1971
GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 235
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966



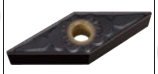
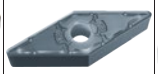


Neutral hand tool holder only. Unit: mm

Order Number	Stock	L/R	Insert Number	H	B	LF	LH	HF	WF	KAPR	Shim	Lock Pin	Lock Screw	Stop Ring	Wrench
PVVNN2020K16	●	N	VN**1604	20	20	125	38	20	10	72.5°	PV322 (PV321) (PV323)	P11S	HSP05008C	E03	HKY25R
PVVNN2525M16	●	N	VN**1604	25	25	150	38	25	12.5	72.5°	PV322 (PV321) (PV323)	P11S	HSP05008C	E03	HKY25R

- Clamp Torque(N • m) : HSP05008C=2.5
- Please use shim no. PV321 with corner radius=0.4 mm inserts and shim no. PV323 with corner radius=1.2 mm inserts. When using corner radius=0.4 mm or 1.2 mm inserts, shim should be ordered separately.
- ●: Inventory maintained in Japan.

·CHIP BREAKER EXAMPLE

Finish Cutting	Light Cutting	Medium Cutting	Medium Cutting	Medium Cutting	For Stainless Steel	G class	CBN
FP (16)	LP (16)	MP (16)	MK  (16)	Standard (16)	MS  (16)	R/L (16)	(16)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.

DVPN

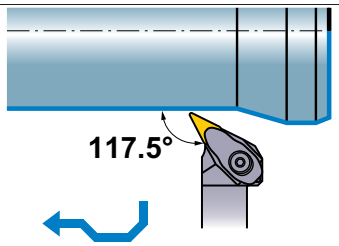
Double clamp holder

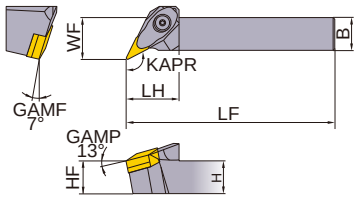
Facing, Copying

Product Information

117° 30′ KAPR

RECOMMENDED CUTTING CONDITION >> 175
TURNING INSERTS >> 128
PCD TURNING INSERTS >> 270
TECHNICAL INFO >> 1971
GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 235
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966



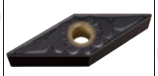
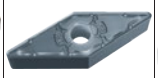


Right hand tool holder shown. Unit: mm

Order Number	Stock	L/R	Insert Number	H	B	LF	LH	HF	WF	KAPR	Shim	Shim Pin	Clamp Bridge	Spring	Clamp Screw	Wrench
DVPNR2020K16	●	R	VN**1604	20	20	125	32	20	25	117.5°	DCSVN32	LLP13	DCK3113	DCS2	DC0520T	TKY15F
DVPNR2525M16	●	R	VN**1604	25	25	150	32	25	32	117.5°	DCSVN32	LLP13	DCK3113	DCS2	DC0520T	TKY15F
DVPNL2020K16	●	L	VN**1604	20	20	125	32	20	25	117.5°	DCSVN32	LLP13	DCK3113	DCS2	DC0520T	TKY15F
DVPNL2525M16	●	L	VN**1604	25	25	150	32	25	32	117.5°	DCSVN32	LLP13	DCK3113	DCS2	DC0520T	TKY15F

- Clamp Torque(N • Clamp Torque (N • m) : DC0520T=3.5
- ●: Inventory maintained in Japan.

·CHIP BREAKER EXAMPLE

Finish Cutting	Light Cutting	Medium Cutting	Medium Cutting	Medium Cutting	For Stainless Steel	G class	CBN
FP (16)	LP (16)	MP (16)	MK  (16)	Standard (16)	MS  (16)	R/L (16)	(16)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.

PVPN

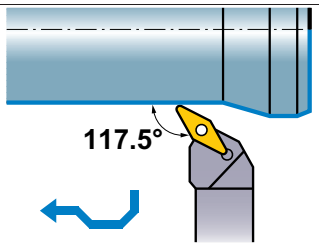
MP HOLDER

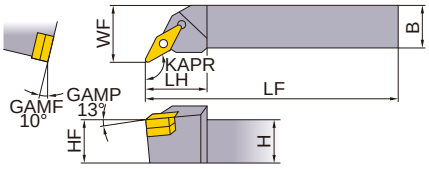
Facing, Copying

Product Information

117° 30′ KAPR

RECOMMENDED CUTTING CONDITION >> 175
TURNING INSERTS >> 128
PCD TURNING INSERTS >> 270
TECHNICAL INFO >> 1971
GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 235
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966



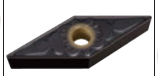
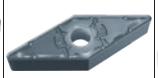


Right hand tool holder shown. Unit: mm

Order Number	Stock	L/R	Insert Number	H	B	LF	LH	HF	WF	KAPR	Shim	Lock Pin	Lock Screw	Stop Ring	Wrench
PVPNR2020K16	●	R	VN**1604	20	20	125	32	20	25	117.5°	PV322 (PV321) (PV323)	P11S	HSP05008C	E03	HKY25R
PVPNR2525M16	●	R	VN**1604	25	25	150	32	25	32	117.5°	PV322 (PV321) (PV323)	P11S	HSP05008C	E03	HKY25R
PVPNL2020K16	●	L	VN**1604	20	20	125	32	20	25	117.5°	PV322 (PV321) (PV323)	P11S	HSP05008C	E03	HKY25R
PVPNL2525M16	●	L	VN**1604	25	25	150	32	25	32	117.5°	PV322 (PV321) (PV323)	P11S	HSP05008C	E03	HKY25R

- Clamp Torque(N • m) : HSP05008C=2.5
- Please use shim no. PV321 with corner radius=0.4 mm inserts and shim no. PV323 with corner radius=1.2 mm inserts. When using corner radius=0.4 mm or 1.2 mm inserts, shim should be ordered separately.
- ●: Inventory maintained in Japan.

·CHIP BREAKER EXAMPLE

Finish Cutting	Light Cutting	Medium Cutting	Medium Cutting	Medium Cutting	For Stainless Steel	G class	CBN
FP (16)	LP (16)	MP (16)	MK  (16)	Standard (16)	MS  (16)	R/L (16)	(16)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.

PWLN

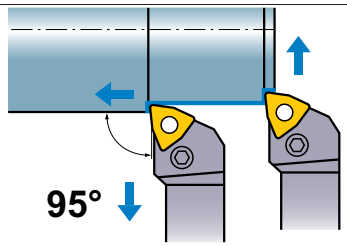
LL HOLDER

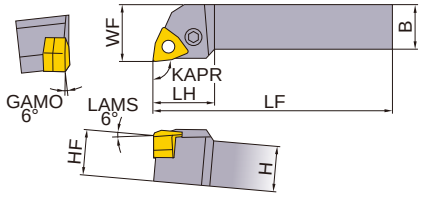
External turning, Facing

Product Information

95° KAPR

RECOMMENDED CUTTING CONDITION >> 175
TURNING INSERTS >> 130
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966
GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 237
TECHNICAL INFO >> 1971



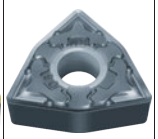


Right hand tool holder shown. Unit: mm

Order Number	Stock	L/R	Insert Number	H	B	LF	LH	HF	WF	KAPR	Shim	Shim Pin	Clamp Lever	Clamp Screw	Wrench
PWLNR1616H06	●	R	WN**06T3	16	16	100	22	16	20	95°	LLSWN3T3 (LLSWN32)	LLP13	LLCL13	LLCS106	HKY25R
PWLNR2020K06	●	R	WN**06T3	20	20	125	22	20	25	95°	LLSWN3T3 (LLSWN32)	LLP13	LLCL13	LLCS106	HKY25R
PWLNR2525M06	●	R	WN**06T3	25	25	150	25	25	32	95°	LLSWN3T3 (LLSWN32)	LLP13	LLCL13	LLCS106	HKY25R
PWLNL1616H06	●	L	WN**06T3	16	16	100	22	16	20	95°	LLSWN3T3 (LLSWN32)	LLP13	LLCL13	LLCS106	HKY25R
PWLNL2020K06	●	L	WN**06T3	20	20	125	22	20	25	95°	LLSWN3T3 (LLSWN32)	LLP13	LLCL13	LLCS106	HKY25R
PWLNL2525M06	●	L	WN**06T3	25	25	150	25	25	32	95°	LLSWN3T3 (LLSWN32)	LLP13	LLCL13	LLCS106	HKY25R

- Clamp Torque(N • m) : LLCS106=2.2
- Please use shim no. LLSWN32 with 4.76 mm thick inserts. When using 4.76 mm thick inserts, shim should be ordered separately.
- ●: Inventory maintained in Japan.

·CHIP BREAKER EXAMPLE

Light Cutting	Medium Cutting	For Stainless Steel
SH (06)	MP (06)	MS  (06)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.

DWLN

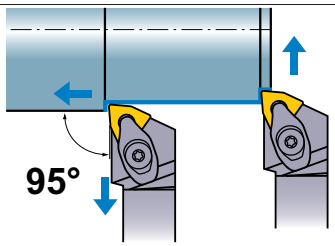
Double clamp holder

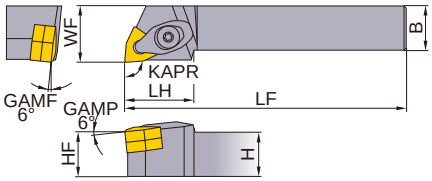
External turning, Facing

Product Information

95° KAPR

GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 237
TECHNICAL INFO >> 1971
TURNING INSERTS >> 130
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966



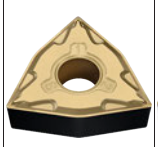
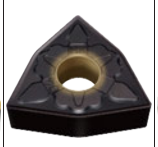
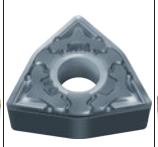


Right hand tool holder shown. Unit: mm

Order Number	Stock	L/R	Insert Number	H	B	LF	LH	HF	WF	KAPR	Shim	Shim Pin	Clamp Bridge	Spring	Clamp Screw	Wrench
DWLNR1616H06	●	R	WN**06T3	16	16	100	25	16	20	95°	LLSWN3T3 (LLSWN32)	LLP23	DCK2211	DCS2	DC0520T	TKY15F
DWLNR2020K06	●	R	WN**06T3	20	20	125	25	20	25	95°	LLSWN3T3 (LLSWN32)	LLP23	DCK2211	DCS2	DC0520T	TKY15F
DWLNR2020K08	●	R	WN**0804	20	20	125	31	20	25	95°	LLSWN42	LLP14	DCK2613	DCS1	DC0621T	TKY20F
DWLNR2525M06	●	R	WN**06T3	25	25	150	25	25	32	95°	LLSWN3T3 (LLSWN32)	LLP23	DCK2211	DCS2	DC0520T	TKY15F
DWLNR2525M08	●	R	WN**0804	25	25	150	31	25	32	95°	LLSWN42	LLP14	DCK2613	DCS1	DC0621T	TKY20F
DWLNR3225P08	●	R	WN**0804	32	25	170	31	32	32	95°	LLSWN42	LLP14	DCK2613	DCS1	DC0621T	TKY20F
DWLNL1616H06	●	L	WN**06T3	16	16	100	25	16	20	95°	LLSWN3T3 (LLSWN32)	LLP23	DCK2211	DCS2	DC0520T	TKY15F
DWLNL2020K06	●	L	WN**06T3	20	20	125	25	20	25	95°	LLSWN3T3 (LLSWN32)	LLP23	DCK2211	DCS2	DC0520T	TKY15F
DWLNL2020K08	●	L	WN**0804	20	20	125	31	20	25	95°	LLSWN42	LLP14	DCK2613	DCS1	DC0621T	TKY20F
DWLNL2525M06	●	L	WN**06T3	25	25	150	25	25	32	95°	LLSWN3T3 (LLSWN32)	LLP23	DCK2211	DCS2	DC0520T	TKY15F
DWLNL2525M08	●	L	WN**0804	25	25	150	31	25	32	95°	LLSWN42	LLP14	DCK2613	DCS1	DC0621T	TKY20F
DWLNL3225P08	●	L	WN**0804	32	25	170	31	32	32	95°	LLSWN42	LLP14	DCK2613	DCS1	DC0621T	TKY20F

- Clamp Torque(N • Clamp Torque (N • m) : DC0520T=3.5, DC0621T=5.0
- Please use shim no. LLSWN32 with 4.76 mm thick inserts. When using 4.76 mm thick inserts, shim should be ordered separately.
- ●: Inventory maintained in Japan.

·CHIP BREAKER EXAMPLE

Finish Cutting	Light Cutting	Medium Cutting	Medium Cutting	Medium Cutting	Medium to Rough Cutting	For Stainless Steel	CBN
FP	LP	MP	MK	Standard	RP	MS	
							
(08)	(08)	(06,08)	(08)	(08)	(08)	(06,08)	(08)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.

SCLC

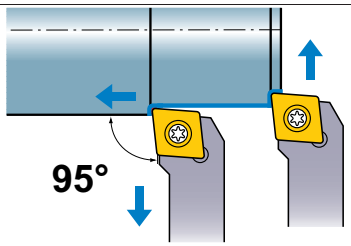
SP HOLDER

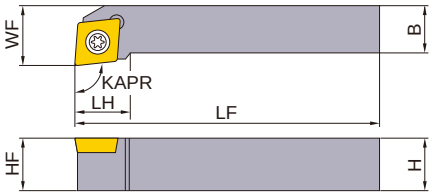
External turning, Facing

Product Information

95° KAPR

RECOMMENDED CUTTING CONDITION >> 175
TURNING INSERTS >> 138
PCD TURNING INSERTS >> 272
TECHNICAL INFO >> 1971
GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 244
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966



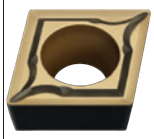
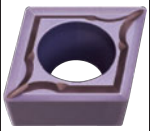
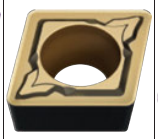
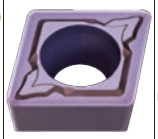
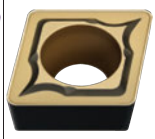
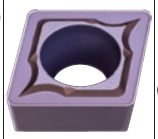


Right hand tool holder shown. Unit: mm

Order Number	Stock	L/R	Insert Number	H	B	LF	LH	HF	WF	KAPR	Clamp Screw	Wrench
SCLCR0808D06	●	R	CC**0602	8	8	60	8.9	8	10	95°	TS25	TKY08F
SCLCR1010E06	●	R	CC**0602	10	10	70	8.9	10	12	95°	TS25	TKY08F
SCLCR1212F09	●	R	CC**09T3	12	12	80	13.6	12	16	95°	TS43	TKY15F
SCLCR1616H12	●	R	CC**1204	16	16	100	16.7	16	20	95°	TS5	TKY25F
SCLCL0808D06	●	L	CC**0602	8	8	60	8.9	8	10	95°	TS25	TKY08F
SCLCL1010E06	●	L	CC**0602	10	10	70	8.9	10	12	95°	TS25	TKY08F
SCLCL1212F09	●	L	CC**09T3	12	12	80	13.6	12	16	95°	TS43	TKY15F
SCLCL1616H12	●	L	CC**1204	16	16	100	16.7	16	20	95°	TS5	TKY25F

- Clamp Torque(N • m) : TS25=1.0, TS43=3.5, TS5=7.5
- ●: Inventory maintained in Japan.

·CHIP BREAKER EXAMPLE

Finish Cutting	Finish Cutting	Light Cutting	Light Cutting	Medium Cutting	Medium Cutting	Without Breaker	PCD/CBN
FP	FM	LP	LM	MP	MM	Flat Top	
							
(06,09)	(06,09)	(06,09)	(06,09)	(06,09,12)	(06,09,12)	(06,09,12)	(06,09,12)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.

SDJC

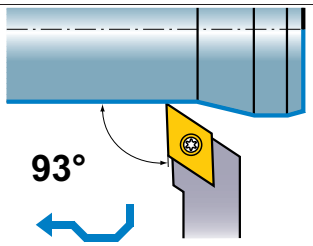
SP HOLDER

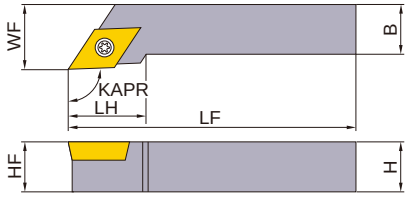
External turning, Copying

Product Information

93° KAPR

RECOMMENDED CUTTING CONDITION >> 175
TURNING INSERTS >> 145
PCD TURNING INSERTS >> 274
TECHNICAL INFO >> 1971
GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 249
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966



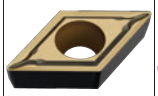
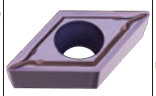
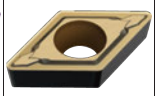
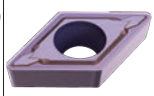
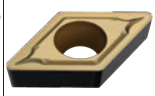
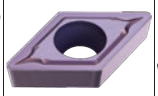
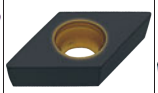
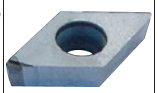


Right hand tool holder shown. Unit: mm

Order Number	Stock	L/R	Insert Number	H	B	LF	LH	HF	WF	KAPR	Clamp Screw	Wrench
SDJCR1010E07	●	R	DC**0702	10	10	70	12	10	12	93°	TS25	TKY08F
SDJCR1212F11	●	R	DC**11T3	12	12	80	18	12	16	93°	TS43	TKY15F
SDJCR1616H11	●	R	DC**11T3	16	16	100	18	16	20	93°	TS43	TKY15F
SDJCL1010E07	●	L	DC**0702	10	10	70	12	10	12	93°	TS25	TKY08F
SDJCL1212F11	●	L	DC**11T3	12	12	80	18	12	16	93°	TS43	TKY15F
SDJCL1616H11	●	L	DC**11T3	16	16	100	18	16	20	93°	TS43	TKY15F

- Clamp Torque(N • m) : TS25=1.0, TS43=3.5
- ●: Inventory maintained in Japan.

·CHIP BREAKER EXAMPLE

Finish Cutting	Finish Cutting	Light Cutting	Light Cutting	Medium Cutting	Medium Cutting	Without Breaker	PCD/CBN
FP	FM	LP	LM	MP	MM	Flat Top	
							
(07,11)	(07,11)	(07,11)	(07,11)	(07,11)	(07,11)	(07,11)	(07,11)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.

SDNC

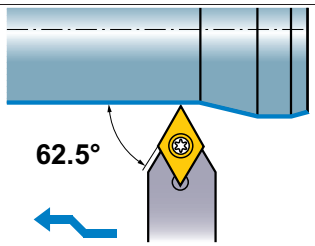
SP HOLDER

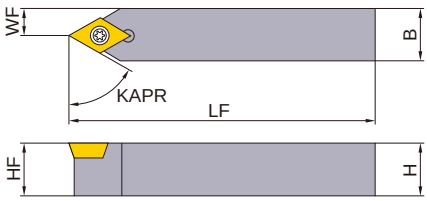
External turning, Copying

Product Information

62° 30′ KAPR

RECOMMENDED CUTTING CONDITION >> 175
TURNING INSERTS >> 145
PCD TURNING INSERTS >> 274
TECHNICAL INFO >> 1971
GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 249
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966



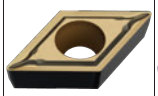
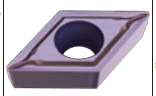
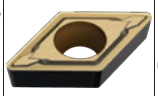
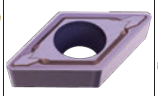
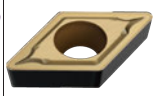
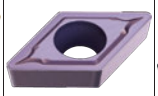
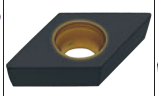
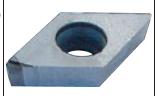


Neutral hand tool holder only. Unit: mm

Order Number	Stock	L/R	Insert Number	H	B	LF	HF	WF	KAPR	Clamp Screw	Wrench
SDNCN0808D07	●	N	DC**0702	8	8	60	8	4	62.5°	TS25	TKY08F
SDNCN1010E07	●	N	DC**0702	10	10	70	10	5	62.5°	TS25	TKY08F
SDNCN1212F11	●	N	DC**11T3	12	12	80	12	6	62.5°	TS43	TKY15F
SDNCN1616H11	●	N	DC**11T3	16	16	100	16	8	62.5°	TS43	TKY15F

- Clamp Torque(N • m) : TS25=1.0, TS43=3.5
- ●: Inventory maintained in Japan.

·CHIP BREAKER EXAMPLE

Finish Cutting	Finish Cutting	Light Cutting	Light Cutting	Medium Cutting	Medium Cutting	Without Breaker	PCD/CBN
FP	FM	LP	LM	MP	MM	Flat Top	
							
(07,11)	(07,11)	(07,11)	(07,11)	(07,11)	(07,11)	(07,11)	(07,11)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.

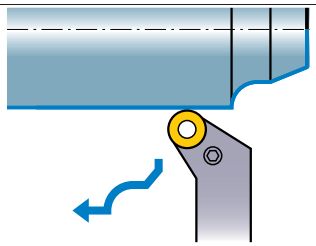
PRGC

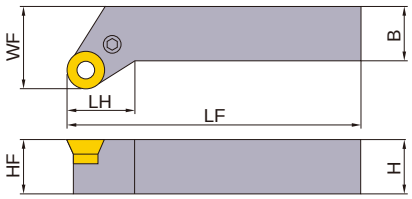
LL HOLDER

External turning, Facing, Coping

Product Information

RECOMMENDED CUTTING CONDITION >> 175
TURNING INSERTS >> 151
TECHNICAL INFO >> 1971
GRADES AND CHIP BREAKERS >> 38
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966





Right hand tool holder shown. Unit: mm

Order Number	Stock	L/R	Insert Number	H	B	LF	LH	HF	WF	Shim	Shim Pin	Clamp Lever	Clamp Screw	Wrench
PRGCR2525M10	●	R	RC**1003	25	25	150	16.7	25	32	LLSRN103	LLP13	LLCL110	LLCS205	HKY20R
PRGCR2525M12	●	R	RC**1204	25	25	150	17.5	25	32	LLSRN123	LLP13	LLCL112	LLCS106	HKY25R
PRGCR2525M16	●	R	RC**1606	25	25	150	19.9	25	32	LLSRN164	LLP24	LLCL116	LLCS306	HKY25R
PRGCR3232P20	●	R	RC**2006	32	32	170	23.8	32	40	LLSRN204	LLP15	LLCL120	LLCS508	HKY30R
PRGCL2525M10	●	L	RC**1003	25	25	150	16.7	25	32	LLSRN103	LLP13	LLCL110	LLCS205	HKY20R
PRGCL2525M12	●	L	RC**1204	25	25	150	17.5	25	32	LLSRN123	LLP13	LLCL112	LLCS106	HKY25R
PRGCL2525M16	●	L	RC**1606	25	25	150	19.9	25	32	LLSRN164	LLP24	LLCL116	LLCS306	HKY25R
PRGCL3232P20	●	L	RC**2006	32	32	170	23.8	32	40	LLSRN204	LLP15	LLCL120	LLCS508	HKY30R

- Clamp Torque(N • m) : LLCS205=1.5, LLCS106=2.2, LLCS306=2.2, LLCS508=3.3
- ●: Inventory maintained in Japan.

·CHIP BREAKER EXAMPLE

Medium Cutting
(10,12,16, 20)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.

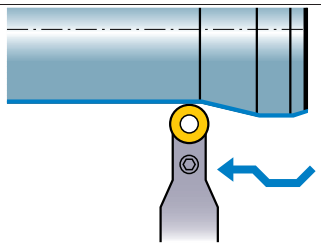
PRDC

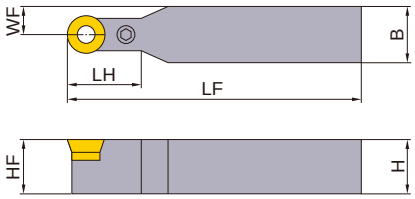
LL HOLDER

External turning, Copying

Product Information

RECOMMENDED CUTTING CONDITION >> 175
TURNING INSERTS >> 151
TECHNICAL INFO >> 1971
GRADES AND CHIP BREAKERS >> 38
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966





Neutral hand tool holder only. Unit: mm

Order Number	Stock	L/R	Insert Number	H	B	LF	LH	HF	WF	Shim	Shim Pin	Clamp Lever	Clamp Screw	Wrench
PRDCN2020K10	●	N	RC**1003	20	20	125	23	20	10	LLSRN103	LLP13	LLCL110	LLCS205	HKY20R
PRDCN2525M12	●	N	RC**1204	25	25	150	24	25	12.5	LLSRN123	LLP13	LLCL112	LLCS106	HKY25R
PRDCN3225P12	●	N	RC**1204	32	25	170	24	32	12.5	LLSRN123	LLP13	LLCL112	LLCS106	HKY25R
PRDCN3225P16	●	N	RC**1606	32	25	170	28	32	12.5	LLSRN164	LLP24	LLCL116	LLCS306	HKY25R
PRDCN3232P20	●	N	RC**2006	32	32	170	33	32	16	LLSRN204	LLP15	LLCL120	LLCS508	HKY30R

- Clamp Torque(N • m) : LLCS205=1.5, LLCS106=2.2, LLCS306=2.2, LLCS508=3.3
- ●: Inventory maintained in Japan.

·CHIP BREAKER EXAMPLE

Medium Cutting
(10,12,16, 20)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.

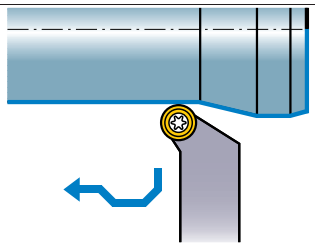
SRGC

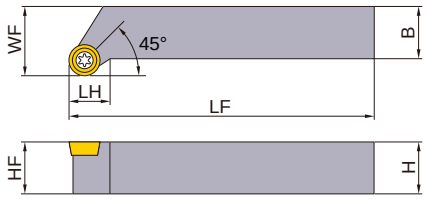
SP HOLDER

External turning, Facing, Coping

Product Information

RECOMMENDED CUTTING CONDITION >> 175
TURNING INSERTS >> 151
TECHNICAL INFO >> 1971
GRADES AND CHIP BREAKERS >> 38
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966





Right hand tool holder shown. Unit: mm

Order Number	Stock	L/R	Insert Number	H	B	LF	LH	HF	WF	Clamp Screw	Wrench
SRGCR1616H06	●	R	RC**0602	16	16	100	10	16	20	TS25	TKY08F
SRGCR1616H08	●	R	RC**0803	16	16	100	14.5	16	22	TS3	TKY08F
SRGCL1616H06	●	L	RC**0602	16	16	100	10	16	20	TS25	TKY08F
SRGCL1616H08	●	L	RC**0803	16	16	100	14.5	16	22	TS3	TKY08F

- Clamp Torque (N • m) : TS25=1.0, TS3=1.0
- ●: Inventory maintained in Japan.

·CHIP BREAKER EXAMPLE

Medium Cutting
Standard (06,08)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.

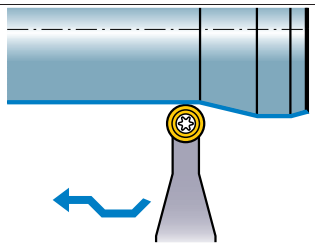
SRDC

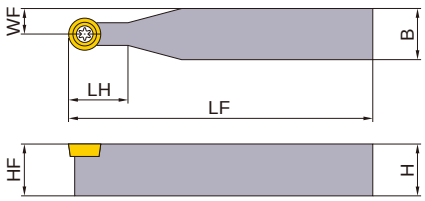
SP HOLDER

External turning, Copying

Product Information

RECOMMENDED CUTTING CONDITION >> 175
TURNING INSERTS >> 151
TECHNICAL INFO >> 1971
GRADES AND CHIP BREAKERS >> 38
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966





Neutral hand tool holder only. Unit: mm

Order Number	Stock	L/R	Insert Number	H	B	LF	LH	HF	WF	Clamp Screw	Wrench
SRDCN1616H06	●	N	RC**0602	16	16	100	12	16	8	TS25	TKY08F
SRDCN1616H08	●	N	RC**0803	16	16	100	16	16	8	TS3	TKY08F

- Clamp Torque(N • m) : TS25=1.0, TS3=1.0
- ●: Inventory maintained in Japan.

·CHIP BREAKER EXAMPLE

Medium Cutting
Standard (06,08)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.

SSSC

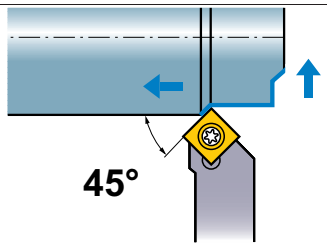
SP HOLDER

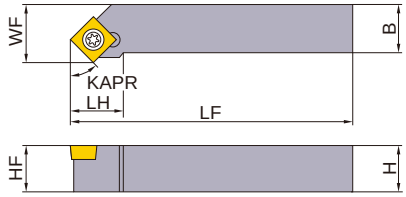
External turning, Facing, Chamfering

Product Information

45° KAPR

RECOMMENDED CUTTING CONDITION >> 175
TURNING INSERTS >> 152
TECHNICAL INFO >> 1971
GRADES AND CHIP BREAKERS >> 38
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966



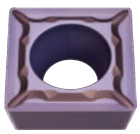


Right hand tool holder shown. Unit: mm

Order Number	Stock	L/R	Insert Number	H	B	LF	LH	HF	WF	KAPR	Clamp Screw	Wrench
SSSCR1212F09	●	R	SC**09T3	12	12	80	15.2	12	13	45°	TS43	TKY15F
SSSCR1616H09	●	R	SC**09T3	16	16	100	15.2	16	17	45°	TS43	TKY15F
SSSCL1212F09	●	L	SC**09T3	12	12	80	15.2	12	13	45°	TS43	TKY15F
SSSCL1616H09	●	L	SC**09T3	16	16	100	15.2	16	17	45°	TS43	TKY15F

- Clamp Torque(N • m) : TS43=3.5
- ●: Inventory maintained in Japan.

·CHIP BREAKER EXAMPLE

Finish Cutting	Finish Cutting	Light Cutting	Light Cutting	Medium Cutting	Medium Cutting	Medium Cutting	Without Breaker
FP	FM	LP	LM	MP	MM	Standard	Flat Top
							
(09)	(09)	(09)	(09)	(09)	(09)	(09)	(09)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.

STGC

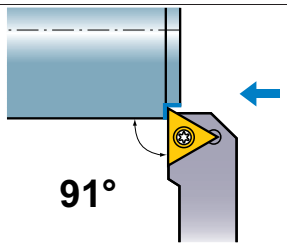
SP HOLDER

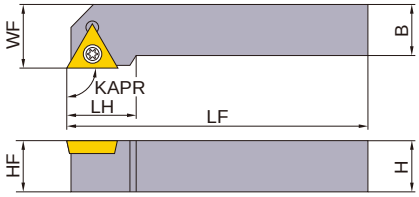
External turning

Product Information

91° KAPR

RECOMMENDED CUTTING CONDITION >> 175
TURNING INSERTS >> 155
PCD TURNING INSERTS >> 276
TECHNICAL INFO >> 1971
GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 252
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966



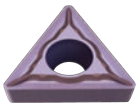
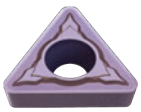
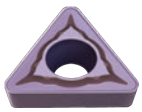
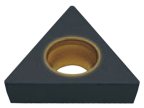


Right hand tool holder shown. Unit: mm

Order Number	Stock	L/R	Insert Number	H	B	LF	LH	HF	WF	KAPR	Clamp Screw	Wrench
STGCR1010E11	●	R	TC**1102	10	10	70	13.5	10	12	91°	TS25	TKY08F
STGCR1212F13	●	R	TC**1303	12	12	80	17.6	12	16	91°	TS3	TKY08F
STGCR1616H16	●	R	TC**16T3	16	16	100	20.7	16	20	91°	TS43	TKY15F
STGCL1010E11	●	L	TC**1102	10	10	70	13.5	10	12	91°	TS25	TKY08F
STGCL1212F13	●	L	TC**1303	12	12	80	17.6	12	16	91°	TS3	TKY08F
STGCL1616H16	●	L	TC**16T3	16	16	100	20.7	16	20	91°	TS43	TKY15F

- Clamp Torque(N • m) : TS25=1.0, TS3=1.0, TS43=3.5
- ●: Inventory maintained in Japan.

·CHIP BREAKER EXAMPLE

Finish Cutting	Finish Cutting	Light Cutting	Light Cutting	Medium Cutting	Medium Cutting	Without Breaker	PCD/CBN
FP (11,16)	FM  (11,16)	LP (11,16)	LM  (11,16)	MP (11,16)	MM  (11,16)	Flat Top  (11,16)	(11,13)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.

SVJC

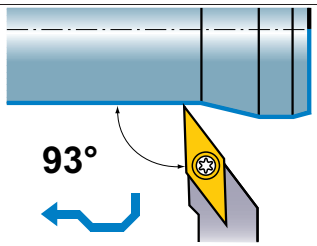
SP HOLDER

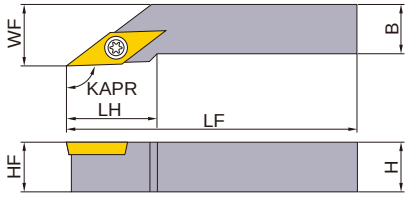
External turning, Copying

Product Information

93° KAPR

RECOMMENDED CUTTING CONDITION >> 175
TURNING INSERTS >> 162
PCD TURNING INSERTS >> 280
TECHNICAL INFO >> 1971
GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 259
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966



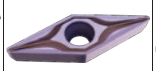
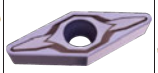
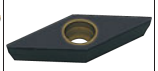


Right hand tool holder shown. Unit: mm

Order Number	Stock	L/R	Insert Number	H	B	LF	LH	HF	WF	KAPR	Shim	Shim Pin	Clamp Screw	Wrench
SVJCR1010E11	●	R	VC**1103	10	10	70	17	10	12	93°			TS25	TKY08F
SVJCR1616H16	●	R	VC**1604	16	16	100	25	16	20	93°			TS43	TKY15F
SVJCR2020K16	●	R	VC**1604	20	20	125	40	20	25	93°	SPSVN32	BCP141	TS44	TKY15R
SVJCR2525M16	●	R	VC**1604	25	25	150	40	25	32	93°	SPSVN32	BCP141	TS44	TKY15R
SVJCL1010E11	●	L	VC**1103	10	10	70	17	10	12	93°			TS25	TKY08F
SVJCL1616H16	●	L	VC**1604	16	16	100	25	16	20	93°			TS43	TKY15F
SVJCL2020K16	●	L	VC**1604	20	20	125	40	20	25	93°	SPSVN32	BCP141	TS44	TKY15R
SVJCL2525M16	●	L	VC**1604	25	25	150	40	25	32	93°	SPSVN32	BCP141	TS44	TKY15R

- Clamp Torque(N • m) : TS25=1.0, TS43=3.5, TS44=3.5
- ●: Inventory maintained in Japan.

·CHIP BREAKER EXAMPLE

Finish Cutting	Finish Cutting	Light Cutting	Light Cutting	Medium Cutting	Medium Cutting	Medium Cutting	Without Breaker
FP	FM	LP	LM	MP	MM	Standard	Flat Top
							
(11,16)	(11,16)	(11,16)	(11,16)	(16)	(16)	(11,16)	(11,16)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.

SVVC

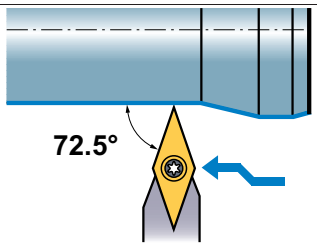
SP HOLDER

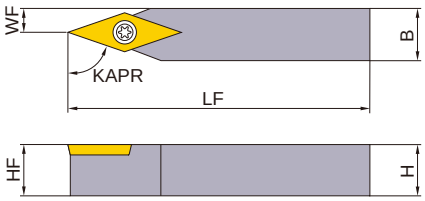
External turning, Copying

Product Information

72° 30′ KAPR

RECOMMENDED CUTTING CONDITION >> 175
TURNING INSERTS >> 162
PCD TURNING INSERTS >> 280
TECHNICAL INFO >> 1971
GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 259
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966



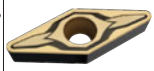
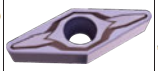
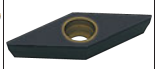


Neutral hand tool holder only. Unit: mm

Order Number	Stock	L/R	Insert Number	H	B	LF	HF	WF	KAPR	Shim	Shim Pin	Clamp Screw	Wrench
SVVCN1616H16	●	N	VC**1604	16	16	100	16	8	72.5°			TS43	TKY15F
SVVCN2020K16	●	N	VC**1604	20	20	125	20	10	72.5°	SPSVN32	BCP141	TS44	TKY15R
SVVCN2525M16	●	N	VC**1604	25	25	150	25	12.5	72.5°	SPSVN32	BCP141	TS44	TKY15R

- Clamp Torque(N • m) : TS43=3.5, TS44=3.5
- ●: Inventory maintained in Japan.

·CHIP BREAKER EXAMPLE

Finish Cutting	Finish Cutting	Light Cutting	Light Cutting	Medium Cutting	Medium Cutting	Medium Cutting	Without Breaker
FP	FM	LP	LM	MP	MM	Standard	Flat Top
							
(16)	(16)	(16)	(16)	(16)	(16)	(16)	(16)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.

SVPC

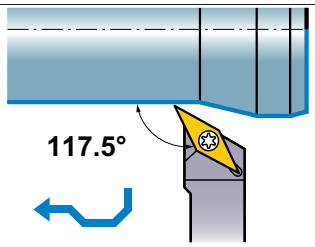
SP HOLDER

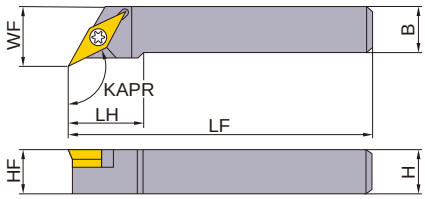
Facing, Copying

Product Information

117° 30′ KAPR

RECOMMENDED CUTTING CONDITION >> 175
TURNING INSERTS >> 162
PCD TURNING INSERTS >> 280
TECHNICAL INFO >> 1971
GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 259
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966



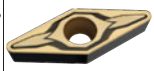
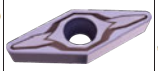
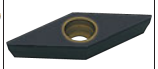


Right hand tool holder shown. Unit: mm

Order Number	Stock	L/R	Insert Number	H	B	LF	LH	HF	WF	KAPR	Shim	Shim Pin	Clamp Screw	Wrench
SVPCR2020K16	●	R	VC**1604	20	20	125	30	20	25	117.5°	SPSVN32	BCP141	TS44	TKY15R
SVPCR2525M16	●	R	VC**1604	25	25	150	30	25	32	117.5°	SPSVN32	BCP141	TS44	TKY15R
SVPCL2020K16	●	L	VC**1604	20	20	125	30	20	25	117.5°	SPSVN32	BCP141	TS44	TKY15R
SVPCL2525M16	●	L	VC**1604	25	25	150	30	25	32	117.5°	SPSVN32	BCP141	TS44	TKY15R

- Clamp Torque (N • m) : TS44=3.5
- ●: Inventory maintained in Japan.

·CHIP BREAKER EXAMPLE

Finish Cutting	Finish Cutting	Light Cutting	Light Cutting	Medium Cutting	Medium Cutting	Medium Cutting	Without Breaker
FP	FM	LP	LM	MP	MM	Standard	Flat Top
							
(16)	(16)	(16)	(16)	(16)	(16)	(16)	(16)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.

SXZC

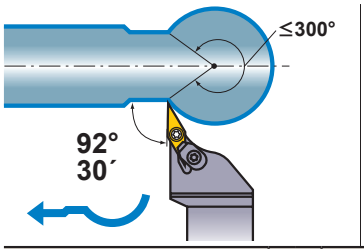
Profile Holder

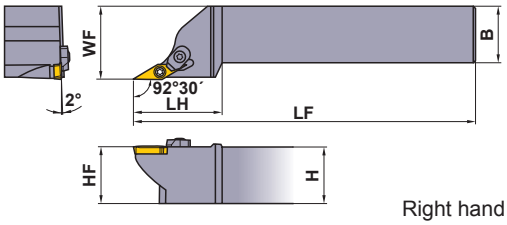
External turning, Copying

Product Information

SPARE PARTS >> 1927
TURNING INSERTS >> 169
TECHNICAL INFO >> 1971

92° 30´ KAPR





Right hand tool holder shown.

Order Number	Stock R	Stock L	Insert Number		Dimensions (mm) H	B	LF	LH	HF	WF	Clamp Screw *	Clamp Bridge	Clamp Bridge Screw *	Spring	Insert Wrench	Wrench for clamp bridge
SXZCR/L1616H15	●	●	XCMT	1503○○-SVX	16	16	100	35	16	20	TS255	AMS3	AJS3010T10	ASS2	TKY08F	TKY10F
SXZCR/L2020K15	●	●	XCMT	1503○○-SVX	20	20	125	35	20	25	TS255	AMS3	AJS3010T10	ASS2	TKY08F	TKY10F
SXZCR/L2525M15	●	●	XCMT	1503○○-SVX	25	25	150	40	25	32	TS255	AMS3	AJS3010T10	ASS2	TKF08F	TKF10F

* Clamp Torque (N • m) : TS255=1.0, AJS3010T10=2.5

·CHIP BREAKER EXAMPLE

Finish Cutting
SVX (15)

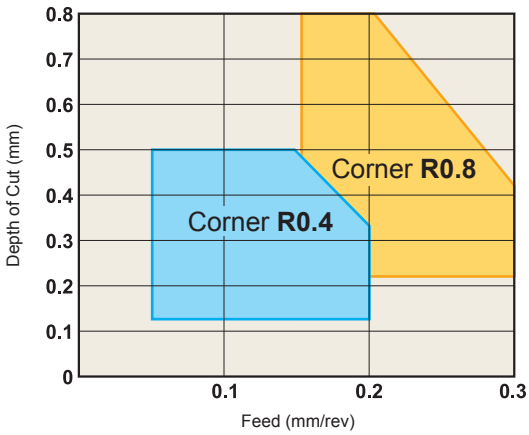
- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.

·RECOMMENDED CUTTING CONDITION

	Work Material	Hardness	Grade	Cutting Speed (m/min)
P	Mild Steel	≤180HB	**UE6020**	150−350
	Carbon Steel, Alloy Steel	150HB−250HB	**UE6020**	100−250

(Note) The above cutting conditions are general guidelines.
Adjustments maybe necessary depending on machine rigidity, workpiece geometry and clamping.

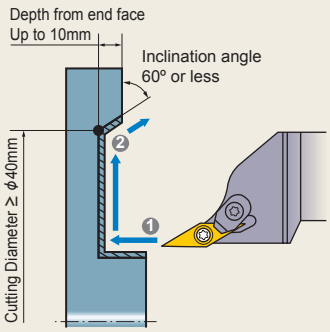
Applicable range



NOTE

Notes when end face copying

Pay special attention to the following when face copying.



●Machining of an outer diameter (Step ①)

- To prevent burr formation, the depth of cut should be below half the nose radius.

●Machining of an inclination (Step ②)

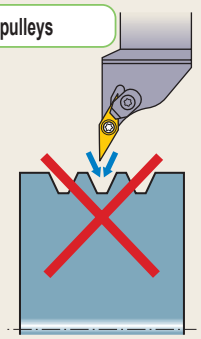
- To reduce the contact length of chips, the depth of cut should be below half the nose radius.
- To prevent interference between the tool and the workpiece, the cutting diameter should be 40mm or larger, inclination angle 60° or less and depth from the end face up to 10mm.

●When changing inserts

- When indexing the inserts, it is recommended to preset the cutting edge position to maintain machining accuracy.

Not possible

Machining of V-pulleys



When machining V-pulleys, use a VNMG insert.

SDJE

AL Holder

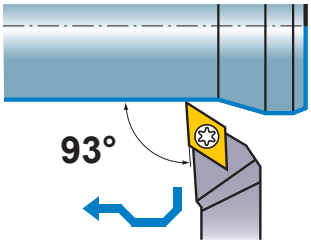
External turning, Copying

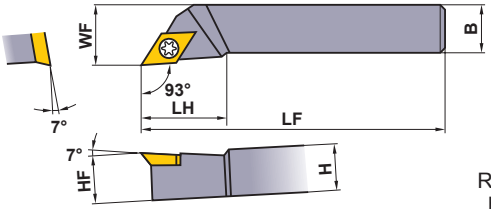
Product Information

SPARE PARTS >> 1927
TURNING INSERTS >> 150
TECHNICAL INFO >> 1971
PCD TURNING INSERTS >> 283

93° KAPR

・Holder



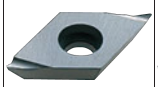


Right hand tool holder shown.

Order Number	Stock		Insert Number		Dimensions (mm)						*	
	R	L			H	B	LF	LH	HF	WF	Clamp Screw	Wrench
SDJER/L1616H15	●	●	DEGX	1504○○	16	16	100	27	16	20	CS451190T	TKY20F
SDJER/L2020K15	●	●		1504○○	20	20	125	35	20	25	CS451190T	TKY20F
SDJER/L2525M15	●	●		1504○○	25	25	150	35	25	32	CS451190T	TKY20F

* Clamp Torque (N • m) : CS451190T=5.0

·CHIP BREAKER EXAMPLE

Finish Cutting	Medium Cutting	PCD
R/L-F	R/L	R/L-F
		
(15)	(15)	(15)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.

·RECOMMENDED CUTTING CONDITION

	Work Material	Grade	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
N	Aluminium Alloy	**HTi10**	400	0.05—0.3	0.2—3.0
		MD220	800	0.05—0.3	0.2—0.5

SDNE

AL Holder

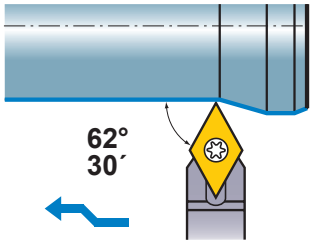
External turning, Copying

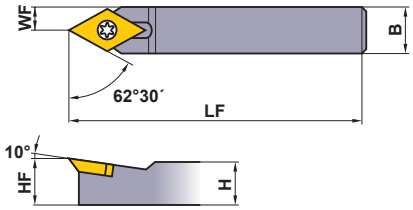
Product Information

SPARE PARTS >> 1927
TURNING INSERTS >> 150
TECHNICAL INFO >> 1971
PCD TURNING INSERTS >> 283

62° 30´ KAPR

·Holder

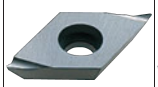




Order Number	Stock	Insert Number		Dimensions (mm)					* Clamp Screw	Wrench
				H	B	LF	HF	WF		
SDNEN1616H15	●	DEGX	1504○○	16	16	100	16	8	CS451190T	TKY20F
SDNEN2020K15	●		1504○○	20	20	125	20	10	CS451190T	TKY20F
SDNEN2525M15	●		1504○○	25	25	150	25	12.5	CS451190T	TKY20F

* Clamp Torque (N • m) : CS451190T=5.0

·CHIP BREAKER EXAMPLE

Finish Cutting	Medium Cutting	PCD
R/L-F  (15)	R/L (15)	R/L-F (15)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.

·RECOMMENDED CUTTING CONDITION

	Work Material	Grade	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
N	Aluminium Alloy	**HTi10**	400	0.05—0.3	0.2—3.0
		MD220	800	0.05—0.3	0.2—0.5

STGE

AL Holder

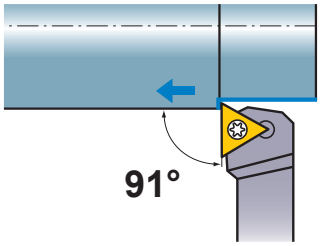
External turning

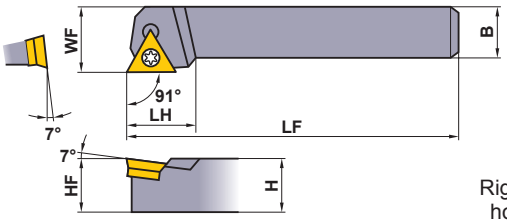
Product Information

91° KAPR

SPARE PARTS >> 1927
TURNING INSERTS >> 157
TECHNICAL INFO >> 1971
PCD TURNING INSERTS >> 284

・Holder



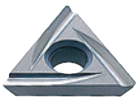


Right hand tool holder shown.

Order Number	Stock		Insert Number		Dimensions (mm)						*	
	R	L			H	B	LF	LH	HF	WF	Clamp Screw	Wrench
STGER/L1616H16	●	●	TEGX	1603○○	16	16	100	22	16	20	FC400890T	TKY10F
STGER/L2020K16	●	●		1603○○	20	20	125	22	20	25	FC400890T	TKY10F
STGER/L2525M16	●	●		1603○○	25	25	150	22	25	32	FC400890T	TKY10F

* Clamp Torque (N • m) : FC400890T=2.5

·CHIP BREAKER EXAMPLE

Medium Cutting	PCD	PCD
R/L  (16)	R/L (16)	(16)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.

·RECOMMENDED CUTTING CONDITION

	Work Material	Grade	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
N	Aluminium Alloy	**HTi10**	400	0.05—0.3	0.2—3.0
		MD220	800	0.05—0.3	0.2—0.5

STFE

AL Holder

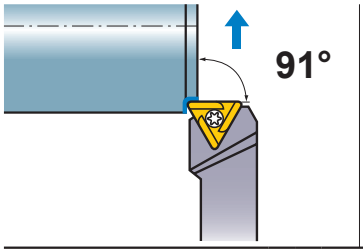
Facing

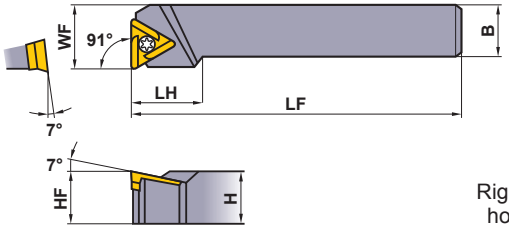
Product Information

91° KAPR

SPARE PARTS >> 1927
TURNING INSERTS >> 157
TECHNICAL INFO >> 1971
PCD TURNING INSERTS >> 284

・Holder





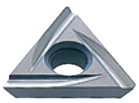
Right hand tool holder shown.

Order Number	Stock		Insert Number		Dimensions (mm)						*	
	R	L			H	B	LF	LH	HF	WF	Clamp Screw	Wrench
STFER/L1616H16	●	●	TEGX	1603○○	16	16	100	22	16	20	FC400890T	TKY10F
STFER/L2020K16	●	●		1603○○	20	20	125	22	20	25	FC400890T	TKY10F
STFER/L2525M16	●	●		1603○○	25	25	150	22	25	32	FC400890T	TKY10F

(Note) When using insert with right or left hand breaker, please use left hand insert for right hand holder and right hand insert for left hand holder.

* Clamp Torque (N • m) : FC400890T=2.5

·CHIP BREAKER EXAMPLE

Medium Cutting	PCD	PCD
R/L  (16)	R/L (16)	(16)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.

·RECOMMENDED CUTTING CONDITION

	Work Material	Grade	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
N	Aluminium Alloy	**HTi10**	400	0.05—0.3	0.2—3.0
		MD220	800	0.05—0.3	0.2—0.5

SVJD

AL Holder

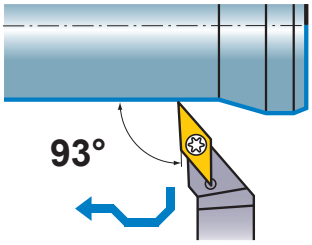
External turning, Copying

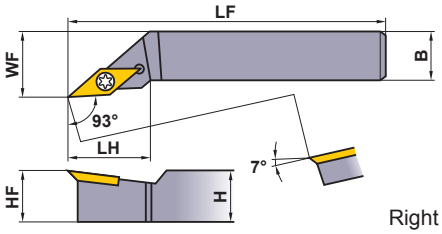
Product Information

93° KAPR

SPARE PARTS >> 1927
TURNING INSERTS >> 164
TECHNICAL INFO >> 1971
PCD TURNING INSERTS >> 285

・Holder





Right hand tool holder shown.

Order Number	Stock R	Stock L	Insert Number		Dimensions (mm) H	B	LF	LH	HF	WF	* Clamp Screw	Wrench
SVJDR/L1616H16	●	●	VDGX	1603○○	16	16	100	30	16	20	FC400890T	TKY10F
SVJDR/L2020K16	●	●		1603○○	20	20	125	30	20	25	FC400890T	TKY10F
SVJDR/L2525M16	●	●		1603○○	25	25	150	30	25	32	FC400890T	TKY10F

* Clamp Torque (N • m) : FC400890T=2.5

·CHIP BREAKER EXAMPLE

Finish Cutting	PCD
R/L (16)	R/L-F (16)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.

·RECOMMENDED CUTTING CONDITION

	Work Material	Grade	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
N	Aluminium Alloy	**HTi10**	400	0.05—0.3	0.2—3.0
		MD220	800	0.05—0.3	0.2—0.5

TLHR

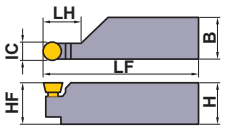
TL HOLDER

External turning, Copying

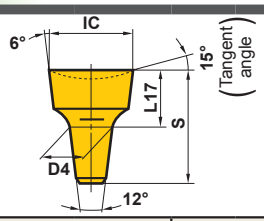
Product Information

TECHNICAL INFO >> 1971

HOLDER

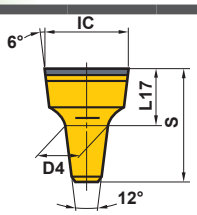
Geometry	Revised order number	Conventional order number	Stock	Insert Number	Dimensions (mm)					
					IC	H	B	HF	LF	LH
TLHR (External turning, Copying) 	**TLHR2020K5**	TLHR2020K5	●	RTG05A	5	20	20	20	125	16
	TLHR2020K6	TLHR2020K6	●	RTG06A	6	20	20	20	125	16
	TLHR2525M7	TLHR2525M7	●	RTG07A	7	25	25	25	150	20
	TLHR3225P10	TLHR54P10	●	RTG10A	10	32	25	32	170	25

INSERTS



Order Number	Stock Carbide		Dimensions (mm)			
	UTi20T	HTi10	IC	S	D4	L17
RTG05A	●	●	5	7.5	2.5	3.5
RTG06A	●	●	6	7.5	3.5	3.5
RTG07A	●		7	11	3.5	5
RTG08A	●	●	8	11	4.5	5
RTG10A	●	●	10	14	5.5	6.5

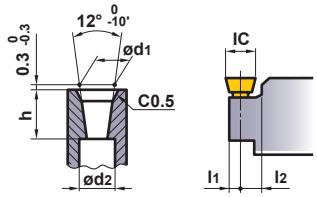
INSERTS (CBN)

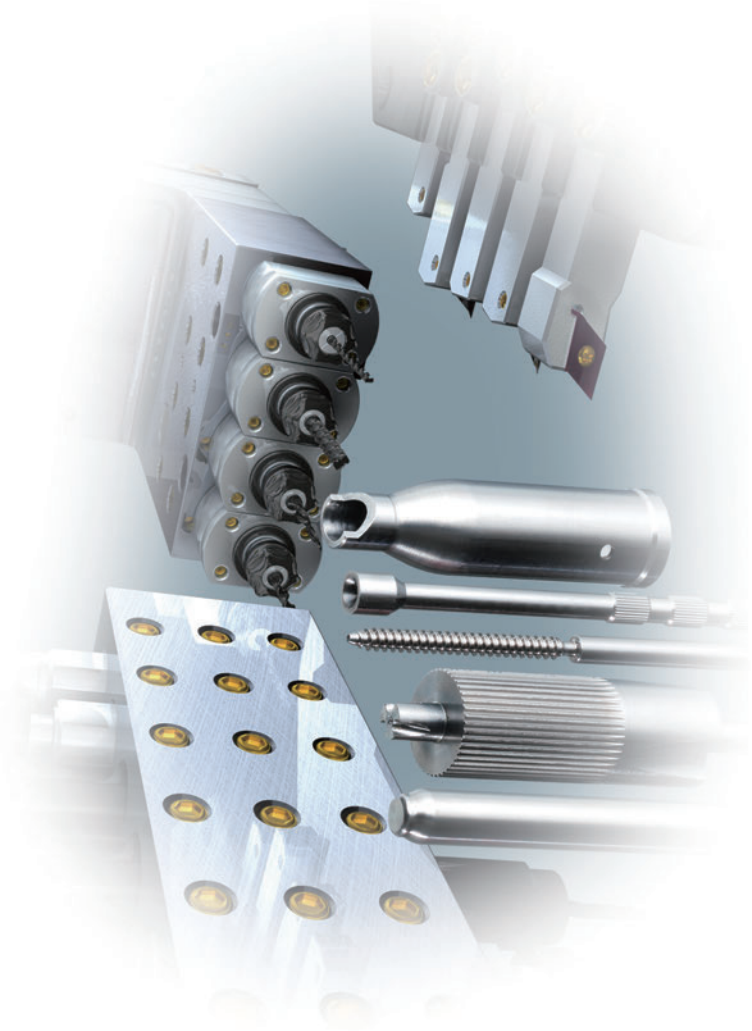


Order Number	Stock CBN	Dimensions (mm)			
	MB825	IC	S	D4	L17
RTG05A	●	5	7.5	2.5	3.5
RTG06A	●	6	7.5	3.5	3.5
RTG07A	●	7	11	3.5	5
RTG08A	●	8	11	4.5	5
RTG10A	●	10	14	5.5	6.5

INSERT SEAT LOCATION

When manufacturing a special tool holder, please machine insert seat in accordance to the drawing.

Insert Seat Dimensions	Insert Diameter **IC**	Dimensions (mm)					Taper Diameter
		h	d1	d2	l1	l2	
	5	4	2.5	1.9	1.85	3.2	1.5
	6	4	3.5	2.9	2.35	3.7	2.5
	7	6	3.5	2.5	2.75	4.3	2.1
	8	6	4.5	3.5	3.25	4.8	3.1
	10	7.5	5.5	4.2	4.15	5.9	3.8
	12	7.5	7.5	6.2	5.15	6.9	5.8



TURNING TOOLS
SMALL TOOLS

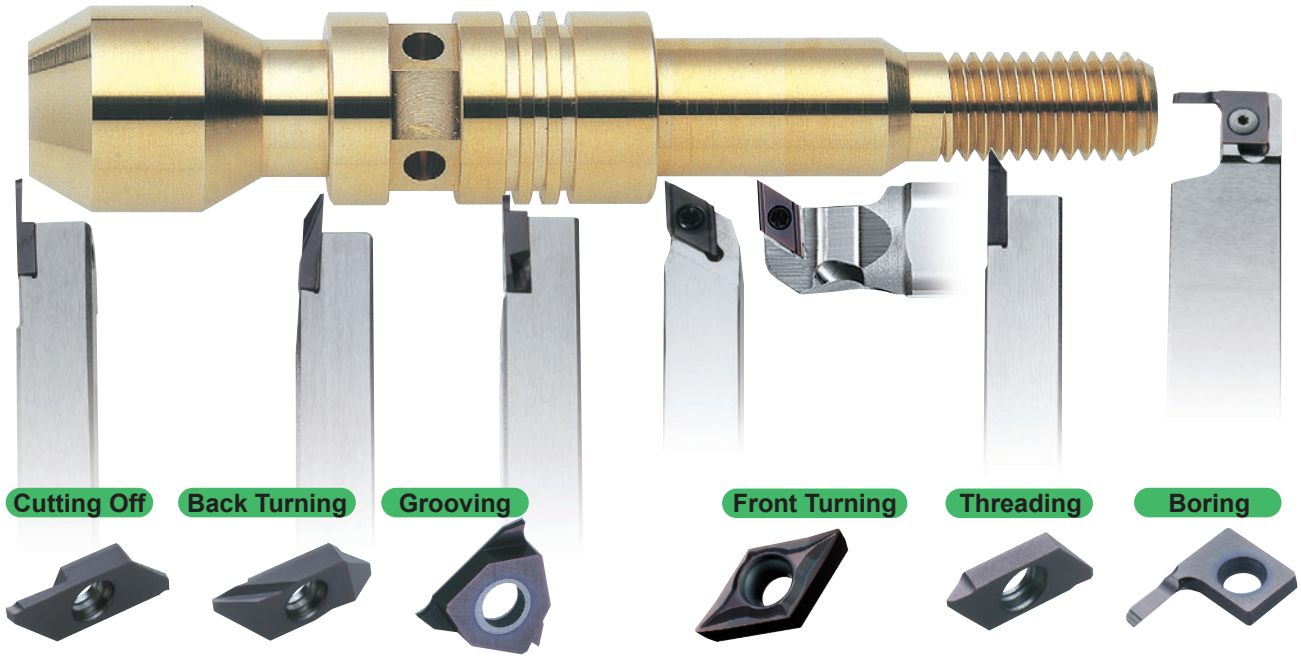
OUTLINE OF SMALL TOOLS 344
STANDARD FOR SMALL TOOLS 346
EXTERNAL FRONT TURNING 350
EXTERNAL BACK TURNING..... 358
EXTERNAL GROOVING 361
EXTERNAL CUTTING OFF 364
EXTERNAL THREADING 370
EXTERNAL FRONT TURNING, COPYING, FACING 373
CAM TYPE TOOL POSTS 374
BORING 378

★Arranged by Alphabetical order

BTAH	358	CTEH	369	SH	373
BTVH	360	GTA/B/CH	361	SVJB-SM	355
CSVH	374	SBAH	378	SVLP-SM	354
CTAH/CTAH-S	364	SCAC-SM	350	SVPP-SM	357
CTBH	359, 366	SCLC-SM	351	SVVB-SM	356
CTCH	367	SDJC-SM	352	TTAH	370
CTDH	368	SDNC-SM	353		

OUTLINE OF SMALL TOOLS

TOOLS FOR GANG TYPE AUTOMATIC LATHES (FOR EXTERNAL TURNING AND BORING)

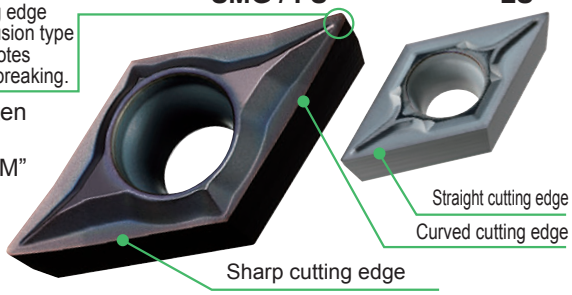


Molded Breaker Insert

Nose radii designed with minus tolerance

- Suitable for small parts applications that often require minus tolerance dimensions.
- The order number is shown with the letter "M" that indicates minus tolerance.
  <Ex>DCGT11T301M-FS
- The radius value is printed on the side of the insert label for easy recognition.

A combination of a curved cutting edge and the protrusion type breaker promotes efficient chip breaking.

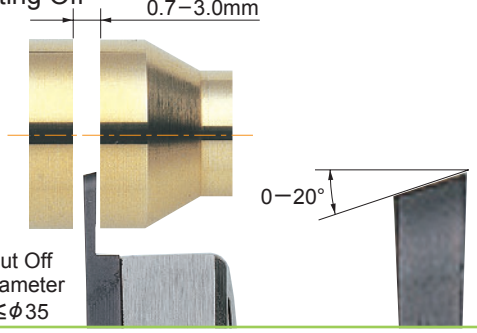


Tolerance Corner R

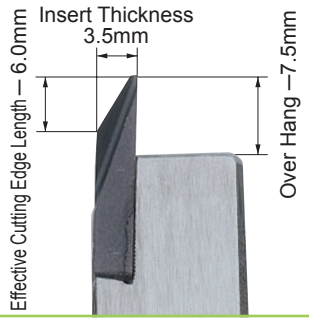
E class
RE $^{0}_{-0.02}$ mm

"M"-mark inserts
RE $^{0}_{-0.05}$ mm
(Conventional G-class insert RE ±0.10 mm)

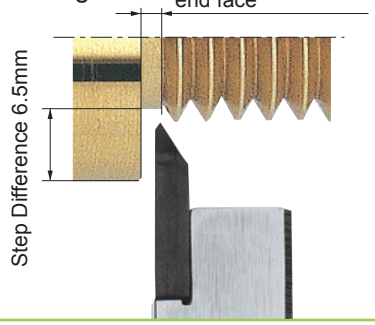
Cutting Off



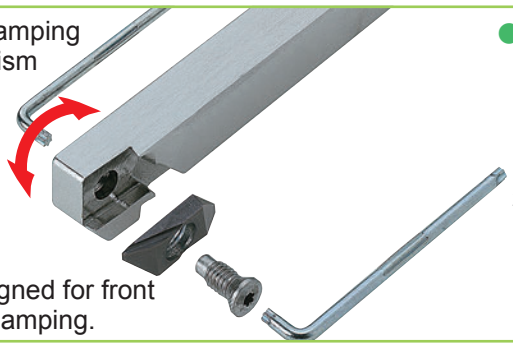
Back Turning



Threading



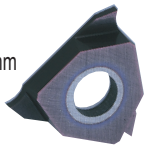
Back Clamping Mechanism

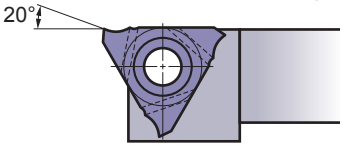


Screw designed for front and back clamping.

Grooving

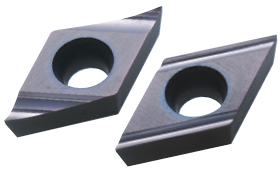
- 3-cornered
- Groove width 0.3−3.0mm
- Traversing possible





Front Turning

- ISO E class accuracy inserts
- A wide variety of small corner R inserts
- Rake angle 30°



Tools for a very wide range of small parts machining

External Turning	Tools for front turning, back turning, grooving, threading, and cutting off
Internal Turning	Tools for boring, internal grooving and internal threading
Drilling	Drills
End Milling	End Mills

Tools for CNC automatic and small lathes

Types of Tool Posts	Gang type, turret type, cam type (radial pattern type)
Tool Sizes	Square shank: 8–16 mm Round shank : less than ϕ25.4

Indexable inserts developed under the concept of "high quality, high efficiency and long tool life."

High Quality	E class tolerance, sharp cutting edge, high accuracy small corner R, smooth surface finish
Long Tool Life	COATED CARBIDE (PVD) MS6015/VP15TF/MP9005/MP9015
High Efficiency	Regrinding not necessary due to the employment of indexable inserts. A wide variety of top cutting edge geometries

TOOLS FOR CAM TYPE AUTOMATIC LATHES

- The most suitable for the use with cam type automatic lathes (radial pattern tool posts)
- The most suitable for machining of small parts with work diameter 5mm or smaller
- Single holder for front turning, back turning, grooving, threading and cutting off operations

Front Turning | Back Turning | Grooving | Threading | Cutting Off

INTERNAL TURNING TOOLS

Solid type ***MICRO-MINI TWIN Boring Bars***

Minimum cutting diameter ϕ2.2–

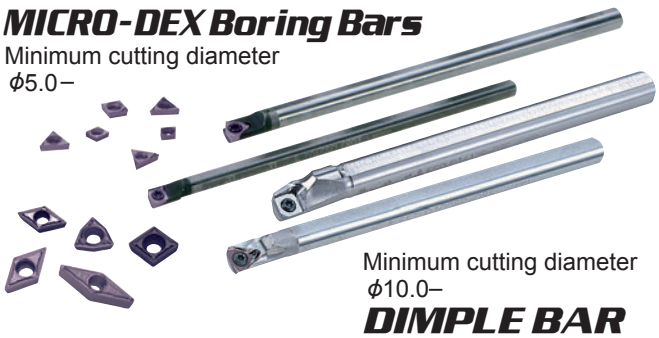
Boring
Grooving
Threading

Round Shank

Square Shank

MICRO-DEX Boring Bars

Minimum cutting diameter ϕ5.0–



Minimum cutting diameter ϕ10.0–

DIMPLE BAR

DRILLING TOOLS

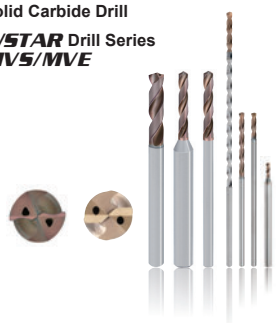
- Carbide drills
- HSS drills

Violet Coated Precision Drills

VAPDSSUS/VAPDMSUS
(For stainless steel)
VAPDSCB
(For counter boring)

Solid Carbide Drill

WSTAR **Drill Series**
MVS/MVE



END MILLING TOOLS

Solid Carbide End Mill

MSTAR **End Mill Series**

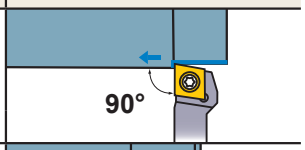
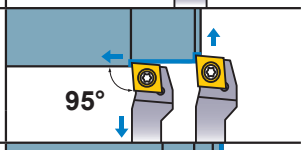
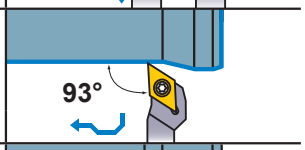
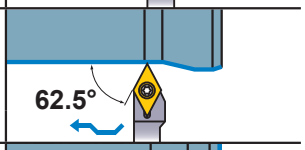
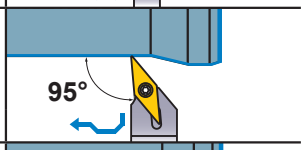
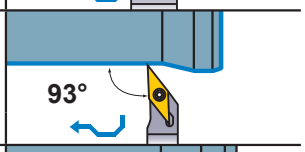
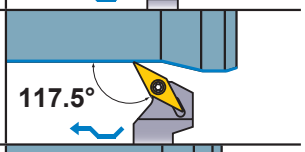
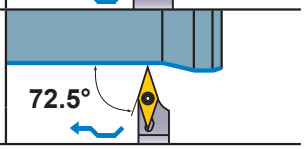
Vibration Control End Mills for Machining Diffi cult-to-Cut Materials

SMART MIRACLE **End Mill Series**

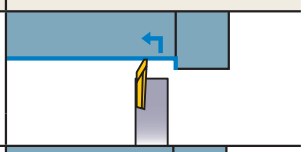
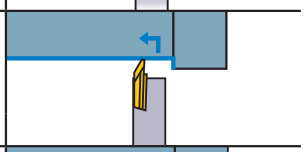
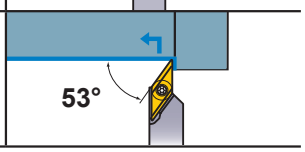
CLASSIFICATION (EXTERNAL TURNING)

GANG TYPE TOOL POSTS

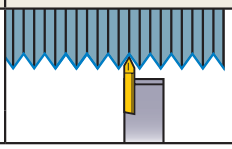
FRONT TURNING

Name of Tool Holder	Shank Size (mm) (H x W x L)	Geometry
SCAC-SM ➲ 350	8 x 8 x 125 10 x 10 x 125 12 x 12 x 150 16 x 16 x 150	
SCLC-SM ➲ 351	8 x 8 x 125 10 x 10 x 125 12 x 12 x 150 16 x 16 x 150	
SDJC-SM ➲ 352	8 x 8 x 125 10 x 10 x 125 12 x 12 x 150 16 x 16 x 150	
SDNC-SM ➲ 353	8 x 8 x 125 10 x 10 x 125 12 x 12 x 150 16 x 16 x 150	
SVLP-SM ➲ 354	10 x 10 x 125 12 x 12 x 150 16 x 16 x 150	
SVJB-SM ➲ 355	10 x 10 x 125 12 x 12 x 150 16 x 16 x 150	
SVPP-SM ➲ 357	10 x 10 x 125 12 x 12 x 150 16 x 16 x 150	
SVVB-SM ➲ 356	10 x 10 x 125 12 x 12 x 150 16 x 16 x 150	

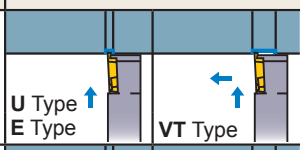
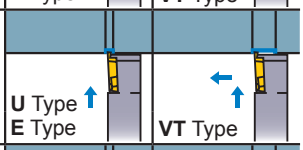
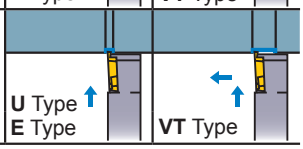
BACK TURNING

Name of Tool Holder	Shank Size (mm) (H x W x L)	Geometry
BTAH (Insert Size 2.8, 3.5, 5.0mm) ➲ 358	8 x 10 x 120 10 x 10 x 120 12 x 12 x 120 16 x 16 x 120	
CTBH (Insert Size 4.5, 6.0mm) ➲ 359	10 x 10 x 120 12 x 12 x 120 16 x 16 x 120	
BTVH (Insert Size 7.5mm) ➲ 360	10 x 10 x 120 12 x 12 x 120 16 x 16 x 120	

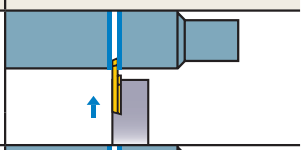
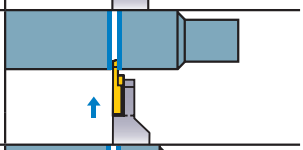
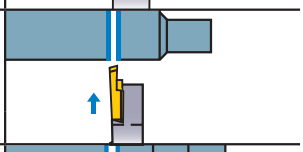
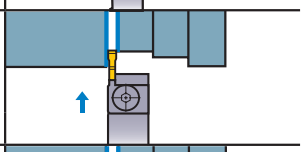
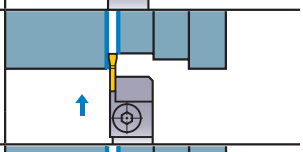
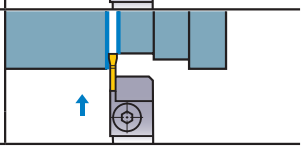
THREADING

Name of Tool Holder	Shank Size (mm) (H x W x L)	Geometry
TTAH ➲ 370	8 x 10 x 120 10 x 10 x 120 12 x 12 x 120 16 x 16 x 120	

GROOVING

Name of Tool Holder	Shank Size (mm) (H x W x L)	Geometry
GTAH (Groove Width 0.3—3.0mm) ➲ 361	8 x 8 x 80 8 x 8 x 120 10 x 10 x 80 10 x 10 x 120 12 x 12 x 80 12 x 12 x 120 16 x 16 x 120	
GTBH (Groove Width 1.45—3.0mm) ➲ 361	10 x 10 x 80 10 x 10 x 120 12 x 12 x 120 16 x 16 x 120	
GTCH (Groove Width 2.5—3.0mm) ➲ 361	10 x 10 x 80 10 x 10 x 120	

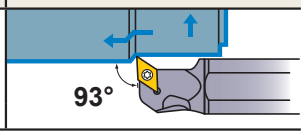
CUTTING OFF

Name of Tool Holder	Shank Size (mm) (H x W x L)	Geometry
CTAH (Max. Cut Off Diameter 12mm) ➲ 364	8 x 10 x 120 10 x 10 x 120 12 x 12 x 120 16 x 16 x 120	
CTAH-S (Max. Cut Off Diameter 12mm) ➲ 364	10 x 10 x 80	
CTBH (Max. Cut Off Diameter 16mm) ➲ 366	10 x 10 x 120 12 x 12 x 120 16 x 16 x 120	
CTCH (Max. Cut Off Diameter 20mm) ➲ 367	10 x 10 x 120 12 x 12 x 120	
CTDH (Max. Cut Off Diameter 23—35mm) ➲ 368	16 x 16 x 120 16 x 16 x 125	
CTEH (Max. Cut Off Diameter 23—35mm) ➲ 369	16 x 16 x 120 16 x 16 x 125	

CLASSIFICATION (EXTERNAL TURNING)

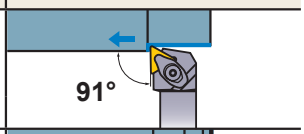
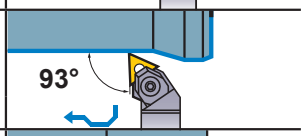
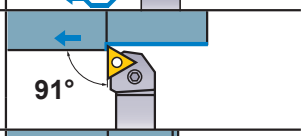
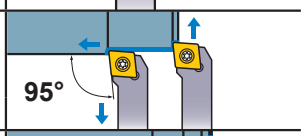
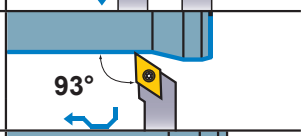
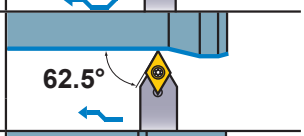
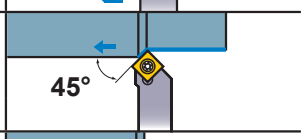
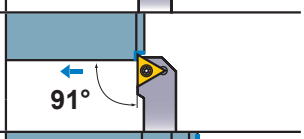
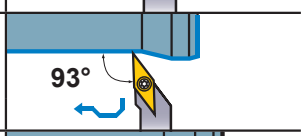
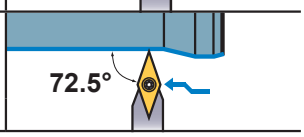
OPPOSITE TOOL POSTS

DIMPLE SLEEVE HOLDER

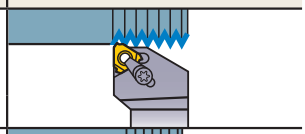
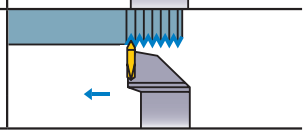
Name of Tool Holder	Shank Size (mm) (Shank Dia. x L)	Geometry
SH (Front Turning, Copying, Facing) ➲ 373	ϕ15.875 x 100 ϕ19.05 x 125 ϕ20 x 125 ϕ22 x 125 ϕ25.4 x 150	

TURRET TYPE TOOL POSTS

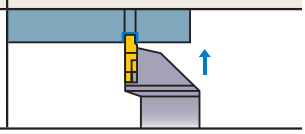
FRONT TURNING

Name of Tool Holder	Shank Size (mm) (H x W x L)	Geometry
DTGN ➲ 311	16 x 16 x 100 20 x 20 x 125 25 x 25 x 150	
MTJN ➲ 313	20 x 20 x 125 25 x 25 x 150	
PTGN ➲ 310	10 x 10 x 70 12 x 12 x 80 16 x 16 x 100 20 x 20 x 125 25 x 25 x 150	
SCLC ➲ 322	8 x 8 x 60 10 x 10 x 70 12 x 12 x 80 16 x 16 x 100	
SDJC ➲ 323	10 x 10 x 70 12 x 12 x 80 16 x 16 x 100	
SDNC ➲ 324	8 x 8 x 60 10 x 10 x 70 12 x 12 x 80 16 x 16 x 100	
SSSC ➲ 329	12 x 12 x 80 16 x 16 x 100	
STGC ➲ 330	10 x 10 x 70 12 x 12 x 80 16 x 16 x 100	
SVJC ➲ 331	10 x 10 x 70 16 x 16 x 100	
SVVC ➲ 332	16 x 16 x 100	

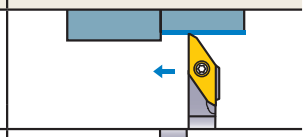
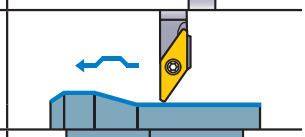
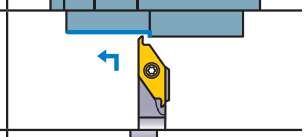
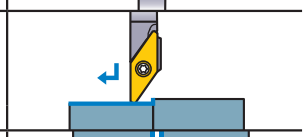
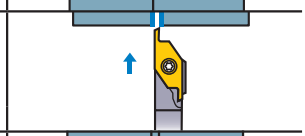
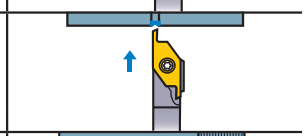
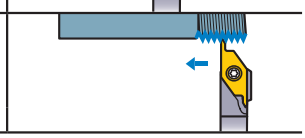
THREADING

Name of Tool Holder	Shank Size (mm) (H x W x L)	Geometry
MMT ➲ 604	12 x 12 x 100 16 x 16 x 100 20 x 20 x 125 25 x 25 x 150 32 x 32 x 170	
SMGH ➲ 611	10 x 10 x 70 12 x 12 x 80 16 x 16 x 100	

GROOVING

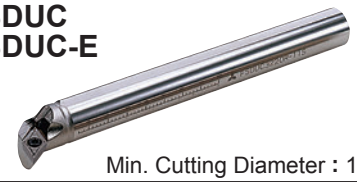
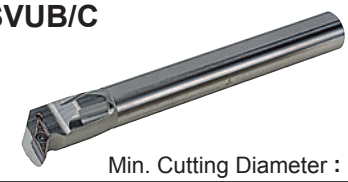
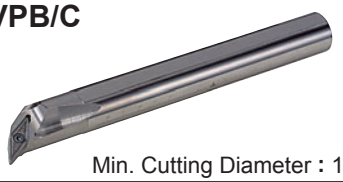
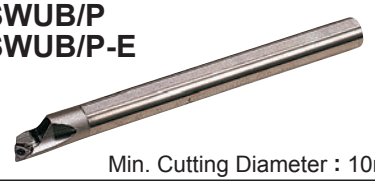
Name of Tool Holder	Shank Size (mm) (H x W x L)	Geometry
SMGH ➲ 560	10 x 10 x 70 12 x 12 x 80 16 x 16 x 100	

CAM TYPE TOOL POSTS

Name of Tool Holder	Shank Size (mm) (H x W x L)	Geometry
CSVH (Front Turning) ➲ 374	7 x 7 x 140 8 x 8 x 140 9.5x 9.5x 140 10 x10 x 140 12 x12 x 140	
CSVH (Front Turning Copying) ➲ 374	7 x 7 x 140 8 x 8 x 140 9.5x 9.5x 140 10 x10 x 140 12 x12 x 140	
CSVH (Back Turning) ➲ 374	7 x 7 x 140 8 x 8 x 140 9.5x 9.5x 140 10 x10 x 140 12 x12 x 140	
CSVH (Back Turning Copying) ➲ 374	7 x 7 x 140 8 x 8 x 140 9.5x 9.5x 140 10 x10 x 140 12 x12 x 140	
CSVH (Cutting Off) ➲ 374	7 x 7 x 140 8 x 8 x 140 9.5x 9.5x 140 10 x10 x 140 12 x12 x 140	
CSVH (Grooving) ➲ 374	7 x 7 x 140 8 x 8 x 140 9.5x 9.5x 140 10 x10 x 140 12 x12 x 140	
CSVH (Threading) ➲ 374	7 x 7 x 140 8 x 8 x 140 9.5x 9.5x 140 10 x10 x 140 12 x12 x 140	

CLASSIFICATION (INTERNAL TURNING)

Product Name	Holder
For Gang Type Tool Posts 378	SBAH Min. Cutting Diameter : 3mm
MICRO-MINI TWIN Boring Bars (Solid Carbide) 410	CB CR Min. Cutting Diameter : 2.2mm
MICRO-MINI Boring Bars (Solid Carbide) 417	C○○FR-BLS Min. Cutting Diameter : 3.2mm
MICRO-DEX Boring Bars (Carbide Shank) 429	SCLC Min. Cutting Diameter : 5mm
MICRO-DEX Boring Bars (Carbide Shank) 408	STUC Min. Cutting Diameter : 8mm
MICRO-DEX Boring Bars (Carbide Shank) 407	SWUB Min. Cutting Diameter : 6mm
F type Bars (Steel Shank) 422	FSWL1 Min. Cutting Diameter : 5.8mm
F type Bars (Carbide Shank) 423	FSWL2 Min. Cutting Diameter : 5.8mm
DIMPLE BAR (Steel Shank Carbide Shank) 386	FSCLC/P FSCLC/P-E Min. Cutting Diameter : 10mm

Product Name	Holder
DIMPLE BAR (Steel Shank Carbide Shank) 390	FSDUC FSDUC-E  Min. Cutting Diameter : 14mm
DIMPLE BAR (Steel Shank Carbide Shank) 392	FSDQC FSDQC-E Min. Cutting Diameter : 13mm
DIMPLE BAR (Steel Shank Carbide Shank) 388	FSTUP FSTUP-E Min. Cutting Diameter : 10mm
DIMPLE BAR (Steel Shank) 396	FSVUB/C  Min. Cutting Diameter : 16mm
DIMPLE BAR (Steel Shank) 397	FSVPB/C  Min. Cutting Diameter : 16mm
DIMPLE BAR (Steel Shank) 398	FSVJB/C Min. Cutting Diameter : 16mm
DIMPLE BAR (Steel Shank Carbide Shank) 394	FSWUB/P FSWUB/P-E  Min. Cutting Diameter : 10mm

CLASSIFICATION (INTERNAL TURNING)

FOR GROOVING AND THREADING

Product Name	Holder
MICRO-MINI TWIN Boring Bars (Solid Type) ➲ 580	**CG TYPE(Grooving)** Min. Cutting Diameter : 3mm
MICRO-MINI TWIN Boring Bars (Solid Type) ➲ 619	**CT TYPE(Threading)** Min. Cutting Diameter : 3mm
F type Bars (Steel Shank / Carbide Shank) (Grooving) (Threading) ➲ 584	**FSL51** **FSL52** Min. Cutting Diameter : 10mm

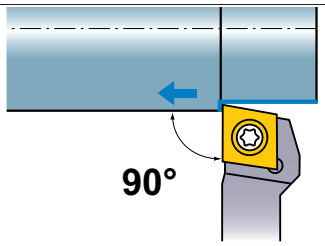
SCAC-SM

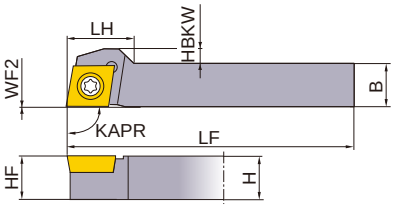
FRONT TURNING TOOLS (FOR GANG TYPE TOOL POSTS)

Product Information

90° KAPR

RECOMMENDED CUTTING CONDITION >> 175
TURNING INSERTS >> 138
PCD TURNING INSERTS >> 272
TECHNICAL INFO >> 1971
GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 244
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966



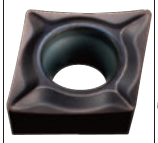
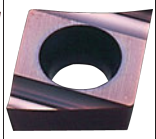
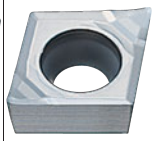


Right hand tool holder shown. Unit: mm

Order Number	Stock	L/R	Insert Number	H	B	LF	LH	HBKW	HF	WF2	KAPR	Clamp Screw	Wrench
SCACR0808K06-SM	●	R	CC**0602	8	8	125	11	1.6	8	0	90°	TS254	TKY08R
SCACR1010K06-SM	●	R	CC**0602	10	10	125			10	0	90°	TS254	TKY08R
SCACR1010K09-SM	●	R	CC**09T3	10	10	125	16	3.5	10	0	90°	TS43	TKY15R
SCACR1212M09-SM	●	R	CC**09T3	12	12	150	14	1.5	12	0	90°	TS43	TKY15R
SCACR1616M09-SM	●	R	CC**09T3	16	16	150			16	0	90°	TS43	TKY15R
SCACL0808K06-SM	●	L	CC**0602	8	8	125	11	1.6	8	0	90°	TS254	TKY08R
SCACL1010K06-SM	●	L	CC**0602	10	10	125			10	0	90°	TS254	TKY08R
SCACL1010K09-SM	●	L	CC**09T3	10	10	125	16	3.5	10	0	90°	TS43	TKY15R
SCACL1212M09-SM	●	L	CC**09T3	12	12	150	14	1.5	12	0	90°	TS43	TKY15R
SCACL1616M09-SM	●	L	CC**09T3	16	16	150			16	0	90°	TS43	TKY15R

- Clamp Torque(N • m) : TS254=1.0, TS43=3.5
- ●: Inventory maintained in Japan.

·CHIP BREAKER EXAMPLE

Finish Cutting	Finish Cutting	Light Cutting	Medium Cutting	Medium Cutting	Without Breaker	For Non-Ferrous Metal	CBN/PCD
SMG	R/L-F	R/L-SS	R/L-SN	R/L-SR	Flat Top	AZ	
							
(06)	(06)	(06,09)	(06,09)	(06,09)	(06,09)	(06,09)	(06,09)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.

·RECOMMENDED CUTTING CONDITION

	Work Material	Hardness	Grade	Cutting Speed (m/min)	Feed (mm/rev)
P	Carbon Steel · Alloy Steel	180HB–280HB	**VP15TF**	100 (50–150)	0.08 (0.01–0.15)
P	Free Cutting Steel	–	**VP15TF**	110 (30–180)	0.08 (0.01–0.15)
P	Free Cutting Steel	–	**NX2525**	150 (50–250)	0.08 (0.01–0.15)
M	Stainless Steel	≤200HB	**VP15TF**	80 (50–120)	0.06 (0.02–0.1)
N	Non-Ferrous Metal	–	**HTi10**	150 (70–230)	0.09 (0.03–0.15)

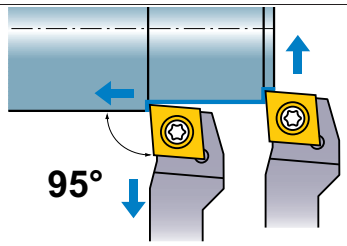
SCLC-SM

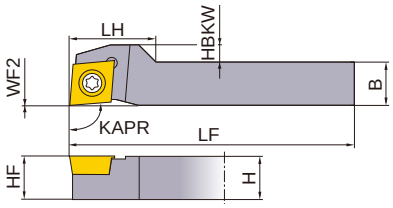
FRONT TURNING TOOLS (FOR GANG TYPE TOOL POSTS)

Product Information

95° KAPR

RECOMMENDED CUTTING CONDITION >> 175
TURNING INSERTS >> 138
PCD TURNING INSERTS >> 272
TECHNICAL INFO >> 1971
GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 244
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966



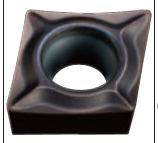
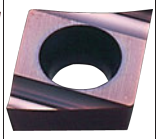
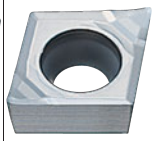


Right hand tool holder shown. Unit: mm

Order Number	Stock	L/R	Insert Number	H	B	LF	LH	HBKW	HF	WF2	KAPR	Clamp Screw	Wrench
SCLCR0808K06-SM	●	R	CC**0602	8	8	125	11	2.1	8	0	95°	TS254	TKY08R
SCLCR1010K06-SM	●	R	CC**0602	10	10	125			10	0	95°	TS254	TKY08R
SCLCR1010K09-SM	●	R	CC**09T3	10	10	125	20	4	10	0	95°	TS43	TKY15R
SCLCR1212M09-SM	●	R	CC**09T3	12	12	150	18	2	12	0	95°	TS43	TKY15R
SCLCR1616M09-SM	●	R	CC**09T3	16	16	150			16	0	95°	TS43	TKY15R
SCLCL0808K06-SM	●	L	CC**0602	8	8	125	11	2.1	8	0	95°	TS254	TKY08R
SCLCL1010K06-SM	●	L	CC**0602	10	10	125			10	0	95°	TS254	TKY08R
SCLCL1010K09-SM	●	L	CC**09T3	10	10	125	20	4	10	0	95°	TS43	TKY15R
SCLCL1212M09-SM	●	L	CC**09T3	12	12	150	18	2	12	0	95°	TS43	TKY15R
SCLCL1616M09-SM	●	L	CC**09T3	16	16	150			16	0	95°	TS43	TKY15R

- Clamp Torque(N • m) : TS254=1.0, TS43=3.5
- ●: Inventory maintained in Japan.

·CHIP BREAKER EXAMPLE

Finish Cutting	Finish Cutting	Light Cutting	Medium Cutting	Medium Cutting	Without Breaker	For Non-Ferrous Metal	CBN/PCD
SMG	R/L-F	R/L-SS	R/L-SN	R/L-SR	Flat Top	AZ	
							
(06)	(06)	(06,09)	(06,09)	(06,09)	(06,09)	(06,09)	(06,09)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.

·RECOMMENDED CUTTING CONDITION

	Work Material	Hardness	Grade	Cutting Speed (m/min)	Feed (mm/rev)
P	Carbon Steel · Alloy Steel	180HB–280HB	**VP15TF**	100 (50–150)	0.08 (0.01–0.15)
P	Free Cutting Steel	–	**VP15TF**	110 (30–180)	0.08 (0.01–0.15)
P	Free Cutting Steel	–	**NX2525**	150 (50–250)	0.08 (0.01–0.15)
M	Stainless Steel	≤200HB	**VP15TF**	80 (50–120)	0.06 (0.02–0.1)
N	Non-Ferrous Metal	–	**HTi10**	150 (70–230)	0.09 (0.03–0.15)

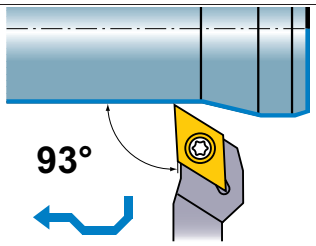
SDJC-SM

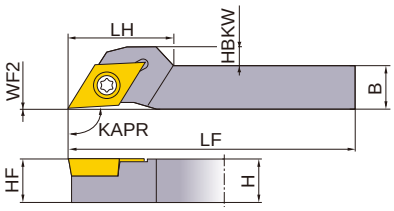
FRONT TURNING TOOLS (FOR GANG TYPE TOOL POSTS)

Product Information

93° KAPR

RECOMMENDED CUTTING CONDITION >> 175
TURNING INSERTS >> 145
PCD TURNING INSERTS >> 274
TECHNICAL INFO >> 1971
GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 249
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966



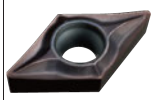
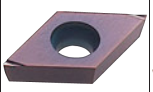
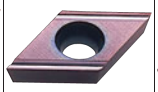
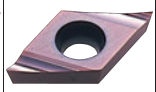
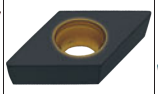
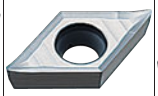
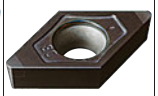


Right hand tool holder shown. Unit: mm

Order Number	Stock	L/R	Insert Number	H	B	LF	LH	HBKW	HF	WF2	KAPR	Clamp Screw	Wrench
SDJCR0808K07-SM	●	R	DC**0702	8	8	125	15	2	8	0	93°	TS254	TKY08R
SDJCR1010K07-SM	●	R	DC**0702	10	10	125			10	0	93°	TS254	TKY08R
SDJCR1010K11-SM	●	R	DC**11T3	10	10	125	24	4	10	0	93°	TS43	TKY15R
SDJCR1212M11-SM	●	R	DC**11T3	12	12	150	22	2	12	0	93°	TS43	TKY15R
SDJCR1616M11-SM	●	R	DC**11T3	16	16	150			16	0	93°	TS43	TKY15R
SDJCL0808K07-SM	●	L	DC**0702	8	8	125	15	2	8	0	93°	TS254	TKY08R
SDJCL1010K07-SM	●	L	DC**0702	10	10	125			10	0	93°	TS254	TKY08R
SDJCL1010K11-SM	●	L	DC**11T3	10	10	125	24	4	10	0	93°	TS43	TKY15R
SDJCL1212M11-SM	●	L	DC**11T3	12	12	150	22	2	12	0	93°	TS43	TKY15R
SDJCL1616M11-SM	●	L	DC**11T3	16	16	150			16	0	93°	TS43	TKY15R

- Clamp Torque(N • m) : TS254=1.0, TS43=3.5
- ●: Inventory maintained in Japan.

·CHIP BREAKER EXAMPLE

Finish Cutting	Finish Cutting	Light Cutting	Medium Cutting	Medium Cutting	Without Breaker	For Non-Ferrous Metal	CBN/PCD
SMG	R-F	R-SS	R-SN	R-SR	Flat Top	AZ	
							
(07,11)	(07,11)	(07,11)	(07,11)	(07,11)	(07,11)	(07,11)	(07,11)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.

·RECOMMENDED CUTTING CONDITION

	Work Material	Hardness	Grade	Cutting Speed (m/min)	Feed (mm/rev)
P	Carbon Steel · Alloy Steel	180HB–280HB	**VP15TF**	100 (50–150)	0.08 (0.01–0.15)
P	Free Cutting Steel	–	**VP15TF**	110 (30–180)	0.08 (0.01–0.15)
P	Free Cutting Steel	–	**NX2525**	150 (50–250)	0.08 (0.01–0.15)
M	Stainless Steel	≤200HB	**VP15TF**	80 (50–120)	0.06 (0.02–0.1)
N	Non-Ferrous Metal	–	**HTi10**	150 (70–230)	0.09 (0.03–0.15)

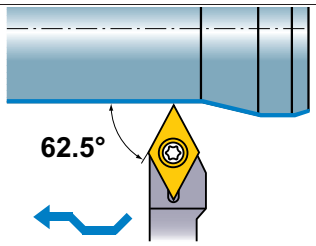
SDNC-SM

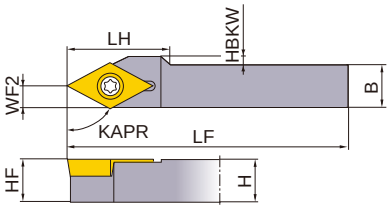
FRONT TURNING TOOLS (FOR GANG TYPE TOOL POSTS)

Product Information

62° 30′ KAPR

RECOMMENDED CUTTING CONDITION >> 175
TURNING INSERTS >> 145
PCD TURNING INSERTS >> 274
TECHNICAL INFO >> 1971
GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 249
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966



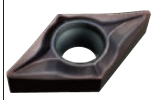
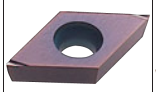
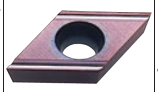
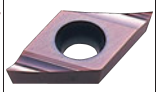
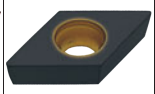
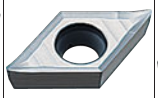
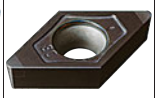


Right hand tool holder shown. Unit: mm

Order Number	Stock	L/R	Insert Number	H	B	LF	LH	HBKW	HF	WF2	KAPR	Clamp Screw	Wrench
SDNCR0808K07-SM	●	R	DC**0702	8	8	125			8	3	62.5°	TS254	TKY08R
SDNCR1010K07-SM	●	R	DC**0702	10	10	125			10	3	62.5°	TS254	TKY08R
SDNCR1010K11-SM	●	R	DC**11T3	10	10	125	24	2	10	5	62.5°	TS43	TKY15R
SDNCR1212M11-SM	●	R	DC**11T3	12	12	150			12	5	62.5°	TS43	TKY15R
SDNCR1616M11-SM	●	R	DC**11T3	16	16	150			16	5	62.5°	TS43	TKY15R
SDNCL0808K07-SM	●	L	DC**0702	8	8	125			8	3	62.5°	TS254	TKY08R
SDNCL1010K07-SM	●	L	DC**0702	10	10	125			10	3	62.5°	TS254	TKY08R
SDNCL1010K11-SM	●	L	DC**11T3	10	10	125	24	2	10	5	62.5°	TS43	TKY15R
SDNCL1212M11-SM	●	L	DC**11T3	12	12	150			12	5	62.5°	TS43	TKY15R
SDNCL1616M11-SM	●	L	DC**11T3	16	16	150			16	5	62.5°	TS43	TKY15R

- Clamp Torque(N • m) : TS254=1.0, TS43=3.5
- ●: Inventory maintained in Japan.

·CHIP BREAKER EXAMPLE

Finish Cutting	Finish Cutting	Light Cutting	Medium Cutting	Medium Cutting	Without Breaker	For Non-Ferrous Metal	CBN/PCD
SMG	R-F	R-SS	R-SN	R-SR	Flat Top	AZ	
							
(07,11)	(07,11)	(07,11)	(07,11)	(07,11)	(07,11)	(07,11)	(07,11)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.

·RECOMMENDED CUTTING CONDITION

	Work Material	Hardness	Grade	Cutting Speed (m/min)	Feed (mm/rev)
P	Carbon Steel · Alloy Steel	180HB–280HB	**VP15TF**	100 (50–150)	0.08 (0.01–0.15)
P	Free Cutting Steel	–	**VP15TF**	110 (30–180)	0.08 (0.01–0.15)
P	Free Cutting Steel	–	**NX2525**	150 (50–250)	0.08 (0.01–0.15)
M	Stainless Steel	≤200HB	**VP15TF**	80 (50–120)	0.06 (0.02–0.1)
N	Non-Ferrous Metal	–	**HTi10**	150 (70–230)	0.09 (0.03–0.15)

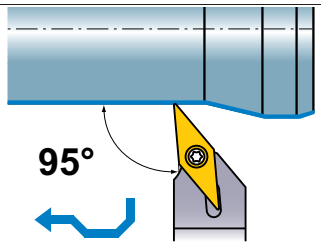
SVLP-SM

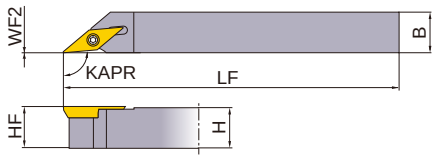
FRONT TURNING TOOLS (FOR GANG TYPE TOOL POSTS)

Product Information

95° KAPR

RECOMMENDED CUTTING CONDITION >> 175
TURNING INSERTS >> 165
TECHNICAL INFO >> 1971
GRADES AND CHIP BREAKERS >> 38
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966



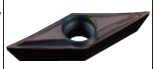


Right hand tool holder shown. Unit: mm

Order Number	Stock	L/R	Insert Number	H	B	LF	HF	WF2	KAPR	Clamp Screw	Wrench
SVLPR1010K08-SM	●	R	VP**0802	10	10	125	10	0	95°	TS202	TKY06R
SVLPR1010K11-SM	●	R	VP**1103	10	10	125	10	0	95°	TS255	TKY08R
SVLPR1212M08-SM	●	R	VP**0802	12	12	150	12	0	95°	TS202	TKY06R
SVLPR1212M11-SM	●	R	VP**1103	12	12	150	12	0	95°	TS255	TKY08R
SVLPR1616M11-SM	●	R	VP**1103	16	16	150	16	0	95°	TS255	TKY08R
SVLPL1010K08-SM	●	L	VP**0802	10	10	125	10	0	95°	TS202	TKY06R
SVLPL1010K11-SM	●	L	VP**1103	10	10	125	10	0	95°	TS255	TKY08R
SVLPL1212M08-SM	●	L	VP**0802	12	12	150	12	0	95°	TS202	TKY06R
SVLPL1212M11-SM	●	L	VP**1103	12	12	150	12	0	95°	TS255	TKY08R
SVLPL1616M11-SM	●	L	VP**1103	16	16	150	16	0	95°	TS255	TKY08R

- Clamp Torque(N • m) : TS202=0.6, TS255=1.0
- ●: Inventory maintained in Japan.

·CHIP BREAKER EXAMPLE

Finish Cutting	Finish Cutting
R/L-SRF	SMG
	
(08,11)	(08,11)

·RECOMMENDED CUTTING CONDITION

	Work Material	Hardness	Grade	Cutting Speed (m/min)	Feed (mm/rev)
P	Carbon Steel · Alloy Steel	180HB–280HB	**VP15TF**	100 (70–120)	0.06 (0.02–0.1)
	Free Cutting Steel	–	**VP15TF**	110 (30–180)	0.06 (0.02–0.1)
M	Stainless Steel	≤200HB	**VP15TF**	100 (70–120)	0.06 (0.02–0.1)

(Note) The insert photos are only examples. The letters refer to the chip breaker and the dimension refers to the inscribed circle.

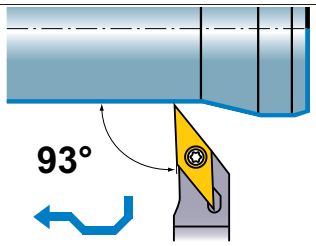
SVJB-SM

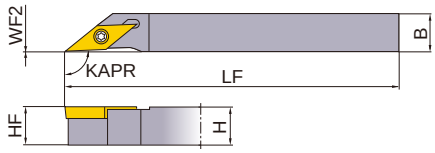
FRONT TURNING TOOLS (FOR GANG TYPE TOOL POSTS)

Product Information

93° KAPR

RECOMMENDED CUTTING CONDITION >> 175
TURNING INSERTS >> 160
PCD TURNING INSERTS >> 279
TECHNICAL INFO >> 1971
GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 257
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966



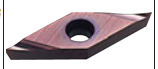


Right hand tool holder shown. Unit: mm

Order Number	Stock	L/R	Insert Number	H	B	LF	HF	WF2	KAPR	Clamp Screw	Wrench
SVJBR1010K11-SM	●	R	VB**1103	10	10	125	10	0	93°	TS255	TKY08R
SVJBR1212M11-SM	●	R	VB**1103	12	12	150	12	0	93°	TS255	TKY08R
SVJBR1616M11-SM	●	R	VB**1103	16	16	150	16	0	93°	TS255	TKY08R
SVJBL1010K11-SM	●	L	VB**1103	10	10	125	10	0	93°	TS255	TKY08R
SVJBL1212M11-SM	●	L	VB**1103	12	12	150	12	0	93°	TS255	TKY08R
SVJBL1616M11-SM	●	L	VB**1103	16	16	150	16	0	93°	TS255	TKY08R

- Clamp Torque(N • m) : TS255=1.0
- ●: Inventory maintained in Japan.

CHIP BREAKER EXAMPLE

Finish Cutting	Medium Cutting	Medium Cutting	Medium Cutting
R/L-F	R/L-SN	MV	R/L-SR
			
(11)	(11)	(11)	(11)

·RECOMMENDED CUTTING CONDITION

	Work Material	Hardness	Grade	Cutting Speed (m/min)	Feed (mm/rev)
P	Carbon Steel · Alloy Steel	180HB–280HB	**VP15TF**	100 (70–120)	0.06 (0.02–0.1)
	Free Cutting Steel	–	**VP15TF**	110 (30–180)	0.06 (0.02–0.1)
M	Stainless Steel	≤200HB	**VP15TF**	100 (70–120)	0.06 (0.02–0.1)

(Note) The insert photos are only examples. The letters refer to the chip breaker and the dimension refers to the inscribed circle.

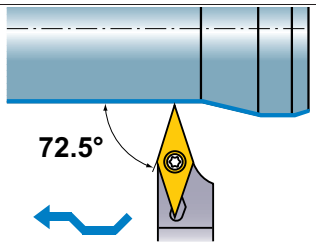
SVVB-SM

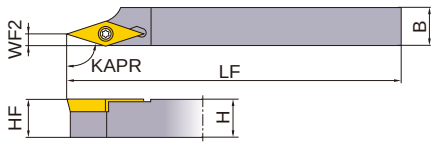
FRONT TURNING TOOLS (FOR GANG TYPE TOOL POSTS)

Product Information

72° 30′ KAPR

RECOMMENDED CUTTING CONDITION >> 175
TURNING INSERTS >> 160
PCD TURNING INSERTS >> 279
TECHNICAL INFO >> 1971
GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 257
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966



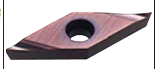


Right hand tool holder shown. Unit: mm

Order Number	Stock	L/R	Insert Number	H	B	LF	HF	WF2	KAPR	Clamp Screw	Wrench
SVVBR1010K11-SM	●	R	VB**1103	10	10	125	10	3	72.5°	TS255	TKY08R
SVVBR1212M11-SM	●	R	VB**1103	12	12	150	12	3	72.5°	TS255	TKY08R
SVVBR1616M11-SM	●	R	VB**1103	16	16	150	16	3	72.5°	TS255	TKY08R
SVVBL1010K11-SM	●	L	VB**1103	10	10	125	10	3	72.5°	TS255	TKY08R
SVVBL1212M11-SM	●	L	VB**1103	12	12	150	12	3	72.5°	TS255	TKY08R
SVVBL1616M11-SM	●	L	VB**1103	16	16	150	16	3	72.5°	TS255	TKY08R

- Clamp Torque(N • m) : TS255=1.0
- ●: Inventory maintained in Japan.

CHIP BREAKER EXAMPLE

Finish Cutting	Medium Cutting	Medium Cutting	Medium Cutting
R/L-F	R/L-SN	MV	R/L-SR
			
(11)	(11)	(11)	(11)

·RECOMMENDED CUTTING CONDITION

	Work Material	Hardness	Grade	Cutting Speed (m/min)	Feed (mm/rev)
P	Carbon Steel · Alloy Steel	180HB–280HB	**VP15TF**	100 (70–120)	0.06 (0.02–0.1)
	Free Cutting Steel	–	**VP15TF**	110 (30–180)	0.06 (0.02–0.1)
M	Stainless Steel	≤200HB	**VP15TF**	100 (70–120)	0.06 (0.02–0.1)

(Note) The insert photos are only examples. The letters refer to the chip breaker and the dimension refers to the inscribed circle.

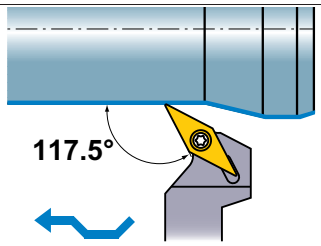
SVPP-SM

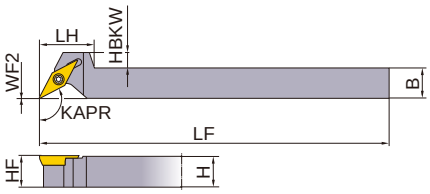
FRONT TURNING TOOLS (FOR GANG TYPE TOOL POSTS)

Product Information

117° 30′ KAPR

RECOMMENDED CUTTING CONDITION >> 175
TURNING INSERTS >> 165
TECHNICAL INFO >> 1971
GRADES AND CHIP BREAKERS >> 38
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966



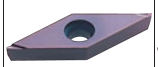
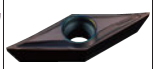


Right hand tool holder shown. Unit: mm

Order Number	Stock	L/R	Insert Number	H	B	LF	LH	HBKW	HF	WF2	KAPR	Clamp Screw	Wrench
SVPPR1010K11-SM	●	R	VP**1103	10	10	125	20	8	10	0	117.5°	TS255	TKY08R
SVPPR1212M11-SM	●	R	VP**1103	12	12	150	20	6	12	0	117.5°	TS255	TKY08R
SVPPR1616M11-SM	●	R	VP**1103	16	16	150	17		16	0	117.5°	TS255	TKY08R
SVPPL1010K11-SM	●	L	VP**1103	10	10	125	20	8	10	0	117.5°	TS255	TKY08R
SVPPL1212M11-SM	●	L	VP**1103	12	12	150	20	6	12	0	117.5°	TS255	TKY08R
SVPPL1616M11-SM	●	L	VP**1103	16	16	150	17		16	0	117.5°	TS255	TKY08R

- Clamp Torque(N • m) : TS255=1.0
- ●: Inventory maintained in Japan.

·CHIP BREAKER EXAMPLE

Finish Cutting	Finish Cutting
R/L-SRF	SMG
	
(11)	(11)

·RECOMMENDED CUTTING CONDITION

	Work Material	Hardness	Grade	Cutting Speed (m/min)	Feed (mm/rev)
P	Carbon Steel · Alloy Steel	180HB–280HB	**VP15TF**	100 (70–120)	0.06 (0.02–0.1)
	Free Cutting Steel	–	**VP15TF**	110 (30–180)	0.06 (0.02–0.1)
M	Stainless Steel	≤200HB	**VP15TF**	100 (70–120)	0.06 (0.02–0.1)

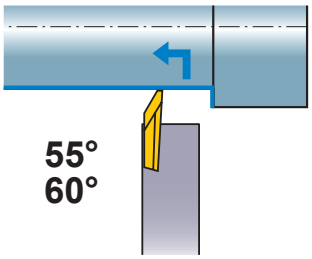
(Note) The insert photos are only examples. The letters refer to the chip breaker and the dimension refers to the inscribed circle.

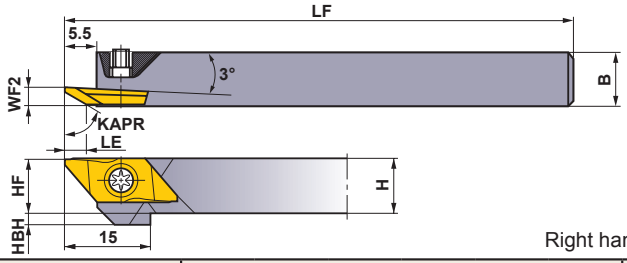
BTAH

BACK TURNING TOOLS (FOR GANG TYPE TOOL POSTS)

Product Information

SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966
TECHNICAL INFO >> 1971





Right hand tool holder shown.

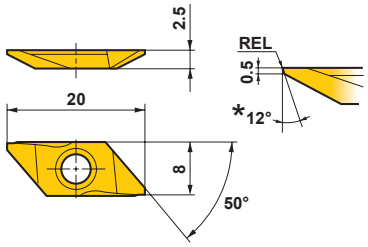
Order Number	Stock R	Stock L	Insert Number		Dimensions (mm) H	B	LF	HF	HBH	WF2	* Clamp Screw	Wrench
BTAHR/L0810-50	●	●	BTAT	5528□□R/L-B 6035□□R/L-B 605000RX	8	10	120	8	4	3.5	NS402W	NKY15S
BTAHR/L1010-50	●	●			10	10	120	10	2	3.5	NS402W	NKY15S
BTAHR/L1212-50	●	●			12	12	120	12	—	3.5	NS403W	NKY15S
BTAHR/L1616-50	●				16	16	120	16	—	3.5	NS403W	NKY15S

(Note 1) Please use right hand insert for right hand holder and left hand insert for left hand holder.
(Note 2) Set the maximum depth of cut at under 60% of the effective cutting edge length (LE).
* Clamp Torque (N • m) : NS402W=1.0, NS403W=1.0

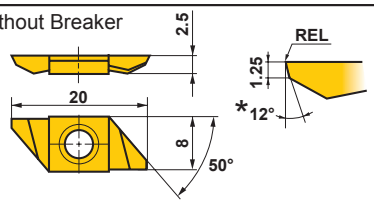
● **: Inventory maintained in Japan.**

INSERTS

Order Number	Hand	Coated VP15TF	Dimensions (mm) KAPR*	REL	LE *	Geometry
BTAT552800R-B	R	●	55°	0	2.8	With Breaker
BTAT552800L-B	L	●	55°	0	2.8	
BTAT552801R-B	R	●	55°	0.1	2.8	
BTAT552801L-B	L	●	55°	0.1	2.8	
BTAT603500R-B	R	●	60°	0	3.5	
BTAT603500L-B	L	●	60°	0	3.5	
BTAT603501R-B	R	●	60°	0.1	3.5	
BTAT603501L-B	L	●	60°	0.1	3.5	
BTAT605000RX	R	●	60°	0	5.0	Without Breaker



Right hand insert shown.



* Numeric value set insert on holder.

● **: Inventory maintained in Japan.**

·RECOMMENDED CUTTING CONDITION

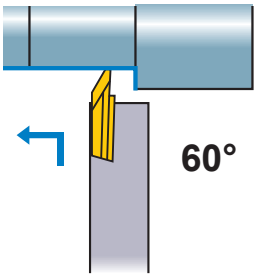
	Work Material	Hardness	Grade	Cutting Speed (m/min)	Feed (mm/rev)
P	Carbon Steel · Alloy Steel	180HB–280HB	**VP15TF**	100 (50–150)	0.08 (0.01–0.15)
	Free Cutting Steel	–	**VP15TF**	110 (30–180)	0.08 (0.01–0.15)
M	Stainless Steel	≤200HB	**VP15TF**	80 (50–120)	0.06 (0.02–0.1)
N	Non-Ferrous Metal	–	**VP15TF**	150 (70–230)	0.09 (0.03–0.15)

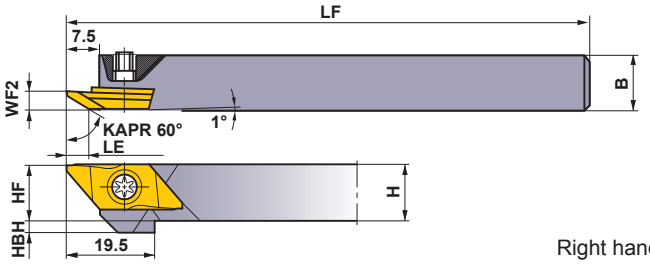
CTBH

BACK TURNING TOOLS (FOR GANG TYPE TOOL POSTS)

Product Information

SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966
TECHNICAL INFO >> 1971





Right hand tool holder shown.

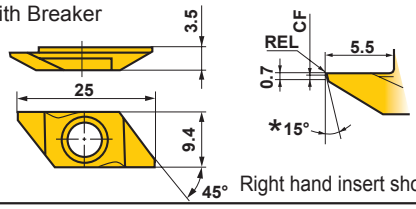
Order Number	Stock R	Stock L	Insert Number		Dimensions (mm) H	B	LF	HF	HBH	WF2	* Clamp Screw	Wrench
CTBHR/L1010-160	●	●	BTBT	60450□R/L-B 606000R/L	10	10	120	10	2	3.4	NS402W	NKY15S
CTBHR/L1212-160	●	●			12	12	120	12	—	3.4	NS403W	NKY15S
CTBHR/L1616-160	●	●			16	16	120	16	—	3.4	NS403W	NKY15S

(Note 1) Please use right hand insert for right hand holder and left hand insert for left hand holder.
(Note 2) Set the maximum depth of cut at under 60% of the effective cutting edge length (LE).
* Clamp Torque (N • m) : NS402W=1.0, NS403W=1.0

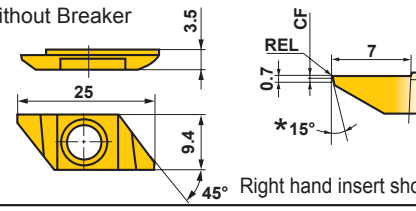
● : Inventory maintained in Japan.

INSERTS

Order Number	Hand	Coated VP15TF	Dimensions (mm) REL	CF	LE (mm) *	Geometry
BTBT604500R-B	R	●	0	0.2	4.5	With Breaker
BTBT604500L-B	L	●	0	0.2	4.5	
BTBT604501R-B	R	●	0.1	0.3	4.5	
BTBT604501L-B	L	●	0.1	0.3	4.5	
BTBT606000R	R	●	0	0.2	6.0	Without Breaker
BTBT606000L	L	●	0	0.2	6.0	



Right hand insert shown.



Right hand insert shown.

* Numeric value set insert on holder.

● : Inventory maintained in Japan.

·RECOMMENDED CUTTING CONDITION

	Work Material	Hardness	Grade	Cutting Speed (m/min)	Feed (mm/rev)
P	Carbon Steel · Alloy Steel	180HB–280HB	**VP15TF**	100 (50–150)	0.08 (0.01–0.15)
	Free Cutting Steel	–	**VP15TF**	110 (30–180)	0.08 (0.01–0.15)
M	Stainless Steel	≤200HB	**VP15TF**	80 (50–120)	0.06 (0.02–0.1)
N	Non-Ferrous Metal	–	**VP15TF**	150 (70–230)	0.09 (0.03–0.15)

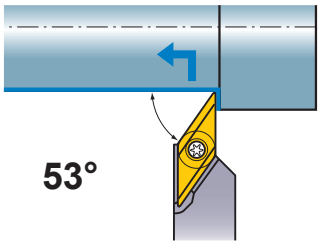
BTVH

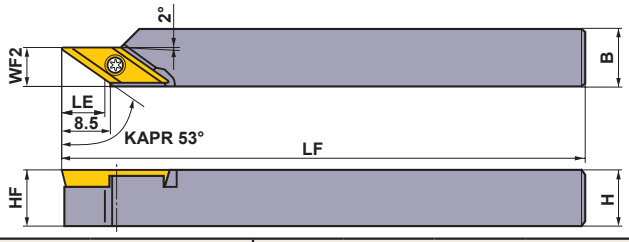
BACK TURNING TOOLS (FOR GANG TYPE TOOL POSTS)

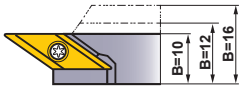
Product Information

SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966
TECHNICAL INFO >> 1971

53° KAPR







BTVHR□□□□-75F

Right hand tool holder only.

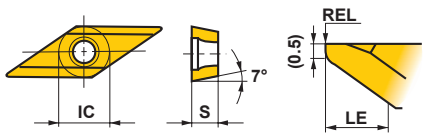
Order Number	Stock	Insert Number		Dimensions (mm)					* Clamp Screw	Wrench
	R			H	B	LF	HF	WF2		
BTVHR1010-75	●	BTVT	5375□□R-B	10	10	120	10	7.5	NS251	NKY15S
BTVHR1212-75	●			12	12	120	12	7.5	NS251	NKY15S
BTVHR1616-75	●			16	16	120	16	7.5	NS251	NKY15S
BTVHR1010-75F	●			10	10	120	10	10.0	NS251	NKY15S
BTVHR1212-75F	●			12	12	120	12	10.0	NS251	NKY15S
BTVHR1616-75F	●			16	16	120	16	10.0	NS251	NKY15S

(Note 1) Set the maximum depth of cut at under 30% of the effective cutting edge length (LE).
(Note 2) For high load machining, F type is recommended.
* Clamp Torque (N • m) : NS251=1.0

● : **Inventory maintained in Japan.**

INSERTS

Order Number	Hand	Coated	Dimensions (mm)			LE (mm) *	Geometry
		VP15TF	IC	S	REL		
BTVT5375V5R-B	R	●	6.35	3.18	0.05	7.5	With Breaker
BTVT537501R-B	R	●	6.35	3.18	0.1	7.5	



* Numeric value set insert on holder.

● : **Inventory maintained in Japan.**

·RECOMMENDED CUTTING CONDITION

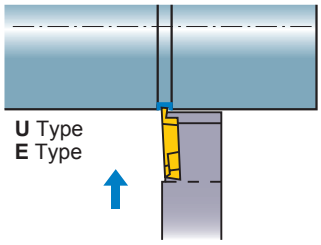
	Work Material	Hardness	Grade	Cutting Speed (m/min)	Feed (mm/rev)
P	Carbon Steel · Alloy Steel	180HB–280HB	**VP15TF**	100 (50–150)	0.08 (0.01–0.15)
	Free Cutting Steel	–	**VP15TF**	110 (30–180)	0.08 (0.01–0.15)
M	Stainless Steel	≤200HB	**VP15TF**	80 (50–120)	0.06 (0.02–0.1)
N	Non-Ferrous Metal	–	**VP15TF**	150 (70–230)	0.09 (0.03–0.15)

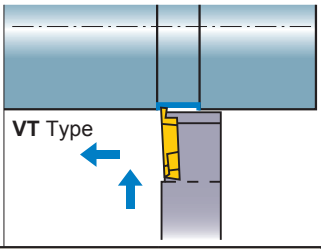
GTA/B/CH

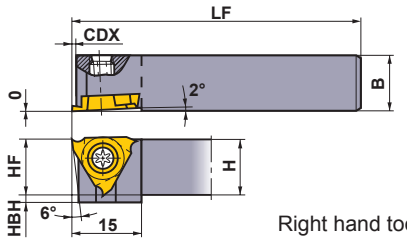
GROOVING TOOLS (FOR GANG TYPE TOOL POSTS)

Product Information

SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966
TECHNICAL INFO >> 1971







Right hand tool holder shown.

	Order Number	Stock R	Stock L	Insert Number		Dimensions (mm) H	B	HF	LF	CDX*1	HBH	Cutting Width (mm)	*2 Clamp Screw	Wrench
Standard Shank	GTAHR/L0808-20S	●	●	GTAT GTBT *1 GTCT *1	○○○○	8	8	8	80	2	5	0.3—3.0	NS404W	NKY15S
	GTAHR/L1010-20S	●	●		○○○○	10	10	10	80	2	3	0.3—3.0	NS404W	NKY15S
	GTAHR/L1212-20S	●	●		○○○○	12	12	12	80	2	1	0.3—3.0	NS404W	NKY15S
	GTBHR/L1010-30S	●	●	GTBT. GTCT	○○○○	10	10	10	80	3	3	1.45—3.0	NS404W	NKY15S
	GTCHR/L1010-30S	●	●	GTCT	○○○○	10	10	10	80	3	3	2.5—3.0	NS404W	NKY15S
Long Shank	GTAHR/L0808-20	●	●	GTAT GTBT *1 GTCT *1	○○○○	8	8	8	120	2	5	0.3—3.0	NS404W	NKY15S
	GTAHR/L1010-20	●	●		○○○○	10	10	10	120	2	3	0.3—3.0	NS404W	NKY15S
	GTAHR/L1212-20	●	●		○○○○	12	12	12	120	2	1	0.3—3.0	NS404W	NKY15S
	GTAHR/L1616-20	●	●		○○○○	16	16	16	120	2	—	0.3—3.0	NS404W	NKY15S
	GTBHR/L1010-30	●	●	GTBT. GTCT	○○○○	10	10	10	120	3	3	1.45—3.0	NS404W	NKY15S
	GTBHR/L1212-30	●	●		○○○○	12	12	12	120	3	1	1.45—3.0	NS404W	NKY15S
	GTBHR/L1616-30	●	●		○○○○	16	16	16	120	3	—	1.45—3.0	NS404W	NKY15S
	GTCHR/L1010-30	●	●	GTCT	○○○○	10	10	10	120	3	3	2.5—3.0	NS404W	NKY15S

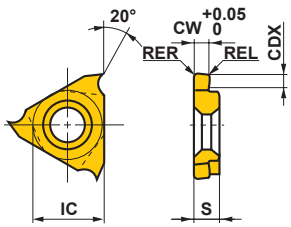
(Note) Please use right hand insert for right hand holder and left hand insert for left hand holder.
*1 Even if the insert dimension CDX exceeds the holder dimension CDX, it is not possible to machine depths over CDX.
*2 Clamp Torque (N • m) : NS404W=1.0

● : **Inventory maintained in Japan.**

·RECOMMENDED CUTTING CONDITION

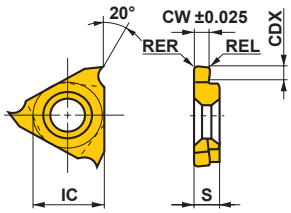
	Work Material	Hardness	Grade	Cutting Speed (m/min)	Feed (mm/rev)
P	Carbon Steel · Alloy Steel	180HB—280HB	**VP15TF**	100 (50—150)	0.05 (0.02—0.09)
	Free Cutting Steel	—	**VP15TF**	110 (30—180)	0.05 (0.01—0.09)
M	Stainless Steel	≤200HB	**VP15TF**	80 (50—120)	0.03 (0.02—0.05)
N	Non-Ferrous Metal	—	**VP15TF**	150 (70—230)	0.07 (0.03—0.11)

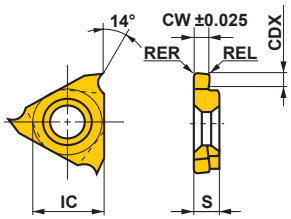
INSERTS

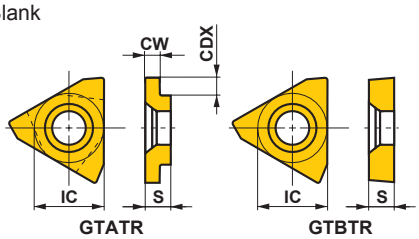
Order Number	Hand	Coated	Dimensions (mm)					Geometry
		VP15TF	CW	CDX *1	RER/L	IC	S	
GTAT 03006V3R-U	R	●	0.3	0.6	0.03	9.525	3.18	**U** Type Breaker (General purpose Grooving)
GTAT 03006V3L-U	L	●	0.3	0.6	0.03	9.525	3.18	
GTAT 05012V5R-U	R	●	0.5	1.2	0.05	9.525	3.18	
GTAT 05012V5L-U	L	●	0.5	1.2	0.05	9.525	3.18	
GTAT 07520V5R-U	R	●	0.75	2.0	0.05	9.525	3.18	
GTAT 07520V5L-U	L	●	0.75	2.0	0.05	9.525	3.18	
GTAT 09520V5R-U	R	●	0.95	2.0	0.05	9.525	3.18	
GTAT 09520V5L-U	L	●	0.95	2.0	0.05	9.525	3.18	
GTAT 10020V5R-U	R	●	1.0	2.0	0.05	9.525	3.18	
GTAT 10020V5L-U	L	●	1.0	2.0	0.05	9.525	3.18	
GTAT 10320V5R-U	R	●	1.03	2.0	0.05	9.525	3.18	
GTAT 12520V5R-U	R	●	1.25	2.0	0.05	9.525	3.18	
GTAT 12520V5L-U	L	●	1.25	2.0	0.05	9.525	3.18	
GTBT14530V5R-U	R	●	1.45	3.0	0.05	9.525	3.18	
GTBT14530V5L-U	L	●	1.45	3.0	0.05	9.525	3.18	
GTBT15030V5R-U	R	●	1.5	3.0	0.05	9.525	3.18	
GTBT15030V5L-U	L	●	1.5	3.0	0.05	9.525	3.18	
GTBT17530V5R-U	R	●	1.75	3.0	0.05	9.525	3.18	
GTBT17530V5L-U	L	●	1.75	3.0	0.05	9.525	3.18	
GTBT20030V5R-U	R	●	2.0	3.0	0.05	9.525	3.18	
GTBT20030V5L-U	L	●	2.0	3.0	0.05	9.525	3.18	
GTCT25030V5R-U	R	●	2.5	3.0	0.05	9.525	3.18	
GTCT25030V5L-U	L	●	2.5	3.0	0.05	9.525	3.18	Right hand insert shown.

INSERTS

Order Number	Hand	Coated VP15TF	Coated VP15KZ	Carbide TF15	Dimensions (mm) CW	CDX	RER/L	IC	S	Max. Cutting Depth (mm)	Geometry
GTAT 03306V3R-E	R	●			0.33	0.6	0.03	9.525	3.18		**E** Type Breaker (Ring processing Grooving)
GTAT 03306V3L-E	L	●			0.33	0.6	0.03	9.525	3.18		
GTAT 04312V3R-E	R	●			0.43	1.2	0.03	9.525	3.18		
GTAT 04312V3L-E	L	●			0.43	1.2	0.03	9.525	3.18		
GTAT 05312V5R-E	R	●			0.53	1.2	0.05	9.525	3.18		
GTAT 05312V5L-E	L	●			0.53	1.2	0.05	9.525	3.18		
GTAT 07520V5R-E	R	●			0.75	2.0	0.05	9.525	3.18		
GTAT 07520V5L-E	L	●			0.75	2.0	0.05	9.525	3.18		
GTAT 09520V5R-E	R	●			0.95	2.0	0.05	9.525	3.18		
GTAT 09520V5L-E	L	●			0.95	2.0	0.05	9.525	3.18		
GTAT 10020V5R-E	R	●			1.0	2.0	0.05	9.525	3.18		
GTAT 10020V5L-E	L	●			1.0	2.0	0.05	9.525	3.18		
GTAT 1002001R-E	R	●			1.0	2.0	0.1	9.525	3.18		
GTAT 1002001L-E	L	●			1.0	2.0	0.1	9.525	3.18		
GTAT 12020V5R-E	R	●			1.2	2.0	0.05	9.525	3.18		
GTAT 12020V5L-E	L	●			1.2	2.0	0.05	9.525	3.18		
GTAT 1202001R-E	R	●			1.2	2.0	0.1	9.525	3.18		
GTAT 1202001L-E	L	●			1.2	2.0	0.1	9.525	3.18		
GTAT 14020V5R-E	R	●			1.4	2.0	0.05	9.525	3.18		
GTAT 14020V5L-E	L	●			1.4	2.0	0.05	9.525	3.18		
GTBT15030V5R-E	R	●			1.5	3.0	0.05	9.525	3.18		
GTBT15030V5L-E	L	●			1.5	3.0	0.05	9.525	3.18		
GTBT1503001R-E	R	●			1.5	3.0	0.1	9.525	3.18		
GTBT1503001L-E	L	●			1.5	3.0	0.1	9.525	3.18		
GTBT18030V5R-E	R	●			1.8	3.0	0.05	9.525	3.18		
GTBT18030V5L-E	L	●			1.8	3.0	0.05	9.525	3.18		
GTBT20030V5R-E	R	●			2.0	3.0	0.05	9.525	3.18		
GTBT20030V5L-E	L	●			2.0	3.0	0.05	9.525	3.18		
GTBT2003001R-E	R	●			2.0	3.0	0.1	9.525	3.18		
GTBT2003001L-E	L	●			2.0	3.0	0.1	9.525	3.18		
GTBT22530V5R-E	R	●			2.25	3.0	0.05	9.525	3.18		
GTBT22530V5L-E	L	●			2.25	3.0	0.05	9.525	3.18		
GTCT25030V5R-E	R	●			2.5	3.0	0.05	9.525	3.18		
GTCT25030V5L-E	L	●			2.5	3.0	0.05	9.525	3.18		
GTCT27530V5R-E	R	●			2.75	3.0	0.05	9.525	3.18		
GTCT27530V5L-E	L	●			2.75	3.0	0.05	9.525	3.18		
GTCT30030V5R-E	R	●			3.0	3.0	0.05	9.525	3.18		
GTCT30030V5L-E	L	●			3.0	3.0	0.05	9.525	3.18		Right hand insert shown.
GTAT 0330600R-VT	R		●		0.33	0.6	0	9.525	3.18	0.25	**VT** Type Breaker (Grooving, Side Turning)
GTAT 0431200R-VT	R		●		0.43	1.2	0	9.525	3.18	0.9	
GTAT 0532000R-VT	R		●		0.53	2.0	0	9.525	3.18	1.6	
GTAT 0652000R-VT	R		●		0.65	2.0	0	9.525	3.18	1.6	
GTAT 0752000R-VT	R		●		0.75	2.0	0	9.525	3.18	1.6	
GTAT 0802000R-VT	R		●		0.8	2.0	0	9.525	3.18	1.6	
GTAT 0852000R-VT	R		●		0.85	2.0	0	9.525	3.18	1.6	
GTAT 0952000R-VT	R		●		0.95	2.0	0	9.525	3.18	1.6	
GTAT 1002000R-VT	R		●		1.0	2.0	0	9.525	3.18	1.6	
GTAT 1102000R-VT	R		●		1.1	2.0	0	9.525	3.18	1.6	
GTAT 1202000R-VT	R		●		1.2	2.0	0	9.525	3.18	1.6	
GTAT 1302000R-VT	R		●		1.3	2.0	0	9.525	3.18	1.6	
GTAT 1402000R-VT	R		●		1.4	2.0	0	9.525	3.18	1.6	
GTBT1503000R-VT	R		●		1.5	3.0	0	9.525	3.18	2.7	
GTBT2003000R-VT	R		●		2.0	3.0	0	9.525	3.18	2.7	
GTATR	R			*●	1.76	3.0	—	9.525	3.18		Blank
GTATL	L			*●	1.76	3.0	—	9.525	3.18		
GTBTR	R			*●	—	0	—	9.525	3.18		
GTBTL	L			*●	—	0	—	9.525	3.18		







Right hand insert shown.

* 10 inserts in one case.

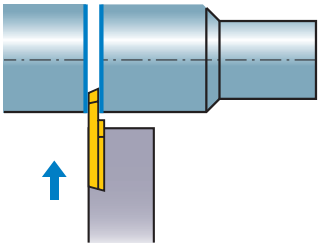
CTAH/CTAH-S

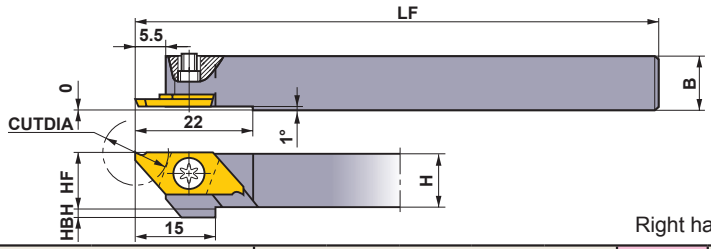
CUTTING OFF TOOLS (FOR GANG TYPE TOOL POSTS)

Product Information

SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966
TECHNICAL INFO >> 1971

·CTAH



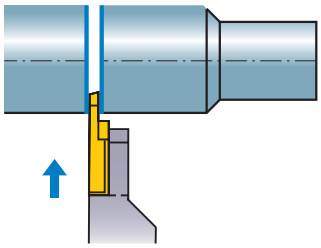


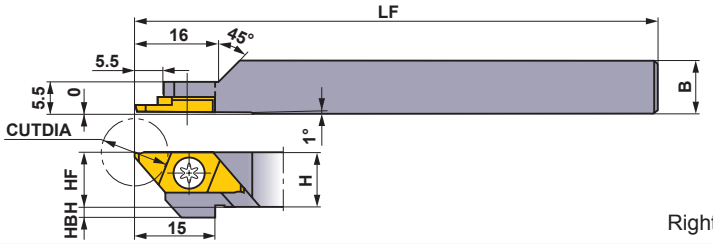
Right hand tool holder shown.

Order Number	Stock R	Stock L	Insert Number		Dimensions (mm) H	B	HF	LF	HBH	CUTDIA (mm)	Clamp Screw *2	Wrench
CTAHR/L0810-120	●	●	CTAT	○○○○	8	10	8	120	4	12 (8) *1	NS402W	NKY15S
CTAHR/L1010-120	●	●		○○○○	10	10	10	120	2		NS402W	NKY15S
CTAHR/L1212-120	●	●		○○○○	12	12	12	120	—		NS403W	NKY15S
CTAHR/L1616-120	●	●		○○○○	16	16	16	120	—		NS403W	NKY15S

*1 When the width of cutting off (CW) is 0.7mm.
*2 Clamp Torque (N • m) : NS402W=1.0, NS403W=1.0

·CTAH-S





Right hand tool holder only.

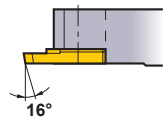
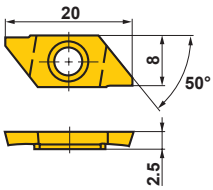
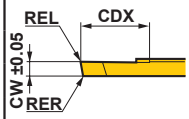
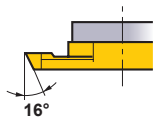
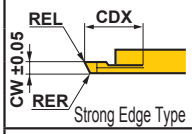
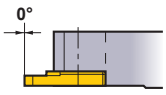
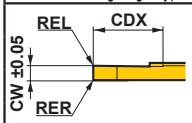
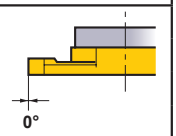
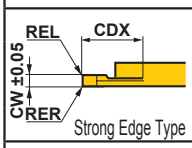
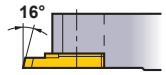
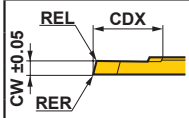
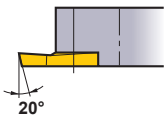
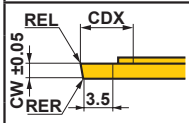
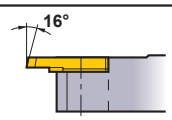
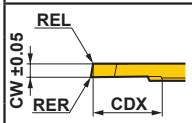
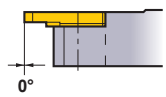
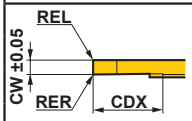
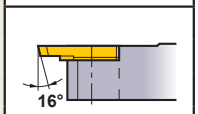
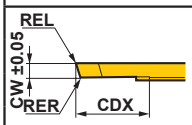
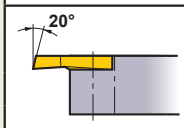
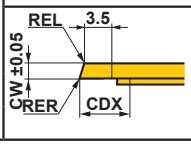
Order Number	Stock R	Insert Number		Dimensions (mm) H	B	HF	LF	HBH	CUTDIA (mm)	Clamp Screw *2	Wrench
CTAHR1010-120S	●	CTAT	○○○○	10	10	10	80	2	12 (8) *1	NS401	NKY15S

*1 When the width of cutting off (CW) is 0.7mm.
*2 Clamp Torque (N • m) : NS401=3.5

·RECOMMENDED CUTTING CONDITION

	Work Material	Hardness	Grade	Cutting Speed (m/min)	Feed (mm/rev)
P	Carbon Steel · Alloy Steel	180HB–280HB	**VP15TF**	100 (50–150)	0.05 (0.02–0.09)
	Free Cutting Steel	–	**VP15TF**	110 (30–180)	0.05 (0.01–0.09)
M	Stainless Steel	≤200HB	**VP15TF**	80 (50–120)	0.03 (0.02–0.05)
N	Non-Ferrous Metal	–	**VP15TF**	150 (70–230)	0.07 (0.03–0.11)

INSERTS

Holder	Setting Geometry	Breaker	Geometry	Insert Geometry	Order Number	Hand	Coated VP15TF	Dimensions (mm) CW	CDX	RER/L	CUTDIA*1 (mm)
Right Hand (R)		With Breaker			CTAT07080V5RR-B	R	●	0.7	4.5	0.05	8
					CTAT10120V5RR-B	R	●	1.0	6.7	0.05	12
					CTAT15120V5RR-B	R	●	1.5	6.7	0.05	12
					CTAT20120V5RR-B	R	●	2.0	6.7	0.05	12
					CTAT15120V5RR-BX	R	●	1.5	6.7	0.05	12
					CTAT20120V5RR-BX	R	●	2.0	6.7	0.05	12
					CTAT10120V5RN-B	N	●	1.0	6.7	0.05	12
					CTAT15120V5RN-B	N	●	1.5	6.7	0.05	12
					CTAT20120V5RN-B	N	●	2.0	6.7	0.05	12
					CTAT15120V5RN-BX	N	●	1.5	6.7	0.05	12
					CTAT20120V5RN-BX	N	●	2.0	6.7	0.05	12
					CTAT10110V5RL-B	L	●	1.0	6.7	0.05	11
					CTAT15110V5RL-B	L	●	1.5	6.7	0.05	11
					CTAT20110V5RL-B	L	●	2.0	6.7	0.05	11
		Without Breaker			CTAT1012000RR	R	●	1.0	6.7	0	12
					CTAT1512000RR	R	●	1.5	6.7	0	12
					CTAT2012000RR	R	●	2.0	6.7	0	12
Left Hand (L)		With Breaker			CTAT07080V5LL-B	L	●	0.7	4.5	0.05	8
					CTAT10120V5LL-B	L	●	1.0	6.7	0.05	12
					CTAT15120V5LL-B	L	●	1.5	6.7	0.05	12
					CTAT20120V5LL-B	L	●	2.0	6.7	0.05	12
					CTAT10120V5LN-B	N	●	1.0	6.7	0.05	12
					CTAT15120V5LN-B	N	●	1.5	6.7	0.05	12
					CTAT20120V5LN-B	N	●	2.0	6.7	0.05	12
					CTAT10110V5LR-B	R	●	1.0	6.7	0.05	11
					CTAT15110V5LR-B	R	●	1.5	6.7	0.05	11
					CTAT20110V5LR-B	R	●	2.0	6.7	0.05	11
		Without Breaker	Right hand insert shown.		CTAT1012000LL	L	●	1.0	6.7	0	12
					CTAT1512000LL	L	●	1.5	6.7	0	12
					CTAT2012000LL	L	●	2.0	6.7	0	12

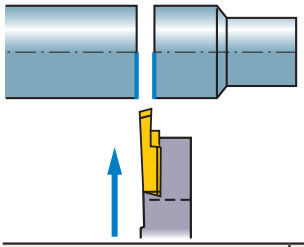
*1 CUTDIA : Max. Cut off Diameter

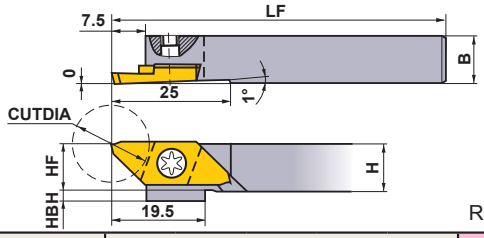
CTBH

CUTTING OFF TOOLS (FOR GANG TYPE TOOL POSTS)

Product Information

SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966
TECHNICAL INFO >> 1971





Right hand tool holder shown.

Order Number	Stock R	Stock L	Insert Number		Dimensions (mm) H	B	HF	LF	HBH	CUTDIA (mm)	* Clamp Screw	Wrench
CTBHR/L1010-160	●	●	CTBT	○○○○	10	10	10	120	2	16	NS402W	NKY15S
CTBHR/L1212-160	●	●		○○○○	12	12	12	120	—	16	NS403W	NKY15S
CTBHR/L1616-160	●	●		○○○○	16	16	16	120	—	16	NS403W	NKY15S

* Clamp Torque (N • m) : NS402W=1.0, NS403W=1.0

● : **Inventory maintained in Japan.**

INSERTS

Holder	Setting Geometry	Breaker	Geometry	Insert Geometry	Order Number	Hand	Coated VP15TF	Dimensions (mm) CW	RER/L	CUTDIA (mm)
Right Hand (R)	16°	With Breaker	25, 9.4, 45°, 3.5	REL 9.2, CW ±0.05, RER	CTBT15160V5RR-B	R	●	1.5	0.05	16
					CTBT20160V5RR-B	R	●	2.0	0.05	16
	0°			REL 9.2, CW ±0.05, RER	CTBT20160V5RN-B	N	●	2.0	0.05	16
Left Hand (L)	16°			REL, CW ±0.05, RER 9.2	CTBT20160V5LL-B	L	●	2.0	0.05	16
	0°			REL, CW ±0.05, RER 9.2	CTBT20160V5LN-B	N	●	2.0	0.05	16
	16°		Right hand insert shown.	REL, CW ±0.05, RER 9.2	CTBT20145V5LR-B	R	●	2.0	0.05	14.5

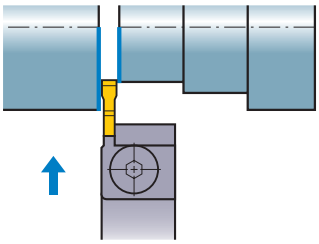
● : **Inventory maintained in Japan.**

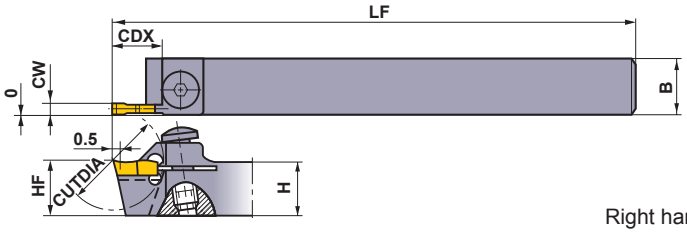
CTCH

CUTTING OFF TOOLS (FOR GANG TYPE TOOL POSTS)

Product Information

SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966
TECHNICAL INFO >> 1971





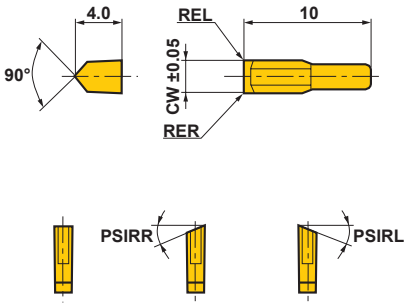
Right hand tool holder shown.

Order Number	Stock R	Stock L	Insert Number		Dimensions (mm) H	B	HF	LF	CDX	CUTDIA (mm)	Clamp Screw *	Wrench
CTCHR/L1010-200	●	●	CTCT	2□□□	10	10	10	120	11	20	NS501W	HKY25RS
CTCHR/L1212-200	●	●		2□□□	12	12	12	120	11	20	NS501W	HKY25RS

* Clamp Torque (N • m) : NS501W=2.2

INSERTS

Breaker	Order Number	Hand	Coated VP15TF	Dimensions (mm) CW	PSIRR/L	RER/L	CUTDIA (mm)	Geometry
With Breaker	CTCT22200V5N-B	N	*●	2.2	0°	0.05	20	
	CTCT2220001N-B	N	*●	2.2	0°	0.1	20	
	CTCT25200V5N-B	N	*●	2.5	0°	0.05	20	
	CTCT2520001N-B	N	*●	2.5	0°	0.1	20	
	CTCT22200V5R-B	R	*●	2.2	17°	0.05	20	
	CTCT2220001R-B	R	*●	2.2	17°	0.1	20	
	CTCT25200V5R-B	R	*●	2.5	17°	0.05	20	
	CTCT2520001R-B	R	*●	2.5	17°	0.1	20	
	CTCT22200V5L-B	L	*●	2.2	17°	0.05	20	
	CTCT2220001L-B	L	*●	2.2	17°	0.1	20	
	CTCT25200V5L-B	L	*●	2.5	17°	0.05	20	
	CTCT2520001L-B	L	*●	2.5	17°	0.1	20	



* 10 inserts in one case.

·RECOMMENDED CUTTING CONDITION

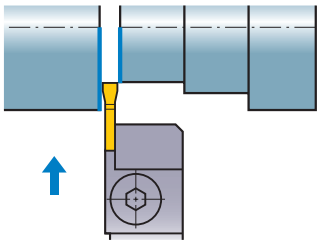
	Work Material	Hardness	Grade	Cutting Speed (m/min)	Feed (mm/rev)
P	Carbon Steel · Alloy Steel	180HB–280HB	VP15TF	100 (50–150)	0.08 (0.01–0.15)
	Free Cutting Steel	–	VP15TF	110 (30–180)	0.08 (0.01–0.15)
M	Stainless Steel	≤200HB	VP15TF	80 (50–120)	0.06 (0.02–0.1)
N	Non-Ferrous Metal	–	VP15TF	150 (70–230)	0.09 (0.03–0.15)

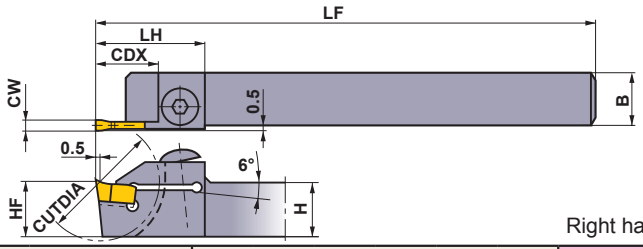
CTDH

CUTTING OFF TOOLS (FOR GANG TYPE TOOL POSTS)

Product Information

SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966
TECHNICAL INFO >> 1971





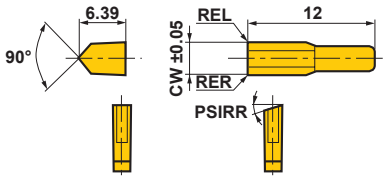
Right hand tool holder shown.

Order Number	Stock R	Stock L	Insert Number		Dimensions (mm) H	B	HF	LF	LH	CDX	CUTDIA (mm)	* Clamp Screw	Wrench
CTDHR/L1616-230	●		CTDT	2535○○	16	16	16	125	24	12.2	23	HBH06020	HKY40R
CTDHR/L1616-280	●			2535○○	16	16	16	120	25	15	28	NS502W	HKY25R
CTDHR/L1616-350	●	●		2535○○	16	16	16	125	32	18.5	35	HBH06020	HKY40R

* Clamp Torque (N • m) : HBH06020=7.0, NS502W=2.2

INSERTS

Breaker	Order Number	Hand	Coated VP15TF	Dimensions (mm) CW	PSIRR	RER/L	CUTDIA (mm)	Geometry
With Breaker	**CTDT2535002N-B**	N	●	2.5	0°	0.2	23–35	
	CTDT25350V5R-B	R	●	2.5	8°	≤0.05	23–35	
	CTDT25350V5R-BS	R	●	2.5	17°	≤0.05	23–35	
	CTDT2535002R-B	R	●	2.5	8°	0.2	23–35	



·RECOMMENDED CUTTING CONDITION

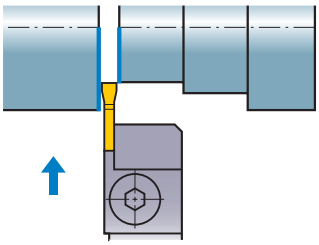
	Work Material	Hardness	Grade	Cutting Speed (m/min)	Feed (mm/rev)
P	Carbon Steel · Alloy Steel	180HB–280HB	**VP15TF**	100 (50–150)	0.08 (0.01–0.15)
	Free Cutting Steel	–	**VP15TF**	110 (30–180)	0.08 (0.01–0.15)
M	Stainless Steel	≤200HB	**VP15TF**	80 (50–120)	0.06 (0.02–0.1)
N	Non-Ferrous Metal	–	**VP15TF**	150 (70–230)	0.09 (0.03–0.15)

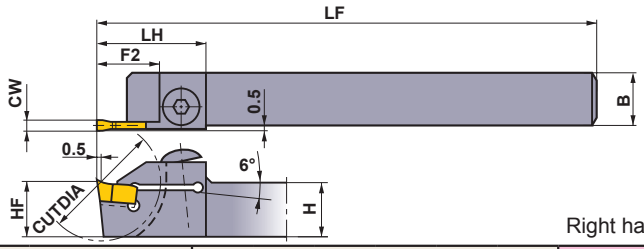
CTEH

CUTTING OFF TOOLS (FOR GANG TYPE TOOL POSTS)

Product Information

SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966
TECHNICAL INFO >> 1971





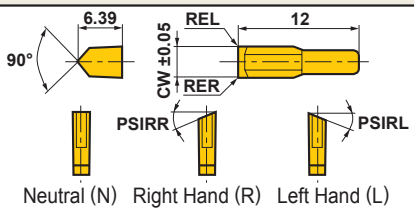
Right hand tool holder shown.

Order Number	Stock R	Stock L	Insert Number		Dimensions (mm) H	B	HF	LF	LH	F2	CUTDIA (mm)	* Clamp Screw	Wrench
CTEHR/L1616-230	●		CTET	3035○○	16	16	16	125	24	12.2	23	HBH06020	HKY40R
CTEHR/L1616-280	●			3035○○	16	16	16	120	25	15	28	NS502W	HKY25R
CTEHR/L1616-350	●	●		3035○○	16	16	16	125	32	18.5	35	HBH06020	HKY40R

* Clamp Torque (N • m) : HBH06020=7.0, NS502W=2.2

INSERTS

Breaker	Order Number	Hand	Coated VP15TF	Dimensions (mm) CW	PSIRR/L	RER/L	CUTDIA (mm)	Geometry
With Breaker	**CTET30350V5R-B**	R	●	3	8°	≤0.05	23–35	
	CTET30350V5R-BS	R	●	3	17°	≤0.05	23–35	
	CTET3035002N-B	N	●	3	0°	0.2	23–35	
	CTET3035002R-B	R	●	3	8°	0.2	23–35	
	CTET3035002L-B	L	●	3	8°	0.2	23–35	



·RECOMMENDED CUTTING CONDITION

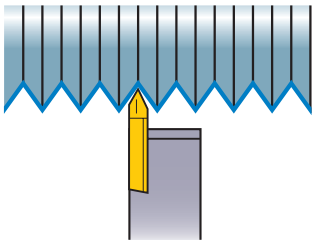
	Work Material	Hardness	Grade	Cutting Speed (m/min)	Feed (mm/rev)
P	Carbon Steel · Alloy Steel	180HB–280HB	**VP15TF**	100 (50–150)	0.08 (0.01–0.15)
	Free Cutting Steel	–	**VP15TF**	110 (30–180)	0.08 (0.01–0.15)
M	Stainless Steel	≤200HB	**VP15TF**	80 (50–120)	0.06 (0.02–0.1)
N	Non-Ferrous Metal	–	**VP15TF**	150 (70–230)	0.09 (0.03–0.15)

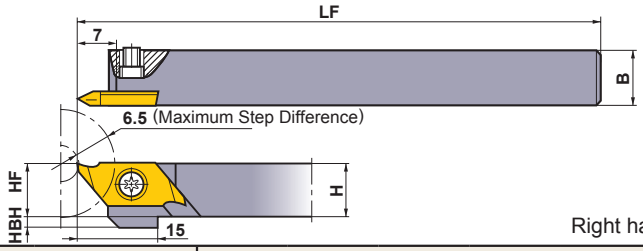
TTAH

THREADING TOOLS (FOR GANG TYPE TOOL POSTS)

Product Information

SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966
TECHNICAL INFO >> 1981





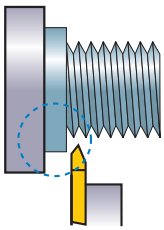
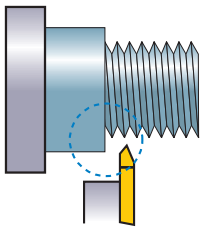
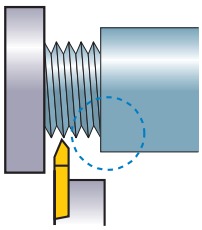
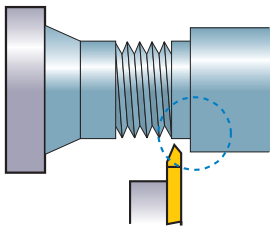
Right hand tool holder shown.

Order Number	Stock R	Stock L	Insert Number		Dimensions (mm) H	B	HF	LF	HBH	* Clamp Screw	Wrench
TTAHR/L0810	●	●	TTAT	○○○○	8	10	8	120	4	NS402W	NKY15S
TTAHR/L1010	●	●		○○○○	10	10	10	120	2	NS402W	NKY15S
TTAHR/L1212	●	●		○○○○	12	12	12	120	—	NS403W	NKY15S
TTAHR/L1616	●	●		○○○○	16	16	16	120	—	NS403W	NKY15S

* Clamp Torque (N • m) : NS402W=1.0, NS403W=1.0

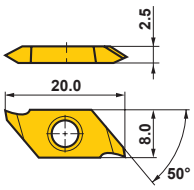
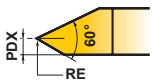
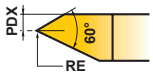
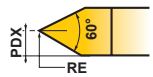
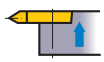
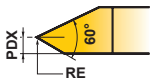
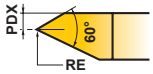
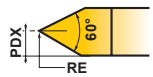
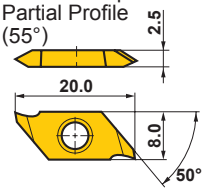
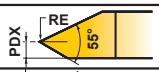
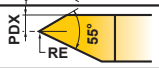
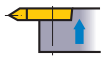
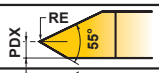
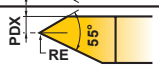
● : **Inventory maintained in Japan.**

HOLDER APPLICATION

	Right Hand Holder	Left Hand Holder
Right Hand Insert		
Left Hand Insert		

*The above combinations enable to machine the side of ○.

INSERTS

Holder	Setting Geometry	Breaker	Geometry	Insert Geometry	Order Number	Hand	Coated VP15TF	Dimensions (mm) PDX	Dimensions (mm) RE	Pitch of Screw (mm) (thread/inch)
Right Hand (R)		With Breaker	General Purpose Partial Profile (60°)  Right hand insert shown.		TTAT60075F5RR-B	R	●	0.4	0.05 Flat	0.2—0.75 (80—36)
					TTAT60125V5RR-B	R	●	0.8	0.05	0.5—1.25 (40—16)
					TTAT60075F5RL-B	L	●	0.4	0.05 Flat	0.2—0.75 (80—36)
					TTAT60125V5RL-B	L	●	0.8	0.05	0.5—1.25 (40—16)
					TTAT6015001RN-B	N	●	1.25	0.1	1.0—1.5 (24—18)
Left Hand (L)					TTAT60075F5LR-B	R	●	0.4	0.05 Flat	0.2—0.75 (80—36)
					TTAT60125V5LR-B	R	●	0.8	0.05	0.5—1.25 (40—16)
					TTAT60075F5LL-B	L	●	0.4	0.05 Flat	0.2—0.75 (80—36)
					TTAT60125V5LL-B	L	●	0.8	0.05	0.5—1.25 (40—16)
					TTAT6015001LN-B	N	●	1.25	0.1	1.0—1.5 (24—18)
Right Hand (R)			General Purpose Partial Profile (55°)  Right hand insert shown.		TTAT55158V5RR-B	R	●	0.8	0.05	(40—16)
					TTAT55158V5RL-B	L	●	0.8	0.05	(40—16)
Left Hand (L)					TTAT55158V5LR-B	R	●	0.8	0.05	(40—16)
					TTAT55158V5LL-B	L	●	0.8	0.05	(40—16)

RECOMMENDED CUTTING CONDITIONS

	Work Material	Hardness	Cutting Speed (m/min)
P	Carbon Steel · Alloy Steel	180HB—280HB	100 (50—150)
	Free Cutting Steel	–	110 (30—180)

	Work Material	Hardness	Cutting Speed (m/min)
M	Stainless Steel	≤200HB	80 (50—120)
N	Non-Ferrous Metal	–	150 (70—230)

THREAD RANGE

Application range

Pitch (mm)	Pitch Diameter of Thread (mm)										Number of Passes
	≥ϕ1.0	≥ϕ1.2	≥ϕ1.6	≥ϕ2.0	≥ϕ2.5	≥ϕ3.0	≥ϕ4.0	≥ϕ5.0	≥ϕ6.0	≥ϕ7.0	
0.2											2－4
0.25											
0.3											3－5
0.35											
0.4											4－6
0.45											
0.5											5－7
0.6											
0.7											
0.75											
0.8		Threading impossible									
1											
1.25											6－8
1.5											

*Metric Thread (60°)

Pitch(thread/inch)	Pitch Diameter of Thread									Number of Passes
Inch	≥ϕ0.060	≥ϕ0.073	≥ϕ0.086	≥ϕ0.099	≥ϕ0.112	≥ϕ0.164	≥ϕ0.190	≥ϕ0.250	≥ϕ0.313	
mm	≥ϕ1.524	≥ϕ1.854	≥ϕ2.184	≥ϕ2.515	≥ϕ2.845	≥ϕ4.166	≥ϕ4.826	≥ϕ6.350	≥ϕ7.938	
80										3－5
72										
64										4－6
56										
48										5－7
44										
40										
32										
28										
26		Threading impossible								
24										
20										6－8
18										
16										

*American UN, Whitworth

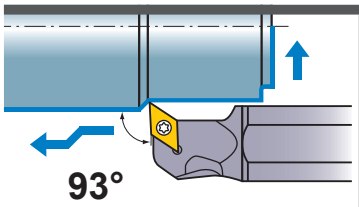
SH

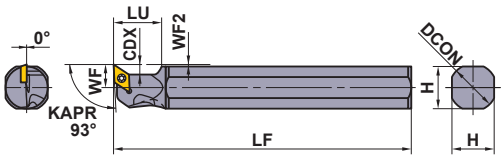
FRONT TURNING TOOLS (FOR GANG TYPE TOOL POSTS)

Product Information

SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966
TECHNICAL INFO >> 1971

93° KAPR





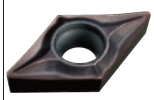
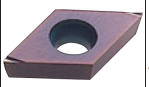
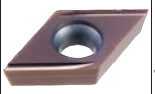
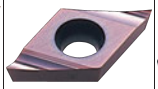
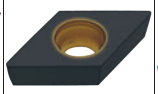
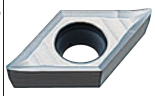
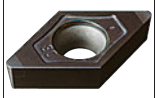
Left hand tool holder only.

Order Number	Stock	Insert Number		Dimensions (mm)							*	
	L			DCON	LF	LU	H	WF	WF2	CDX	Clamp Screw	Wrench
SH16H-FSDUCL07	●	DCET DCGT DCGW DCMT DCMW NP-DCGW NP-DCMT NP-DCMW	0702○○	15.875	100	20	14	7.75	0.75	4.2	TS254	TKY08R
SH19K-FSDUCL07	●			19.05	125	20	17	9.25	0.75	4.2	TS254	TKY08R
SH20K-FSDUCL07	●			20	125	20	18	9.75	0.75	4.2	TS254	TKY08R
SH22K-FSDUCL07	●			22	125	20	20	10.75	0.75	4.2	TS254	TKY08R
SH25M-FSDUCL07	●			25.4	150	20	23	12.25	0.75	4.2	TS254	TKY08R
SH16H-FSDUCL11	●	DCET DCGT DCGW DCMT DCMW NP-DCGW NP-DCMT NP-DCMW	11T3○○	15.875	100	20	15	7.75	0.75	6.4	TS43	TKY15R
SH19K-FSDUCL11	●			19.05	125	20	17	9.25	0.75	6.4	TS43	TKY15R
SH20K-FSDUCL11	●			20	125	20	18	9.75	0.75	6.4	TS43	TKY15R
SH22K-FSDUCL11	●			22	125	20	20	10.75	0.75	6.4	TS43	TKY15R
SH25M-FSDUCL11	●			25.4	150	20	23	12.25	0.75	6.4	TS43	TKY15R

* Clamp Torque (N • m) : TS254=1.0, TS43=3.5

● : Inventory maintained in Japan.

·CHIP BREAKER EXAMPLE

Finish Cutting	Finish Cutting	Light Cutting	Medium Cutting	Medium Cutting	Without Breaker	For Non-Ferrous Metal	CBN/PCD
SMG	R-F	R-SS	R-SN	R-SR	Flat Top	AZ	
							
(7, 11)	(7, 11)	(7, 11)	(7, 11)	(7, 11)	(7, 11)	(7, 11)	(7, 11)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.
- When using insert with right and left hand chip breaker, please use right hand insert only.

·RECOMMENDED CUTTING CONDITION

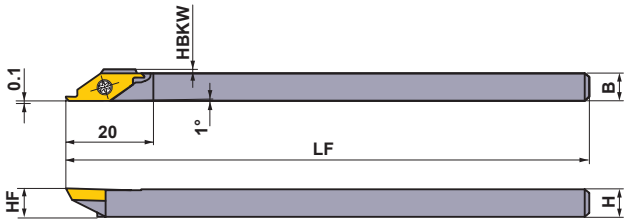
	Work Material	Hardness	Grade	Cutting Speed (m/min)	Feed (mm/rev)
P	Carbon Steel · Alloy Steel	180HB–280HB	**VP15TF**	100 (50–150)	0.08 (0.01–0.15)
P	Free Cutting Steel	–	**VP15TF**	110 (30–180)	0.08 (0.01–0.15)
P	Free Cutting Steel	–	**NX2525**	150 (50–250)	0.08 (0.01–0.15)
M	Stainless Steel	≤200HB	**VP15TF**	80 (50–120)	0.06 (0.02–0.1)
N	Non-Ferrous Metal	–	**HTi10**	150 (70–230)	0.09 (0.03–0.15)

CSVH

FOR RADIAL TYPE TOOL POSTS

Product Information

SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966
TECHNICAL INFO >> 1971



Right hand tool holder shown.

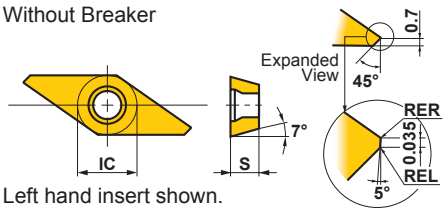
Order Number	Stock R	Stock L	Insert Number		Dimensions (mm) H	B	HF	LF	HBKW	*1 APMX (mm)	*2 Clamp Screw	Wrench
CSVHR/L0707	●	●	CSVT	○○○○	7	7	7	140	0.5	3.0	NS251	NKY15S
CSVHR/L0808	●	●		○○○○	8	8	8	140	0	3.0	NS251	NKY15S
CSVHR/L0909	●			○○○○	9.5	9.5	9.5	140	0	3.0	NS251	NKY15S
CSVHR/L1010	●	●		○○○○	10	10	10	140	0	3.0	NS251	NKY15S
CSVHR/L1212	●			○○○○	12	12	12	140	0	3.0	NS251	NKY15S

(Note 1) Please use right hand insert for right hand holder and left hand insert for left hand holder.
(Note 2) Max. Cutting Depth (APMX) varies depending on the type of insert used.
*1 APMX : Max. Cutting Depth
*2 Clamp Torque (N • m) : NS251=1.0

● : Inventory maintained in Japan.

·Back turning, Copying ; CSVTBXL

Order Number	Hand	Coated VP15KZ	Dimensions (mm) IC	S	RER/L	APMX * (mm)	Geometry
CSVTBXL	L	●	6.35	2.38	0	3.0	Without Breaker

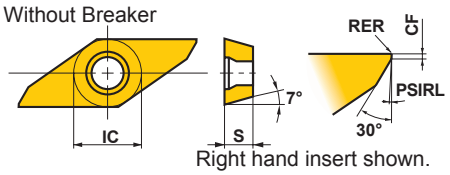


Left hand insert shown.

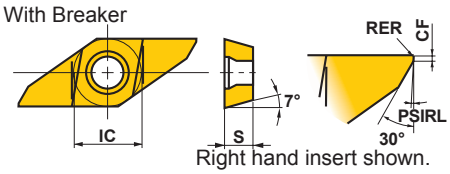
* APMX : Max. Cutting Depth

·Front turning ; CSVTF

Order Number	Hand	Coated	Dimensions (mm)					APMX* (mm)	Geometry
		VP15KZ	IC	S	RER	CF	PSIRL		
CSVTF30AR	R	●	6.35	2.38	0	0.3	5°	3.0	Without Breaker
CSVTF30AL	L	●	6.35	2.38	0	0.3	5°	3.0	
CSVTF30BR	R	●	6.35	2.38	0	0.3	2°	3.0	
CSVTF30CR	R	●	6.35	2.38	0	0.15	2°	3.0	
CSVTF30DR	R	●	6.35	2.38	0	0.15	5°	3.0	
CSVTF30AR-B	R	●	6.35	2.38	0	0.3	5°	3.0	With Breaker
CSVTF30AL-B	L	●	6.35	2.38	0	0.3	5°	3.0	
CSVTF30BR-B	R	●	6.35	2.38	0	0.3	2°	3.0	
CSVTF30CR-B	R	●	6.35	2.38	0	0.15	2°	3.0	
CSVTF30DR-B	R	●	6.35	2.38	0	0.15	5°	3.0	



Right hand insert shown.

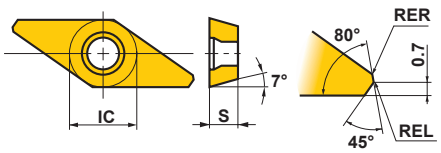


Right hand insert shown.

* APMX : Max. Cutting Depth

·Front turning, Copying ; CSVTFXL

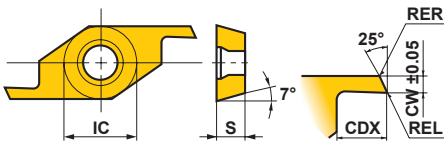
Order Number	Hand	Coated	Dimensions (mm)			APMX* (mm)	Geometry
		VP15KZ	IC	S	RER/L		
CSVTFXL	L	●	6.35	2.38	0	3.0	Without Breaker

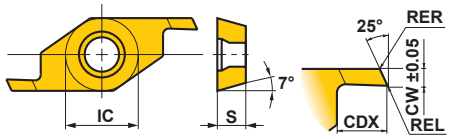


* APMX : Max. Cutting Depth

·Cutting off ; CSVTC

Order Number	Hand	Coated	Dimensions (mm)					APMX* (mm)	Geometry
		VP15KZ	IC	S	RER/L	CDX	CW		
CSVTC0640R	R	●	6.35	2.38	0	2.0	0.6	1.5	Without Breaker
CSVTC0750R	R	●	6.35	2.38	0	2.5	0.7	2.0	
CSVTC0750L	L	●	6.35	2.38	0	2.5	0.7	2.0	
CSVTC0850R	R	●	6.35	2.38	0	2.5	0.8	2.0	
CSVTC0850L	L	●	6.35	2.38	0	2.5	0.8	2.0	
CSVTC0950R	R	●	6.35	2.38	0	2.5	0.9	2.0	
CSVTC1060R	R	●	6.35	2.38	0	3.0	1.0	2.5	
CSVTC1060L	L	●	6.35	2.38	0	3.0	1.0	2.5	
CSVTC1360R	R	●	6.35	2.38	0	3.0	1.3	2.5	
CSVTC1360L	L	●	6.35	2.38	0	3.0	1.3	2.5	
CSVTC1560R	R	●	6.35	2.38	0	3.0	1.5	2.5	
CSVTC1560L	L	●	6.35	2.38	0	3.0	1.5	2.5	Right hand insert shown.
CSVTC0640R-B	R	●	6.35	2.38	0	2.0	0.6	1.5	With Breaker
CSVTC0750R-B	R	●	6.35	2.38	0	2.5	0.7	2.0	
CSVTC0850R-B	R	●	6.35	2.38	0	2.5	0.8	2.0	
CSVTC0950R-B	R	●	6.35	2.38	0	2.5	0.9	2.0	
CSVTC1060R-B	R	●	6.35	2.38	0	3.0	1.0	2.5	
CSVTC1360R-B	R	●	6.35	2.38	0	3.0	1.3	2.5	
CSVTC1560R-B	R	●	6.35	2.38	0	3.0	1.5	2.5	Right hand insert shown.

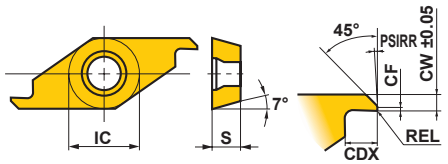


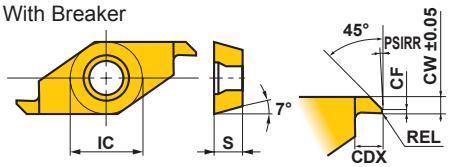


* APMX : Max. Cutting Depth

·Back turning ; CSVTB

Order Number	Hand	Coated	Dimensions (mm)							APMX* (mm)	Geometry
		VP15KZ	IC	S	REL	CDX	CW	CF	PSIRR		
CSVTB10AR	R	●	6.35	2.38	0	2.5	1	0.3	5°	2.0	Without Breaker
CSVTB10AL	L	●	6.35	2.38	0	2.5	1	0.3	5°	2.0	
CSVTB10BR	R	●	6.35	2.38	0	2.5	1	0.3	2°	2.0	
CSVTB10CR	R	●	6.35	2.38	0	2.5	1	0.15	2°	2.0	
CSVTB10DR	R	●	6.35	2.38	0	2.5	1	0.15	5°	2.0	
CSVTB12AR	R	●	6.35	2.38	0	2.5	1.2	0.3	5°	2.0	
CSVTB14AR	R	●	6.35	2.38	0	2.5	1.4	0.3	5°	2.0	Right hand insert shown.
CSVTB10AR-B	R	●	6.35	2.38	0	2.5	1	0.3	5°	2.0	With Breaker
CSVTB10BR-B	R	●	6.35	2.38	0	2.5	1	0.3	2°	2.0	
CSVTB10CR-B	R	●	6.35	2.38	0	2.5	1	0.15	2°	2.0	
CSVTB10DR-B	R	●	6.35	2.38	0	2.5	1	0.15	5°	2.0	
CSVTB12AR-B	R	●	6.35	2.38	0	2.5	1.2	0.3	5°	2.0	
CSVTB14AR-B	R	●	6.35	2.38	0	2.5	1.4	0.3	5°	2.0	Right hand insert shown.

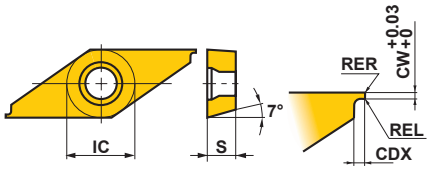




* APMX : Max. Cutting Depth

·Grooving ; CSVTG

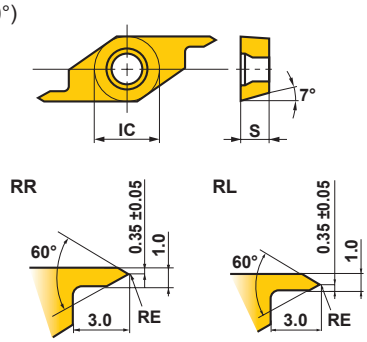
Order Number	Hand	Coated VP15KZ	Dimensions (mm) IC	S	RER/L	CDX	CW	APMX* (mm)	Geometry
CSVTG02505R	R	●	6.35	2.38	0	0.5	0.25	0.15	Without Breaker
CSVTG03005R	R	●	6.35	2.38	0	0.5	0.3	0.15	
CSVTG03505R	R	●	6.35	2.38	0	0.5	0.35	0.15	
CSVTG04005R	R	●	6.35	2.38	0	0.5	0.4	0.15	
CSVTG04510R	R	●	6.35	2.38	0	1.0	0.45	0.45	
CSVTG05010R	R	●	6.35	2.38	0	1.0	0.5	0.45	
CSVTG05510R	R	●	6.35	2.38	0	1.0	0.55	0.45	
CSVTG06010R	R	●	6.35	2.38	0	1.0	0.6	0.45	
CSVTG06510R	R	●	6.35	2.38	0	1.0	0.65	0.45	
CSVTG07010R	R	●	6.35	2.38	0	1.0	0.7	0.45	
CSVTG07520R	R	●	6.35	2.38	0	2.0	0.75	1.4	
CSVTG07520L	L	●	6.35	2.38	0	2.0	0.75	1.4	
CSVTG08020R	R	●	6.35	2.38	0	2.0	0.8	1.4	
CSVTG08520R	R	●	6.35	2.38	0	2.0	0.85	1.4	
CSVTG09020R	R	●	6.35	2.38	0	2.0	0.9	1.4	
CSVTG09520R	R	●	6.35	2.38	0	2.0	0.95	1.4	
CSVTG09520L	L	●	6.35	2.38	0	2.0	0.95	1.4	
CSVTG10020R	R	●	6.35	2.38	0	2.0	1.0	1.4	
CSVTG11030R	R	●	6.35	2.38	0	3.0	1.1	2.6	
CSVTG12030R	R	●	6.35	2.38	0	3.0	1.2	2.6	
CSVTG12030L	L	●	6.35	2.38	0	3.0	1.2	2.6	
CSVTG13030R	R	●	6.35	2.38	0	3.0	1.3	2.6	
CSVTG14030R	R	●	6.35	2.38	0	3.0	1.4	2.6	
CSVTG15030R	R	●	6.35	2.38	0	3.0	1.5	2.6	Right hand insert shown.



* APMX : Max. Cutting Depth

·Threading ; CSVTT

Order Number	Hand	Coated VP15KZ	Pitch (mm)	Dimensions (mm) IC	S	RE	Geometry
CSVTT60050RR	R	●	0.2–0.5	6.35	2.38	0.03	Without Breaker General Purpose Partial Profile (60°)
CSVTT60050RL	R	●	0.2–0.5	6.35	2.38	0.03	



Right hand insert shown.

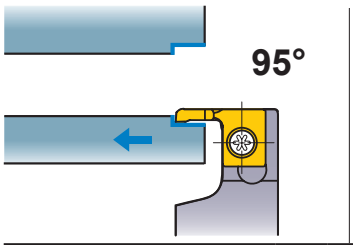
SBAH

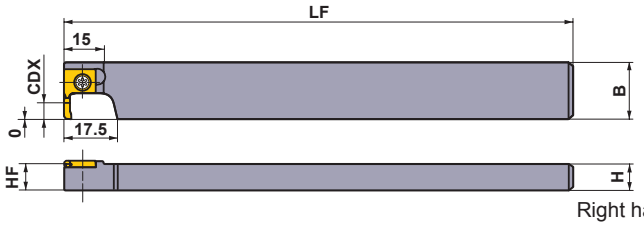
Boring

Product Information

SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966
TECHNICAL INFO >> 1971

·Without off set





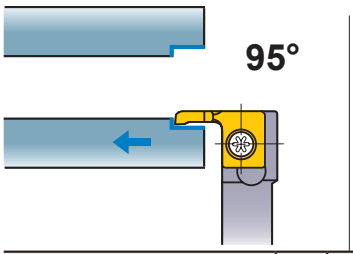
Right hand tool holder only.

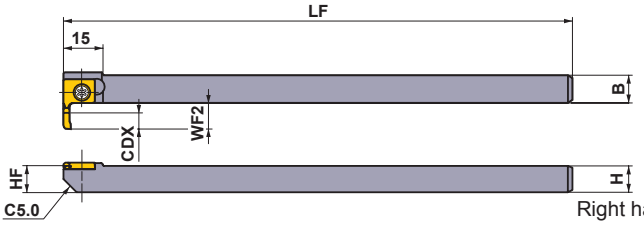
Order Number	Stock	Insert Number		Dimensions (mm)				CDX (mm)	*1 DMIN (mm)	*2 Clamp Screw	Wrench
	R			H	B	LF	HF				
SBAHR1022	●	SBAT	3080○○L/L-B	10	21.5	120	10	8	3	NS402W	NKY15S
SBAHR1222	●	SBAT	3080○○L/L-B	12	21.5	120	12	8	3	NS403W	NKY15S

*1 DMIN : Min. Cutting Diameter
*2 Clamp Torque (N • m) : NS402W=1.0, NS403W=1.0

● : **Inventory maintained in Japan.**

·With off set





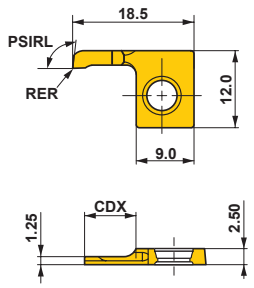
Right hand tool holder only.

Order Number	Stock	Insert Number		Dimensions (mm)					CDX (mm)	*1 DMIN (mm)	*2 Clamp Screw	Wrench
	R			H	B	LF	HF	WF2				
SBAHR1010	●	SBAT	3080○○L/L-B	10	10	120	10	10	8	3	NS402W	NKY15S

*1 DMIN : Min. Cutting Diameter
*2 Clamp Torque (N • m) : NS402W=1.0

● : **Inventory maintained in Japan.**

·INSERTS

Breaker	Order Number	Coated	Dimensions (mm)			DMIN * (mm)	Geometry
		VP15KZ	PSIRL	RER	CDX		
Without Breaker	SBAT308000L	●	95°	0	8.0	3	
Without Breaker	SBAT3080V5L	●	95°	0.05	8.0	3	
With Breaker	SBAT308000L-B	●	95°	0	8.0	3	
With Breaker	SBAT3080V5L-B	●	95°	0.05	8.0	3	

* DMIN : Min. Cutting Diameter

TURNING TOOLS
BORING BARS

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C-SDUC 427
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DDUN 401
DPCL 447
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FSCLC/P-E 387
FSDQC 392
FSDQC-E 393
FSDUC 390
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FSTUP 388
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FSVJB/C 398
FSVPB/C 397
FSVUB/C 396
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S-SCZC 436
S-SDQC 430
S-SDUC 426
S-SSKC 434
S-STFC 424
S-STFE 451
S-SVQC 432
S-SVUC 435
SCLC 406
STUC 408
SWUB 407

IDENTIFICATION

DIMPLE BAR

①Function	
F	Fixed type

②Clamp Structure	
S	Screw-on

③Insert Shape	
C	RHOMBIC 80°
D	RHOMBIC 55°
T	TRIANGULAR 60°
V	RHOMBIC 35°
W	TRIGON

④Cutting Angle	
U	93°
L	95°
Q	107°30´
P	117°30´
J	142°

⑤Insert Clearance	
B	5°
C	7°
P	11°

⑥Min.Cutting Diameter (mm)			
10	10	22	22
12	12	25	25
13	13	30	30
14	14	32	32
16	16	34	34
18	18	40	40
20	20		

⑦Shank Diameter (mm)	
08	8
10	10
12	12
16	16
20	20
25	25
32	32

①	②	③	④	⑤	⑥	⑦	⑧		⑨	⑩		⑪
F	S	C	L	C	10	08	R	-	06	E	-	2/3

⑧Hand of Tool	
R	Right Hand
L	Left Hand

⑨Cutting Edge Length (mm)					
Inscribed circle of insert	4.76	5.56	6.35	7.94	9.525
RHOMBIC 80°	–	–	**06**	**0.8**	**09**
RHOMBIC 55°	–	–	**07**	–	**11**
TRIANGULAR 60°	**08**	**09**	**11**	–	**16**
RHOMBIC 35°	**08**	–	**11**	–	**16**
TRIGON	**L3**	–	**04**	–	**06**

⑩Shank Material	
E	Carbide Shank
S	Steel Shank

⑪ Tool Length (Carbide shank only) (mm)					
Shank Dia.	8	10	12	16	20
No symbol	140	160	180	220	250
2/3	90	105	120	145	165
1/2	70	80	90	110	125

ISO TYPE Boring tools
[For Aluminium Alloy, P-type and S-type]

①	②	③	④	⑤	⑥	⑦	⑧	⑨
S	16	M	S	C	L	C	R	09

①Shank Material	
A	Steel Shank with Coolant Hole
C	Carbide Shank
E	Carbide Shank with Coolant Hole
S	Steel Shank

②Shank Diameter (mm)	
08	8
10	10
12	12
16	16
20	20
25	25
32	32
40	40

③Tool Length (mm)	
F	80
H	100
K	125
M	150
Q	180
R	200
S	250
T	300
U	350
V	400

④Clamp Structure	
P	Lever Lock
S	Screw-on

⑤Insert Shape	
C	RHOMBIC 80°
D	RHOMBIC 55°
S	SQUARE 90°
T	TRIANGULAR 60°
V	RHOMBIC 35°
W	TRIGON

⑥Cutting Angle	
F	91°
K	75°
L	95°
Q	107°30´
U	93°

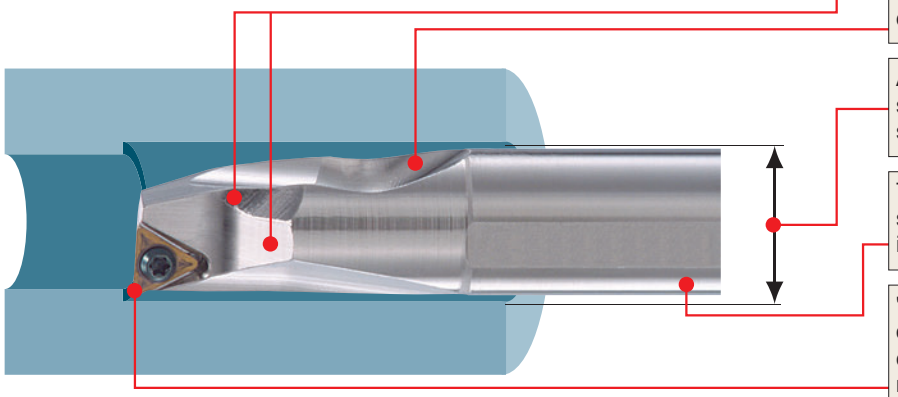
⑦Insert Clearance	
C	7°Positive
E	20°Positive
N	0°
P	11°Positive

⑧Hand of Tool	
R	Right Hand
L	Left Hand

⑨Cutting Edge Length (mm)					
Inscribed circle of insert	6.35	7.94	9.525	12.70	19.05
RHOMBIC 80°	**06**	**08**	**09**	**12**	**19**
RHOMBIC 55°	**07**	–	**11**	**15**	–
SQUARE 90°	–	–	**09**	**12**	**19**
TRIANGULAR 60°	**11**	–	**16**	**22**	–
RHOMBIC 35°	**11**	–	**16**	–	–

FEATURES OF DIMPLE BAR

Highly rigid steel shank and a lightweight head configuration designed by computer simulation analysis reduces chatter and improves the vibration damping properties.



- Chip disposal is improved by having two channels for chip evacuation.
- The lightweight head with its large dimple reduces chatter.
- Available in sizes smaller than the ISO standard. Therefore the boring of small diameter holes is possible.
- The boring bar has a laser printed scale on the shank to facilitate easy installation.
- "F and FS" breakers improves the quality of the surface finish, "MV" breaker offers excellent chip disposal. High wear resistant CBN inserts are also available for the machining of hardened materials.

VIBRATION RESISTANCE

●DIMPLE BAR

Weight of the Head	Damping Time
49.7g	15.8ms

By reducing the weight of the head, the damping properties are increased.

●Conventional Product

Weight of the Head	Damping Time
70.1g	20ms

* The simulation data stated above was conducted with a FSCLP1816R-09S holder, under the following conditions; l/d=5, depth of cut=0.5mm, and feed=0.05mm/rev.

Direction for the use of CCG/MT • CPG/MT • CPMX • TPG/MX type inserts

By changing the clamp screw, it is possible to use the inserts listed in the table below.

Holder : FSCLC/P • FSCLC/P...E

Insert Number	Clamp Screw
CCG/MT0602○○ (ϕ6.35)	Can be used as it is.
CPG/MT0802○○ (ϕ7.94)	Change to **TS3**
CPG/MT0903○○ (ϕ9.525)	Change to **TS4**
CPMX0802○○ (ϕ7.94)	Can be used as it is.
CPMX0903○○ (ϕ9.525)	Can be used as it is.

Holder : FSTUP • FSTUP...E

Insert Number	Clamp Screw
TPG/MX0802○○ (ϕ4.76)	Change to **CS200T**
TPG/MX0902○○ (ϕ5.56)	Change to **CS250T**
TPG/MX1103○○ (ϕ9.525)	Change to **CS300890T**

* If the screw is too long the please shorten as necessary.

(Note) TPMT/W09, W11 types cannot be used due to a different clamp screw size.

CLASSIFICATION

Name of Tool Holder	Features	KAPR=75°	KAPR=91°	KAPR=93°		
		KAPR	KAPR	KAPR		
DIMPLE BAR	● The minimum cutting diameter is from ϕ10. ● 5°, 7°, 11° positive insert. ● Excellent vibration resistance due to a light dimple head. ● l/d is 3 to 5 times the diameter (Carbide shank is 7 to 8 times the diameter).			FSTUP ➲ 388	FSDUC ➲ 390	FSVUB/C ➲ 396
DOUBLE CLAMP DIMPLE BAR	● The minimum cutting diameter is from ϕ32. ● Economical negative insert. ● Single action type. ● Excellent vibration resistance due to a light dimple head. (With coolant hole.) ● l/d is 3 to 4 times the diameter.	DSKN ➲ 402	DTFN ➲ 403	DDUN ➲ 401	DVUN ➲ 404	
F Type Boring Bars	● The minimum cutting diameter is from ϕ5.8. ● 11°positive insert. ● Screw-on type and Clamp-on type. ● l/d is 3 to 5 times the diameter. ● FSWL type is 7°positive insert.			FSTU ➲ 418	FCTU ➲ 420	
S Type Boring Bars	● The minimum cutting diameter is from ϕ11. ● ISO standard. ● 7°positive insert. ● Screw-on type. ● l/d is 3 to 5 times the diameter (Carbide shank is 7 times the diameter).	SSKC ➲ 434	STFC ➲ 424	SDUC ➲ 426	SVUC ➲ 435	
P Type Boring Bars	● The minimum cutting diameter is from ϕ25. ● ISO standard. ● Economical negative insert. ● Lever lock type, and pin lock type. ● l/d is 3 times the diameter.	PSKN ➲ 437	PTFN ➲ 438	PDUN ➲ 439		
D Type Boring Head	● The minimum cutting diameter is from ϕ40. ● Economical negative insert. ● Lever lock type. ● Exchangeable head type.		DPTF ➲ 445	DPDU ➲ 446		
M Type Boring Bars	● The minimum cutting diameter is from ϕ32. ● Negative trigon shape insert. ● Double clamp type. ● l/d is 3 times the diameter.					
AL Type Boring Bars	● The minimum cutting diameter is from ϕ20. ● Suitable for non-ferrous metal. ● 20°positive insert. ● Screw-on type. ● l/d is 6 times the diameter. ● Excellent vibration resistance.		STFE ➲ 451			
MICRO-DEX Boring Bars (Carbide Shank)	● The minimum cutting diameter is from ϕ5. ● 7°positive insert. ● Carbide shank type. ● Easy-to-use tool geometries. ● Suitable for small workpieces. ● l/d is 5 times the diameter.			SWUB ➲ 407	STUC ➲ 408	
MICRO-MINI TWIN Boring Bars	● The minimum cutting diameter is from ϕ2.2. ● Solid carbide type with two cutting edges. ● Continuous cutting from boring to facing. ● With or without a chip breaker.					
MICRO-MINI Boring Bars	● The minimum cutting diameter is from ϕ3.2. ● Solid carbide type (Single cutting edges). ● l/d is 5 times the diameter. ● Cutting edge can be shaped according to the application. Thus, it covers a wide cutting range (threading,grooving,copying, etc.).	C○○FR-BLS ➲ 417				

(Note 1) Holders with blue colour symbol have an anti-vibration carbide shank. (For Micro-dex boring bars, carbide shank only.)

CLASSIFICATION

KAPR=93°	KAPR=95°		KAPR=107.5°—117.5°		KAPR=142°	KAPR=3°,5°	Selection Standard: Economical	Low Cutting Resistance (Sharpness)	Clamp Rigidity	Vibration Resisiance	Operation Efficiency	Coolant Hole	Specialized	Small Diameter Cutting
FSWUB/P ➲ 394	FSCLC/P ➲ 386		FSDQC ➲ 392	FSVPB/C ➲ 397	FSVJB/C ➲ 398			◎		◎*	◎	◎*		
	DCLN ➲ 400	DWLN ➲ 405												
	FSWL ➲ 422							○		○*				○*
	SCLC ➲ 428		SDQC ➲ 430	SVQC ➲ 432		SCZC ➲ 436		○		○*				
	PCLN ➲ 440	PWLN ➲ 441	PDQN ➲ 442			PDZN ➲ 443	◎		○		◎	◎		
	DPCL ➲ 447		DPDH ➲ 448	DPVP ➲ 449			◎		○		◎			
	MWLN ➲ 444						◎		◎		○	◎		
								◎		○			◎	
	SCLC ➲ 406									◎				◎
	CB○○RS(-B) ➲ 410				CR ➲ 412			◎		◎				◎
								◎						◎

(Note 2) ◎ : 1st recommendation. ○: 2nd recommendation.
(Note 3) ＊Indicates that the shank material is carbide.

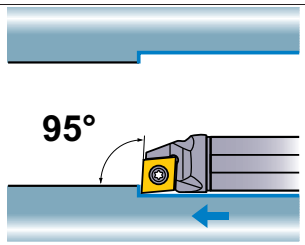
FSCLC/P

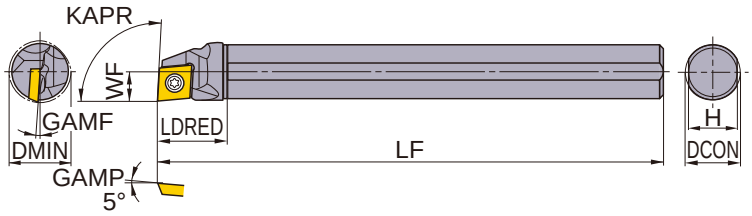
DIMPLE BAR

Product Information

95° KAPR

RECOMMENDED CUTTING CONDITION >> 399
GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 244
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966
FEATURES OF DIMPLE BAR >> 383
TURNING INSERTS >> 138
PCD TURNING INSERTS >> 272
TECHNICAL INFO >> 1971



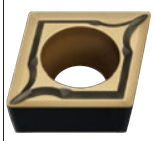
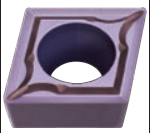
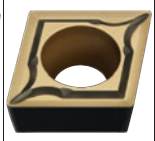
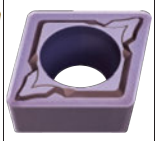
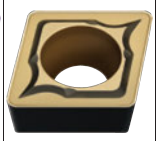


※GAMP:FSCL108R/L-06S = 1° Right hand tool holder shown. Unit: mm

Order Number	Stock	L/R	Inserts	DCON	LF	LDRED	WF	H	GAMF	DMIN	l/d	KAPR	Clamp Screw	Wrench
FSCLC1008R-06S	●	R	CC**0602	8	125	18	5	7.2	12°	10	3	95°	TS253	TKY08F
FSCLP1210R-08S	●	R	CP**0802(*)	10	150	22.5	6	9	5°	12	3.5	95°	TS3D	TKY10F
FSCLP1412R-08S	●	R	CP**0802(*)	12	150	27	7	11	4°	14	4	95°	TS3D	TKY10F
FSCLP1612R-09S	●	R	CP**0903(*)	12	150	30	8	11	4°	16	4	95°	TS4D	TKY15F
FSCLP1816R-09S	●	R	CP**0903(*)	16	180	36	9	15	3.5°	18	5	95°	TS4D	TKY15F
FSCLP2220R-09S	●	R	CP**0903(*)	20	220	45	11	19	2°	22	5	95°	TS4D	TKY15F
FSCLP3025R-09S	●	R	CP**0903(*)	25	250	56.3	15	23.4	0°	30	5	95°	TS4D	TKY15F
FSCLC1008L-06S	●	L	CC**0602	8	125	18	5	7.2	12°	10	3	95°	TS253	TKY08F
FSCLP1210L-08S	●	L	CP**0802(*)	10	150	22.5	6	9	5°	12	3.5	95°	TS3D	TKY10F
FSCLP1412L-08S	●	L	CP**0802(*)	12	150	27	7	11	4°	14	4	95°	TS3D	TKY10F
FSCLP1612L-09S	●	L	CP**0903(*)	12	150	30	8	11	4°	16	4	95°	TS4D	TKY15F
FSCLP1816L-09S	●	L	CP**0903(*)	16	180	36	9	15	3.5°	18	5	95°	TS4D	TKY15F
FSCLP2220L-09S	●	L	CP**0903(*)	20	220	45	11	19	2°	22	5	95°	TS4D	TKY15F
FSCLP3025L-09S	●	L	CP**0903(*)	25	250	56.3	15	23.4	0°	30	5	95°	TS4D	TKY15F

- Clamp Torque(N • m) : TS253=1.0, TS3D=2.5, TS4D=3.5
- (*)By changing the clamp screw, it is possible to use the other inserts. Please refer to the FEATURES OF DIMPLE BAR
- ●: Inventory maintained in Japan.

·CHIP BREAKER EXAMPLE

Finish Cutting	Finish Cutting	Light Cutting	Light Cutting	Medium Cutting	Medium Cutting	CBN/PCD
FP	FM	LP	LM	MP	MM	
						
(06,09)	(06,09)	(06,09)	(06,09)	(06,09)	(06,09)	(06,09)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.
- When using insert with right and left hand chip breaker, please use left hand insert for right hand holder and right hand insert for left hand holder.

FSCLC/P-E

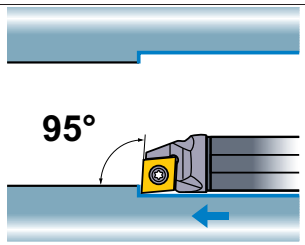
DIMPLE BAR

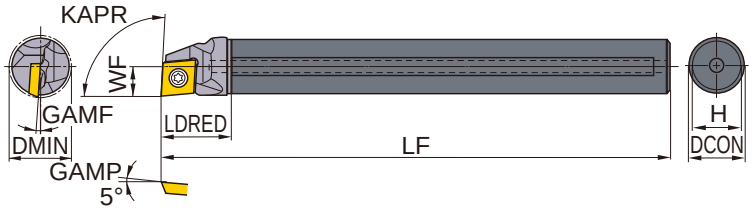
Carbide shank with coolant hole

Product Information

95° KAPR

RECOMMENDED CUTTING CONDITION >> 399
GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 244
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966
FEATURES OF DIMPLE BAR >> 383
TURNING INSERTS >> 138
PCD TURNING INSERTS >> 272
TECHNICAL INFO >> 1971



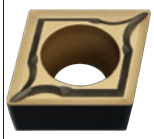
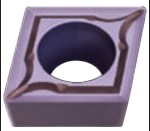
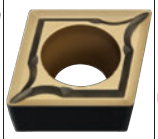
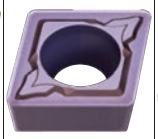
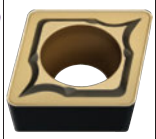
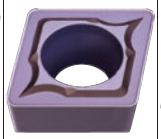


※GAMP:FSCL108R/L-06E = 1° Right hand tool holder shown. Unit: mm

Order Number	Stock	L/R	Inserts	DCON	LF	LDRED	WF	H	GAMF	DMIN	l/d	KAPR	Clamp Screw	Wrench
FSCLC1008R-06E	●	R	CC**0602	8	140	13.8	5	7.2	12°	10	7	95°	TS253	TKY08F
FSCLC1008R-06E-2/3	●	R	CC**0602	8	90	13.8	5	7.2	12°	10	7	95°	TS253	TKY08F
FSCLC1008R-06E-1/2	●	R	CC**0602	8	70	13.8	5	7.2	12°	10	7	95°	TS253	TKY08F
FSCLP1210R-08E	●	R	CP**0802(*)	10	160	16	6	9	5°	12	7.5	95°	TS3D	TKY10F
FSCLP1210R-08E-2/3	●	R	CP**0802(*)	10	105	16	6	9	5°	12	7.5	95°	TS3D	TKY10F
FSCLP1210R-08E-1/2	●	R	CP**0802(*)	10	80	16	6	9	5°	12	7.5	95°	TS3D	TKY10F
FSCLP1412R-08E	●	R	CP**0802(*)	12	180	17.8	7	11	4°	14	8	95°	TS3D	TKY10F
FSCLP1412R-08E-2/3	●	R	CP**0802(*)	12	120	17.8	7	11	4°	14	8	95°	TS3D	TKY10F
FSCLP1412R-08E-1/2	●	R	CP**0802(*)	12	90	17.8	7	11	4°	14	8	95°	TS3D	TKY10F
FSCLP1816R-09E	●	R	CP**0903(*)	16	220	21.8	9	15	3.5°	18	8	95°	TS4D	TKY15F
FSCLP1816R-09E-2/3	●	R	CP**0903(*)	16	145	21.8	9	15	3.5°	18	8	95°	TS4D	TKY15F
FSCLP1816R-09E-1/2	●	R	CP**0903(*)	16	110	21.8	9	15	3.5°	18	8	95°	TS4D	TKY15F
FSCLP2220R-09E	●	R	CP**0903(*)	20	250	24	11	19	2°	22	8	95°	TS4D	TKY15F
FSCLP2220R-09E-2/3	●	R	CP**0903(*)	20	165	24	11	19	2°	22	8	95°	TS4D	TKY15F
FSCLP2220R-09E-1/2	●	R	CP**0903(*)	20	125	24	11	19	2°	22	8	95°	TS4D	TKY15F
FSCLC1008L-06E	●	L	CC**0602	8	140	13.8	5	7.2	12°	10	7	95°	TS253	TKY08F
FSCLP1210L-08E	●	L	CP**0802(*)	10	160	16	6	9	5°	12	7.5	95°	TS3D	TKY10F
FSCLP1412L-08E	●	L	CP**0802(*)	12	180	17.8	7	11	4°	14	8	95°	TS3D	TKY10F
FSCLP1816L-09E	●	L	CP**0903(*)	16	220	21.8	9	15	3.5°	18	8	95°	TS4D	TKY15F
FSCLP2220L-09E	●	L	CP**0903(*)	20	250	24	11	19	2°	22	8	95°	TS4D	TKY15F

- Clamp Torque(N • m) : TS253=1.0, TS3D=2.5, TS4D=3.5
- ●: Inventory maintained in Japan.

·CHIP BREAKER EXAMPLE

Finish Cutting	Finish Cutting	Light Cutting	Light Cutting	Medium Cutting	Medium Cutting	CBN/PCD
FP	FM	LP	LM	MP	MM	
						
(06,09)	(06,09)	(06,09)	(06,09)	(06,09)	(06,09)	(06,09)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.
- When using insert with right and left hand chip breaker, please use left hand insert for right hand holder and right hand insert for left hand holder.

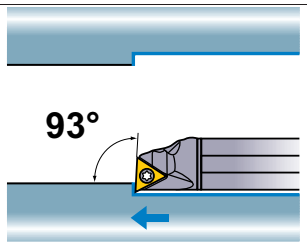
FSTUP

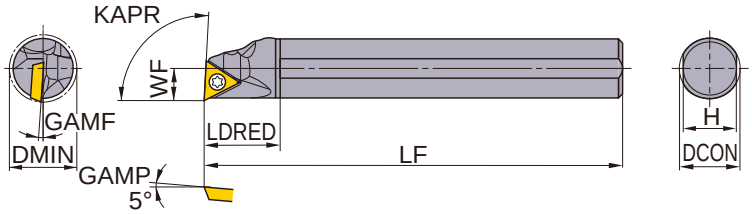
DIMPLE BAR

Product Information

93° KAPR

RECOMMENDED CUTTING CONDITION >> 399
GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 254
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966
FEATURES OF DIMPLE BAR >> 383
TURNING INSERTS >> 158
PCD TURNING INSERTS >> 277
TECHNICAL INFO >> 1971



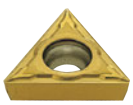


Right hand tool holder shown. Unit: mm

Order Number	Stock	L/R	Inserts	DCON	LF	LDRED	WF	H	GAMF	DMIN	l/d	KAPR	Clamp Screw	Wrench
FSTUP1008R-08S	●	R	TP**0802(*)	8	125	18	5	7.2	10°	10	3	93°	TS2D	TKY06F
FSTUP1210R-09S	●	R	TP**0902(*)	10	150	22.5	6	9	8°	12	3.5	93°	TS25D	TKY08F
FSTUP1210R-11S	●	R	TP**1103(*)	10	150	22.5	6	9	8°	12	3.5	93°	TS31D	TKY10F
FSTUP1412R-09S	●	R	TP**0902(*)	12	150	27	7	11	7°	14	4	93°	TS25D	TKY08F
FSTUP1412R-11S	●	R	TP**1103(*)	12	150	27	7	11	7°	14	4	93°	TS31D	TKY10F
FSTUP1816R-11S	●	R	TP**1103(*)	16	180	36	9	15	4°	18	5	93°	TS31D	TKY10F
FSTUP2220R-11S	●	R	TP**1103(*)	20	220	45	11	19	0°	22	5	93°	TS31D	TKY10F
FSTUP3225R-16S	●	R	TP**1603(*)	25	270	56.3	16	23.4	0°	32	5	93°	TS4D	TKY15F
FSTUP1008L-08S	●	L	TP**0802(*)	8	125	18	5	7.2	10°	10	3	93°	TS2D	TKY06F
FSTUP1210L-09S	●	L	TP**0902(*)	10	150	22.5	6	9	8°	12	3.5	93°	TS25D	TKY08F
FSTUP1210L-11S	●	L	TP**1103(*)	10	150	22.5	6	9	8°	12	3.5	93°	TS31D	TKY10F
FSTUP1412L-09S	●	L	TP**0902(*)	12	150	27	7	11	7°	14	4	93°	TS25D	TKY08F
FSTUP1412L-11S	●	L	TP**1103(*)	12	150	27	7	11	7°	14	4	93°	TS31D	TKY10F
FSTUP1816L-11S	●	L	TP**1103(*)	16	180	36	9	15	4°	18	5	93°	TS31D	TKY10F
FSTUP2220L-11S	●	L	TP**1103(*)	20	220	45	11	19	0°	22	5	93°	TS31D	TKY10F
FSTUP3225L-16S	●	L	TP**1603(*)	25	270	56.3	16	23.4	0°	32	5	93°	TS4D	TKY15F

- Clamp Torque(N • m) : TS2D=0.6, TS25D=1.0, TS31D=2.5, TS4D=3.5
- (*)By changing the clamp screw, it is possible to use the other inserts. Please refer to the FEATURES OF DIMPLE BAR
- ●: Inventory maintained in Japan.

·CHIP BREAKER EXAMPLE

Finish Cutting	Light Cutting	Medium Cutting	PCD	CBN
FV	SV	MV	R/L-F	
				
(08,09)	(08,09,11,16)	(08,09,11,16)	(08,09,11)	(08,09,11,16)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.
- When using insert with right and left hand chip breaker, please use left hand insert for right hand holder and right hand insert for left hand holder.

FSTUP-E

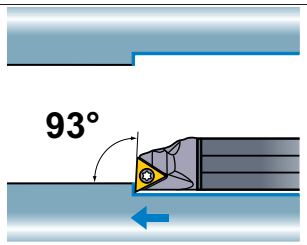
DIMPLE BAR

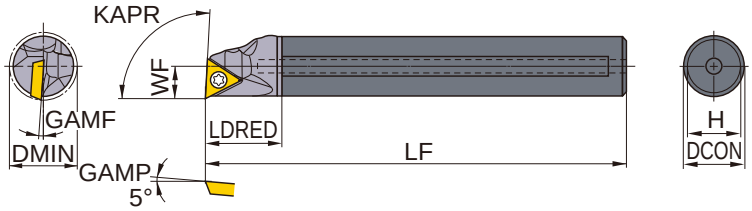
Carbide shank with coolant hole

Product Information

93° KAPR

RECOMMENDED CUTTING CONDITION >> 399
GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 254
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966
FEATURES OF DIMPLE BAR >> 383
TURNING INSERTS >> 158
PCD TURNING INSERTS >> 277
TECHNICAL INFO >> 1971



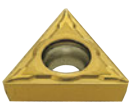


Right hand tool holder shown. Unit: mm

Order Number	Stock	L/R	Inserts	DCON	LF	LDRED	WF	H	GAMF	DMIN	l/d	KAPR	Clamp Screw	Wrench
FSTUP1008R-08E	●	R	TP**0802(*)	8	140	13.8	5	7.2	10°	10	7	93°	TS2D	TKY06F
FSTUP1008R-08E-2/3	●	R	TP**0802(*)	8	90	13.8	5	7.2	10°	10	7	93°	TS2D	TKY06F
FSTUP1008R-08E-1/2	●	R	TP**0802(*)	8	70	13.8	5	7.2	10°	10	7	93°	TS2D	TKY06F
FSTUP1210R-09E	●	R	TP**0902(*)	10	160	16	6	9	8°	12	7.5	93°	TS25D	TKY08F
FSTUP1210R-09E-2/3	●	R	TP**0902(*)	10	105	16	6	9	8°	12	7.5	93°	TS25D	TKY08F
FSTUP1210R-09E-1/2	●	R	TP**0902(*)	10	80	16	6	9	8°	12	7.5	93°	TS25D	TKY08F
FSTUP1412R-09E	●	R	TP**0902(*)	12	180	17.8	7	11	7°	14	8	93°	TS25D	TKY08F
FSTUP1412R-09E-2/3	●	R	TP**0902(*)	12	120	17.8	7	11	7°	14	8	93°	TS25D	TKY08F
FSTUP1412R-09E-1/2	●	R	TP**0902(*)	12	90	17.8	7	11	7°	14	8	93°	TS25D	TKY08F
FSTUP1816R-11E	●	R	TP**1103(*)	16	220	21.8	9	15	4°	18	8	93°	TS31D	TKY10F
FSTUP1816R-11E-2/3	●	R	TP**1103(*)	16	145	21.8	9	15	4°	18	8	93°	TS31D	TKY10F
FSTUP1816R-11E-1/2	●	R	TP**1103(*)	16	110	21.8	9	15	4°	18	8	93°	TS31D	TKY10F
FSTUP2220R-11E	●	R	TP**1103(*)	20	250	24	11	19	0°	22	8	93°	TS31D	TKY10F
FSTUP2220R-11E-2/3	●	R	TP**1103(*)	20	165	24	11	19	0°	22	8	93°	TS31D	TKY10F
FSTUP2220R-11E-1/2	●	R	TP**1103(*)	20	125	24	11	19	0°	22	8	93°	TS31D	TKY10F
FSTUP1008L-08E	●	L	TP**0802(*)	8	140	13.8	5	7.2	10°	10	7	93°	TS2D	TKY06F
FSTUP1210L-09E	●	L	TP**0902(*)	10	160	16	6	9	8°	12	7.5	93°	TS25D	TKY08F
FSTUP1412L-09E	●	L	TP**0902(*)	12	180	17.8	7	11	7°	14	8	93°	TS25D	TKY08F
FSTUP1816L-11E	●	L	TP**1103(*)	16	220	21.8	9	15	4°	18	8	93°	TS31D	TKY10F
FSTUP2220L-11E	●	L	TP**1103(*)	20	250	24	11	19	0°	22	8	93°	TS31D	TKY10F

- Clamp Torque(N • m) : TS2D=0.6, TS25D=1.0, TS31D=2.5
- ●: Inventory maintained in Japan.

·CHIP BREAKER EXAMPLE

Finish Cutting	Light Cutting	Medium Cutting	PCD	CBN
FV  (08,09)	SV (08,09,11)	MV (08,09,11)	R/L-F (08,09,11)	(08,09,11)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.
- When using insert with right and left hand chip breaker, please use left hand insert for right hand holder and right hand insert for left hand holder.

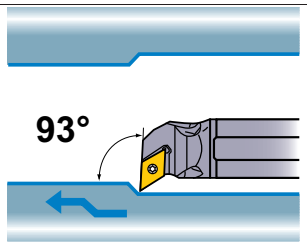
FSDUC

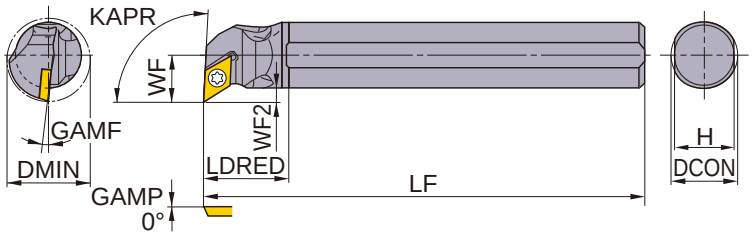
DIMPLE BAR

Product Information

93° KAPR

RECOMMENDED CUTTING CONDITION >> 399
TURNING INSERTS >> 145
PCD TURNING INSERTS >> 274
TECHNICAL INFO >> 1971
GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 249
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966



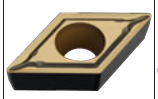
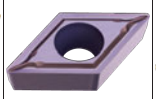
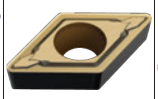
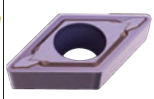
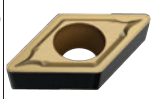
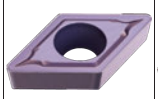
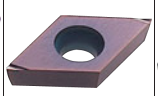
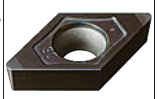


Right hand tool holder shown. Unit: mm

Order Number	Stock	L/R	Inserts	DCON	LF	LDRED	WF	WF2	H	GAMF	DMIN	l/d	KAPR	Clamp Screw	Wrench
FSDUC1410R-07S	●	R	DC**0702	10	150	18	8.3	3.3	9	7.5°	14	3.5	93°	TS25	TKY08F
FSDUC1612R-07S	●	R	DC**0702	12	150	20	9.3	3.3	11	6°	16	4	93°	TS25	TKY08F
FSDUC2016R-07S	●	R	DC**0702	16	180	20	11.3	3.3	15	5°	20	5	93°	TS25	TKY08F
FSDUC3220R-11S	●	R	DC**11T3	20	180	22.5	16.1	6.1	19	5°	32	5	93°	TS43	TKY15F
FSDUC1410L-07S	●	L	DC**0702	10	150	18	8.3	3.3	9	7.5°	14	3.5	93°	TS25	TKY08F
FSDUC1612L-07S	●	L	DC**0702	12	150	20	9.3	3.3	11	6°	16	4	93°	TS25	TKY08F
FSDUC2016L-07S	●	L	DC**0702	16	180	20	11.3	3.3	15	5°	20	5	93°	TS25	TKY08F
FSDUC3220L-11S	●	L	DC**11T3	20	180	22.5	16.1	6.1	19	5°	32	5	93°	TS43	TKY15F

- Clamp Torque(N • m) : TS25=1.0, TS43=3.5
- ●: Inventory maintained in Japan.

·CHIP BREAKER EXAMPLE

Finish Cutting	Finish Cutting	Light Cutting	Light Cutting	Medium Cutting	Medium Cutting	PCD	CBN
FP	FM	LP	LM	MP	MM	RL-F	
							
(07,11)	(07,11)	(07,11)	(07,11)	(07,11)	(07,11)	(07,11)	(07,11)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.
- When using insert with right and left hand chip breaker, please use left hand insert for right hand holder and right hand insert for left hand holder.

FSDUC-E

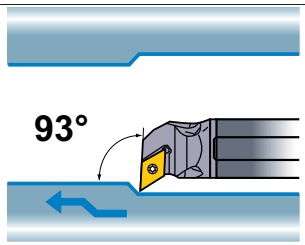
DIMPLE BAR

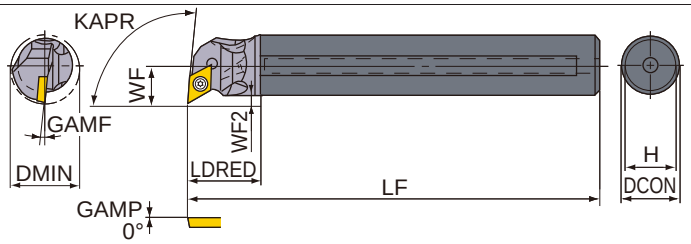
Carbide shank with coolant hole

Product Information

93° KAPR

RECOMMENDED CUTTING CONDITION >> 399
TURNING INSERTS >> 145
PCD TURNING INSERTS >> 274
TECHNICAL INFO >> 1971
GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 249
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966



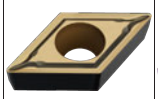
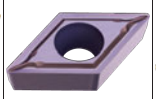
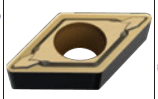
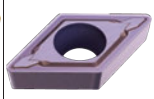
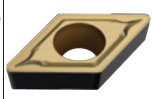
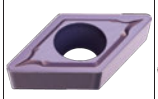
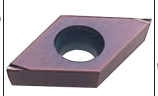
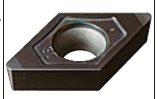


Right hand tool holder shown. Unit: mm

Order Number	Stock	L/R	Inserts	DCON	LF	LDRED	WF	WF2	H	GAMF	DMIN	l/d	KAPR	Clamp Screw	Wrench
FSDUC1410R-07E	●	R	DC**0702	10	160	16	8.3	3.3	9	7.5°	14	7.5	93°	TS25	TKY08F
FSDUC1612R-07E	●	R	DC**0702	12	180	17.8	9.3	3.3	11	6°	16	8	93°	TS25	TKY08F
FSDUC2016R-07E	●	R	DC**0702	16	220	21.8	11.3	3.3	15	5°	20	8	93°	TS25	TKY08F
FSDUC3220R-11E	●	R	DC**11T3	20	250	24	16.1	6.1	19	5°	32	8	93°	TS43	TKY15F
FSDUC1410L-07E	●	L	DC**0702	10	160	16	8.3	3.3	9	7.5°	14	7.5	93°	TS25	TKY08F
FSDUC1612L-07E	●	L	DC**0702	12	180	17.8	9.3	3.3	11	6°	16	8	93°	TS25	TKY08F
FSDUC2016L-07E	●	L	DC**0702	16	220	21.8	11.3	3.3	15	5°	20	8	93°	TS25	TKY08F
FSDUC3220L-11E	●	L	DC**11T3	20	250	24	16.1	6.1	19	5°	32	8	93°	TS43	TKY15F

- Clamp Torque(N • m) : TS25=1.0, TS43=3.5
- ●: Inventory maintained in Japan.

·CHIP BREAKER EXAMPLE

Finish Cutting	Finish Cutting	Light Cutting	Light Cutting	Medium Cutting	Medium Cutting	PCD	CBN
FP	FM	LP	LM	MP	MM	RL-F	
							
(07,11)	(07,11)	(07,11)	(07,11)	(07,11)	(07,11)	(07,11)	(07,11)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.
- When using insert with right and left hand chip breaker, please use left hand insert for right hand holder and right hand insert for left hand holder.

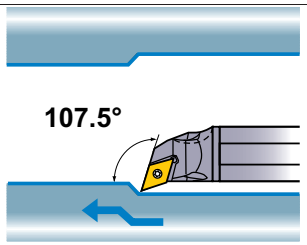
FSDQC

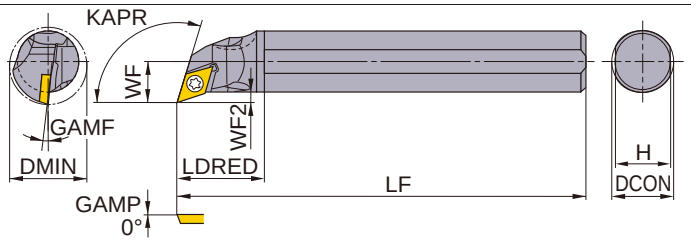
DIMPLE BAR

Product Information

107° 30′ KAPR

RECOMMENDED CUTTING CONDITION >> 399
TURNING INSERTS >> 145
PCD TURNING INSERTS >> 274
TECHNICAL INFO >> 1971
GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 249
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966



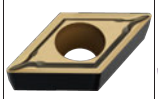
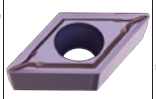
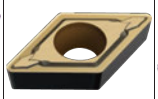
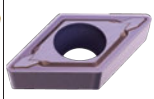
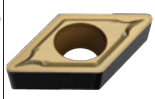
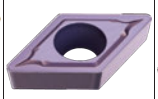
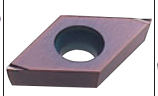
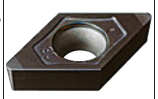


Right hand tool holder shown. Unit: mm

Order Number	Stock	L/R	Inserts	DCON	LF	LDRED	WF	WF2	H	GAMF	DMIN	l/d	KAPR	Clamp Screw	Wrench
FSDQC1310R-07S	●	R	DC**0702	10	150	20.5	7.6	2.6	9	8°	13	3.5	107.5°	TS25	TKY08F
FSDQC1612R-07S	●	R	DC**0702	12	150	22.5	8.6	2.6	11	6°	16	4	107.5°	TS25	TKY08F
FSDQC2016R-07S	●	R	DC**0702	16	180	22.5	10.6	2.6	15	5°	20	5	107.5°	TS25	TKY08F
FSDQC2520R-11S	●	R	DC**11T3	20	180	26	13.7	3.7	19	7°	25	5	107.5°	TS43	TKY15F
FSDQC1310L-07S	●	L	DC**0702	10	150	20.5	7.6	2.6	9	8°	13	3.5	107.5°	TS25	TKY08F
FSDQC1612L-07S	●	L	DC**0702	12	150	22.5	8.6	2.6	11	6°	16	4	107.5°	TS25	TKY08F
FSDQC2016L-07S	●	L	DC**0702	16	180	22.5	10.6	2.6	15	5°	20	5	107.5°	TS25	TKY08F
FSDQC2520L-11S	●	L	DC**11T3	20	180	26	13.7	3.7	19	7°	25	5	107.5°	TS43	TKY15F

- Clamp Torque(N • m) : TS25=1.0, TS43=3.5
- ●: Inventory maintained in Japan.

·CHIP BREAKER EXAMPLE

Finish Cutting	Finish Cutting	Light Cutting	Light Cutting	Medium Cutting	Medium Cutting	PCD	CBN
FP	FM	LP	LM	MP	MM	RL-F	
							
(07,11)	(07,11)	(07,11)	(07,11)	(07,11)	(07,11)	(07,11)	(07,11)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.
- When using insert with right and left hand chip breaker, please use left hand insert for right hand holder and right hand insert for left hand holder.

FSDQC-E

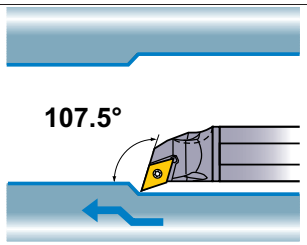
DIMPLE BAR

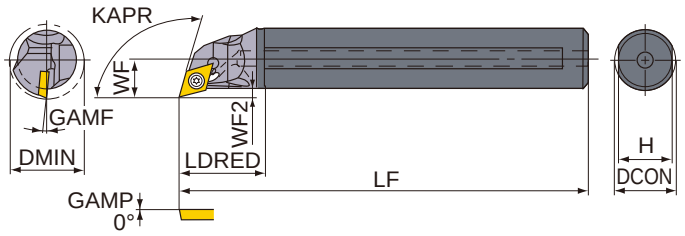
Carbide shank with coolant hole

Product Information

107° 30′ KAPR

RECOMMENDED CUTTING CONDITION >> 399
TURNING INSERTS >> 145
PCD TURNING INSERTS >> 274
TECHNICAL INFO >> 1971
GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 249
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966



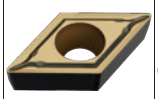
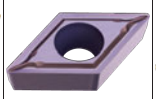
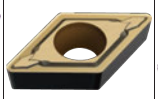
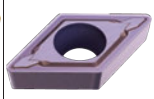
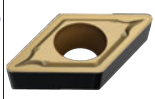
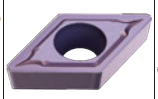
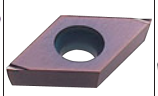
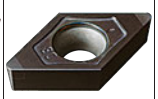


Right hand tool holder shown. Unit: mm

Order Number	Stock	L/R	Inserts	DCON	LF	LDRED	WF	WF2	H	GAMF	DMIN	l/d	KAPR	Clamp Screw	Wrench
FSDQC1310R-07E	●	R	DC**0702	10	162	18.4	7.6	2.6	9	8°	13	7.5	107.5°	TS25	TKY08F
FSDQC1612R-07E	●	R	DC**0702	12	182	20.2	8.6	2.6	11	6°	16	8	107.5°	TS25	TKY08F
FSDQC2016R-07E	●	R	DC**0702	16	222	24.2	10.6	2.6	15	5°	20	8	107.5°	TS25	TKY08F
FSDQC2520R-11E	●	R	DC**11T3	20	254	28	13.7	3.7	19	7°	25	8	107.5°	TS43	TKY15F
FSDQC1310L-07E	●	L	DC**0702	10	162	18.4	7.6	2.6	9	8°	13	7.5	107.5°	TS25	TKY08F
FSDQC1612L-07E	●	L	DC**0702	12	182	20.2	8.6	2.6	11	6°	16	8	107.5°	TS25	TKY08F
FSDQC2016L-07E	●	L	DC**0702	16	222	24.2	10.6	2.6	15	5°	20	8	107.5°	TS25	TKY08F
FSDQC2520L-11E	●	L	DC**11T3	20	254	28	13.7	3.7	19	7°	25	8	107.5°	TS43	TKY15F

- Clamp Torque(N • m) : TS25=1.0, TS43=3.5
- ●: Inventory maintained in Japan.

·CHIP BREAKER EXAMPLE

Finish Cutting	Finish Cutting	Light Cutting	Light Cutting	Medium Cutting	Medium Cutting	PCD	CBN
FP	FM	LP	LM	MP	MM	RL-F	
							
(07,11)	(07,11)	(07,11)	(07,11)	(07,11)	(07,11)	(07,11)	(07,11)

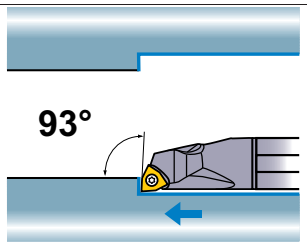
- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.
- When using insert with right and left hand chip breaker, please use left hand insert for right hand holder and right hand insert for left hand holder.

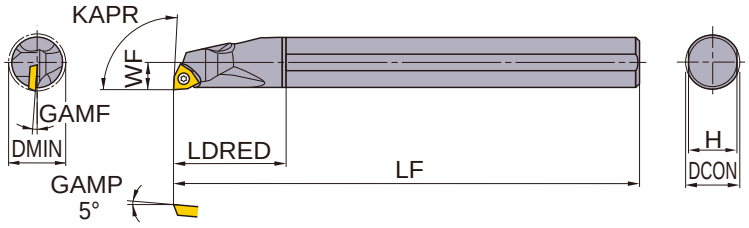
FSWUB/P DIMPLE BAR

Product Information

93° KAPR

RECOMMENDED CUTTING CONDITION >> 399
TURNING INSERTS >> 166
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966
GRADES AND CHIP BREAKERS >> 38
PCD TURNING INSERTS >> 282
TECHNICAL INFO >> 1971



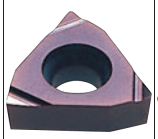


Right hand tool holder shown. Unit: mm

Order Number	Stock	L/R	Inserts	DCON	LF	LDRED	WF	H	GAMF	DMIN	l/d	KAPR	Clamp Screw	Wrench
FSWUB1008R-L3S	●	R	WB**L302	8	125	18	5	7.2	14°	10	3	93°	TS2	TKY06F
FSWUB1210R-L3S	●	R	WB**L302	10	150	22.5	6	9	11°	12	3.5	93°	TS2	TKY06F
FSWUP1412R-04S	●	R	WP**0402	12	150	27	7	11	4°	14	4	93°	TS253	TKY08F
FSWUP1816R-04S	●	R	WP**0402	16	180	36	9	15	1°	18	5	93°	TS253	TKY08F
FSWUP2220R-06S	●	R	WP**0603	20	220	45	11	19	2°	22	5	93°	TS4	TKY15F
FSWUP3025R-06S	●	R	WP**0603	25	250	56.3	15	23.4	0°	30	5	93°	TS4	TKY15F
FSWUB1008L-L3S	●	L	WB**L302	8	125	18	5	7.2	14°	10	3	93°	TS2	TKY06F
FSWUB1210L-L3S	●	L	WB**L302	10	150	22.5	6	9	11°	12	3.5	93°	TS2	TKY06F
FSWUP1412L-04S	●	L	WP**0402	12	150	27	7	11	4°	14	4	93°	TS253	TKY08F
FSWUP1816L-04S	●	L	WP**0402	16	180	36	9	15	1°	18	5	93°	TS253	TKY08F
FSWUP2220L-06S	●	L	WP**0603	20	220	45	11	19	2°	22	5	93°	TS4	TKY15F
FSWUP3025L-06S	●	L	WP**0603	25	250	56.3	15	23.4	0°	30	5	93°	TS4	TKY15F

- Clamp Torque(N • m) : TS2=0.6, TS253=1.0, TS4=3.5
- ●: Inventory maintained in Japan.
- GAMP of FSWUB1008R/L-L3S and FSWUB1210R/L-L3S are 0°

·CHIP BREAKER EXAMPLE

Finish Cutting	Medium Cutting
R/L-F・FS	MV
	
(L3,04,06)	(L3,04,06)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.
- When using insert with right and left hand chip breaker, please use left hand insert for right hand holder and right hand insert for left hand holder.

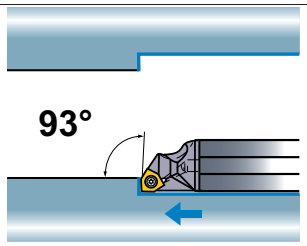
FSWUB/P-E DIMPLE BAR

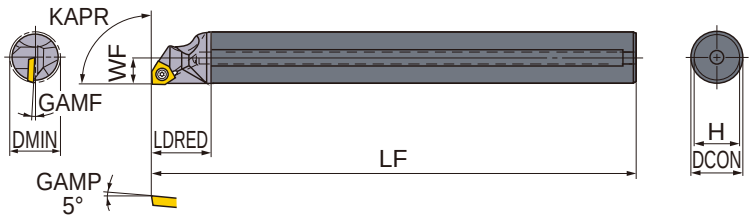
Carbide shank with coolant hole

Product Information

93° KAPR

RECOMMENDED CUTTING CONDITION >> 399
TURNING INSERTS >> 166
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966
GRADES AND CHIP BREAKERS >> 38
PCD TURNING INSERTS >> 282
TECHNICAL INFO >> 1971



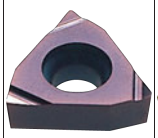


Right hand tool holder shown. Unit: mm

Order Number	Stock	L/R	Inserts	DCON	LF	LDRED	WF	H	GAMF	DMIN	l/d	KAPR	Clamp Screw	Wrench
FSWUB1008R-L3E	●	R	WB**L302	8	140	13.8	5	7.2	14°	10	7	93°	TS2	TKY06F
FSWUB1008R-L3E-2/3	●	R	WB**L302	8	90	13.8	5	7.2	14°	10	7	93°	TS2	TKY06F
FSWUB1008R-L3E-1/2	●	R	WB**L302	8	70	13.8	5	7.2	14°	10	7	93°	TS2	TKY06F
FSWUB1210R-L3E	●	R	WB**L302	10	160	16	6	9	11°	12	7.5	93°	TS2	TKY06F
FSWUB1210R-L3E-2/3	●	R	WB**L302	10	105	16	6	9	11°	12	7.5	93°	TS2	TKY06F
FSWUB1210R-L3E-1/2	●	R	WB**L302	10	80	16	6	9	11°	12	7.5	93°	TS2	TKY06F
FSWUP1412R-04E	●	R	WP**0402	12	180	17.8	7	11	4°	14	8	93°	TS253	TKY08F
FSWUP1412R-04E-2/3	●	R	WP**0402	12	120	17.8	7	11	4°	14	8	93°	TS253	TKY08F
FSWUP1412R-04E-1/2	●	R	WP**0402	12	90	17.8	7	11	4°	14	8	93°	TS253	TKY08F
FSWUP1816R-04E	●	R	WP**0402	16	220	21.8	9	15	1°	18	8	93°	TS253	TKY08F
FSWUP1816R-04E-2/3	●	R	WP**0402	16	145	21.8	9	15	1°	18	8	93°	TS253	TKY08F
FSWUP1816R-04E-1/2	●	R	WP**0402	16	110	21.8	9	15	1°	18	8	93°	TS253	TKY08F
FSWUP2220R-06E	●	R	WP**0603	20	250	24	11	19	2°	22	8	93°	TS4	TKY15F
FSWUP2220R-06E-2/3	●	R	WP**0603	20	165	24	11	19	2°	22	8	93°	TS4	TKY15F
FSWUP2220R-06E-1/2	●	R	WP**0603	20	125	24	11	19	2°	22	8	93°	TS4	TKY15F
FSWUB1008L-L3E	●	L	WB**L302	8	140	13.8	5	7.2	14°	10	7	93°	TS2	TKY06F
FSWUB1210L-L3E	●	L	WB**L302	10	160	16	6	9	11°	12	7.5	93°	TS2	TKY06F
FSWUP1412L-04E	●	L	WP**0402	12	180	17.8	7	11	4°	14	8	93°	TS253	TKY08F
FSWUP1816L-04E	●	L	WP**0402	16	220	21.8	9	15	1°	18	8	93°	TS253	TKY08F
FSWUP2220L-06E	●	L	WP**0603	20	250	24	11	19	2°	22	8	93°	TS4	TKY15F

- Clamp Torque(N • m) : TS2=0.6, TS253=1.0, TS4=3.5
- ●: Inventory maintained in Japan. GAMP of FSWUB1008R/L-L3SE and FSWUB1210R/L-L3E are 0°

·CHIP BREAKER EXAMPLE

Finish Cutting	Medium Cutting
R/L-F・FS	MV
	
(L3,04,06)	(L3,04,06)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.
- When using insert with right and left hand chip breaker, please use left hand insert for right hand holder and right hand insert for left hand holder.

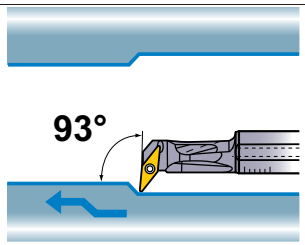
FSVUB/C

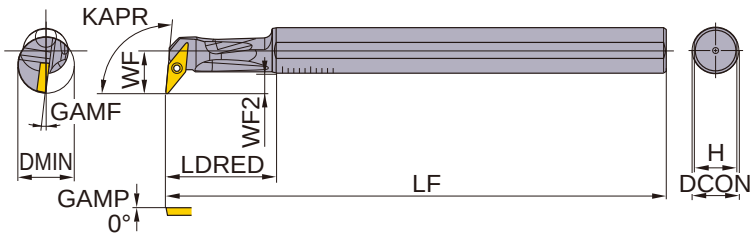
DIMPLE BAR

Product Information

93° KAPR

RECOMMENDED CUTTING CONDITION >> 399
TURNING INSERTS >> 162
PCD TURNING INSERTS >> 280
TECHNICAL INFO >> 1971
GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 259
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966



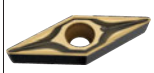
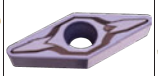


Right hand tool holder shown. Unit: mm

Order Number	Stock	L/R	Inserts	DCON	LF	LDRED	WF	WF2	H	GAMF	DMIN	l/d	KAPR	Shim	Shim Pin	Clamp Screw	Wrench
FSVUC1612R-08S	●	R	VC**0802	12	150	25	11	5.5	11	8°	16	4	93°			TS202	TKY06F
FSVUB2016R-11S	●	R	VB**1103	16	180	32.5	15.5	8	15	8°	20	5	93°			TS255	TKY08F
FSVUB2520R-11S	●	R	VB**1103	20	200	40.5	17.5	8	19	7°	25	5	93°			TS255	TKY08F
FSVUB3425R-16S	●	R	VB**1604	25	220	50	20.5	8.5	23.4	13°	34	5	93°	SPSVN32	BCP141	TS35D	TKY15F
FSVUB4032R-16S	●	R	VB**1604	32	250	84	27.5	12	30.4	9°	40	5	93°	SPSVN32	BCP141	TS35D	TKY15F
FSVUC1612L-08S	●	L	VC**0802	12	150	25	11	5.5	11	8°	16	4	93°			TS202	TKY06F
FSVUB2016L-11S	●	L	VB**1103	16	180	32.5	15.5	8	15	8°	20	5	93°			TS255	TKY08F
FSVUB2520L-11S	●	L	VB**1103	20	200	40.5	17.5	8	19	7°	25	5	93°			TS255	TKY08F
FSVUB3425L-16S	●	L	VB**1604	25	220	50	20.5	8.5	23.4	13°	34	5	93°	SPSVN32	BCP141	TS35D	TKY15F
FSVUB4032L-16S	●	L	VB**1604	32	250	84	27.5	12	30.4	9°	40	5	93°	SPSVN32	BCP141	TS35D	TKY15F

- Clamp Torque(N • m) : TS202=0.6, TS255=1.0, TS35D=3.5
- ●: Inventory maintained in Japan.

·CHIP BREAKER EXAMPLE

Finish Cutting	Finish Cutting	Light Cutting	Light Cutting	Medium Cutting	Medium Cutting	Medium Cutting	CBN
FP	FM	LP	LM	MP	MM	Standard	
							
(11,16)	(11,16)	(11,16)	(11,16)	(16)	(16)	(16)	(16)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.
- When using insert with right and left hand chip breaker, please use left hand insert for right hand holder and right hand insert for left hand holder.

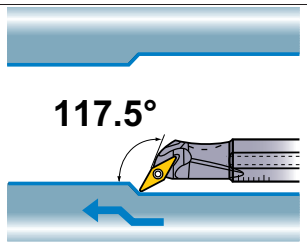
FSVPB/C

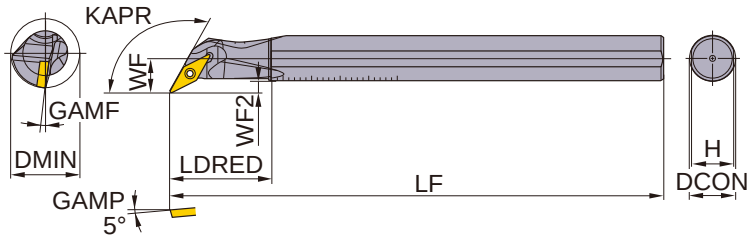
DIMPLE BAR

Product Information

117° 30′ KAPR

RECOMMENDED CUTTING CONDITION >> 399
TURNING INSERTS >> 162
PCD TURNING INSERTS >> 280
TECHNICAL INFO >> 1971
GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 259
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966



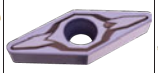


Right hand tool holder shown. Unit: mm

Order Number	Stock	L/R	Inserts	DCON	LF	LDRED	WF	WF2	H	GAMF	DMIN	l/d	KAPR	Shim	Shim Pin	Clamp Screw	Wrench
FSVPC1610R-08S	●	R	VC**0802	10	150	25	8	3	9	8°	16	3.5	117.5°			TS202	TKY06F
FSVPB2012R-11S	●	R	VB**1103	12	150	28	10	4.5	11	8°	20	4	117.5°			TS255	TKY08F
FSVPB2516R-11S	●	R	VB**1103	16	180	35	12.5	5	15	5°	25	5	117.5°			TS255	TKY08F
FSVPB3020R-11S	●	R	VB**1103	20	200	40	15	5	19	5°	30	5	117.5°			TS255	TKY08F
FSVPB3425R-16S	●	R	VB**1604	25	220	50	17	5	23.5	13°	34	5	117.5°	SPSVN32	BCP141	TS35D	TKY15F
FSVPB4032R-16S	●	R	VB**1604	32	250	55	22	6.5	30.4	9°	40	5	117.5°	SPSVN32	BCP141	TS35D	TKY15F
FSVPC1610L-08S	●	L	VC**0802	10	150	25	8	3	9	8°	16	3.5	117.5°			TS202	TKY06F
FSVPB2012L-11S	●	L	VB**1103	12	150	28	10	4.5	11	8°	20	4	117.5°			TS255	TKY08F
FSVPB2516L-11S	●	L	VB**1103	16	180	35	12.5	5	15	5°	25	5	117.5°			TS255	TKY08F
FSVPB3020L-11S	●	L	VB**1103	20	200	40	15	5	19	5°	30	5	117.5°			TS255	TKY08F
FSVPB3425L-16S	●	L	VB**1604	25	220	50	17	5	23.5	13°	34	5	117.5°	SPSVN32	BCP141	TS35D	TKY15F
FSVPB4032L-16S	●	L	VB**1604	32	250	55	22	6.5	30.4	9°	40	5	117.5°	SPSVN32	BCP141	TS35D	TKY15F

- Clamp Torque(N • m) : TS202=0.6, TS255=1.0, TS35D=3.5
- ●: Inventory maintained in Japan.

·CHIP BREAKER EXAMPLE

Finish Cutting	Finish Cutting	Light Cutting	Light Cutting	Medium Cutting	Medium Cutting	Medium Cutting	CBN
FP	FM	LP	LM	MP	MM	Standard	
							
(11,16)	(11,16)	(11,16)	(11,16)	(16)	(16)	(16)	(16)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.
- When using insert with right and left hand chip breaker, please use left hand insert for right hand holder and right hand insert for left hand holder.

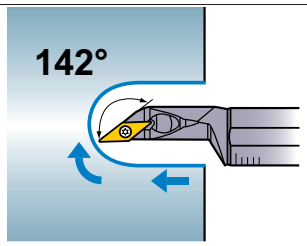
FSVJB/C

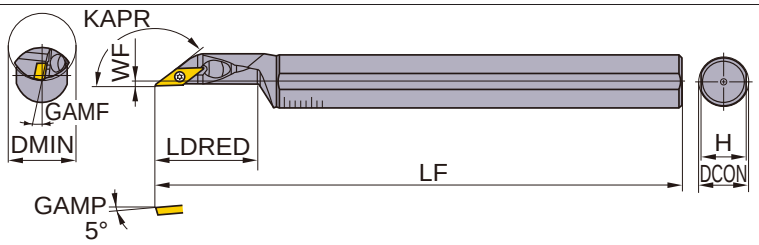
DIMPLE BAR

Product Information

142° KAPR

RECOMMENDED CUTTING CONDITION >> 399
TURNING INSERTS >> 162
PCD TURNING INSERTS >> 280
TECHNICAL INFO >> 1971
GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 259
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966



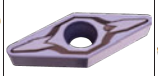


Right hand tool holder shown. Unit: mm

Order Number	Stock	L/R	Inserts	DCON	LF	LDRED	WF	H	GAMF	DMIN	l/d	KAPR	Clamp Screw	Wrench
FSVJC1612R-08S	●	R	VC**0802	12	150	26	2	11	5°	16	4	142°	TS202	TKY06F
FSVJC2016R-08S	●	R	VC**0802	16	180	36	2	15	5°	20	5	142°	TS202	TKY06F
FSVJB2520R-11S	●	R	VB**1103	20	200	37.5	2	19	5°	25	5	142°	TS255	TKY08F
FSVJB3025R-11S	●	R	VB**1103	25	250	45	3.5	23.4	5°	30	5	142°	TS255	TKY08F
FSVJC1612L-08S	●	L	VC**0802	12	150	26	2	11	5°	16	4	142°	TS202	TKY06F
FSVJC2016L-08S	●	L	VC**0802	16	180	36	2	15	5°	20	5	142°	TS202	TKY06F
FSVJB2520L-11S	●	L	VB**1103	20	200	37.5	2	19	5°	25	5	142°	TS255	TKY08F
FSVJB3025L-11S	●	L	VB**1103	25	250	45	3.5	23.4	5°	30	5	142°	TS255	TKY08F

- Clamp Torque(N • m) : TS202=0.6, TS255=1.0
- ●: Inventory maintained in Japan.

·CHIP BREAKER EXAMPLE

Finish Cutting	Finish Cutting	Light Cutting	Light Cutting	Medium Cutting
FP	FM	LP	LM	MV
				
(11)	(11)	(11)	(11)	(08,11)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.
- When using insert with right and left hand chip breaker, please use left hand insert for right hand holder and right hand insert for left hand holder.

·RECOMMENDED CUTTING CONDITION

Work Material		Cutting Mode	Breaker	Recom-mendation	Grade	Cutting Speed (m/min)	l/d ≤ 3 (Steel shank) l/d ≤ 6 (Carbide shank)		l/d = 4—5 (Steel shank) l/d = 7—8 (Carbide shank)	
							Feed (mm/rev)	Depth of Cut (mm)	Feed (mm/rev)	Depth of Cut (mm)
P	Mild Steel ≤180HB	Finish	FP	①	NX2525	170 (120—220)	0.10 (0.05—0.15)	—0.5	0.10 (0.05—0.15)	—0.5
		Light	LP	①	MP3025	150 (100—200)	0.20 (0.10—0.25)	—1.0	0.15 (0.05—0.20)	—1.0
				②	NX2525	160 (110—210)	0.20 (0.10—0.25)	—1.0	0.15 (0.05—0.20)	—1.0
		Medium	MP	①	MP3025	140 (90—190)	0.25 (0.15—0.35)	—2.0	0.20 (0.15—0.25)	—1.5
				②	NX2525	150 (100—200)	0.25 (0.15—0.35)	—2.0	0.20 (0.15—0.25)	—1.5
	Carbon Steel Alloy Steel 180—350HB	Finish	FP	①	MC6015	140 (90—190)	0.10 (0.05—0.15)	—0.5	0.10 (0.05—0.15)	—0.5
				②	NX2525	130 (80—180)	0.10 (0.05—0.15)	—0.5	0.10 (0.05—0.15)	—0.5
		Light	LP	①	MC6025	140 (90—190)	0.20 (0.10—0.25)	—1.0	0.15 (0.05—0.20)	—1.0
				②	MP3025	110 (60—160)	0.20 (0.10—0.25)	—1.0	0.15 (0.05—0.20)	—1.0
		Medium	MP	①	MC6025	130 (80—180)	0.25 (0.15—0.35)	—2.0	0.20 (0.15—0.25)	—1.5
				②	MP3025	100 (60—150)	0.25 (0.15—0.35)	—2.0	0.20 (0.15—0.25)	—1.5
M	Stainless Steel ≤200HB	Finish	FM	①	VP15TF	150 (110—190)	0.10 (0.05—0.15)	—0.5	0.10 (0.05—0.15)	—0.5
		Light	LM	①	MC7025	125 (85—165)	0.20 (0.10—0.25)	—1.0	0.15 (0.05—0.20)	—1.0
				②	VP15TF	130 (90—170)	0.20 (0.10—0.25)	—1.0	0.15 (0.05—0.20)	—1.0
		Medium	MM	①	MC7025	105 (70—135)	0.20 (0.15—0.25)	—2.0	0.20 (0.15—0.25)	—1.0
				②	VP15TF	120 (80—160)	0.20 (0.15—0.25)	—2.0	0.20 (0.15—0.25)	—1.0
K	Gray Cast Iron Tensile Strength ≤350MPa	Finish	F, FS	①	HTi10	130 (90—160)	0.15 (0.10—0.20)	—0.5	0.15 (0.10—0.20)	—0.5
		Medium	MK	①	MC5015	90 (60—120)	0.20 (0.15—0.25)	—2.0	0.20 (0.15—0.25)	—1.5
N	Aluminium Alloy	Finish	F, FS	①	HTi10	300 (200—400)	0.10 (0.05—0.15)	—0.5	0.10 (0.05—0.15)	—0.5
			Flat Top	①	MD220	200 (150—250)	0.10 (0.05—0.15)	—2.0	0.10 (0.05—0.15)	—1.0
H	Heat Treated Steel 35–65HRC	Finish	Flat Top	①	MB8025	100 (80—200)	0.10 (0.05—0.15)	—0.15	0.10 (0.05—0.15)	—0.1

(Note 1) When vibrations occur, reduce cutting speed by 30%.
(Note 2) The depth of cut needs to be less than the corner diameter when using the FSVJ type.

DCLN

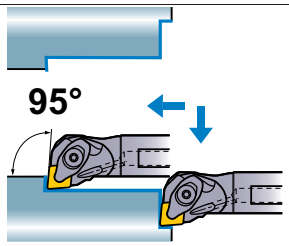
DOUBLE CLAMP DIMPLE BAR

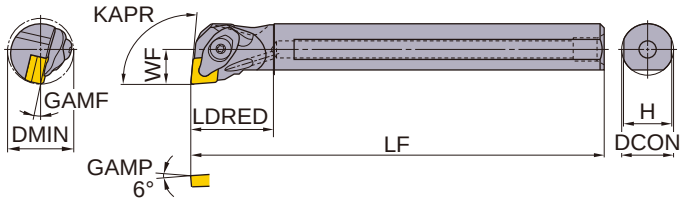
With coolant hole

Product Information

95° KAPR

GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 222
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966
TURNING INSERTS >> 102
PCD TURNING INSERTS >> 266
TECHNICAL INFO >> 1971



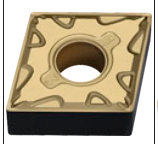


Right hand tool holder shown. Unit: mm

Order Number	Stock	L/R	Inserts	DCON	LF	LDRED	WF	H	GAMF	DMIN	KAPR	Shim	Shim Pin	Clamp Bridge	Spring	Clamp Screw	Wrench
A25R-DCLNR12	●	R	CN**1204	25	200	40	17	23	13°	32	95°	LLSCP42	LLP14	DCK2613	DCS1	DC0621T	TKY20F
A32S-DCLNR12	●	R	CN**1204	32	250	50	22	30	13°	40	95°	LLSCN42	LLP14	DCK2613	DCS1	DC0621T	TKY20F
A40T-DCLNR12	●	R	CN**1204	40	300	63	27	37	10°	50	95°	LLSCN42	LLP14	DCK2613	DCS1	DC0621T	TKY20F
A25R-DCLNL12	●	L	CN**1204	25	200	40	17	23	13°	32	95°	LLSCP42	LLP14	DCK2613	DCS1	DC0621T	TKY20F
A32S-DCLNL12	●	L	CN**1204	32	250	50	22	30	13°	40	95°	LLSCN42	LLP14	DCK2613	DCS1	DC0621T	TKY20F
A40T-DCLNL12	●	L	CN**1204	40	300	63	27	37	10°	50	95°	LLSCN42	LLP14	DCK2613	DCS1	DC0621T	TKY20F

- Clamp Torque(N • m) : DC0621T=5.0
- ●: Inventory maintained in Japan.

·CHIP BREAKER EXAMPLE

Finish Cutting	Light Cutting	Light Cutting	Light Cutting	Medium Cutting	Medium Cutting	For Stainless Steel	CBN/PCD
FP	SA	LP	LM	MP	Standard	MM	
							
(12)	(12)	(12)	(12)	(12)	(12)	(12)	(12)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.
- When using insert with right and left hand chip breaker, please use left hand insert for right hand holder and right hand insert for left hand holder.

·RECOMMENDED CUTTING CONDITION

	Work Material	Hardness	Cutting Mode	l/d≤3			l/d=3—4		
				Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
P	Carbon Steel Alloy Steel	180—350HB	Medium	110 (80—140)	0.25 (0.1—0.4)	—5.0	110 (80—140)	0.2 (0.1—0.3)	—4.0
M	Stainless Steel	≤200HB	Medium	80 (60—100)	0.2 (0.1—0.3)	—4.0	70 (50—100)	0.15 (0.1—0.25)	—3.0
K	Gray Cast Iron	Tensile Strength ≤350MPa	Medium	80 (60—100)	0.25 (0.1—0.4)	—5.0	80 (60—100)	0.2 (0.1—0.3)	—4.0

DDUN

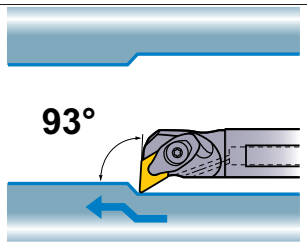
DOUBLE CLAMP DIMPLE BAR

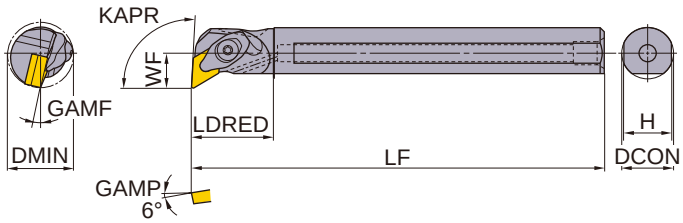
With coolant hole

Product Information

93° KAPR

GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 226
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966
TURNING INSERTS >> 108
PCD TURNING INSERTS >> 267
TECHNICAL INFO >> 1971



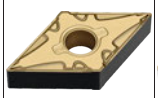
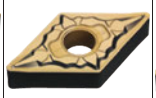
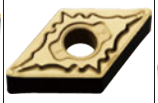
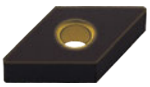
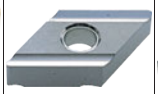
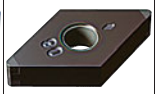


Right hand tool holder shown. Unit: mm

Order Number	Stock	L/R	Inserts	DCON	LF	LDRED	WF	H	GAMF	DMIN	KAPR	Shim	Shim Pin	Clamp Bridge	Spring	Clamp Screw	Wrench
A25R-DDUNR15	●	R	DN**1504	25	200	40	17	23	13°	35	93°	LLSDP42	LLP14	DCK2613	DCS1	DC0621T	TKY20F
A32S-DDUNR15	●	R	DN**1504	32	250	50	22	30	13°	40	93°	LLSDN42	LLP14	DCK2613	DCS1	DC0621T	TKY20F
A40T-DDUNR15	●	R	DN**1504	40	300	63	27	37	10°	50	93°	LLSDN42	LLP14	DCK2613	DCS1	DC0621T	TKY20F
A25R-DDUNL15	●	L	DN**1504	25	200	40	17	23	13°	35	93°	LLSDP42	LLP14	DCK2613	DCS1	DC0621T	TKY20F
A32S-DDUNL15	●	L	DN**1504	32	250	50	22	30	13°	40	93°	LLSDN42	LLP14	DCK2613	DCS1	DC0621T	TKY20F
A40T-DDUNL15	●	L	DN**1504	40	300	63	27	37	10°	50	93°	LLSDN42	LLP14	DCK2613	DCS1	DC0621T	TKY20F

- Clamp Torque(N • m) : DC0621T=5.0
- ●: Inventory maintained in Japan.

·CHIP BREAKER EXAMPLE

Finish Cutting	Light Cutting	Medium Cutting	Medium Cutting	Medium Cutting	For Stainless Steel	G class	CBN/PCD
FP	LP	MP	MH	Standard	MM	R/L	
							
(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.
- When using insert with right and left hand chip breaker, please use left hand insert for right hand holder and right hand insert for left hand holder.

·RECOMMENDED CUTTING CONDITION

	Work Material	Hardness	Cutting Mode	l/d≤3			l/d=3–4		
				Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
P	Carbon Steel Alloy Steel	180–350HB	Medium	110 (80–140)	0.25 (0.1–0.4)	–5.0	110 (80–140)	0.2 (0.1–0.3)	–4.0
M	Stainless Steel	≤200HB	Medium	80 (60–100)	0.2 (0.1–0.3)	–4.0	70 (50–100)	0.15 (0.1–0.25)	–3.0
K	Gray Cast Iron	Tensile Strength ≤350MPa	Medium	80 (60–100)	0.25 (0.1–0.4)	–5.0	80 (60–100)	0.2 (0.1–0.3)	–4.0

DSKN

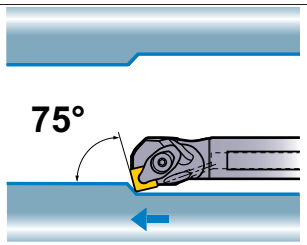
DOUBLE CLAMP DIMPLE BAR

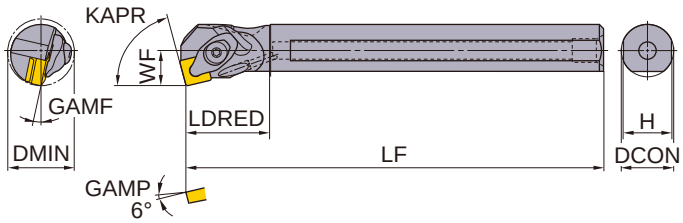
With coolant hole

Product Information

75° KAPR

GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 230
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966
TURNING INSERTS >> 115
PCD TURNING INSERTS >> 268
TECHNICAL INFO >> 1971





Right hand tool holder shown. Unit: mm

Order Number	Stock	L/R	Inserts	DCON	LF	LDRED	WF	H	GAMF	DMIN	KAPR	Shim	Shim Pin	Clamp Bridge	Spring	Clamp Screw	Wrench
A25R-DSKNR12	●	R	SN**1204	25	200	40	17	23	13°	32	75°	LLSSP42	LLP14	DCK2613	DCS1	DC0621T	TKY20F
A32S-DSKNR12	●	R	SN**1204	32	250	50	22	30	13°	40	75°	LLSSN42	LLP14	DCK2613	DCS1	DC0621T	TKY20F
A25R-DSKNL12	●	L	SN**1204	25	200	40	17	23	13°	32	75°	LLSSP42	LLP14	DCK2613	DCS1	DC0621T	TKY20F
A32S-DSKNL12	●	L	SN**1204	32	250	50	22	30	13°	40	75°	LLSSN42	LLP14	DCK2613	DCS1	DC0621T	TKY20F

- Clamp Torque(N • m) : DC0621T=5.0
- ●: Inventory maintained in Japan.

·CHIP BREAKER EXAMPLE

Finish Cutting	Light Cutting	Medium Cutting	Medium Cutting	Medium Cutting	For Stainless Steel	G class	CBN/PCD
FP	LP	MP	MH	Standard	MM	R/L	
(12)	(12)	(12)	(12)	(12)	(12)	(12)	(12)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.
- When using insert with right and left hand chip breaker, please use left hand insert for right hand holder and right hand insert for left hand holder.

·RECOMMENDED CUTTING CONDITION

	Work Material	Hardness	Cutting Mode	l/d≤3			l/d=3–4		
				Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
P	Carbon Steel Alloy Steel	180–350HB	Medium	110 (80–140)	0.25 (0.1–0.4)	–5.0	110 (80–140)	0.2 (0.1–0.3)	–4.0
M	Stainless Steel	≤200HB	Medium	80 (60–100)	0.2 (0.1–0.3)	–4.0	70 (50–100)	0.15 (0.1–0.25)	–3.0
K	Gray Cast Iron	Tensile Strength ≤350MPa	Medium	80 (60–100)	0.25 (0.1–0.4)	–5.0	80 (60–100)	0.2 (0.1–0.3)	–4.0

DTFN

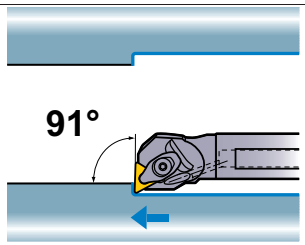
DOUBLE CLAMP DIMPLE BAR

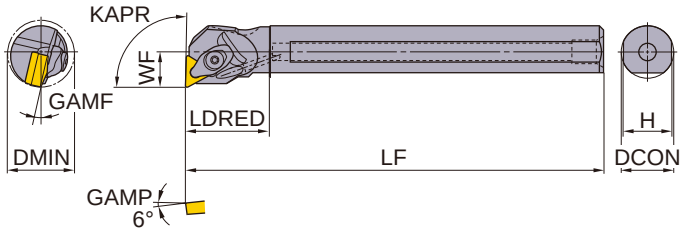
With coolant hole

Product Information

91° KAPR

GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 232
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966
TURNING INSERTS >> 121
PCD TURNING INSERTS >> 269
TECHNICAL INFO >> 1971



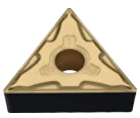
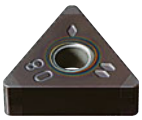


Right hand tool holder shown. Unit: mm

Order Number	Stock	L/R	Inserts	DCON	LF	LDRED	WF	H	GAMF	DMIN	KAPR	Shim	Shim Pin	Clamp Bridge	Spring	Clamp Screw	Wrench
A25R-DTFNR16	●	R	TN**1604	25	200	40	17	23	13°	32	91°	LLSTP32	LLP23	DCK2211	DCS2	DC0520T	TKY15F
A32S-DTFNR16	●	R	TN**1604	32	250	50	22	30	13°	40	91°	LLSTN32	LLP23	DCK2211	DCS2	DC0520T	TKY15F
A25R-DTFNL16	●	L	TN**1604	25	200	40	17	23	13°	32	91°	LLSTP32	LLP23	DCK2211	DCS2	DC0520T	TKY15F
A32S-DTFNL16	●	L	TN**1604	32	250	50	22	30	13°	40	91°	LLSTN32	LLP23	DCK2211	DCS2	DC0520T	TKY15F

- Clamp Torque(N • Clamp Torque (N • m) : DC0520T=3.5
- ●: Inventory maintained in Japan.

·CHIP BREAKER EXAMPLE

Finish Cutting	Light Cutting	Medium Cutting	Medium Cutting	Medium Cutting	For Stainless Steel	G class	CBN/PCD
FP	LP	MP	MH	Standard	MM	R/L	
							
(16)	(16)	(16)	(16)	(16,22)	(16,22)	(16,22)	(16)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.
- When using insert with right and left hand chip breaker, please use left hand insert for right hand holder and right hand insert for left hand holder.

·RECOMMENDED CUTTING CONDITION

	Work Material	Hardness	Cutting Mode	l/d≤3			l/d=3—4		
				Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
P	Carbon Steel Alloy Steel	180—350HB	Medium	110 (80—140)	0.25 (0.1—0.4)	—5.0	110 (80—140)	0.2 (0.1—0.3)	—4.0
M	Stainless Steel	≤200HB	Medium	80 (60—100)	0.2 (0.1—0.3)	—4.0	70 (50—100)	0.15 (0.1—0.25)	—3.0
K	Gray Cast Iron	Tensile Strength ≤350MPa	Medium	80 (60—100)	0.25 (0.1—0.4)	—5.0	80 (60—100)	0.2 (0.1—0.3)	—4.0

DVUN

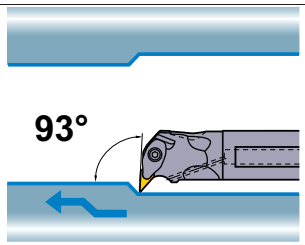
DOUBLE CLAMP DIMPLE BAR

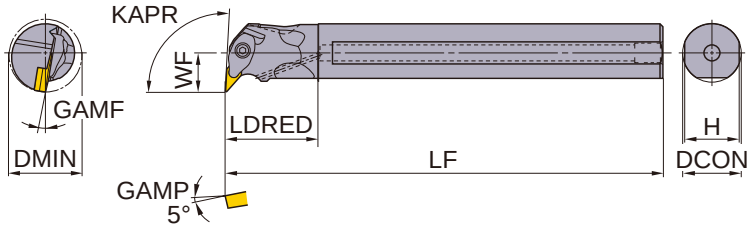
With coolant hole

Product Information

93° KAPR

GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 235
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966
TURNING INSERTS >> 128
PCD TURNING INSERTS >> 270
TECHNICAL INFO >> 1971





Right hand tool holder shown. Unit: mm

Order Number	Stock	L/R	Inserts	DCON	LF	LDRED	WF	H	GAMF	DMIN	KAPR	Shim	Shim Pin	Clamp Bridge	Spring	Clamp Screw	Wrench
A40T-DVUNR16	●	R	VN**1604	40	300	63	27	37	9°	50	93°	DCSVN32	LLP13	DCK3113	DCS2	DC0520T	TKY15F
A40T-DVUNL16	●	L	VN**1604	40	300	63	27	37	9°	50	93°	DCSVN32	LLP13	DCK3113	DCS2	DC0520T	TKY15F

- Clamp Torque(N • Clamp Torque (N • m) : DC0520T=3.5
- ●: Inventory maintained in Japan.

·CHIP BREAKER EXAMPLE

Finish Cutting	Light Cutting	Medium Cutting	Medium Cutting	Medium Cutting	For Stainless Steel	G class	CBN/PCD
FP	LP	MP	MH	Standard	MM	R/L	
(16)	(16)	(16)	(16)	(16)	(16)	(16)	(16)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.
- When using insert with right and left hand chip breaker, please use left hand insert for right hand holder and right hand insert for left hand holder.

·RECOMMENDED CUTTING CONDITION

	Work Material	Hardness	Cutting Mode	l/d≤3			l/d=3—4		
				Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
P	Carbon Steel Alloy Steel	180—350HB	Medium	110 (80—140)	0.25 (0.1—0.4)	—5.0	110 (80—140)	0.2 (0.1—0.3)	—4.0
M	Stainless Steel	≤200HB	Medium	80 (60—100)	0.2 (0.1—0.3)	—4.0	70 (50—100)	0.15 (0.1—0.25)	—3.0
K	Gray Cast Iron	Tensile Strength ≤350MPa	Medium	80 (60—100)	0.25 (0.1—0.4)	—5.0	80 (60—100)	0.2 (0.1—0.3)	—4.0

DWLN

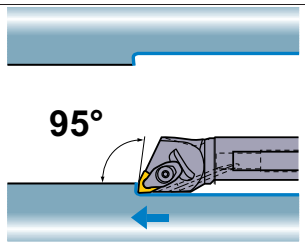
DOUBLE CLAMP DIMPLE BAR

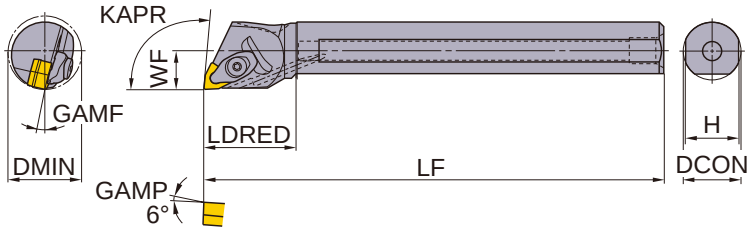
With coolant hole

Product Information

95° KAPR

GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 237
TECHNICAL INFO >> 1971
TURNING INSERTS >> 130
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966



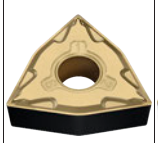


Right hand tool holder shown. Unit: mm

Order Number	Stock	L/R	Inserts	DCON	LF	LDRED	WF	H	GAMF	DMIN	KAPR	Shim	Shim Pin	Clamp Bridge	Spring	Clamp Screw	Wrench
A25R-DWLNR06	●	R	WN**0604	25	200	40	17	23	13°	35	95°	LLSWP32	LLP23	DCK2211	DCS2	DC0520T	TKY15F
A25R-DWLNR08	●	R	WN**0804	25	200	40	17	23	13°	35	95°	LLSWP42	LLP14	DCK2613	DCS1	DC0621T	TKY20F
A32S-DWLNR08	●	R	WN**0804	32	250	50	22	30	13°	40	95°	LLSWN42	LLP14	DCK2613	DCS1	DC0621T	TKY20F
A40T-DWLNR08	●	R	WN**0804	40	300	63	27	37	10°	50	95°	LLSWN42	LLP14	DCK2613	DCS1	DC0621T	TKY20F
A25R-DWLNL06	●	L	WN**0604	25	200	40	17	23	13°	35	95°	LLSWP32	LLP23	DCK2211	DCS2	DC0520T	TKY15F
A25R-DWLNL08	●	L	WN**0804	25	200	40	17	23	13°	35	95°	LLSWP42	LLP14	DCK2613	DCS1	DC0621T	TKY20F
A32S-DWLNL08	●	L	WN**0804	32	250	50	22	30	13°	40	95°	LLSWN42	LLP14	DCK2613	DCS1	DC0621T	TKY20F
A40T-DWLNL08	●	L	WN**0804	40	300	63	27	37	10°	50	95°	LLSWN42	LLP14	DCK2613	DCS1	DC0621T	TKY20F

- Clamp Torque(N • Clamp Torque (N • m) : DC0520T=3.5, DC0621T=5.0
- ●: Inventory maintained in Japan.

·CHIP BREAKER EXAMPLE

Finish Cutting	Light Cutting	Medium Cutting	Medium Cutting	Medium Cutting	Medium to Rough Cutting	For Stainless Steel
FP	LP	MP	MH	Standard	RP	MM
						
(08)	(08)	(06,08)	(08)	(08)	(08)	(06,8)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.
- When using insert with right and left hand chip breaker, please use left hand insert for right hand holder and right hand insert for left hand holder.

·RECOMMENDED CUTTING CONDITION

	Work Material	Hardness	Cutting Mode	l/d≤3			l/d=3—4		
				Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
P	Carbon Steel Alloy Steel	180—350HB	Medium	110 (80—140)	0.25 (0.1—0.4)	—5.0	110 (80—140)	0.2 (0.1—0.3)	—4.0
M	Stainless Steel	≤200HB	Medium	80 (60—100)	0.2 (0.1—0.3)	—4.0	70 (50—100)	0.15 (0.1—0.25)	—3.0
K	Gray Cast Iron	Tensile Strength ≤350MPa	Medium	80 (60—100)	0.25 (0.1—0.4)	—5.0	80 (60—100)	0.2 (0.1—0.3)	—4.0

SCLC

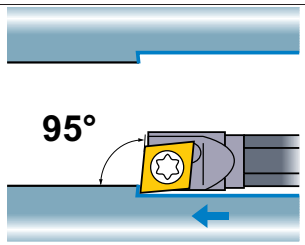
MICRO-DEX BORING BARS

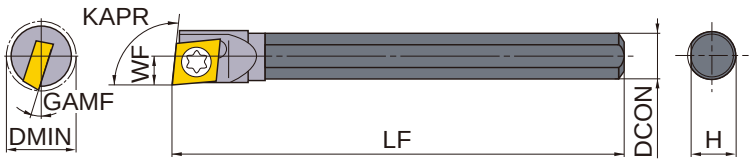
Carbide shank

Product Information

95° KAPR

GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 244
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966
TURNING INSERTS >> 138
PCD TURNING INSERTS >> 272
TECHNICAL INFO >> 1971





Right hand tool holder shown. Unit: mm

Order Number	Stock	L/R	Inserts	DCON	LF	WF	H	GAMF	DMIN	KAPR	Clamp Screw	Wrench
C04GSCLCR03	●	R	CC**03S1	4	90	2.5	3.7	15°	5	95°	TS16	TKY06F
C05HSCLCR03	●	R	CC**03S1	5	100	3.0	4.7	13°	6	95°	TS16	TKY06F
C06JSCLCR04	●	R	CC**04T0	6	110	3.5	5.7	13°	7	95°	TS21	TKY06F
C07KSCLCR04	●	R	CC**04T0	7	125	4.0	6.7	11°	8	95°	TS21	TKY06F

- Diameter of inscribed circle is special. (For SCLC type)
- Clamp Torque(N • m) : TS16=0.6, TS21=0.6
- ●: Inventory maintained in Japan.

·CHIP BREAKER EXAMPLE

Finish Cutting	CBN/PCD
L-F (03,04)	(03,04)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.
- When using insert with right and left hand chip breaker, please use left hand insert for right hand holder and right hand insert for left hand holder.

·RECOMMENDED CUTTING CONDITION

	Work Material	Grade	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)	l/d
P	Carbon Steel, Alloy Steel 180–350HB	**NX2525**	80 (40–120)	0.03 (0.01–0.05)	0.2 (0.1–0.3)	3–5
M	Stainless Steel ≤200HB	**VP15TF**	80 (40–120)	0.03 (0.01–0.05)	0.2 (0.1–0.3)	3–5
K	Gray Cast Iron ≤350MPa	**VP15TF**	80 (40–120)	0.03 (0.01–0.05)	0.2 (0.1–0.3)	3–5
N	Non-Ferrous Meterial	**VP15TF**	120 (80–160)	0.05 (0.01–0.08)	0.4 (0.1–0.6)	3–5
		MD220	120 (80–160)	0.05 (0.01–0.08)	0.4 (0.1–0.6)	3–5
H	Heat Treated Steel 35–65HRC	**MB810**	80 (40–120)	0.03 (0.01–0.05)	0.1 (0.03–0.2)	3–5

SWUB

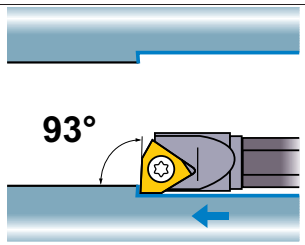
MICRO-DEX BORING BARS

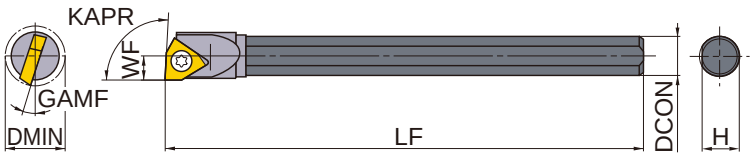
Carbide shank

Product Information

93° KAPR

GRADES AND CHIP BREAKERS >> 38
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966
TURNING INSERTS >> 166
TECHNICAL INFO >> 1971





Right hand tool holder shown. Unit: mm

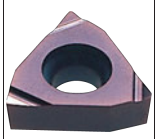
Order Number	Stock	L/R	Inserts	DCON	LF	WF	H	GAMF	DMIN	KAPR	Clamp Screw	Wrench
C05HSWUBR02	●	R	WB**0201	5	100	3.0	4.7	15°	6	93°	TS21	TKY06F
C06JSWUBR02	●	R	WB**0201	6	110	3.5	5.7	13°	7	93°	TS2C	TKY06F
C07KSWUBRL3	●	R	WB**L302	7	125	4.0	6.7	15°	8	93°	TS2	TKY06F

- Clamp Torque(N • m) : TS21=0.6, TS2C=0.6, TS2=0.6
- ●: Inventory maintained in Japan.

·CHIP BREAKER EXAMPLE

Finish Cutting

L-F



(02,L3)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.
- When using insert with right and left hand chip breaker, please use left hand insert for right hand holder and right hand insert for left hand holder.

·RECOMMENDED CUTTING CONDITION

	Work Material	Grade	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)	l/d
P	Carbon Steel, Alloy Steel 180–350HB	NX2525	80 (40–120)	0.03 (0.01–0.05)	0.2 (0.1–0.3)	3–5
M	Stainless Steel ≤200HB	VP15TF	80 (40–120)	0.03 (0.01–0.05)	0.2 (0.1–0.3)	3–5
K	Gray Cast Iron ≤350MPa	VP15TF	80 (40–120)	0.03 (0.01–0.05)	0.2 (0.1–0.3)	3–5
N	Non-Ferrous Meterial	VP15TF	120 (80–160)	0.05 (0.01–0.08)	0.4 (0.1–0.6)	3–5
		MD220	120 (80–160)	0.05 (0.01–0.08)	0.4 (0.1–0.6)	3–5
H	Heat Treated Steel 35–65HRC	MB810	80 (40–120)	0.03 (0.01–0.05)	0.1 (0.03–0.2)	3–5

STUC

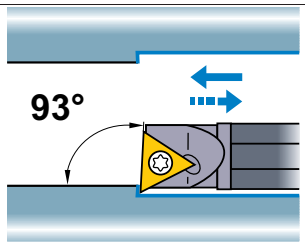
MICRO-DEX BORING BARS

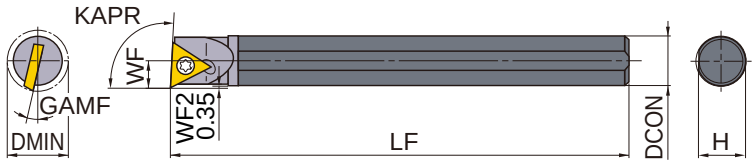
Carbide shank

Product Information

93° KAPR

GRADES AND CHIP BREAKERS >> 38
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966
TURNING INSERTS >> 155
TECHNICAL INFO >> 1971





Right hand tool holder shown. Unit: mm

Order Number	Stock	L/R	Inserts	DCON	LF	WF	H	GAMF	DMIN	KAPR	Clamp Screw	Wrench
C07KSTUCR06	●	R	TC**0601	7	125	4	6.7	12°	8	93°	TS2C	TKY06F

- Clamp Torque(N • m) :TS2C=0.6
- ●: Inventory maintained in Japan.

·CHIP BREAKER EXAMPLE

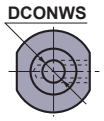
Finish Cutting
L-F (06)

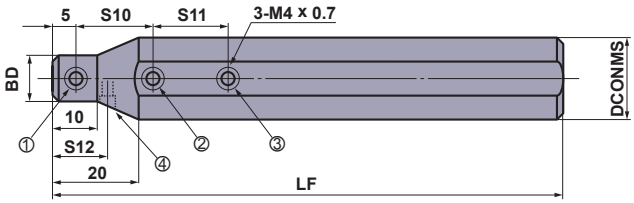
- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.
- When using insert with right and left hand chip breaker, please use left hand insert for right hand holder and right hand insert for left hand holder.

·RECOMMENDED CUTTING CONDITION

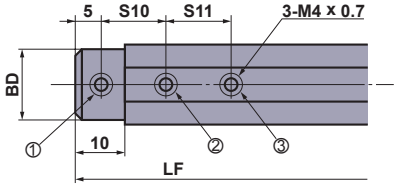
	Work Material	Grade	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)	l/d
P	Carbon Steel, Alloy Steel 180—350HB	**NX2525**	80 (40—120)	0.03 (0.01—0.05)	0.2 (0.1—0.3)	3—5
M	Stainless Steel ≤200HB	**VP15TF**	80 (40—120)	0.03 (0.01—0.05)	0.2 (0.1—0.3)	3—5
K	Gray Cast Iron ≤350MPa	**VP15TF**	80 (40—120)	0.03 (0.01—0.05)	0.2 (0.1—0.3)	3—5
N	Non-Ferrous Meterial	**VP15TF**	120 (80—160)	0.05 (0.01—0.08)	0.4 (0.1—0.6)	3—5
		MD220	120 (80—160)	0.05 (0.01—0.08)	0.4 (0.1—0.6)	3—5
H	Heat Treated Steel 35—65HRC	**MB810**	80 (40—120)	0.03 (0.01—0.05)	0.1 (0.03—0.2)	3—5

STANDARD HOLDER





RBH22□□N has a temporary set screw for different machine specifications.
(Represented by number 4)



RBH158□□N, RBH16□□N,
RBH190□□N

Order Number	Stock	Dimensions(mm)							MICRO-DEX	*Clamp Screw				Wrench	Torque (N • m)
		DCONMS	DCONWS	BD	LF	S10	S11	S12		①	②	③	④		
RBH15840N	●	15.875	4	15	100	15	15	—	C04GS□□□R□□	A	A	A	—	HKY20F	2.0
RBH15850N	●	15.875	5	15	100	15	15	—	C05HS□□□R□□	A	A	A	—	HKY20F	2.0
RBH15860N	●	15.875	6	15	100	15	15	—	C06JS□□□R□□	A	A	A	—	HKY20F	2.0
RBH15870N	●	15.875	7	15	100	20	20	—	C07KS□□□R□□	A	A	A	—	HKY20F	2.0
RBH1640N	●	16	4	15	100	15	15	—	C04GS□□□R□□	A	A	A	—	HKY20F	2.0
RBH1650N	●	16	5	15	100	15	15	—	C05HS□□□R□□	A	A	A	—	HKY20F	2.0
RBH1660N	●	16	6	15	100	15	15	—	C06JS□□□R□□	A	A	A	—	HKY20F	2.0
RBH1670N	●	16	7	15	100	20	20	—	C07KS□□□R□□	A	A	A	—	HKY20F	2.0
*2 RBH19040N	●	19.05	4	18	125	15	15	—	C04GS□□□R□□	B	B	B	—	HKY20F	2.0
*2 RBH19050N	●	19.05	5	18	125	15	15	—	C05HS□□□R□□	B	B	B	—	HKY20F	2.0
*2 RBH19060N	●	19.05	6	18	125	15	15	—	C06JS□□□R□□	B	B	B	—	HKY20F	2.0
*2 RBH19070N	●	19.05	7	18	125	20	20	—	C07KS□□□R□□	B	B	B	—	HKY20F	2.0
RBH2040N	●	20	4	13	125	15	15	—	C04GS□□□R□□	A	B	B	—	HKY20F	2.0
RBH2050N	●	20	5	14	125	15	15	—	C05HS□□□R□□	A	B	B	—	HKY20F	2.0
RBH2060N	●	20	6	15	125	15	15	—	C06JS□□□R□□	A	B	B	—	HKY20F	2.0
RBH2070N	●	20	7	16	125	20	20	—	C07KS□□□R□□	A	B	B	—	HKY20F	2.0
RBH2240N	●	22	4	13	125	15	15	12.5	C04GS□□□R□□	A	B	B	A	HKY20F	2.0
RBH2250N	●	22	5	14	125	15	15	12.5	C05HS□□□R□□	A	B	B	A	HKY20F	2.0
RBH2260N	●	22	6	15	125	15	15	15	C06JS□□□R□□	A	B	B	A	HKY20F	2.0
RBH2270N	●	22	7	16	125	20	20	15	C07KS□□□R□□	A	B	B	A	HKY20F	2.0
RBH2540N	●	25	4	13	150	15	15	—	C04GS□□□R□□	A	C	C	—	HKY20F	2.0
RBH2550N	●	25	5	14	150	15	15	—	C05HS□□□R□□	A	C	C	—	HKY20F	2.0
RBH2560N	●	25	6	15	150	15	15	—	C06JS□□□R□□	A	C	C	—	HKY20F	2.0
RBH2570N	●	25	7	16	150	20	20	—	C07KS□□□R□□	A	C	C	—	HKY20F	2.0
RBH25440N	●	25.4	4	13	150	15	15	—	C04GS□□□R□□	A	C	C	—	HKY20F	2.0
RBH25450N	●	25.4	5	14	150	15	15	—	C05HS□□□R□□	A	C	C	—	HKY20F	2.0
RBH25460N	●	25.4	6	15	150	15	15	—	C06JS□□□R□□	A	C	C	—	HKY20F	2.0
RBH25470N	●	25.4	7	16	150	20	20	—	C07KS□□□R□□	A	C	C	—	HKY20F	2.0

*1 Order number of clamp screw A=HSS04004, B=HSS04006, C=HSS04008
*2 Revised order number.

Conventional Order Number	Revised Order Number
RBH1940N	RBH19040N
RBH1950N	RBH19050N
RBH1960N	RBH19060N
RBH1970N	RBH19070N

● : Inventory maintained in Japan. (MICRO-MINI TWIN is available in 1 piece in one pack.)

CB

MICRO-MINI TWIN

Carbide shank

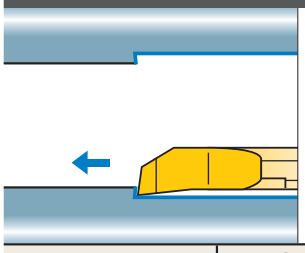
Product Information

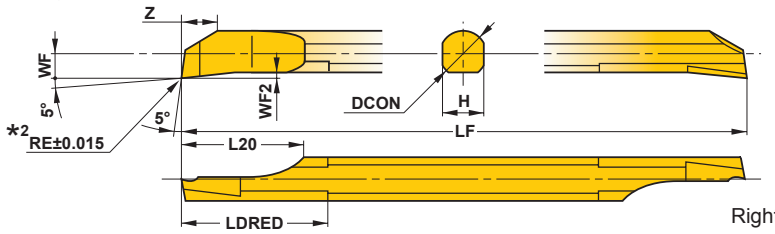
TECHNICAL INFO >> 1971

ISO13399 PROPERTY >> 1966

CB

For internal machining





Right hand tool only.

Order Number	Stock Micro Grain TF15	Stock Coated VP15TF	Breaker	Dimensions(mm) DMIN*1 l/d ≤ 3	DMIN*1 l/d>3	RE	DCON	LF	L20	LDRED	WF	WF2	H	Z
CB02RS	●	●	without	2.2	3.6	0.05	2	50	5	6	1	0.25	1.8	1.4
CB02RS-B	●	●	with	2.2	3.9	0.05	2	50	5	6	1	0.25	1.8	1.4
CB02RS-01	●	●	without	2.2	3.6	0.1	2	50	5	6	1	0.25	1.8	1.4
CB02RS-01B	●	●	with	2.2	4.2	0.1	2	50	5	6	1	0.25	1.8	1.4
CB02RS-02	●	●	without	2.2	3.6	0.2	2	50	5	6	1	0.25	1.8	1.4
CB02RS-02B	●	●	with	2.2	4.9	0.2	2	50	5	6	1	0.25	1.8	1.4
CB03RS	●	●	without	3.2	4.2	0.05	3	50	7.5	9	1.5	0.35	2.7	2.3
CB03RS-B	●	●	with	3.2	4.4	0.05	3	50	7.5	9	1.5	0.35	2.7	2.3
CB03RS-01	●	●	without	3.2	4.2	0.1	3	50	7.5	9	1.5	0.35	2.7	2.3
CB03RS-01B	●	●	with	3.2	4.5	0.1	3	50	7.5	9	1.5	0.35	2.7	2.3
CB03RS-02	●	●	without	3.2	4.2	0.2	3	50	7.5	9	1.5	0.35	2.7	2.3
CB03RS-02B	●	●	with	3.2	4.8	0.2	3	50	7.5	9	1.5	0.35	2.7	2.3
CB04RS	●	●	without	4.2	5.1	0.05	4	60	10	12	2	0.45	3.6	3.1
CB04RS-B	●	●	with	4.2	5.2	0.05	4	60	10	12	2	0.45	3.6	3.1
CB04RS-01	●	●	without	4.2	5.1	0.1	4	60	10	12	2	0.45	3.6	3.1
CB04RS-01B	●	●	with	4.2	5.3	0.1	4	60	10	12	2	0.45	3.6	3.1
CB04RS-02	●	●	without	4.2	5.1	0.2	4	60	10	12	2	0.45	3.6	3.1
CB04RS-02B	●	●	with	4.2	5.5	0.2	4	60	10	12	2	0.45	3.6	3.1
CB05RS	●	●	without	5.2	6.0	0.05	5	70	12.5	15	2.5	0.55	4.5	3.9
CB05RS-B	●	●	with	5.2	6.1	0.05	5	70	12.5	15	2.5	0.55	4.5	3.9
CB05RS-02	●	●	without	5.2	6.0	0.2	5	70	12.5	15	2.5	0.55	4.5	3.9
CB05RS-02B	●	●	with	5.2	6.4	0.2	5	70	12.5	15	2.5	0.55	4.5	3.9
CB06RS	●	●	without	6.2	7.2	0.05	6	75	12.5	18	3	0.65	5.4	4.7
CB06RS-B	●	●	with	6.2	7.3	0.05	6	75	12.5	18	3	0.65	5.4	4.7
CB06RS-02	●	●	without	6.2	7.2	0.2	6	75	12.5	18	3	0.65	5.4	4.7
CB06RS-02B	●	●	with	6.2	7.8	0.2	6	75	12.5	18	3	0.65	5.4	4.7
CB07RS	●	●	without	7.2	8.6	0.05	7	85	12.5	21	3.5	0.75	6.3	5.5
CB07RS-B	●	●	with	7.2	8.8	0.05	7	85	12.5	21	3.5	0.75	6.3	5.5
CB07RS-02	●	●	without	7.2	8.6	0.2	7	85	12.5	21	3.5	0.75	6.3	5.5
CB07RS-02B	●	●	with	7.2	9.2	0.2	7	85	12.5	21	3.5	0.75	6.3	5.5
CB08RS	●	●	without	8.2	9.5	0.05	8	95	15	24	4	0.85	7.2	6.3
CB08RS-B	●	●	with	8.2	9.6	0.05	8	95	15	24	4	0.85	7.2	6.3
CB08RS-02	●	●	without	8.2	9.5	0.2	8	95	15	24	4	0.85	7.2	6.3
CB08RS-02B	●	●	with	8.2	9.8	0.2	8	95	15	24	4	0.85	7.2	6.3

*1 DMIN : Min. Cutting Diameter
*2 The RE dimension represents the size before grinding a chip breaker.

·RECOMMENDED CUTTING CONDITION

Work Material		Micro-Mini Twin **CB**				Micro-Mini Twin **CR**		
		Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)	l/d	Cutting Speed (m/min)	Feed(mm/rev) 03RS/04RS	Feed(mm/rev) 05RS
P	Carbon Steel Alloy Steel 180—350HB	80 (40—120)	0.03 (0.01—0.05)	0.2 (0.1—0.3)	3—5	80 (40—120)	0.02 (0.01—0.03)	0.03 (0.01—0.05)
M	Stainless Steel ≤200HB	80 (40—120)	0.03 (0.01—0.05)	0.2 (0.1—0.3)	3—5	80 (40—120)	0.02 (0.01—0.03)	0.03 (0.01—0.05)
K	Gray Cast Iron ≤350MPa	80 (40—120)	0.03 (0.01—0.05)	0.2 (0.1—0.3)	3—5	80 (40—120)	0.03 (0.01—0.05)	0.03 (0.01—0.05)
N	Non-Ferrous Meterial	120 (80—160)	0.05 (0.01—0.08)	0.3 (0.1—0.5)	3—5	120 (80—160)	0.03 (0.01—0.05)	0.05 (0.01—0.08)

(Note) Recommend wet machining.

CR

MICRO-MINI TWIN

Carbide shank

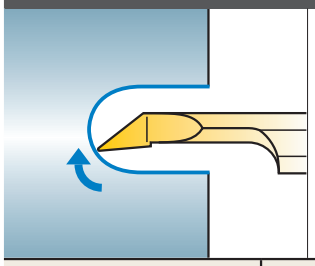
Product Information

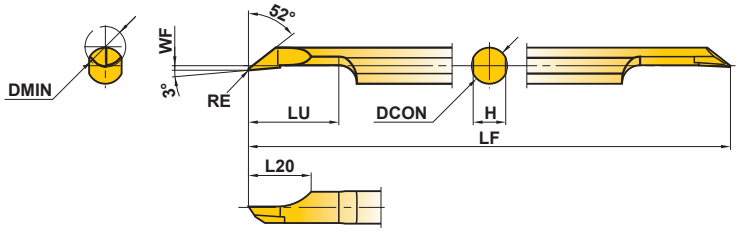
TECHNICAL INFO >> 1971

ISO13399 PROPERTY >> 1966

CR

For internal copying





Right hand tool only.

Order Number	Stock		Breaker	Dimensions(mm)							
	Micro Grain	Coated		DMIN	RE	DCON	LF	LU	L20	WF	H
	TF15	VP15TF									
CR03RS-01	●	●	without	**3.5**	0.1	3	50	8	6	0.15	2.7
CR03RS-01B	●	●	with	**3.5**	0.1	3	50	8	6	0.15	2.7
CR04RS-01	●	●	without	**4.5**	0.1	4	60	10	7	0.15	3.6
CR04RS-01B	●	●	with	**4.5**	0.1	4	60	10	7	0.15	3.6
CR05RS-01	●	●	without	**5.5**	0.1	5	70	12	8	0.15	4.5
CR05RS-01B	●	●	with	**5.5**	0.1	5	70	12	8	0.15	4.5

● : Inventory maintained in Japan. (MICRO-MINI TWIN is available in 1 piece in one pack.)

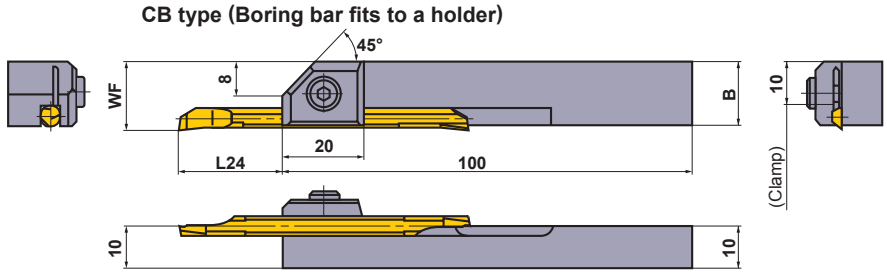
·RECOMMENDED CUTTING CONDITION

	Work Material	Micro-Mini Twin **CB**				Micro-Mini Twin **CR**		
		Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)	l/d	Cutting Speed (m/min)	Feed(mm/rev) 03RS/04RS	Feed(mm/rev) 05RS
P	Carbon Steel Alloy Steel 180–350HB	80 (40–120)	0.03 (0.01–0.05)	0.2 (0.1–0.3)	3–5	80 (40–120)	0.02 (0.01–0.03)	0.03 (0.01–0.05)
M	Stainless Steel ≤200HB	80 (40–120)	0.03 (0.01–0.05)	0.2 (0.1–0.3)	3–5	80 (40–120)	0.02 (0.01–0.03)	0.03 (0.01–0.05)
K	Gray Cast Iron ≤350MPa	80 (40–120)	0.03 (0.01–0.05)	0.2 (0.1–0.3)	3–5	80 (40–120)	0.03 (0.01–0.05)	0.03 (0.01–0.05)
N	Non-Ferrous Meterial	120 (80–160)	0.05 (0.01–0.08)	0.3 (0.1–0.5)	3–5	120 (80–160)	0.03 (0.01–0.05)	0.05 (0.01–0.08)

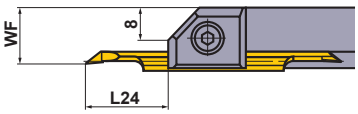
(Note 1) Recommend wet machining.
(Note 2) The recommended tool overhang of CR type is LU+2mm.

SQUARE TYPE HOLDER

CB type (Boring bar fits to a holder)



CR type (Boring bar fits to a holder)



Order Number	Stock	Dimensions(mm)						Micro-Mini Twin		Clamp Screw	Wrench	Torque (N • m)
		WF		L24 *		B						
		CB	CR	CB	CR	CB	CR	CB	CR			
SBH1020R	●	13	—	6—24 (6—10)	—	12.9		02RS(-B) 02RS-0□(B)	—	HSC04010	HKY30R	4.8
SBH1030R	●	14	12.65	8.5—22 (9—15)	11—19.5 (12)	13.8		03RS(-B) 03RS-0□(B)	03RS-01(B)	HSC05012	HKY40R	9.5
SBH1040R	●	15	13.15	11—29.5 (12—20)	13—27.5 (14)	14.7		04RS(-B) 04RS-0□(B)	04RS-01(B)	HSC05012	HKY40R	9.5
SBH1050R	●	16	13.65	13.5—37 (15—25)	15—35.5 (16)	15.6		05RS(-B) 05RS-0□(B)	05RS-01(B)	HSC05012	HKY40R	9.5
SBH1060R	●	17	—	13.5—42 (18—30)	—	16.5		06RS(-B) 06RS-0□(B)	—	HSC05012	HKY40R	9.5
SBH1070R	●	18	—	13.5—52 (21—35)	—	17.4		07RS(-B) 07RS-0□(B)	—	HSC05012	HKY40R	9.5

(Note) The MICRO-DEX and the MICRO-MINI cannot be fit to square holders.
*L24 is the length of overhang for sufficient clamping, and ( ) is the recommended length for machining of carbon and alloy steel.

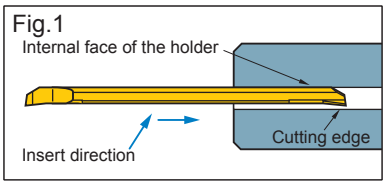
● : **Inventory maintained in Japan.**

PRECAUTIONS WHEN USING THE MICRO-MINI TWIN

●When using a holder for general purpose / small automatic lathe:

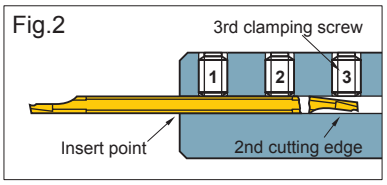
1 To avoid chipping of the 2nd cutting edge take care when inserting the boring bar into the holder. Refer to fig.1. If the 2nd edge contacts the internal face of the holder there is a possibility that it may chip.

Fig.1



2 When using this type of holder, there is a possibility that damage to the shank and the 2nd cutting edge can occur. Make sure that the clamping screws are tightened to the set torque value. Additionally make sure that there is no clamping screw near the 2nd cutting edge as this can break the boring bar.

Fig.2



◎When using Mitsubishi holders

When using holders with a tool overhang of recommended quantity, ensure that the 3rd clamping screw is removed prior to machining. (RBH1620N, RBH19020N, RBH2020N and RBH2520N do not have the 3rd screw.) The set torque value for clamping screw is 2.0 N•m.

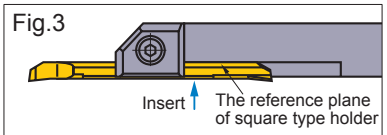
●When using a square type holder:

1 When installing the boring bar into the holder, tighten the clamp screws after ensuring the flats on the tool holder are parallel to the reference flats on the micro-mini bar. Refer to fig.3.

2 Make sure that the clamping screws are tightened to the recommended values.

3 Do not tighten the clamp screw without a bar in place, otherwise the bridge will be deformed.

Fig.3



Tighten the clamping screw ensuring making the micro-mini twin boring bars is in contact with the reference plane of square type holder.

MACHINING METHODS OF THE CR TYPE

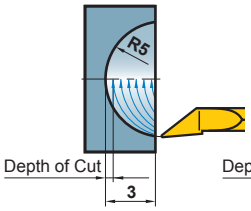
●Profile turning

By drilling a pre-prepared hole, the machining time will be shortened and chip control will be improved.

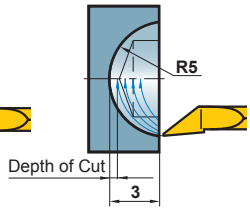
<Cutting Conditions>

Workpiece	: JIS S20C
Holder	: CR05RS-01B
Cutting Speed	: 80m/min
Feed	: 0.05mm/rev
Depth of Cut	: 0.05mm
Wet Cutting	

Machining a work piece without a pre-prepared hole



Machining a work piece with a pre-prepared hole



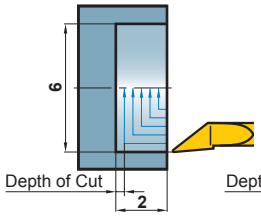
●Inner end facing

By drilling a pre-prepared hole, the machining time will be shortened and chip control will be improved.

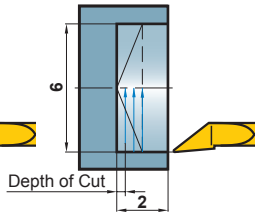
<Cutting Conditions>

Workpiece	: JIS S20C
Holder	: CR05RS-01B
Cutting Speed	: 80m/min
Feed	: 0.05mm/rev
Depth of Cut	: 0.05mm
Wet Cutting	

Machining a work piece without a pre-prepared hole

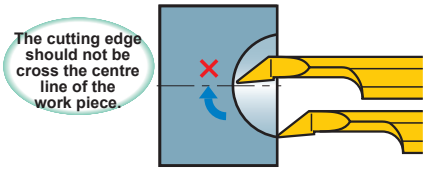


Machining a work piece with a pre-prepared hole



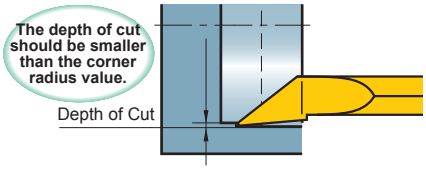
NOTES FOR USE

Profile turning, Inner end facing



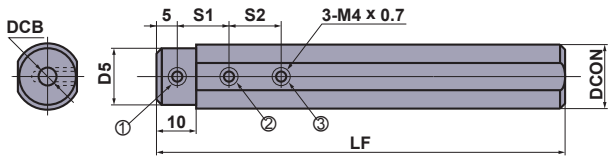
If the cutting edge crosses the centre line of a work piece, the cutting edge can fracture.

Copying

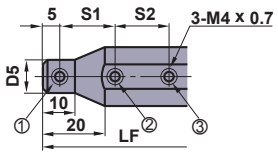


With depths of cut larger than the corner radius value, burrs will be formed.

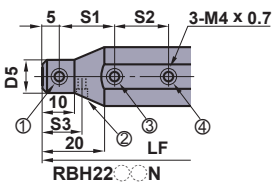
ROUND TYPE HOLDER



RBH158○○N, RBH16○○N, RBH190○○N



RBH20○○N, RBH25○○N, RBH254○○N



RBH22○○N

Order Number		Stock	Dimensions(mm)							Micro-Mini C	Micro-Mini Twin		*1 Clamp Screw				Wrench	Torque (N • m)
			DCON	DCB	D5	LF	S1	S2	S3		CB	CR	①	②	③	④		
	RBH15820N	●	15.875	2	15	100	10	—	—	—	02RS(-B) 02RS-0○(B)	—	B	B	—	—	HKY20F	2.0
	RBH15830N	●	15.875	3	15	100	10	10	—	03FR-BLS	03RS(-B) 03RS-0○(B)	03RS-01(B)	A	A	A	—	HKY20F	2.0
	RBH15840N	●	15.875	4	15	100	15	15	—	04FR-BLS	04RS(-B) 04RS-0○(B)	04RS-01(B)	A	A	A	—	HKY20F	2.0
	RBH15850N	●	15.875	5	15	100	15	15	—	05HR-BLS	05RS(-B) 05RS-0○(B)	05RS-01(B)	A	A	A	—	HKY20F	2.0
	RBH15860N	●	15.875	6	15	100	15	15	—	—	06RS(-B) 06RS-0○(B)	—	A	A	A	—	HKY20F	2.0
	RBH15870N	●	15.875	7	15	100	20	20	—	—	07RS(-B) 07RS-0○(B)	—	A	A	A	—	HKY20F	2.0
	RBH15880N	●	15.875	8	15	100	20	20	—	—	08RS(-B) 08RS-0○(B)	—	D	D	D	—	HKY20F	2.0
	RBH1620N	●	16	2	15	100	10	—	—	—	02RS(-B) 02RS-0○(B)	—	B	B	—	—	HKY20F	2.0
	RBH1630N	●	16	3	15	100	10	10	—	03FR-BLS	03RS(-B) 03RS-0○(B)	03RS-01(B)	A	A	A	—	HKY20F	2.0
	RBH1640N	●	16	4	15	100	15	15	—	04FR-BLS	04RS(-B) 04RS-0○(B)	04RS-01(B)	A	A	A	—	HKY20F	2.0
	RBH1650N	●	16	5	15	100	15	15	—	05HR-BLS	05RS(-B) 05RS-0○(B)	05RS-01(B)	A	A	A	—	HKY20F	2.0
	RBH1660N	●	16	6	15	100	15	15	—	—	06RS(-B) 06RS-0○(B)	—	A	A	A	—	HKY20F	2.0
	RBH1670N	●	16	7	15	100	20	20	—	—	07RS(-B) 07RS-0○(B)	—	A	A	A	—	HKY20F	2.0
	RBH1680N	●	16	8	15	100	20	20	—	—	08RS(-B) 08RS-0○(B)	—	D	D	D	—	HKY20F	2.0
*2	RBH19020N	●	19.05	2	18	125	10	—	—	—	02RS(-B) 02RS-0○(B)	—	C	C	—	—	HKY20F	2.0
*2	RBH19030N	●	19.05	3	18	125	10	10	—	03FR-BLS	03RS(-B) 03RS-0○(B)	03RS-01(B)	B	B	B	—	HKY20F	2.0
*2	RBH19040N	●	19.05	4	18	125	15	15	—	04FR-BLS	04RS(-B) 04RS-0○(B)	04RS-01(B)	B	B	B	—	HKY20F	2.0
*2	RBH19050N	●	19.05	5	18	125	15	15	—	05HR-BLS	05RS(-B) 05RS-0○(B)	05RS-01(B)	B	B	B	—	HKY20F	2.0
*2	RBH19060N	●	19.05	6	18	125	15	15	—	—	06RS(-B) 06RS-0○(B)	—	B	B	B	—	HKY20F	2.0
*2	RBH19070N	●	19.05	7	18	125	20	20	—	—	07RS(-B) 07RS-0○(B)	—	B	B	B	—	HKY20F	2.0
	RBH19080N	●	19.05	8	18	125	20	20	—	—	08RS(-B) 08RS-0○(B)	—	A	A	A	—	HKY20F	2.0
	RBH2020N	●	20	2	11	125	10	—	—	—	02RS(-B) 02RS-0○(B)	—	A	A	—	—	HKY20F	2.0
	RBH2030N	●	20	3	12	125	10	10	—	03FR-BLS	03RS(-B) 03RS-0○(B)	03RS-01(B)	A	A	B	—	HKY20F	2.0
	RBH2040N	●	20	4	13	125	15	15	—	04FR-BLS	04RS(-B) 04RS-0○(B)	04RS-01(B)	A	B	B	—	HKY20F	2.0
	RBH2050N	●	20	5	14	125	15	15	—	05HR-BLS	05RS(-B) 05RS-0○(B)	05RS-01(B)	A	B	B	—	HKY20F	2.0
	RBH2060N	●	20	6	15	125	15	15	—	—	06RS(-B) 06RS-0○(B)	—	A	B	B	—	HKY20F	2.0
	RBH2070N	●	20	7	16	125	20	20	—	—	07RS(-B) 07RS-0○(B)	—	A	B	B	—	HKY20F	2.0
	RBH2080N	●	20	8	17	125	20	20	—	—	08RS(-B) 08RS-0○(B)	—	A	A	A	—	HKY20F	2.0

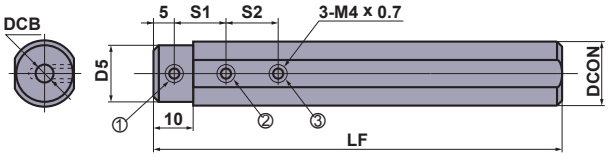
*1 Order number of clamp screw A=HSS04004, B=HSS04006, C=HSS04008, D=HSS04003 *2 Revised order number.

Conventional Order Number	Revised Order Number
RBH1920N	RBH19020N
RBH1930N	RBH19030N
RBH1940N	RBH19040N

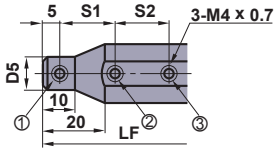
Conventional Order Number	Revised Order Number
RBH1950N	RBH19050N
RBH1960N	RBH19060N
RBH1970N	RBH19070N

● : Inventory maintained in Japan.

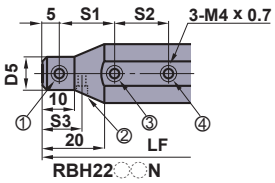
ROUND TYPE HOLDER



RBH158○○N, RBH16○○N, RBH190○○N



RBH20○○N, RBH25○○N, RBH254○○N



RBH22○○N

Order Number	Stock	Dimensions(mm)							Micro-Mini C	Micro-Mini Twin		*1 Clamp Screw				Wrench	Torque (N • m)
		DCON	DCB	D5	LF	S1	S2	S3		CB	CR	①	②	③	④		
RBH2220N	●	22	2	11	125	10	—	10	—	02RS(-B) 02RS-0○(B)	—	A	B	—	A	HKY20F	2.0
RBH2230N	●	22	3	12	125	10	10	10	03FR-BLS	03RS(-B) 03RS-0○(B)	03RS-01(B)	A	B	C	A	HKY20F	2.0
RBH2240N	●	22	4	13	125	15	15	12.5	04FR-BLS	04RS(-B) 04RS-0○(B)	04RS-01(B)	A	B	B	A	HKY20F	2.0
RBH2250N	●	22	5	14	125	15	15	12.5	05HR-BLS	05RS(-B) 05RS-0○(B)	05RS-01(B)	A	B	B	A	HKY20F	2.0
RBH2260N	●	22	6	15	125	15	15	15	—	06RS(-B) 06RS-0○(B)	—	A	B	B	A	HKY20F	2.0
RBH2270N	●	22	7	16	125	20	20	15	—	07RS(-B) 07RS-0○(B)	—	A	B	B	A	HKY20F	2.0
RBH2280N	●	22	8	17	125	20	20	15	—	08RS(-B) 08RS-0○(B)	—	A	B	B	A	HKY20F	2.0
RBH2520N	●	25	2	11	150	10	—	—	—	02RS(-B) 02RS-0○(B)	—	A	B	—	—	HKY20F	2.0
RBH2530N	●	25	3	12	150	10	10	—	03FR-BLS	03RS(-B) 03RS-0○(B)	03RS-01(B)	A	B	C	—	HKY20F	2.0
RBH2540N	●	25	4	13	150	15	15	—	04FR-BLS	04RS(-B) 04RS-0○(B)	04RS-01(B)	A	C	C	—	HKY20F	2.0
RBH2550N	●	25	5	14	150	15	15	—	05HR-BLS	05RS(-B) 05RS-0○(B)	05RS-01(B)	A	C	C	—	HKY20F	2.0
RBH2560N	●	25	6	15	150	15	15	—	—	06RS(-B) 06RS-0○(B)	—	A	C	C	—	HKY20F	2.0
RBH2570N	●	25	7	16	150	20	20	—	—	07RS(-B) 07RS-0○(B)	—	A	C	C	—	HKY20F	2.0
RBH2580N	●	25	8	17	150	20	20	—	—	08RS(-B) 08RS-0○(B)	—	A	B	B	—	HKY20F	2.0
RBH25420N	●	25.4	2	11	150	10	—	—	—	02RS(-B) 02RS-0○(B)	—	A	B	—	—	HKY20F	2.0
RBH25430N	●	25.4	3	12	150	10	10	—	03FR-BLS	03RS(-B) 03RS-0○(B)	03RS-01(B)	A	B	C	—	HKY20F	2.0
RBH25440N	●	25.4	4	13	150	15	15	—	04FR-BLS	04RS(-B) 04RS-0○(B)	04RS-01(B)	A	C	C	—	HKY20F	2.0
RBH25450N	●	25.4	5	14	150	15	15	—	05HR-BLS	05RS(-B) 05RS-0○(B)	05RS-01(B)	A	C	C	—	HKY20F	2.0
RBH25460N	●	25.4	6	15	150	15	15	—	—	06RS(-B) 06RS-0○(B)	—	A	C	C	—	HKY20F	2.0
RBH25470N	●	25.4	7	16	150	20	20	—	—	07RS(-B) 07RS-0○(B)	—	A	C	C	—	HKY20F	2.0
RBH25480N	●	25.4	8	17	150	20	20	—	—	08RS(-B) 08RS-0○(B)	—	A	B	B	—	HKY20F	2.0

*1 Order number of clamp screw A=HSS04004, B=HSS04006, C=HSS04008, D=HSS04003 *2 Revised order number.

Conventional Order Number	Revised Order Number
RBH1920N	RBH19020N
RBH1930N	RBH19030N
RBH1940N	RBH19040N

Conventional Order Number	Revised Order Number
RBH1950N	RBH19050N
RBH1960N	RBH19060N
RBH1970N	RBH19070N

● : Inventory maintained in Japan.

C-BLS

MICRO-MINI BORING BARS

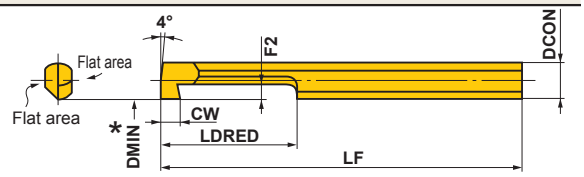
Carbide shank

Product Information

ROUND TYPE HOLDER >> 412
ISO13399 PROPERTY >> 1966
TECHNICAL INFO >> 1971

STANDARD MICRO-MINI BORING BARS (Solid carbide boring bar)

Order Number	Stock TF15	Dimensions(mm) CW	DCON	LF	LDRED	DMIN	F2	Geometry
C03FR-BLS	●	2.0	3	80	15	3.2	1.0	
C04FR-BLS	●	2.5	4	80	20	4.2	1.5	
C05HR-BLS	●	3.0	5	100	25	5.2	2.0	



Right hand tool only.

*DMIN : Min. Cutting Diameter

● : **Inventory maintained in Japan. (MICRO MINI is available in 1 piece in one pack.)**

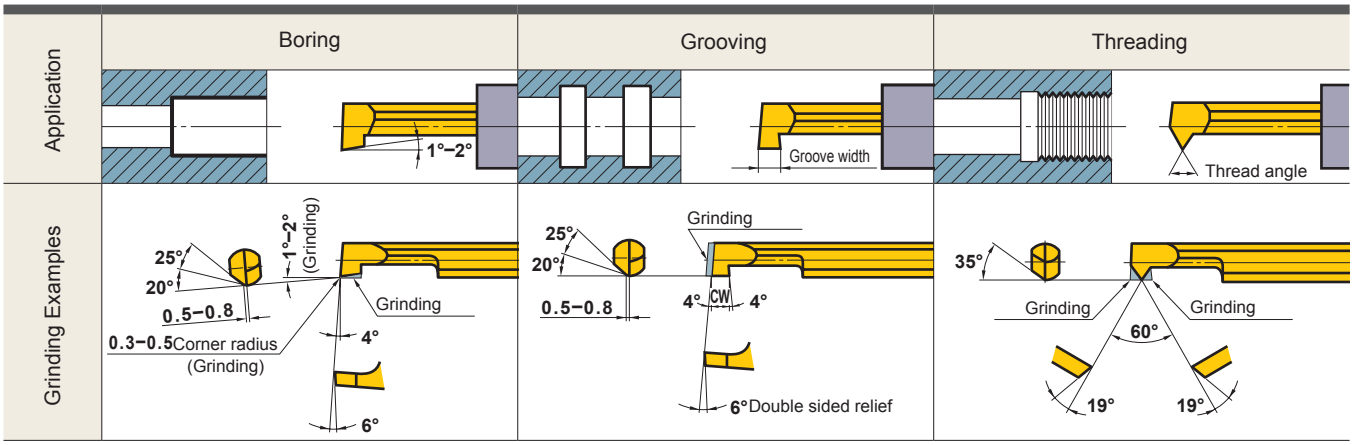
RECOMMENDED CUTTING CONDITIONS

	Work Material	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)	l/d	Edge Condition (mm) *Corner Radius or C	Edge Condition (mm) *Honing
P	Carbon Steel, Alloy Steel 180–350HB	40 (30–50)	0.05 (–0.1)	0.2 (0.1–0.3)	5	0.1–0.5	0.01–0.05
M	Stainless Steel ≤200HB	40 (30–50)	0.05 (–0.1)	0.2 (0.1–0.3)	5	≤0.4	≤0.03 (Honing not required)
K	Gray Cast Iron ≤350MPa	40 (30–50)	0.05 (–0.05)	0.2 (0.1–0.3)	5	0.1–0.5	0.01–0.05
N	Non-Ferrous Meterial	80 (60–100)	0.05 (–0.1)	0.3 (0.1–0.5)	5	0.1–0.5	≤0.03 (Honing not required)

*Cutting edge is not honed. Please hone according to the workpiece before machining.

GRINDING THE CUTTING EDGE OF MICRO-MINI BORING BAR

- MICRO-MINI boring bar can be applied to boring and grooving without any modifications. It can also be reground as shown below.
- For shaping and regrinding, use a diamond whetstone approximately #250–#400.
  Please grind according to the application using the figure below as a reference.



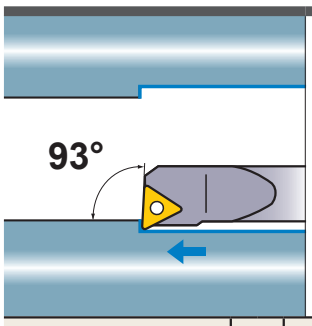
FSTU1

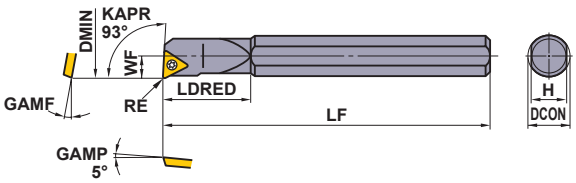
F TYPE BORING BARS

Product Information

93° KAPR

GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 254
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966
TURNING INSERTS >> 158
PCD TURNING INSERTS >> 277
TECHNICAL INFO >> 1971





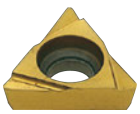
Right hand tool holder shown.

Order Number	Stock R	Stock L	Insert Number		DCON	LF	LDRED	WF	H	GAMF	DMIN	RE	* Clamp Screw	Wrench
FSTU108R/L	●	●	TPGX TPMX NP-TPGX NP-TPMX	0802○○	8	125	18	5	7	15°	**10**	0.4	CS200T	TKY06F
FSTU110R/L	●	●		0902○○	10	150	22	6	9	13°	**12**	0.4	CS250T	TKY08F
FSTU112R/L	●	●		0902○○	12	180	25	8	11	10°	**16**	0.4	CS250T	TKY08F
FSTU116R/L	●	●		1103○○	16	200	30	11	14	7°	**22**	0.4	CS300890T	TKY08F

* Clamp Torque (N • m) : CS200T=0.6, CS250T=1.0, CS300890T=1.0

● : **Inventory maintained in Japan.**

·CHIP BREAKER EXAMPLE

Light Cutting	Without Breaker	PCD	CBN/PCD
R/L  (08,09,11)	(08,09,11)	R/L-F (08,09,11)	(11)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.
- When using insert with right and left hand chip breaker, please use left hand insert for right hand holder and right hand insert for left hand holder.

·RECOMMENDED CUTTING CONDITION

	Steel Shank			l/d≤3			l/d=3–4 (Shank Diameter ≥ 25mm)		
	Carbide Shank			l/d≤5			l/d=6–7		
	Work Material	Hardness	Cutting Mode	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
P	Carbon Steel Alloy Steel	180–350HB	Light Cutting	130 (90–160)	0.1 (0.05–0.15)	0.2	120 (80–150)	0.1 (0.05–0.15)	0.2
			Medium Cutting	90 (60–120)	0.25 (0.15–0.35)	–3.0	80 (50–110)	0.15 (0.1–0.2)	–1.5
M	Stainless Steel	≤200HB	Light Cutting	140 (100–180)	0.1 (0.05–0.15)	0.2	140 (100–180)	0.1 (0.05–0.15)	0.2
			Medium Cutting	70 (50–90)	0.2 (0.15–0.25)	–2.0	60 (40–80)	0.15 (0.1–0.2)	–1.0
N	Aluminium Alloy	–	Light Cutting	300 (200–400)	0.1 (0.05–0.15)	0.2	300 (200–400)	0.1 (0.05–0.15)	0.2
			Medium Cutting	200 (150–250)	0.1 (0.05–0.15)	–2.0	200 (150–250)	0.1 (0.05–0.15)	–1.5

FSTU2

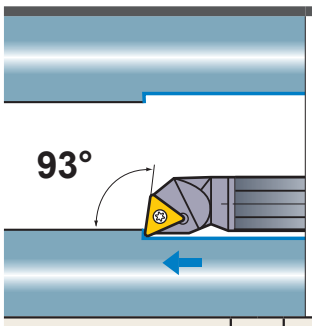
F TYPE BORING BARS

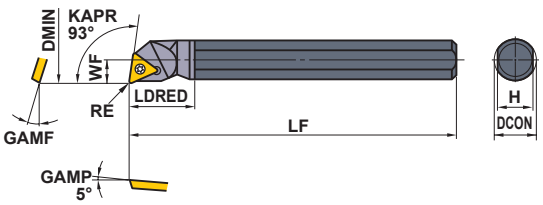
Carbide shank

Product Information

93° KAPR

GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 254
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966
TURNING INSERTS >> 158
PCD TURNING INSERTS >> 277
TECHNICAL INFO >> 1971





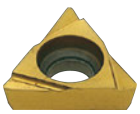
Right hand tool holder shown.

Order Number	Stock R	Stock L	Insert Number		DCON	LF	LDRED	WF	H	GAMF	DMIN	RE	Clamp Screw *	Wrench
FSTU208R/L	●	●	TPGX TPMX NP-TPGX NP-TPMX	0802○○	8	125	13	5	7	15°	**10**	0.4	CS200T	TKY06F
FSTU210R/L	●	●		0902○○	10	150	16	6	9	13°	**12**	0.4	CS250T	TKY08F
FSTU212R/L	●	●		0902○○	12	180	19	8	11	10°	**16**	0.4	CS250T	TKY08F
FSTU216R/L	●	●		1103○○	16	200	26	11	14	7°	**22**	0.4	CS300890T	TKY08F

* Clamp Torque (N • m) : CS200T=0.6, CS250T=1.0, CS300890T=1.0

● : **Inventory maintained in Japan.**

·CHIP BREAKER EXAMPLE

Light Cutting	Without Breaker	PCD	CBN/PCD
R/L  (08,09,11)	(08,09,11)	R/L-F (08,09,11)	(11)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.
- When using insert with right and left hand chip breaker, please use left hand insert for right hand holder and right hand insert for left hand holder.

·RECOMMENDED CUTTING CONDITION

	Steel Shank			l/d≤3			l/d=3–4 (Shank Diameter ≥ 25mm)		
	Carbide Shank			l/d≤5			l/d=6–7		
	Work Material	Hardness	Cutting Mode	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
P	Carbon Steel Alloy Steel	180–350HB	Light Cutting	130 (90–160)	0.1 (0.05–0.15)	0.2	120 (80–150)	0.1 (0.05–0.15)	0.2
			Medium Cutting	90 (60–120)	0.25 (0.15–0.35)	–3.0	80 (50–110)	0.15 (0.1–0.2)	–1.5
M	Stainless Steel	≤200HB	Light Cutting	140 (100–180)	0.1 (0.05–0.15)	0.2	140 (100–180)	0.1 (0.05–0.15)	0.2
			Medium Cutting	70 (50–90)	0.2 (0.15–0.25)	–2.0	60 (40–80)	0.15 (0.1–0.2)	–1.0
N	Aluminium Alloy	–	Light Cutting	300 (200–400)	0.1 (0.05–0.15)	0.2	300 (200–400)	0.1 (0.05–0.15)	0.2
			Medium Cutting	200 (150–250)	0.1 (0.05–0.15)	–2.0	200 (150–250)	0.1 (0.05–0.15)	–1.5

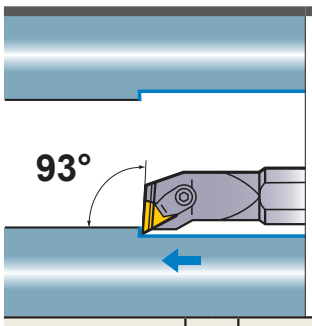
FCTU1

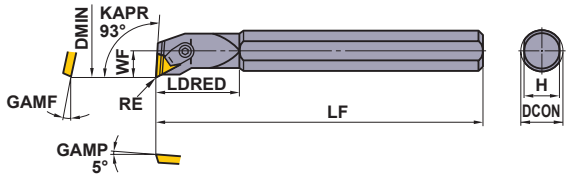
F TYPE BORING BARS

Product Information

93° KAPR

GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 263
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966
TURNING INSERTS >> 173
PCD TURNING INSERTS >> 287
TECHNICAL INFO >> 1971





Right hand tool holder shown.

Order Number	Stock R	Stock L	Insert Number		DCON	LF	LDRED	WF	H	GAMF	DMIN	RE	Shim	Shim Pin	Clamp Set *	Breaker Piece	Wrench
FCTU116R/L	●	●	TPMN TPMR TPGN TPGR	1103○○	16	200	30	11	14	7°	**22**	0.4	–	–	C3	CBT2N	HKY25R
FCTU120R/L	●	●		1603○○	20	200	37	13	18	5°	**26**	0.8	–	–	C4	CBT3F	HKY30R
FCTU125R/L (4 Side Flat Shank)	●	●		1603○○	25	250	40	16	22	5°	**32**	0.8	PT32	BCP202	C4	CBT3F	HKY30R
FCTU132R/L (4 Side Flat Shank)	●	●		1603○○	32	300	45	20	29	0°	**40**	0.8	PT32	BCP201	C4	CBT3F	HKY30R

* Clamp Torque (N • m) : C3=2.2, C4=3.3

● : **Inventory maintained in Japan.**

·CHIP BREAKER EXAMPLE

M Class	M Class	G class	G class	CBN/PCD
Standard	Flat Top	R/L		
(11,16)	(11,16)	(11,16)	(11,16)	(11,16)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.
- When using insert with right and left hand chip breaker, please use left hand insert for right hand holder and right hand insert for left hand holder.

·RECOMMENDED CUTTING CONDITION

Steel Shank				l/d≤3			l/d=3–4 (Shank Diameter ≥ 25mm)		
Carbide Shank				l/d≤5			l/d=6–7		
	Work Material	Hardness	Cutting Mode	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
P	Carbon Steel Alloy Steel	180–350HB	Light Cutting	130 (90–160)	0.1 (0.05–0.15)	0.2	120 (80–150)	0.1 (0.05–0.15)	0.2
			Medium Cutting	90 (60–120)	0.25 (0.15–0.35)	–3.0	80 (50–110)	0.15 (0.1–0.2)	–1.5
M	Stainless Steel	≤200HB	Light Cutting	140 (100–180)	0.1 (0.05–0.15)	0.2	140 (100–180)	0.1 (0.05–0.15)	0.2
			Medium Cutting	70 (50–90)	0.2 (0.15–0.25)	–2.0	60 (40–80)	0.15 (0.1–0.2)	–1.0
N	Aluminium Alloy	–	Light Cutting	300 (200–400)	0.1 (0.05–0.15)	0.2	300 (200–400)	0.1 (0.05–0.15)	0.2
			Medium Cutting	200 (150–250)	0.1 (0.05–0.15)	–2.0	200 (150–250)	0.1 (0.05–0.15)	–1.5

FCTU2

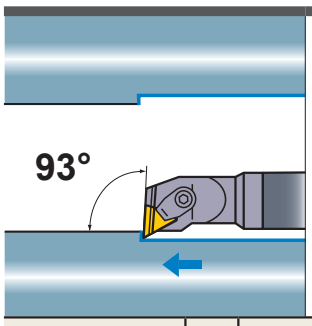
F TYPE BORING BARS

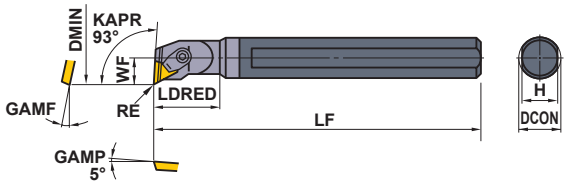
Carbide shank

Product Information

93° KAPR

GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 263
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966
TURNING INSERTS >> 173
PCD TURNING INSERTS >> 287
TECHNICAL INFO >> 1971





Right hand tool holder only.

Order Number	Stock	Insert Number		Dimensions(mm)								Shim	Shim Pin	Clamp Set *	Breaker Piece	Wrench
	R			DCON	LF	LDRED	WF	H	GAMF	DMIN	RE					
FCTU216R	●	TPMN TPMR TPGN TPGR	1103○○	16	200	26	11	14	7°	**22**	0.4	–	–	C3	CBT2N	HKY25R
FCTU220R	●		1603○○	20	200	33	13	18	5°	**26**	0.8	–	–	C4	CBT3F	HKY30R
FCTU225R	●		1603○○	25	250	37	16	22	5°	**32**	0.8	PT32	BCP202	C4	CBT3F	HKY30R

* Clamp Torque (N • m) : C3=2.2, C4=3.3

● : **Inventory maintained in Japan.**

·CHIP BREAKER EXAMPLE

M Class	M Class	G class	G class	CBN/PCD
Standard	Flat Top	R/L		
(11,16)	(11,16)	(11,16)	(11,16)	(11,16)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.
- When using insert with right and left hand chip breaker, please use left hand insert for right hand holder and right hand insert for left hand holder.

·RECOMMENDED CUTTING CONDITION

Steel Shank				l/d≤3			l/d=3–4 (Shank Diameter ≥ 25mm)		
Carbide Shank				l/d≤5			l/d=6–7		
	Work Material	Hardness	Cutting Mode	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
P	Carbon Steel Alloy Steel	180–350HB	Light Cutting	130 (90–160)	0.1 (0.05–0.15)	0.2	120 (80–150)	0.1 (0.05–0.15)	0.2
			Medium Cutting	90 (60–120)	0.25 (0.15–0.35)	–3.0	80 (50–110)	0.15 (0.1–0.2)	–1.5
M	Stainless Steel	≤200HB	Light Cutting	140 (100–180)	0.1 (0.05–0.15)	0.2	140 (100–180)	0.1 (0.05–0.15)	0.2
			Medium Cutting	70 (50–90)	0.2 (0.15–0.25)	–2.0	60 (40–80)	0.15 (0.1–0.2)	–1.0
N	Aluminium Alloy	–	Light Cutting	300 (200–400)	0.1 (0.05–0.15)	0.2	300 (200–400)	0.1 (0.05–0.15)	0.2
			Medium Cutting	200 (150–250)	0.1 (0.05–0.15)	–2.0	200 (150–250)	0.1 (0.05–0.15)	–1.5

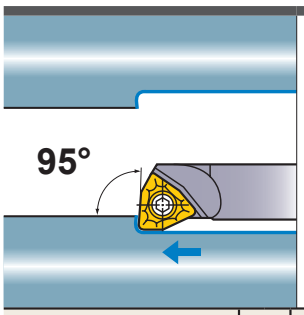
FSWL1

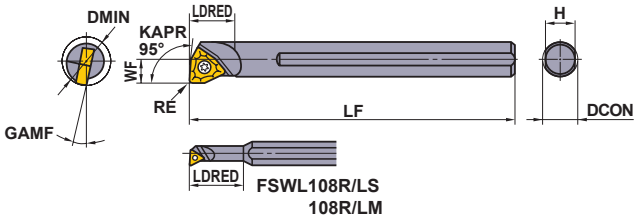
F TYPE BORING BARS

Product Information

95° KAPR

GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 260
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966
TURNING INSERTS >> 167
PCD TURNING INSERTS >> 281
TECHNICAL INFO >> 1971





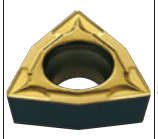
Right hand tool holder shown.

Order Number	Stock R	Stock L	Insert Number		Dimensions(mm) DCON	LF	LDRED	WF	H	GAMF	DMIN	RE	* Clamp Screw	Wrench
FSWL108R/LS	●	●	WCMT WCGT	0201○○	8	100	19	2.9	7	17°	**5.8**	0.4	TS21	TKY06F
FSWL108R/LM	●	●	WCMT WCGT WCMW	L302○○	8	100	25	4	7	15°	**8**	0.4	TS2	TKY06F
FSWL108R/L	●	●	WCMT WCMW	0402○○	8	125	10	5	7	15°	**10**	0.4	TS25	TKY08F
FSWL110R/L	●	●		0402○○	10	150	12	6	9	13°	**12**	0.4	TS25	TKY08F
FSWL112R/L	●	●		06T3○○	12	180	15	8	11	13°	**16**	0.8	TS4	TKY15F
FSWL116R/L	●	●		06T3○○	16	200	20	11	14	7°	**22**	0.8	TS4	TKY15F

* Clamp Torque (N • m) : TS21=0.6, TS2=0.6, TS25=1.0, TS4=3.5

● : **Inventory maintained in Japan.**

·CHIP BREAKER EXAMPLE

Light Cutting	Light Cutting	CBN/PCD
Standard	R/L	
		
(02,L3,04,06)	(02,L3)	(L3,04,06)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.
- When using insert with right and left hand chip breaker, please use left hand insert for right hand holder and right hand insert for left hand holder.

·RECOMMENDED CUTTING CONDITION

Steel Shank				l/d≤3			l/d=3–4 (Shank Diameter ≥ 25mm)		
Carbide Shank				l/d≤5			l/d=6–7		
	Work Material	Hardness	Cutting Mode	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
P	Carbon Steel Alloy Steel	180–350HB	Light Cutting	130 (90–160)	0.1 (0.05–0.15)	0.2	120 (80–150)	0.1 (0.05–0.15)	0.2
			Medium Cutting	90 (60–120)	0.25 (0.15–0.35)	–3.0	80 (50–110)	0.15 (0.1–0.2)	–1.5
M	Stainless Steel	≤200HB	Light Cutting	140 (100–180)	0.1 (0.05–0.15)	0.2	140 (100–180)	0.1 (0.05–0.15)	0.2
			Medium Cutting	70 (50–90)	0.2 (0.15–0.25)	–2.0	60 (40–80)	0.15 (0.1–0.2)	–1.0
N	Aluminium Alloy	–	Light Cutting	300 (200–400)	0.1 (0.05–0.15)	0.2	300 (200–400)	0.1 (0.05–0.15)	0.2
			Medium Cutting	200 (150–250)	0.1 (0.05–0.15)	–2.0	200 (150–250)	0.1 (0.05–0.15)	–1.5

FSWL2

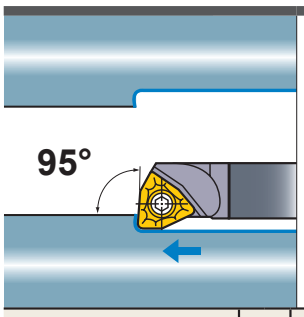
F TYPE BORING BARS

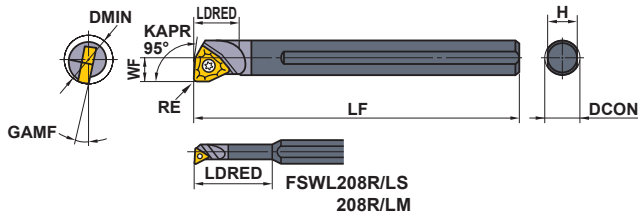
Carbide shank

Product Information

95° KAPR

GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 260
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966
TURNING INSERTS >> 167
PCD TURNING INSERTS >> 281
TECHNICAL INFO >> 1971





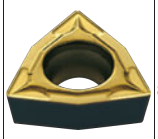
Right hand tool holder shown.

Order Number	Stock R	Stock L	Insert Number		Dimensions(mm) DCON	LF	LDRED	WF	H	GAMF	DMIN	RE	* Clamp Screw	Wrench
FSWL208R/LS	●	●	WCMT WCGT	0201○○	8	122	25	2.9	7	17°	**5.8**	0.4	TS21	TKY06F
FSWL208R/LM	●	●	WCMT WCGT WCMW	L302○○	8	125	33	4	7	15°	**8**	0.4	TS2	TKY06F
FSWL208R/L	●	●	WCMT WCMW	0402○○	8	125	10	5	7	15°	**10**	0.4	TS25	TKY08F
FSWL210R/L	●	●		0402○○	10	150	12	6	9	13°	**12**	0.4	TS25	TKY08F
FSWL212R/L	●	●		06T3○○	12	180	15	8	11	13°	**16**	0.8	TS4	TKY15F
FSWL216R/L	●	●		06T3○○	16	200	20	11	14	7°	**22**	0.8	TS4	TKY15F

* Clamp Torque (N • m) : TS21=0.6, TS2=0.6, TS25=1.0, TS4=3.5

● : **Inventory maintained in Japan.**

·CHIP BREAKER EXAMPLE

Light Cutting	Light Cutting	CBN/PCD
Standard	R/L	
		
(02,L3,04,06)	(02,L3)	(L3,04,06)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.
- When using insert with right and left hand chip breaker, please use left hand insert for right hand holder and right hand insert for left hand holder.

·RECOMMENDED CUTTING CONDITION

Steel Shank				l/d≤3			l/d=3–4 (Shank Diameter ≥ 25mm)		
Carbide Shank				l/d≤5			l/d=6–7		
	Work Material	Hardness	Cutting Mode	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
P	Carbon Steel Alloy Steel	180–350HB	Light Cutting	130 (90–160)	0.1 (0.05–0.15)	0.2	120 (80–150)	0.1 (0.05–0.15)	0.2
			Medium Cutting	90 (60–120)	0.25 (0.15–0.35)	–3.0	80 (50–110)	0.15 (0.1–0.2)	–1.5
M	Stainless Steel	≤200HB	Light Cutting	140 (100–180)	0.1 (0.05–0.15)	0.2	140 (100–180)	0.1 (0.05–0.15)	0.2
			Medium Cutting	70 (50–90)	0.2 (0.15–0.25)	–2.0	60 (40–80)	0.15 (0.1–0.2)	–1.0
N	Aluminium Alloy	–	Light Cutting	300 (200–400)	0.1 (0.05–0.15)	0.2	300 (200–400)	0.1 (0.05–0.15)	0.2
			Medium Cutting	200 (150–250)	0.1 (0.05–0.15)	–2.0	200 (150–250)	0.1 (0.05–0.15)	–1.5

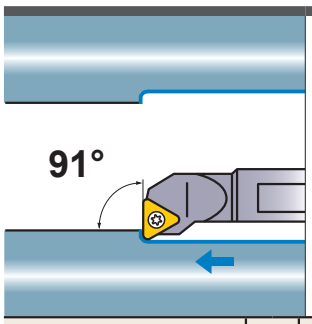
S-STFC

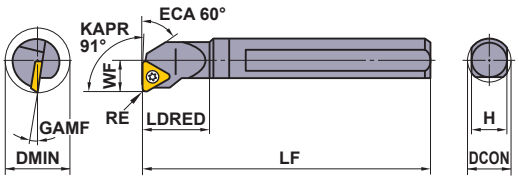
S TYPE BORING BARS

Product Information

91° KAPR

GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 252
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966
TURNING INSERTS >> 155
PCD TURNING INSERTS >> 276
TECHNICAL INFO >> 1971





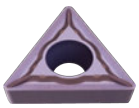
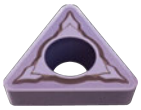
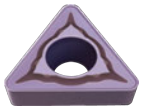
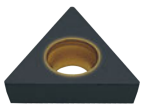
Right hand tool holder shown.

Order Number	Stock R	Stock L	Insert Number		DCON	LF	LDRED	WF	H	GAMF	DMIN	RE	Clamp Screw *	Wrench
S08FSTFCR/L09	●	●	TCMT	0902○○	8	80	12	6	7	15°	**11**	0.4	TS22	TKY06F
S10HSTFCR/L11	●	●	TCMW TCMT	1102○○	10	100	16	7	9	13°	**13**	0.4	TS25	TKY08F
S12KSTFCR/L11	●	●		1102○○	12	125	20	9	11	10°	**16**	0.4	TS25	TKY08F
S16MSTFCR/L11	●	●		1102○○	16	150	25	11	14	7°	**20**	0.4	TS25	TKY08F
S20QSTFCR/L16	●	●		16T3○○	20	180	32	13	18	7°	**25**	0.8	TS4	TKY15F
S25RSTFCR/L16	●	●		16T3○○	25	200	40	17	23	5°	**32**	0.8	TS4	TKY15F
S32SSTFCR/L16	●	●		16T3○○	32	250	50	22	30	5°	**40**	0.8	TS4	TKY15F

* Clamp Torque (N • m) : TS22=0.6, TS25=1.0, TS4=3.5

● : **Inventory maintained in Japan.**

·CHIP BREAKER EXAMPLE

Finish Cutting	Finish Cutting	Light Cutting	Light Cutting	Medium Cutting	Medium Cutting	Without Breaker	CBN/PCD
FP	FM	LP	LM	MP	MM	Flat Top	
							
(09,11,16)	(09,11,16)	(09,11,16)	(09,11,16)	(09,11,16)	(09,11,16)	(11,16)	(11)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.
- When using insert with right and left hand chip breaker, please use left hand insert for right hand holder and right hand insert for left hand holder.

·RECOMMENDED CUTTING CONDITION

	Steel Shank			l/d≤3			l/d=3–4 (Shank Diameter ≥ 25mm)		
	Carbide Shank			l/d≤5			l/d=6–7		
	Work Material	Hardness	Cutting Mode	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
P	Carbon Steel Alloy Steel	180–350HB	Light Cutting	130 (90–160)	0.1 (0.05–0.15)	0.2	120 (80–150)	0.1 (0.05–0.15)	0.2
			Medium Cutting	90 (60–120)	0.25 (0.15–0.35)	–3.0	80 (50–110)	0.15 (0.1–0.2)	–1.5
M	Stainless Steel	≤200HB	Light Cutting	140 (100–180)	0.1 (0.05–0.15)	0.2	140 (100–180)	0.1 (0.05–0.15)	0.2
			Medium Cutting	70 (50–90)	0.2 (0.15–0.25)	–2.0	60 (40–80)	0.15 (0.1–0.2)	–1.0
N	Aluminium Alloy	–	Light Cutting	300 (200–400)	0.1 (0.05–0.15)	0.2	300 (200–400)	0.1 (0.05–0.15)	0.2
			Medium Cutting	200 (150–250)	0.1 (0.05–0.15)	–2.0	200 (150–250)	0.1 (0.05–0.15)	–1.5

C-STFC

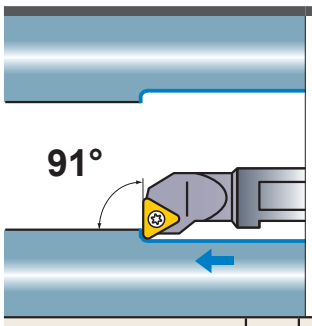
S TYPE BORING BARS

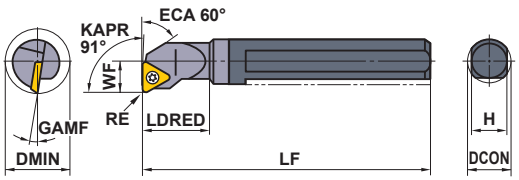
Carbide shank

Product Information

91° KAPR

GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 252
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966
TURNING INSERTS >> 155
PCD TURNING INSERTS >> 276
TECHNICAL INFO >> 1971





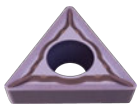
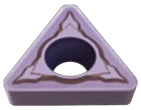
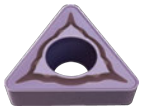
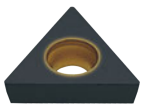
Right hand tool holder only.

Order Number	Stock	Insert Number		Dimensions(mm)								*	
	R			DCON	LF	LDRED	WF	H	GAMF	DMIN	RE	Clamp Screw	Wrench
C08HSTFCR09	●	TCMT	0902○○	8	100	12	6	7	15°	**11**	0.4	TS22	TKY06F
C10KSTFCR11	●	TCMW TCMT	1102○○	10	125	16	7	9	13°	**13**	0.4	TS25	TKY08F
C12MSTFCR11	●		1102○○	12	150	20	9	11	10°	**16**	0.4	TS25	TKY08F
C16RSTFCR11	●		1102○○	16	200	25	11	14	7°	**20**	0.4	TS25	TKY08F
C20SSTFCR16	●		16T3○○	20	250	32	13	18	7°	**25**	0.8	TS4	TKY15F
C25TSTFCR16	●		16T3○○	25	300	40	17	23	5°	**32**	0.8	TS4	TKY15F

* Clamp Torque (N • m) : TS22=0.6, TS25=1.0, TS4=3.5

● : **Inventory maintained in Japan.**

·CHIP BREAKER EXAMPLE

Finish Cutting	Finish Cutting	Light Cutting	Light Cutting	Medium Cutting	Medium Cutting	Without Breaker	CBN/PCD
FP	FM	LP	LM	MP	MM	Flat Top	
							
(09,11,16)	(09,11,16)	(09,11,16)	(09,11,16)	(09,11,16)	(09,11,16)	(11,16)	(11)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.
- When using insert with right and left hand chip breaker, please use left hand insert for right hand holder and right hand insert for left hand holder.

·RECOMMENDED CUTTING CONDITION

Steel Shank				l/d≤3			l/d=3–4 (Shank Diameter ≥ 25mm)		
Carbide Shank				l/d≤5			l/d=6–7		
	Work Material	Hardness	Cutting Mode	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
P	Carbon Steel Alloy Steel	180–350HB	Light Cutting	130 (90–160)	0.1 (0.05–0.15)	0.2	120 (80–150)	0.1 (0.05–0.15)	0.2
			Medium Cutting	90 (60–120)	0.25 (0.15–0.35)	–3.0	80 (50–110)	0.15 (0.1–0.2)	–1.5
M	Stainless Steel	≤200HB	Light Cutting	140 (100–180)	0.1 (0.05–0.15)	0.2	140 (100–180)	0.1 (0.05–0.15)	0.2
			Medium Cutting	70 (50–90)	0.2 (0.15–0.25)	–2.0	60 (40–80)	0.15 (0.1–0.2)	–1.0
N	Aluminium Alloy	–	Light Cutting	300 (200–400)	0.1 (0.05–0.15)	0.2	300 (200–400)	0.1 (0.05–0.15)	0.2
			Medium Cutting	200 (150–250)	0.1 (0.05–0.15)	–2.0	200 (150–250)	0.1 (0.05–0.15)	–1.5

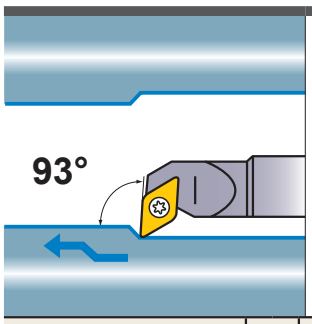
S-SDUC

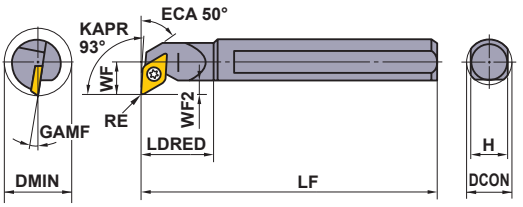
S TYPE BORING BARS

Product Information

93° KAPR

GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 249
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966
TURNING INSERTS >> 145
PCD TURNING INSERTS >> 274
TECHNICAL INFO >> 1971





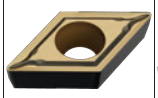
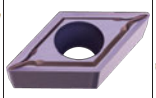
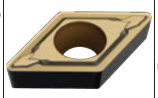
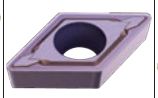
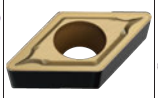
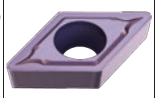
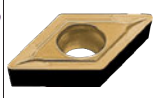
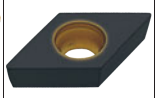
Right hand tool holder shown.

Order Number	Stock R	Stock L	Insert Number		DCON	LF	LDRED	WF	WF2	H	GAMF	DMIN	RE	Clamp Screw *	Wrench
					Dimensions(mm)										
S10HSDUCR/L07	●	●	DCMT DCET DCGT DCMW DCGW NP-DCGW NP-DCMT	0702○○	10	100	16	7	2.4	9	13°	**13**	0.4	TS25	TKY08F
S12KSDUCR/L07	●	●		0702○○	12	125	20	9	3.4	11	10°	**16**	0.4	TS25	TKY08F
S16MSDUCR/L07	●	●		0702○○	16	150	25	11	3.9	14	7°	**20**	0.4	TS25	TKY08F
S20QSDUCR/L11	●	●		11T3○○	20	180	32	13	4.4	18	7°	**25**	0.8	TS4	TKY15F
S25RSDUCR/L15	●	●		1504○○	25	200	40	17	6.9	23	5°	**32**	0.8	TS5	TKY25F
S32SSDUCR/L15	●	●		1504○○	32	250	50	22	8.4	30	5°	**40**	0.8	TS5	TKY25F
S40TSDUCR/L15	●	●		1504○○	40	300	63	27	9.4	37	5°	**50**	0.8	TS5	TKY25F

* Clamp Torque (N • m) : TS25=1.0, TS4=3.5, TS5=7.5

● : **Inventory maintained in Japan.**

·CHIP BREAKER EXAMPLE

Finish Cutting	Finish Cutting	Light Cutting	Light Cutting	Medium Cutting	Medium Cutting	Medium Cutting	Without Breaker
FP	FM	LP	LM	MP	MM	Standard	Flat Top
							
(07,11)	(07,11)	(07,11)	(07,11)	(07,11,15)	(07,11,15)	(07,11,15)	(07,11)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.
- When using insert with right and left hand chip breaker, please use left hand insert for right hand holder and right hand insert for left hand holder.

·RECOMMENDED CUTTING CONDITION

	Steel Shank			l/d≤3			l/d=3–4 (Shank Diameter ≥ 25mm)		
	Carbide Shank			l/d≤5			l/d=6–7		
	Work Material	Hardness	Cutting Mode	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
P	Carbon Steel Alloy Steel	180–350HB	Light Cutting	130 (90–160)	0.1 (0.05–0.15)	0.2	120 (80–150)	0.1 (0.05–0.15)	0.2
			Medium Cutting	90 (60–120)	0.25 (0.15–0.35)	–3.0	80 (50–110)	0.15 (0.1–0.2)	–1.5
M	Stainless Steel	≤200HB	Light Cutting	140 (100–180)	0.1 (0.05–0.15)	0.2	140 (100–180)	0.1 (0.05–0.15)	0.2
			Medium Cutting	70 (50–90)	0.2 (0.15–0.25)	–2.0	60 (40–80)	0.15 (0.1–0.2)	–1.0
N	Aluminium Alloy	–	Light Cutting	300 (200–400)	0.1 (0.05–0.15)	0.2	300 (200–400)	0.1 (0.05–0.15)	0.2
			Medium Cutting	200 (150–250)	0.1 (0.05–0.15)	–2.0	200 (150–250)	0.1 (0.05–0.15)	–1.5

C-SDUC

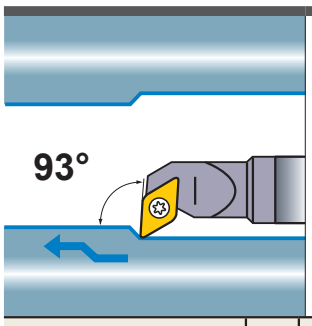
S TYPE BORING BARS

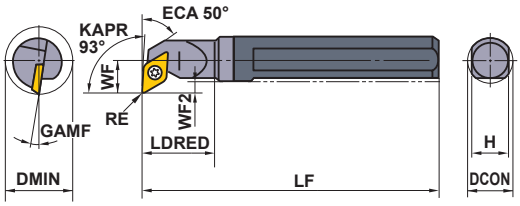
Carbide shank

Product Information

93° KAPR

GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 249
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966
TURNING INSERTS >> 145
PCD TURNING INSERTS >> 274
TECHNICAL INFO >> 1971





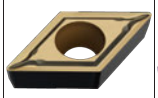
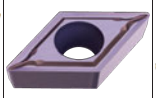
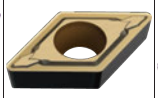
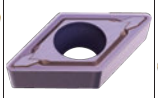
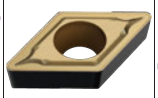
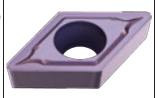
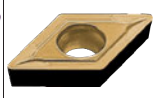
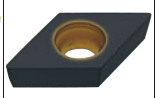
Right hand tool holder only.

Order Number	Stock	Insert Number		Dimensions(mm)									*	
	R			DCON	LF	LDRED	WF	WF2	H	GAMF	DMIN	RE	Clamp Screw	Wrench
C10KSDUCR07	●	DCMT DCET DCGT DCMW DCGW NP-DCGW NP-DCMT	0702○○	10	125	16	7	2.1	9	13°	**13**	0.4	TS25	TKY08F
C12MSDUCR07	●		0702○○	12	150	20	9	3.1	11	10°	**16**	0.4	TS25	TKY08F
C16RSDUCR07	●		0702○○	16	200	25	11	3.1	14	7°	**20**	0.4	TS25	TKY08F
C20SSDUCR11	●		11T3○○	20	250	32	13	3.1	18	7°	**25**	0.8	TS4	TKY15F
C25TSDUCR15	●	DCMW DCMT	1504○○	25	300	40	17	4.9	23	5°	**32**	0.8	TS5	TKY25F

* Clamp Torque (N • m) : TS25=1.0, TS4=3.5, TS5=7.5

● : **Inventory maintained in Japan.**

·CHIP BREAKER EXAMPLE

Finish Cutting	Finish Cutting	Light Cutting	Light Cutting	Medium Cutting	Medium Cutting	Medium Cutting	Without Breaker
FP	FM	LP	LM	MP	MM	Standard	Flat Top
							
(07,11)	(07,11)	(07,11)	(07,11)	(07,11,15)	(07,11,15)	(07,11,15)	(07,11)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.
- When using insert with right and left hand chip breaker, please use left hand insert for right hand holder and right hand insert for left hand holder.

·RECOMMENDED CUTTING CONDITION

Steel Shank				l/d≤3			l/d=3–4 (Shank Diameter ≥ 25mm)		
Carbide Shank				l/d≤5			l/d=6–7		
	Work Material	Hardness	Cutting Mode	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
P	Carbon Steel Alloy Steel	180–350HB	Light Cutting	130 (90–160)	0.1 (0.05–0.15)	0.2	120 (80–150)	0.1 (0.05–0.15)	0.2
			Medium Cutting	90 (60–120)	0.25 (0.15–0.35)	–3.0	80 (50–110)	0.15 (0.1–0.2)	–1.5
M	Stainless Steel	≤200HB	Light Cutting	140 (100–180)	0.1 (0.05–0.15)	0.2	140 (100–180)	0.1 (0.05–0.15)	0.2
			Medium Cutting	70 (50–90)	0.2 (0.15–0.25)	–2.0	60 (40–80)	0.15 (0.1–0.2)	–1.0
N	Aluminium Alloy	–	Light Cutting	300 (200–400)	0.1 (0.05–0.15)	0.2	300 (200–400)	0.1 (0.05–0.15)	0.2
			Medium Cutting	200 (150–250)	0.1 (0.05–0.15)	–2.0	200 (150–250)	0.1 (0.05–0.15)	–1.5

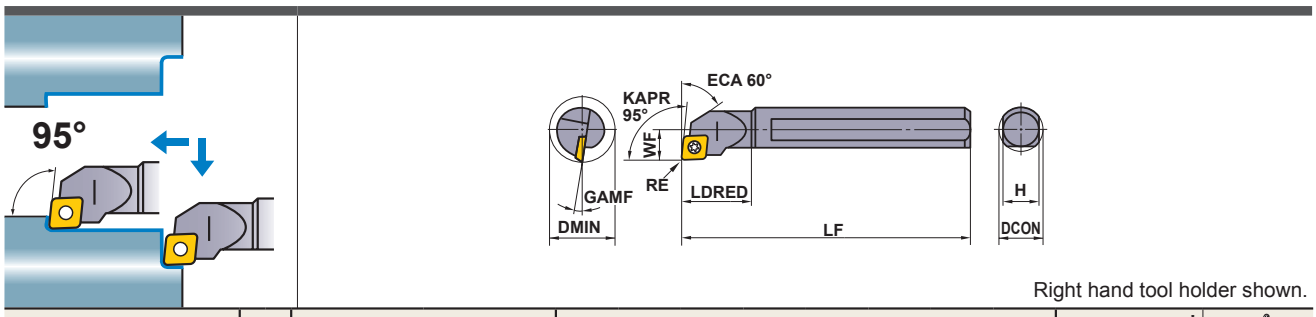
S-SCLC

S TYPE BORING BARS

Product Information

95° KAPR

GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 244
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966
TURNING INSERTS >> 138
PCD TURNING INSERTS >> 272
TECHNICAL INFO >> 1971



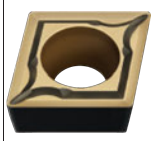
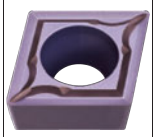
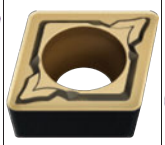
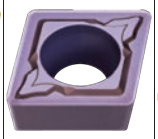
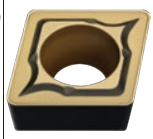
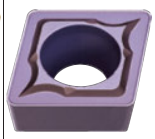
Right hand tool holder shown.

Order Number	Stock R	Stock L	Insert Number		Dimensions(mm) DCON	LF	LDRED	WF	H	GAMF	DMIN	RE	* Clamp Screw	Wrench
S08FSCLCR/L06	●	●	CCMH CCMT CCET CCGT CCMW CCGW NP-CCGW	0602○○	8	80	12	6	7	15°	**11**	0.4	TS25	TKY08F
S10HSCLCR/L06	●	●		0602○○	10	100	16	7	9	13°	**13**	0.4	TS25	TKY08F
S12KSCLCR/L06	●	●		0602○○	12	125	20	9	11	10°	**16**	0.4	TS25	TKY08F
S16MSCLCR/L09	●	●		09T3○○	16	150	25	11	14	7°	**20**	0.8	TS4	TKY15F
S20QSCLCR/L09	●	●		09T3○○	20	180	32	13	18	7°	**25**	0.8	TS4	TKY15F
S25RSCLCR/L12	●	●		1204○○	25	200	40	17	23	5°	**32**	0.8	TS5	TKY25F
S32SSCLCR/L12	●	●		1204○○	32	250	50	22	30	5°	**40**	0.8	TS5	TKY25F
S40TSCLCR/L12	●	●		1204○○	40	300	63	27	37	5°	**50**	0.8	TS5	TKY25F

* Clamp Torque (N • m) : TS25=1.0, TS4=3.5, TS5=7.5

● : **Inventory maintained in Japan.**

·CHIP BREAKER EXAMPLE

Finish Cutting	Finish Cutting	Light Cutting	Light Cutting	Medium Cutting	Medium Cutting	Without Breaker	CBN/PCD
FP	FM	LP	LM	MP	MM	Flat Top	
							
(06,09)	(06,09)	(06,09)	(06,09)	(06,09,12)	(06,09,12)	(06,09,12)	(06,09,12)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.
- When using insert with right and left hand chip breaker, please use left hand insert for right hand holder and right hand insert for left hand holder.

·RECOMMENDED CUTTING CONDITION

Steel Shank				l/d≤3			l/d=3–4 (Shank Diameter ≥ 25mm)		
Carbide Shank				l/d≤5			l/d=6–7		
	Work Material	Hardness	Cutting Mode	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
P	Carbon Steel Alloy Steel	180–350HB	Light Cutting	130 (90–160)	0.1 (0.05–0.15)	0.2	120 (80–150)	0.1 (0.05–0.15)	0.2
			Medium Cutting	90 (60–120)	0.25 (0.15–0.35)	–3.0	80 (50–110)	0.15 (0.1–0.2)	–1.5
M	Stainless Steel	≤200HB	Light Cutting	140 (100–180)	0.1 (0.05–0.15)	0.2	140 (100–180)	0.1 (0.05–0.15)	0.2
			Medium Cutting	70 (50–90)	0.2 (0.15–0.25)	–2.0	60 (40–80)	0.15 (0.1–0.2)	–1.0
N	Aluminium Alloy	–	Light Cutting	300 (200–400)	0.1 (0.05–0.15)	0.2	300 (200–400)	0.1 (0.05–0.15)	0.2
			Medium Cutting	200 (150–250)	0.1 (0.05–0.15)	–2.0	200 (150–250)	0.1 (0.05–0.15)	–1.5

C-SCLC

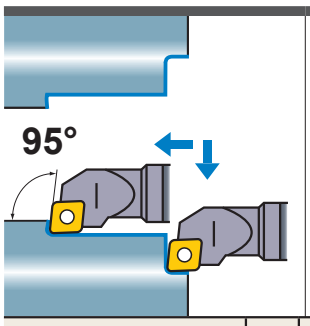
S TYPE BORING BARS

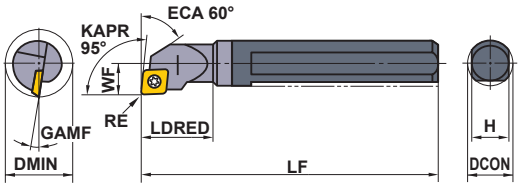
Carbide shank

Product Information

95° KAPR

GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 244
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966
TURNING INSERTS >> 138
PCD TURNING INSERTS >> 272
TECHNICAL INFO >> 1971





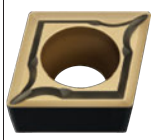
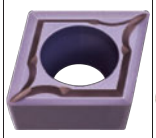
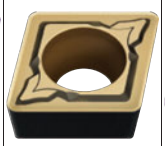
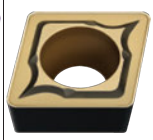
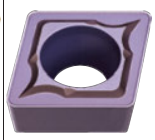
Right hand tool holder only.

Order Number	Stock	Insert Number		Dimensions(mm)								*	
	R			DCON	LF	LDRED	WF	H	GAMF	DMIN	RE	Clamp Screw	Wrench
C08HSCLCR06	●	CCMH CCMT CCET CCGT CCMW CCGW NP-CCGW	0602○○	8	100	12	6	7	15°	**11**	0.4	TS25	TKY08F
C10KSCLCR06	●		0602○○	10	125	16	7	9	13°	**13**	0.4	TS25	TKY08F
C12MSCLCR06	●		0602○○	12	150	20	9	11	10°	**16**	0.4	TS25	TKY08F
C16RSCLCR09	●		09T3○○	16	200	25	11	14	7°	**20**	0.8	TS4	TKY15F
C20SSCLCR09	●		09T3○○	20	250	32	13	18	7°	**25**	0.8	TS4	TKY15F

* Clamp Torque (N • m) : TS25=1.0, TS4=3.5

● : **Inventory maintained in Japan.**

·CHIP BREAKER EXAMPLE

Finish Cutting	Finish Cutting	Light Cutting	Light Cutting	Medium Cutting	Medium Cutting	Without Breaker	CBN/PCD
FP	FM	LP	LM	MP	MM	Flat Top	
							
(06,09)	(06,09)	(06,09)	(06,09)	(06,09)	(06,09)	(06,09)	(06,09)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.
- When using insert with right and left hand chip breaker, please use left hand insert for right hand holder and right hand insert for left hand holder.

·RECOMMENDED CUTTING CONDITION

Steel Shank				l/d≤3			l/d=3–4 (Shank Diameter ≥ 25mm)		
Carbide Shank				l/d≤5			l/d=6–7		
	Work Material	Hardness	Cutting Mode	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
P	Carbon Steel Alloy Steel	180–350HB	Light Cutting	130 (90–160)	0.1 (0.05–0.15)	0.2	120 (80–150)	0.1 (0.05–0.15)	0.2
			Medium Cutting	90 (60–120)	0.25 (0.15–0.35)	–3.0	80 (50–110)	0.15 (0.1–0.2)	–1.5
M	Stainless Steel	≤200HB	Light Cutting	140 (100–180)	0.1 (0.05–0.15)	0.2	140 (100–180)	0.1 (0.05–0.15)	0.2
			Medium Cutting	70 (50–90)	0.2 (0.15–0.25)	–2.0	60 (40–80)	0.15 (0.1–0.2)	–1.0
N	Aluminium Alloy	–	Light Cutting	300 (200–400)	0.1 (0.05–0.15)	0.2	300 (200–400)	0.1 (0.05–0.15)	0.2
			Medium Cutting	200 (150–250)	0.1 (0.05–0.15)	–2.0	200 (150–250)	0.1 (0.05–0.15)	–1.5

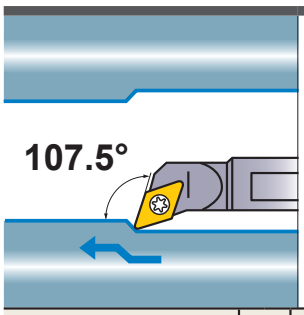
S-SDQC

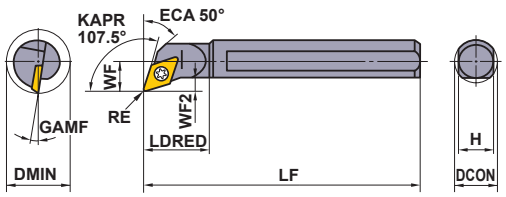
S TYPE BORING BARS

Product Information

107° 30′ KAPR

GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 249
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966
TURNING INSERTS >> 145
PCD TURNING INSERTS >> 274
TECHNICAL INFO >> 1971





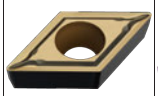
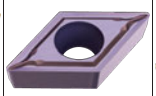
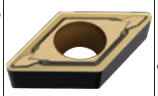
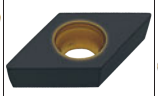
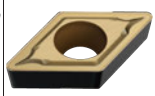
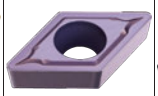
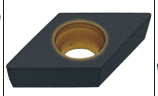
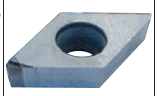
Right hand tool holder shown.

Order Number	Stock R	Stock L	Insert Number		DCON	LF	LDRED	WF	WF2	H	GAMF	DMIN	RE	Clamp Screw *	Wrench
					Dimensions(mm)										
S10HSDQCR/L07	●	●	DCMT DCET DCGT DCMW DCGW NP-DCMW NP-DCMT	0702○○	10	100	16	7	2.4	9	13°	**13**	0.4	TS25	TKY08F
S12KSDQCR/L07	●	●		0702○○	12	125	20	9	3.4	11	10°	**16**	0.4	TS25	TKY08F
S16MSDQCR/L07	●	●		0702○○	16	150	25	11	3.9	14	7°	**20**	0.4	TS25	TKY08F
S20QSDQCR/L11	●	●		11T3○○	20	180	32	13	4.4	18	7°	**25**	0.8	TS4	TKY15F
S25RSDQCR/L15	●	●		1504○○	25	200	40	17	6.9	23	5°	**32**	0.8	TS5	TKY25F
S32SSDQCR15	●			1504○○	32	250	50	22	8.4	30	5°	**40**	0.8	TS5	TKY25F
S40TSDQCR15	●			1504○○	40	300	63	27	9.4	37	5°	**50**	0.8	TS5	TKY25F

* Clamp Torque (N • m) : TS25=1.0, TS4=3.5, TS5=7.5

● : **Inventory maintained in Japan.**

·CHIP BREAKER EXAMPLE

Finish Cutting	Finish Cutting	Light Cutting	Light Cutting	Medium Cutting	Medium Cutting	Without Breaker	CBN/PCD
FP	FM	LP	LM	MP	MM	Flat Top	
							
(07,11)	(07,11)	(07,11)	(07,11)	(07,11,15)	(07,11,15)	(07,11,15)	(07,11)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.
- When using insert with right and left hand chip breaker, please use left hand insert for right hand holder and right hand insert for left hand holder.

·RECOMMENDED CUTTING CONDITION

Steel Shank				l/d≤3			l/d=3–4 (Shank Diameter ≥ 25mm)		
Carbide Shank				l/d≤5			l/d=6–7		
	Work Material	Hardness	Cutting Mode	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
P	Carbon Steel Alloy Steel	180–350HB	Light Cutting	130 (90–160)	0.1 (0.05–0.15)	0.2	120 (80–150)	0.1 (0.05–0.15)	0.2
			Medium Cutting	90 (60–120)	0.25 (0.15–0.35)	–3.0	80 (50–110)	0.15 (0.1–0.2)	–1.5
M	Stainless Steel	≤200HB	Light Cutting	140 (100–180)	0.1 (0.05–0.15)	0.2	140 (100–180)	0.1 (0.05–0.15)	0.2
			Medium Cutting	70 (50–90)	0.2 (0.15–0.25)	–2.0	60 (40–80)	0.15 (0.1–0.2)	–1.0
N	Aluminium Alloy	–	Light Cutting	300 (200–400)	0.1 (0.05–0.15)	0.2	300 (200–400)	0.1 (0.05–0.15)	0.2
			Medium Cutting	200 (150–250)	0.1 (0.05–0.15)	–2.0	200 (150–250)	0.1 (0.05–0.15)	–1.5

C-SDQC

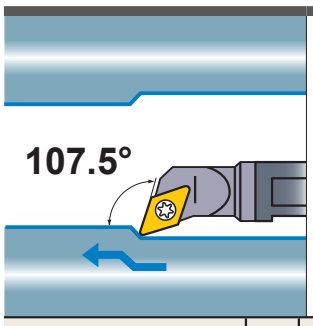
S TYPE BORING BARS

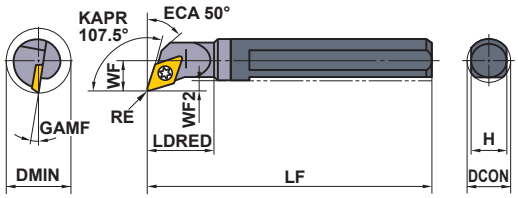
Carbide shank

Product Information

107° 30′ KAPR

GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 249
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966
TURNING INSERTS >> 145
PCD TURNING INSERTS >> 274
TECHNICAL INFO >> 1971





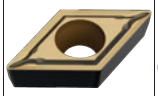
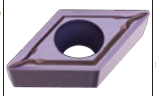
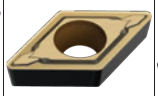
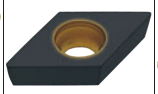
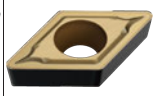
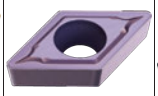
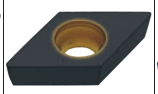
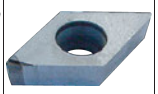
Right hand tool holder only.

Order Number	Stock R	Insert Number		Dimensions(mm) DCON	LF	LDRED	WF	WF2	H	GAMF	DMIN	RE	* Clamp Screw	Wrench
C10KSDQCR07	●	DCMT DCET DCGT DCMW DCGW NP-DCMW NP-DCMT	0702○○	10	125	16	7	2.1	9	13°	**13**	0.4	TS25	TKY08F
C12MSDQCR07	●		0702○○	12	150	20	9	3.1	11	10°	**16**	0.4	TS25	TKY08F
C16RSDQCR07	●		0702○○	16	200	25	11	3.1	14	7°	**20**	0.4	TS25	TKY08F
C20SSDQCR11	●		11T3○○	20	250	32	13	3.1	18	7°	**25**	0.8	TS4	TKY15F
C25TSDQCR15	●	DCMW DCMT	1504○○	25	300	40	17	4.9	23	5°	**32**	0.8	TS5	TKY25F

* Clamp Torque (N • m) : TS25=1.0, TS4=3.5, TS5=7.5

● : Inventory maintained in Japan.

·CHIP BREAKER EXAMPLE

Finish Cutting	Finish Cutting	Light Cutting	Light Cutting	Medium Cutting	Medium Cutting	Without Breaker	CBN/PCD
FP	FM	LP	LM	MP	MM	Flat Top	
							
(07,11)	(07,11)	(07,11)	(07,11)	(07,11,15)	(07,11,15)	(07,11,15)	(07,11)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.
- When using insert with right and left hand chip breaker, please use left hand insert for right hand holder and right hand insert for left hand holder.

·RECOMMENDED CUTTING CONDITION

Steel Shank				l/d≤3			l/d=3–4 (Shank Diameter ≥ 25mm)		
Carbide Shank				l/d≤5			l/d=6–7		
	Work Material	Hardness	Cutting Mode	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
P	Carbon Steel Alloy Steel	180–350HB	Light Cutting	130 (90–160)	0.1 (0.05–0.15)	0.2	120 (80–150)	0.1 (0.05–0.15)	0.2
			Medium Cutting	90 (60–120)	0.25 (0.15–0.35)	–3.0	80 (50–110)	0.15 (0.1–0.2)	–1.5
M	Stainless Steel	≤200HB	Light Cutting	140 (100–180)	0.1 (0.05–0.15)	0.2	140 (100–180)	0.1 (0.05–0.15)	0.2
			Medium Cutting	70 (50–90)	0.2 (0.15–0.25)	–2.0	60 (40–80)	0.15 (0.1–0.2)	–1.0
N	Aluminium Alloy	–	Light Cutting	300 (200–400)	0.1 (0.05–0.15)	0.2	300 (200–400)	0.1 (0.05–0.15)	0.2
			Medium Cutting	200 (150–250)	0.1 (0.05–0.15)	–2.0	200 (150–250)	0.1 (0.05–0.15)	–1.5

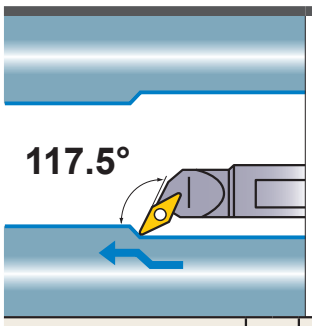
S-SVQC

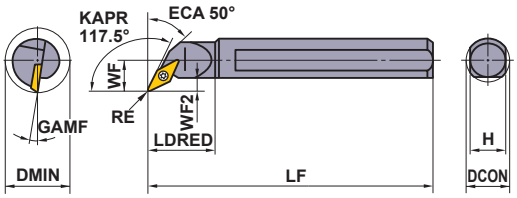
S TYPE BORING BARS

Product Information

117° 30′ KAPR

GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 259
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966
TURNING INSERTS >> 162
PCD TURNING INSERTS >> 280
TECHNICAL INFO >> 1971





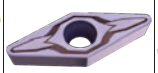
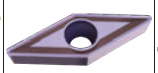
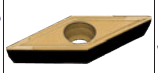
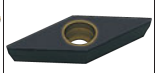
Right hand tool holder shown.

Order Number	Stock R	Stock L	Insert Number		DCON	LF	LDRED	WF	WF2	H	GAMF	DMIN	RE	Clamp Screw *	Wrench
S16MSVQCR/L11	●	●	VCMW VCMT	1103○○	16	150	25	11	3.9	14	7°	**20**	0.4	TS25	TKY08F
S20QSVQCR/L11	●	●		1103○○	20	180	32	13	4.4	18	7°	**25**	0.4	TS25	TKY08F
S25RSVQCR/L16	●	●		1604○○	25	200	40	17	6.9	23	5°	**32**	0.8	TS4	TKY15F
S32SSVQCR/L16	●	●		1604○○	32	250	50	22	8.4	30	5°	**40**	0.8	TS4	TKY15F
S40TSVQCR16	●			1604○○	40	300	63	27	9.4	37	5°	**50**	0.8	TS4	TKY15F

* Clamp Torque (N • m) : TS25=1.0, TS4=3.5

● : **Inventory maintained in Japan.**

·CHIP BREAKER EXAMPLE

Finish Cutting	Finish Cutting	Light Cutting	Light Cutting	Medium Cutting	Medium Cutting	Medium Cutting	Without Breaker
FP	FM	LP	LM	MP	MM	Standard	Flat Top
							
(11,16)	(11,16)	(11,16)	(11,16)	(16)	(16)	(11,16)	(11,16)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.
- When using insert with right and left hand chip breaker, please use left hand insert for right hand holder and right hand insert for left hand holder.

·RECOMMENDED CUTTING CONDITION

	Steel Shank			l/d≤3			l/d=3–4 (Shank Diameter ≥ 25mm)		
	Carbide Shank			l/d≤5			l/d=6–7		
	Work Material	Hardness	Cutting Mode	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
P	Carbon Steel Alloy Steel	180–350HB	Light Cutting	130 (90–160)	0.1 (0.05–0.15)	0.2	120 (80–150)	0.1 (0.05–0.15)	0.2
			Medium Cutting	90 (60–120)	0.25 (0.15–0.35)	–3.0	80 (50–110)	0.15 (0.1–0.2)	–1.5
M	Stainless Steel	≤200HB	Light Cutting	140 (100–180)	0.1 (0.05–0.15)	0.2	140 (100–180)	0.1 (0.05–0.15)	0.2
			Medium Cutting	70 (50–90)	0.2 (0.15–0.25)	–2.0	60 (40–80)	0.15 (0.1–0.2)	–1.0
N	Aluminium Alloy	–	Light Cutting	300 (200–400)	0.1 (0.05–0.15)	0.2	300 (200–400)	0.1 (0.05–0.15)	0.2
			Medium Cutting	200 (150–250)	0.1 (0.05–0.15)	–2.0	200 (150–250)	0.1 (0.05–0.15)	–1.5

C-SVQC

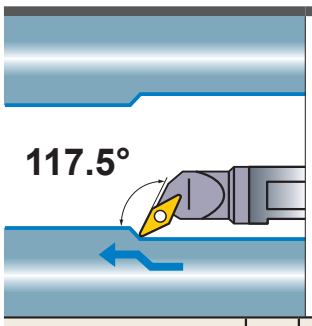
S TYPE BORING BARS

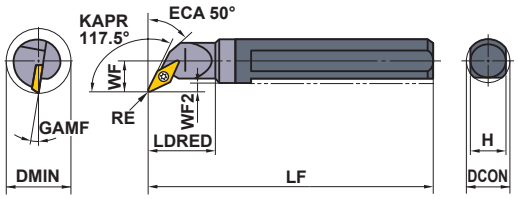
Carbide shank

Product Information

117° 30′ KAPR

GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 259
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966
TURNING INSERTS >> 162
PCD TURNING INSERTS >> 280
TECHNICAL INFO >> 1971





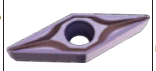
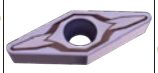
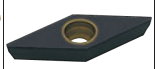
Right hand tool holder only.

Order Number	Stock R	Insert Number		DCON	LF	LDRED	WF	WF2	H	GAMF	DMIN	RE	* Clamp Screw	Wrench
				Dimensions(mm)										
C16RSVQCR11	●	VCMT VCMW	1103○○	16	200	25	11	3.1	14	7°	**20**	0.4	TS25	TKY08F
C20SSVQCR11	●		1103○○	20	250	32	13	3.1	18	7°	**25**	0.4	TS25	TKY08F
C25TSVQCR16	●		1604○○	25	300	40	17	4.9	23	5°	**32**	0.8	TS4	TKY15F

* Clamp Torque (N • m) : TS25=1.0, TS4=3.5

● : **Inventory maintained in Japan.**

·CHIP BREAKER EXAMPLE

Finish Cutting	Finish Cutting	Light Cutting	Light Cutting	Medium Cutting	Medium Cutting	Medium Cutting	Without Breaker
FP	FM	LP	LM	MP	MM	Standard	Flat Top
							
(11,16)	(11,16)	(11,16)	(11,16)	(16)	(16)	(11,16)	(11,16)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.
- When using insert with right and left hand chip breaker, please use left hand insert for right hand holder and right hand insert for left hand holder.

·RECOMMENDED CUTTING CONDITION

Steel Shank			l/d≤3			l/d=3–4 (Shank Diameter ≥ 25mm)		
Carbide Shank			l/d≤5			l/d=6–7		
Work Material	Hardness	Cutting Mode	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
P Carbon Steel Alloy Steel	180–350HB	Light Cutting	130 (90–160)	0.1 (0.05–0.15)	0.2	120 (80–150)	0.1 (0.05–0.15)	0.2
		Medium Cutting	90 (60–120)	0.25 (0.15–0.35)	–3.0	80 (50–110)	0.15 (0.1–0.2)	–1.5
M Stainless Steel	≤200HB	Light Cutting	140 (100–180)	0.1 (0.05–0.15)	0.2	140 (100–180)	0.1 (0.05–0.15)	0.2
		Medium Cutting	70 (50–90)	0.2 (0.15–0.25)	–2.0	60 (40–80)	0.15 (0.1–0.2)	–1.0
N Aluminium Alloy	–	Light Cutting	300 (200–400)	0.1 (0.05–0.15)	0.2	300 (200–400)	0.1 (0.05–0.15)	0.2
		Medium Cutting	200 (150–250)	0.1 (0.05–0.15)	–2.0	200 (150–250)	0.1 (0.05–0.15)	–1.5

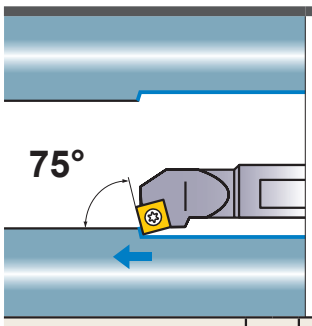
S-SSKC

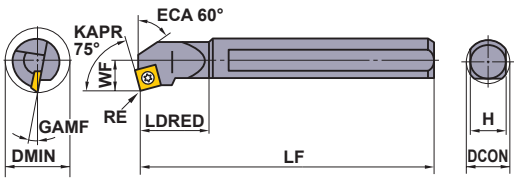
S TYPE BORING BARS

Product Information

75° KAPR

GRADES AND CHIP BREAKERS >> 38
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966
TURNING INSERTS >> 152
TECHNICAL INFO >> 1971





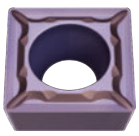
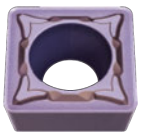
Right hand tool holder shown.

Order Number	Stock R	Stock L	Insert Number		DCON	LF	LDRED	WF	H	GAMF	DMIN	RE	Clamp Screw *	Wrench
S16MSSKCR/L09	●	●	SCMW SCMT	09T3○○	16	150	25	11	14	7°	**20**	0.8	TS4	TKY15F
S20QSSKCR/L09	●	●		09T3○○	20	180	32	13	18	7°	**25**	0.8	TS4	TKY15F
S25RSSKCR/L12	●	●		1204○○	25	200	40	17	23	5°	**32**	0.8	TS5	TKY25F

* Clamp Torque (N • m) : TS4=3.5, TS5=7.5

● : **Inventory maintained in Japan.**

·CHIP BREAKER EXAMPLE

Finish Cutting	Finish Cutting	Light Cutting	Light Cutting	Medium Cutting	Medium Cutting	Medium Cutting	Without Breaker
FP	FM	LP	LM	MP	MM	Standard	Flat Top
							
(09)	(09)	(09)	(09)	(09,12)	(09,12)	(09,12)	(09,12)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.
- When using insert with right and left hand chip breaker, please use left hand insert for right hand holder and right hand insert for left hand holder.

·RECOMMENDED CUTTING CONDITION

Steel Shank			l/d≤3			l/d=3–4 (Shank Diameter ≥ 25mm)		
Carbide Shank			l/d≤5			l/d=6–7		
Work Material	Hardness	Cutting Mode	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
P Carbon Steel Alloy Steel	180–350HB	Light Cutting	130 (90–160)	0.1 (0.05–0.15)	0.2	120 (80–150)	0.1 (0.05–0.15)	0.2
		Medium Cutting	90 (60–120)	0.25 (0.15–0.35)	–3.0	80 (50–110)	0.15 (0.1–0.2)	–1.5
M Stainless Steel	≤200HB	Light Cutting	140 (100–180)	0.1 (0.05–0.15)	0.2	140 (100–180)	0.1 (0.05–0.15)	0.2
		Medium Cutting	70 (50–90)	0.2 (0.15–0.25)	–2.0	60 (40–80)	0.15 (0.1–0.2)	–1.0
N Aluminium Alloy	–	Light Cutting	300 (200–400)	0.1 (0.05–0.15)	0.2	300 (200–400)	0.1 (0.05–0.15)	0.2
		Medium Cutting	200 (150–250)	0.1 (0.05–0.15)	–2.0	200 (150–250)	0.1 (0.05–0.15)	–1.5

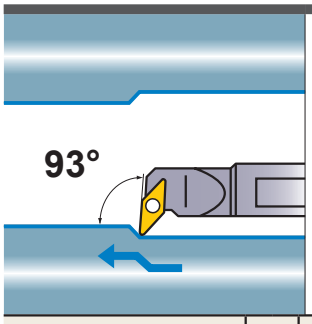
S-SVUC

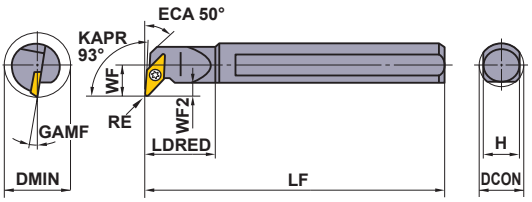
S TYPE BORING BARS

Product Information

93° KAPR

GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 259
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966
TURNING INSERTS >> 162
PCD TURNING INSERTS >> 280
TECHNICAL INFO >> 1971





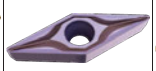
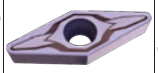
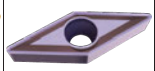
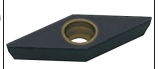
Right hand tool holder only.

Order Number	Stock R	Stock L	Insert Number		DCON	LF	LDRED	WF	WF2	H	GAMF	DMIN	RE	Clamp Screw *	Wrench
					Dimensions(mm)										
S20QSVUCR/L11	●	●	VCMW VCMT	1103○○	20	180	32	13	4.4	18	7°	**25**	0.4	TS25	TKY08F
S25RSVUCR/L16	●	●		1604○○	25	200	40	17	6.9	23	5°	**32**	0.8	TS4	TKY15F
S32SSVUCR/L16	●	●		1604○○	32	250	50	22	8.4	30	5°	**40**	0.8	TS4	TKY15F
S40TSVUCR/L16	●	●		1604○○	40	300	63	27	9.4	37	5°	**50**	0.8	TS4	TKY15F

* Clamp Torque (N • m) : TS25=1.0, TS4=3.5

● : **Inventory maintained in Japan.**

·CHIP BREAKER EXAMPLE

Finish Cutting	Finish Cutting	Light Cutting	Light Cutting	Medium Cutting	Medium Cutting	Medium Cutting	Without Breaker
FP	FM	LP	LM	MP	MM	Standard	Flat Top
							
(11,16)	(11,16)	(11,16)	(11,16)	(16)	(16)	(11,16)	(11,16)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.
- When using insert with right and left hand chip breaker, please use left hand insert for right hand holder and right hand insert for left hand holder.

·RECOMMENDED CUTTING CONDITION

Steel Shank			l/d≤3			l/d=3–4 (Shank Diameter ≥ 25mm)		
Carbide Shank			l/d≤5			l/d=6–7		
Work Material	Hardness	Cutting Mode	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
P Carbon Steel Alloy Steel	180–350HB	Light Cutting	130 (90–160)	0.1 (0.05–0.15)	0.2	120 (80–150)	0.1 (0.05–0.15)	0.2
		Medium Cutting	90 (60–120)	0.25 (0.15–0.35)	–3.0	80 (50–110)	0.15 (0.1–0.2)	–1.5
M Stainless Steel	≤200HB	Light Cutting	140 (100–180)	0.1 (0.05–0.15)	0.2	140 (100–180)	0.1 (0.05–0.15)	0.2
		Medium Cutting	70 (50–90)	0.2 (0.15–0.25)	–2.0	60 (40–80)	0.15 (0.1–0.2)	–1.0
N Aluminium Alloy	–	Light Cutting	300 (200–400)	0.1 (0.05–0.15)	0.2	300 (200–400)	0.1 (0.05–0.15)	0.2
		Medium Cutting	200 (150–250)	0.1 (0.05–0.15)	–2.0	200 (150–250)	0.1 (0.05–0.15)	–1.5

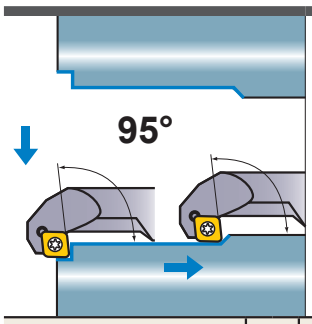
S-SCZC

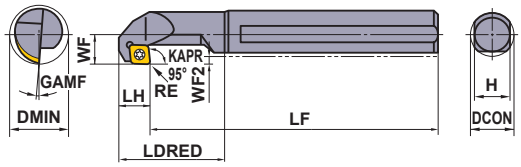
S TYPE BORING BARS

Product Information

95° KAPR

GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 244
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966
TURNING INSERTS >> 138
PCD TURNING INSERTS >> 272
TECHNICAL INFO >> 1971





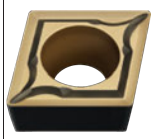
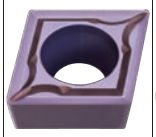
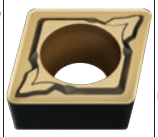
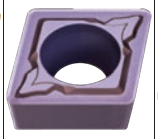
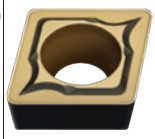
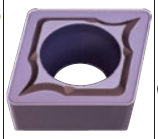
Right hand tool holder shown.

Order Number	Stock R	Stock L	Insert Number		DCON	LF	LDRED	LH	WF	WF2	H	GAMF	DMIN	RE	Clamp Screw *	Wrench
S16MSCZCR/L06	●	●	CCMH CCMT CCET CCGT CCMW	0602○○	16	150	36	11	11	3	14	10°	**20**	0.4	TS25	TKY08F
S20QSCZCR/L09	●	●		09T3○○	20	180	50	18	13	3	18	7°	**25**	0.8	TS4	TKY15F

∗ Clamp Torque (N • m) : TS25=1.0, TS4=3.5

● : **Inventory maintained in Japan.**

·CHIP BREAKER EXAMPLE

Finish Cutting	Finish Cutting	Light Cutting	Light Cutting	Medium Cutting	Medium Cutting	Without Breaker	CBN/PCD
FP	FM	LP	LM	MP	MM	Flat Top	
							
(06,09)	(06,09)	(06,09)	(06,09)	(06,09)	(06,09)	(06,09)	(06,09)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.
- When using insert with right and left hand chip breaker, please use left hand insert for right hand holder and right hand insert for left hand holder.

·RECOMMENDED CUTTING CONDITION

	Work Material	Hardness	Cutting Mode	l/d≤3 Cutting Speed (m/min)	l/d≤3 Feed (mm/rev)	l/d≤3 Depth of Cut (mm)	l/d=3–4 (Shank Diameter ≥ 25mm) Cutting Speed (m/min)	l/d=3–4 Feed (mm/rev)	l/d=3–4 Depth of Cut (mm)
P	Carbon Steel Alloy Steel	180–350HB	Light Cutting	130 (90–160)	0.1 (0.05–0.15)	0.2	120 (80–150)	0.1 (0.05–0.15)	0.2
			Medium Cutting	90 (60–120)	0.25 (0.15–0.35)	–3.0	80 (50–110)	0.15 (0.1–0.2)	–1.5
M	Stainless Steel	≤200HB	Light Cutting	140 (100–180)	0.1 (0.05–0.15)	0.2	140 (100–180)	0.1 (0.05–0.15)	0.2
			Medium Cutting	70 (50–90)	0.2 (0.15–0.25)	–2.0	60 (40–80)	0.15 (0.1–0.2)	–1.0
N	Aluminium Alloy	–	Light Cutting	300 (200–400)	0.1 (0.05–0.15)	0.2	300 (200–400)	0.1 (0.05–0.15)	0.2
			Medium Cutting	200 (150–250)	0.1 (0.05–0.15)	–2.0	200 (150–250)	0.1 (0.05–0.15)	–1.5

A-PSKN

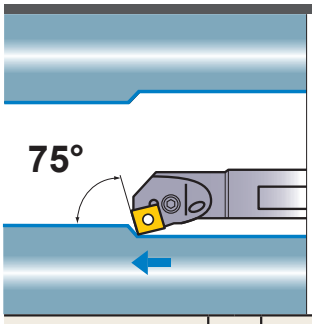
P TYPE BORING BARS

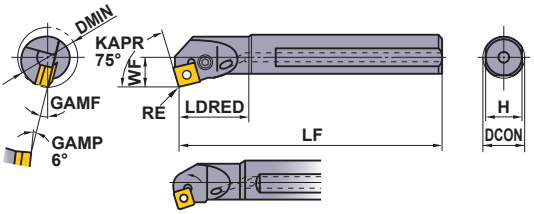
With coolant hole

Product Information

75° KAPR

GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 230
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966
TURNING INSERTS >> 115
PCD TURNING INSERTS >> 268
TECHNICAL INFO >> 1971





∗1 Pin Lock Type

Right hand tool holder shown.

Order Number	Stock R	Stock L	Insert Number		DCON	LF	LDRED	WF	H	GAMF	DMIN	RE	Shim	Shim Pin	Clamp Lever	Clamp Screw ∗2	Wrench	Plug	Clamp Pin ∗2	Pin	Screw
A20QPSKNR/L09	●	●	SNMA SNMG	0903	20	180	32	13	18	13°	**25**	0.8	—	—	—	—	HKY15R HKY25R	HGM-PT1/8	HP3T	P208AM	HSS03005
A25RPSKNR/L12	●	●	SNMM SNGA	1204	25	200	40	17	23	13°	**32**	0.8	MLSP42	—	—	—	HKY15R HKY30R	HGM-PT1/4	HP43	P210AM	HSS03005
A32SPSKNR/L12	●	●	SNGG	1204	32	250	50	22	30	13°	**44**	0.8	LLSSN42	LLP14	LLCL14	LLCS108S	HKY30R	HGM-PT3/8	—	—	—

∗1 Pin Lock Type : A20QPSKNR/L09, A25RPSKNR/L12
∗2 Clamp Torque (N • m) : LLCS108S=3.3, HP3T=2.2, HP43=3.3

● : **Inventory maintained in Japan.**

·CHIP BREAKER EXAMPLE

Finish Cutting	Light Cutting	Medium Cutting	Medium Cutting	Medium Cutting	For Stainless Steel	G class	CBN/PCD
FP	LP	MP	MH	Standard	MM	R/L	
(12)	(12)	(12)	(12)	(12)	(12)	(12)	(12)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.
- When using insert with right and left hand chip breaker, please use left hand insert for right hand holder and right hand insert for left hand holder.

·RECOMMENDED CUTTING CONDITION

	Work Material	Hardness	Cutting Mode	l/d≤3 Cutting Speed (m/min)	l/d≤3 Feed (mm/rev)	l/d≤3 Depth of Cut (mm)	l/d=3—4 Cutting Speed (m/min)	l/d=3—4 Feed (mm/rev)	l/d=3—4 Depth of Cut (mm)
P	Carbon Steel Alloy Steel	180—350HB	Medium	110 (80—140)	0.25 (0.1—0.4)	—5.0	110 (80—140)	0.2 (0.1—0.3)	—4.0
M	Stainless Steel	≤200HB	Medium	80 (60—100)	0.2 (0.1—0.3)	—4.0	70 (50—100)	0.15 (0.1—0.25)	—3.0
K	Gray Cast Iron	Tensile Strength ≤350MPa	Medium	80 (60—100)	0.25 (0.1—0.4)	—5.0	80 (60—100)	0.2 (0.1—0.3)	—4.0

A-PTFN

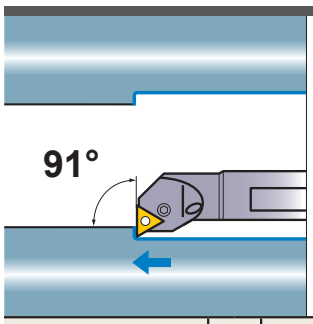
P TYPE BORING BARS

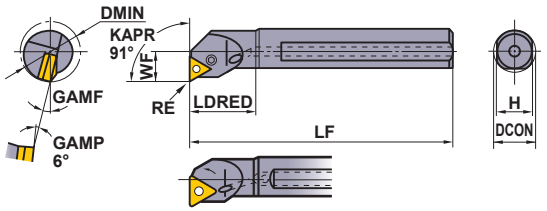
With coolant hole

Product Information

91° KAPR

GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 232
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966
TURNING INSERTS >> 121
PCD TURNING INSERTS >> 269
TECHNICAL INFO >> 1971





∗1 Pin Lock Type

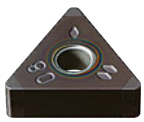
Right hand tool holder shown.

Order Number	Stock R	Stock L	Insert Number		Dimensions(mm) DCON	LF	LDRED	WF	H	GAMF	DMIN	RE	Shim	Shim Pin	Clamp Lever	Clamp Screw ∗2	Wrench	Plug	Clamp Pin ∗2	Pin	Screw
A20QPTFNR/L16	●	●	TNMA TNMG TNMM TNGA TNGG	1604	20	180	32	13	18	15°	**25**	0.8	—	—	—	—	HKY15R HKY25R	HGM-PT1/8	HP31	P208AM	HSS03005
A25RPTFNR/L16	●	●		1604	25	200	40	17	23	13°	**32**	0.8	MLTP32	—	—	—	HKY15R HKY25R	HGM-PT1/4	HP33	P208AM	HSS03005
A32SPTFNR/L16	●	●		1604	32	250	50	22	30	13°	**44**	0.8	LLSTN32	LLP13	LLCL13	LLCS106	HKY25R	HGM-PT3/8	—	—	—
A40TPTFNR/L22	●	●		2204	40	300	63	27	37	10°	**54**	0.8	LLSTN42	LLP14	LLCL14	LLCS108S	HKY30R	HGM-PT3/8	—	—	—
A50UPTFNR/L22	●	●		2204	50	350	80	35	47	9°	**70**	0.8	LLSTN42	LLP14	LLCL14	LLCS108S	HKY30R	HGM-PT3/8	—	—	—

∗1 Pin Lock Type : A20QPTFNR/L16, A25RPTFNR/L16
∗2 Clamp Torque (N • m) : LLCS106=2.2, LLCS108S=3.3, HP31=2.2, HP33=2.2

● : **Inventory maintained in Japan.**

·CHIP BREAKER EXAMPLE

Finish Cutting	Light Cutting	Medium Cutting	Medium Cutting	Medium Cutting	For Stainless Steel	G class	CBN/PCD
FP	LP	MP	MH	Standard	MM	R/L	
							
(16)	(16)	(16)	(16)	(16,22)	(16,22)	(16,22)	(16)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.
- When using insert with right and left hand chip breaker, please use left hand insert for right hand holder and right hand insert for left hand holder.

·RECOMMENDED CUTTING CONDITION

	Work Material	Hardness	Cutting Mode	l/d≤3 Cutting Speed (m/min)	l/d≤3 Feed (mm/rev)	l/d≤3 Depth of Cut (mm)	l/d=3—4 Cutting Speed (m/min)	l/d=3—4 Feed (mm/rev)	l/d=3—4 Depth of Cut (mm)
P	Carbon Steel Alloy Steel	180—350HB	Medium	110 (80—140)	0.25 (0.1—0.4)	—5.0	110 (80—140)	0.2 (0.1—0.3)	—4.0
M	Stainless Steel	≤200HB	Medium	80 (60—100)	0.2 (0.1—0.3)	—4.0	70 (50—100)	0.15 (0.1—0.25)	—3.0
K	Gray Cast Iron	Tensile Strength ≤350MPa	Medium	80 (60—100)	0.25 (0.1—0.4)	—5.0	80 (60—100)	0.2 (0.1—0.3)	—4.0

A-PDUN

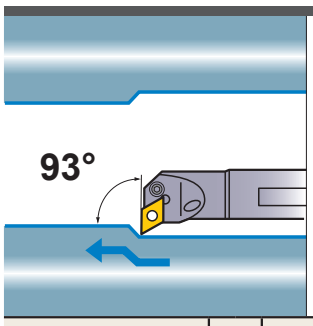
P TYPE BORING BARS

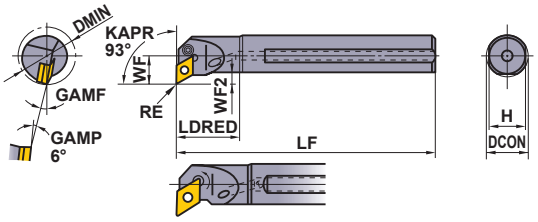
With coolant hole

Product Information

93° KAPR

GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 226
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966
TURNING INSERTS >> 108
PCD TURNING INSERTS >> 267
TECHNICAL INFO >> 1971





∗1 Pin Lock Type

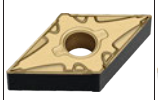
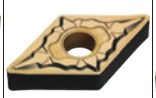
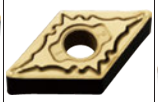
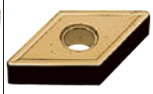
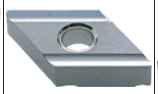
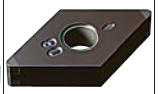
Right hand tool holder shown.

Order Number	Stock R	Stock L	Insert Number		DCON	LF	LDRED	WF	WF2	H	GAMF	DMIN	RE	Shim	Shim Pin	Clamp Lever	Clamp Screw ∗2	Wrench	Plug	Clamp Pin ∗2	Pin	Screw
A20QPDUNR/L11	●	●	DNMA DNMG DNMX DNMM DNGA DNGG	1104○○	20	180	32	15	6.4	18	13°	**26**	0.8	—	—	LLCL23S	LLCS125	HKY20R	HGM-PT1/8	—	—	—
A25RPDUNR/L11	●	●		1104○○	25	200	40	17	6.9	23	15°	**32**	0.8	LLSDN32	LLP13	LLCL23	LLCS106	HKY25R	HGM-PT1/4	—	—	—
A25RPDUNR/L15	●	●		1504○○	25	200	40	17	6.9	23	13°	**32**	0.8	MLDP42	—	—	—	HKY15R HKY30R	HGM-PT1/4	HP43	P210AM	HSS03005
A32SPDUNR/L11	●	●		1104○○	32	250	50	22	8.4	30	13°	**44**	0.8	LLSDN32	LLP13	LLCL23	LLCS106	HKY25R	HGM-PT3/8	—	—	—
A32SPDUNR/L15	●	●		1504○○	32	250	50	22	8.4	30	13°	**44**	0.8	LLSDN42	LLP14	LLCL24	LLCS108S	HKY30R	HGM-PT3/8	—	—	—
A40TPDUNR/L15	●	●		1504○○	40	300	63	27	9.4	37	10°	**54**	0.8	LLSDN42	LLP14	LLCL24	LLCS108S	HKY30R	HGM-PT3/8	—	—	—
A50UPDUNR/L15	●	●		1504○○	50	350	80	35	12.4	47	9°	**70**	0.8	LLSDN42	LLP14	LLCL24	LLCS108S	HKY30R	HGM-PT3/8	—	—	—

∗1 Pin Lock Type : A25RPDUNR/L15
∗2 Clamp Torque (N • m) : LLCS125=1.5, LLCS106=2.2, LLCS108S=3.3, HP43=3.3

● : **Inventory maintained in Japan.**

·CHIP BREAKER EXAMPLE

Finish Cutting	Light Cutting	Medium Cutting	Medium Cutting	Medium Cutting	For Stainless Steel	G class	CBN/PCD
FP	LP	MP	MH	Standard	MM	L	
							
(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.
- When using insert with right and left hand chip breaker, please use left hand insert for right hand holder and right hand insert for left hand holder.

·RECOMMENDED CUTTING CONDITION

	Work Material	Hardness	Cutting Mode	l/d≤3 Cutting Speed (m/min)	l/d≤3 Feed (mm/rev)	l/d≤3 Depth of Cut (mm)	l/d=3—4 Cutting Speed (m/min)	l/d=3—4 Feed (mm/rev)	l/d=3—4 Depth of Cut (mm)
P	Carbon Steel Alloy Steel	180—350HB	Medium	110 (80—140)	0.25 (0.1—0.4)	—5.0	110 (80—140)	0.2 (0.1—0.3)	—4.0
M	Stainless Steel	≤200HB	Medium	80 (60—100)	0.2 (0.1—0.3)	—4.0	70 (50—100)	0.15 (0.1—0.25)	—3.0
K	Gray Cast Iron	Tensile Strength ≤350MPa	Medium	80 (60—100)	0.25 (0.1—0.4)	—5.0	80 (60—100)	0.2 (0.1—0.3)	—4.0

A-PCLN

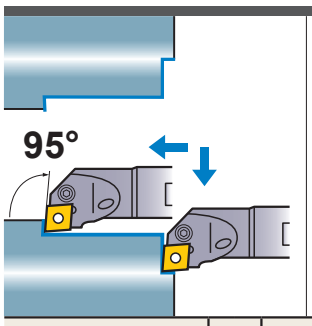
P TYPE BORING BARS

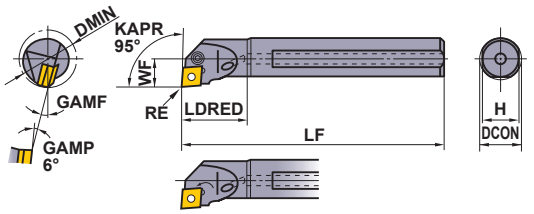
With coolant hole

Product Information

95° KAPR

GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 222
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966
TURNING INSERTS >> 102
PCD TURNING INSERTS >> 266
TECHNICAL INFO >> 1971





∗1 Pin Lock Type

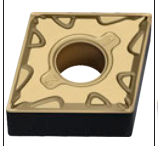
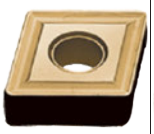
Right hand tool holder shown.

Order Number	Stock R	Stock L	Insert Number		DCON	LF	LDRED	WF	H	GAMF	DMIN	RE	Shim	Shim Pin	Clamp Lever	Clamp Screw ∗2	Wrench	Plug	Clamp Pin ∗2	Pin	Screw
A16MPCLNR/L09	●	●	CNMA CNMG CNMM CNGG	09T3	16	150	25	11	14	15°	**20**	0.8	—	—	LLCL13S	LLCS105	HKY20R	HGM-PT1/8	—	—	—
A20QPCLNR/L09	●	●		09T3	20	180	32	13	18	13°	**25**	0.8	—	—	—	—	HKY25R HKY15R	HGM-PT1/8	HP3T	P208AM	HSS03005
A20QPCLNR/L09N	●	●		09T3	20	180	32	13	18	13°	**25**	0.8	—	—	LLCL13S	LLCS105	HKY20R	HGM-PT1/8	—	—	—
A25RPCLNR/L09	●	●		09T3	25	200	40	17	23	13°	**32**	0.8	—	—	LLCL13S	LLCS105	HKY20R	HGM-PT1/4	—	—	—
A25RPCLNR/L12	●	●		1204	25	200	40	17	23	13°	**32**	0.8	MLCP42	—	—	—	HKY30R HKY15R	HGM-PT1/4	HP43	P210AM	HSS03005
A32SPCLNR/L12	●	●		1204	32	250	50	22	30	13°	**44**	0.8	LLSCN42	LLP14	LLCL14	LLCS108S	HKY30R	HGM-PT3/8	—	—	—
A40TPCLNR/L12	●	●		1204	40	300	63	27	37	10°	**54**	0.8	LLSCN42	LLP14	LLCL14	LLCS108S	HKY30R	HGM-PT3/8	—	—	—
A50UPCLNR12	●			1204	50	350	80	35	47	10°	**63**	0.8	LLSCP42	LLP14	LLCL14	LLCS108S	HKY30R	HGM-PT3/8	—	—	—

∗1 Pin Lock Type : A20QPCLNR/L09, A25RPCLNR/L12
∗2 Clamp Torque (N • m) : LLCS105=1.5, LLCS106=2.2, LLCS108S=3.3, HP3T=2.2, HP43=3.3

● : **Inventory maintained in Japan.**

·CHIP BREAKER EXAMPLE

Finish Cutting	Light Cutting	Light Cutting	Medium Cutting	Medium Cutting	Medium Cutting	For Stainless Steel	CBN/PCD
FP	SA	LP	MP	MH	Standard	MM	
							
(12)	(12)	(12)	(12)	(12)	(12)	(12)	(12)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.
- When using insert with right and left hand chip breaker, please use left hand insert for right hand holder and right hand insert for left hand holder.

·RECOMMENDED CUTTING CONDITION

	Work Material	Hardness	Cutting Mode	l/d≤3 Cutting Speed (m/min)	l/d≤3 Feed (mm/rev)	l/d≤3 Depth of Cut (mm)	l/d=3—4 Cutting Speed (m/min)	l/d=3—4 Feed (mm/rev)	l/d=3—4 Depth of Cut (mm)
P	Carbon Steel Alloy Steel	180—350HB	Medium	110 (80—140)	0.25 (0.1—0.4)	—5.0	110 (80—140)	0.2 (0.1—0.3)	—4.0
M	Stainless Steel	≤200HB	Medium	80 (60—100)	0.2 (0.1—0.3)	—4.0	70 (50—100)	0.15 (0.1—0.25)	—3.0
K	Gray Cast Iron	Tensile Strength ≤350MPa	Medium	80 (60—100)	0.25 (0.1—0.4)	—5.0	80 (60—100)	0.2 (0.1—0.3)	—4.0

A-PWLN

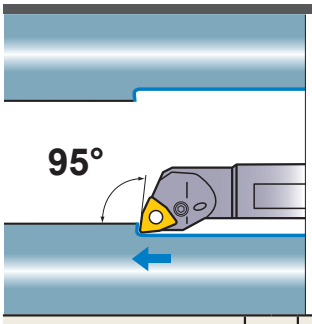
P TYPE BORING BARS

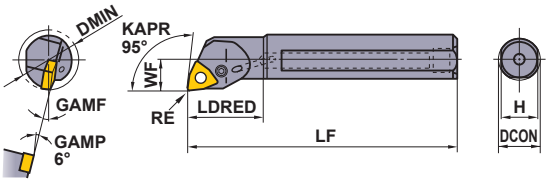
With coolant hole

Product Information

95° KAPR

GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 237
TECHNICAL INFO >> 1971
TURNING INSERTS >> 130
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966





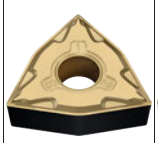
Right hand tool holder shown.

Order Number	Stock R	Stock L	Insert Number		DCON	LF	LDRED	WF	H	GAMF	DMIN	RE	Clamp Lever	Clamp Screw *	Wrench	Plug
A16MPWLNR/L06	●	●	WNMG	06T3◌◌	16	150	25	11	14	15°	**20**	0.8	LLCL13S	LLCS105	HKY20R	HGM-PT1/8
A20QPWLNR/L06	●	●		06T3◌◌	20	180	32	13	18	13°	**25**	0.8	LLCL13S	LLCS105	HKY20R	HGM-PT1/8
A25RPWLNR/L06	●	●		06T3◌◌	25	200	40	17	23	13°	**32**	0.8	LLCL13S	LLCS105	HKY20R	HGM-PT1/4

* Clamp Torque (N • m) : LLCS105=1.5

● : **Inventory maintained in Japan.**

·CHIP BREAKER EXAMPLE

Finish Cutting	Light Cutting	Medium Cutting	Medium Cutting	Medium Cutting	Medium to Rough Cutting	For Stainless Steel
FP	LP	MP	MH	Standard	RP	MM
						
(08)	(08)	(06,08)	(08)	(08)	(08)	(06,8)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.
- When using insert with right and left hand chip breaker, please use left hand insert for right hand holder and right hand insert for left hand holder.

·RECOMMENDED CUTTING CONDITION

	Work Material	Hardness	Cutting Mode	l/d≤3 Cutting Speed (m/min)	l/d≤3 Feed (mm/rev)	l/d≤3 Depth of Cut (mm)	l/d=3—4 Cutting Speed (m/min)	l/d=3—4 Feed (mm/rev)	l/d=3—4 Depth of Cut (mm)
P	Carbon Steel Alloy Steel	180—350HB	Medium	110 (80—140)	0.25 (0.1—0.4)	—5.0	110 (80—140)	0.2 (0.1—0.3)	—4.0
M	Stainless Steel	≤200HB	Medium	80 (60—100)	0.2 (0.1—0.3)	—4.0	70 (50—100)	0.15 (0.1—0.25)	—3.0
K	Gray Cast Iron	Tensile Strength ≤350MPa	Medium	80 (60—100)	0.25 (0.1—0.4)	—5.0	80 (60—100)	0.2 (0.1—0.3)	—4.0

A-PDQN

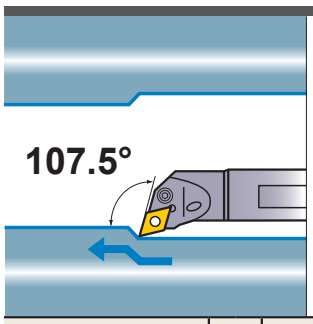
P TYPE BORING BARS

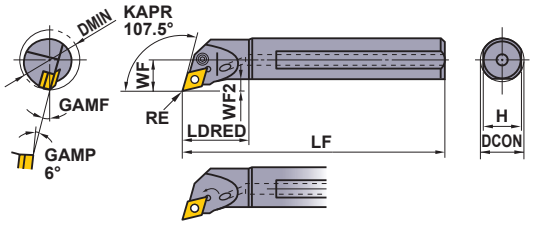
With coolant hole

Product Information

107° 30′ KAPR

GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 226
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966
TURNING INSERTS >> 108
PCD TURNING INSERTS >> 267
TECHNICAL INFO >> 1971





*1 Pin Lock Type

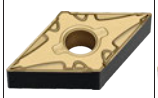
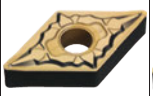
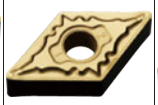
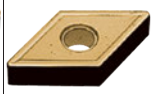
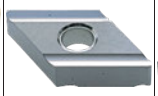
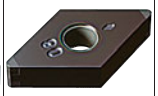
Right hand tool holder shown.

Order Number	Stock R	Stock L	Insert Number		DCON	LF	LDRED	WF	WF2	H	GAMF	DMIN	RE	Shim	Shim Pin	Clamp Lever	Clamp Screw *2	Wrench	Plug	Clamp Pin *2	Pin	Screw
A25RPDQNR/L15	●	●	DNMA DNMG DNMM DNGA DNGG	1504○○	25	200	40	17	6.9	23	13°	**32**	0.8	MLDP42	—	—	—	HKY15R HKY30R	HGM-PT1/4	HP43	P210AM	HSS03005
A32SPDQNR/L15	●	●		1504○○	32	250	50	22	8.4	30	13°	**44**	0.8	LLSDN42	LLP14	LLCL24	LLCS108S	HKY30R	HGM-PT3/8	—	—	—
A40TPDQNR/L15	●	●		1504○○	40	300	63	27	9.4	37	10°	**54**	0.8	LLSDN42	LLP14	LLCL24	LLCS108S	HKY30R	HGM-PT3/8	—	—	—
A50UPDQNR15	●			1504○○	50	350	80	35	12.4	47	9°	**70**	0.8	LLSDN42	LLP14	LLCL24	LLCS108S	HKY30R	HGM-PT3/8	—	—	—

*1 Pin Lock Type : A25RPDQNR/L15
*2 Clamp Torque (N • m) : LLCS108S=3.3, HP43=3.3

● : **Inventory maintained in Japan.**

·CHIP BREAKER EXAMPLE

Finish Cutting	Light Cutting	Medium Cutting	Medium Cutting	Medium Cutting	For Stainless Steel	G class	CBN/PCD
FP	LP	MP	MH	Standard	MM	L	
							
(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.
- When using insert with right and left hand chip breaker, please use left hand insert for right hand holder and right hand insert for left hand holder.

·RECOMMENDED CUTTING CONDITION

	Work Material	Hardness	Cutting Mode	l/d≤3 Cutting Speed (m/min)	l/d≤3 Feed (mm/rev)	l/d≤3 Depth of Cut (mm)	l/d=3–4 Cutting Speed (m/min)	l/d=3–4 Feed (mm/rev)	l/d=3–4 Depth of Cut (mm)
P	Carbon Steel Alloy Steel	180–350HB	Medium	110 (80–140)	0.25 (0.1–0.4)	–5.0	110 (80–140)	0.2 (0.1–0.3)	–4.0
M	Stainless Steel	≤200HB	Medium	80 (60–100)	0.2 (0.1–0.3)	–4.0	70 (50–100)	0.15 (0.1–0.25)	–3.0
K	Gray Cast Iron	Tensile Strength ≤350MPa	Medium	80 (60–100)	0.25 (0.1–0.4)	–5.0	80 (60–100)	0.2 (0.1–0.3)	–4.0

A-PDZN

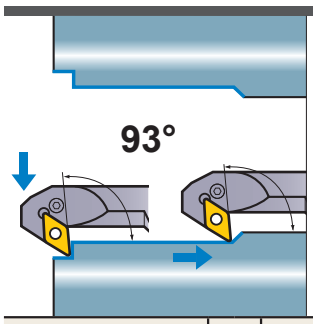
P TYPE BORING BARS

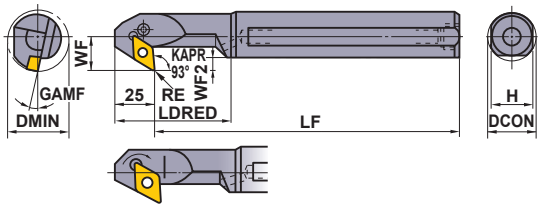
With coolant hole

Product Information

93° KAPR

GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 226
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966
TURNING INSERTS >> 108
PCD TURNING INSERTS >> 267
TECHNICAL INFO >> 1971





*1 Pin Lock Type

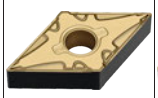
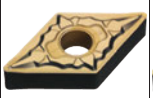
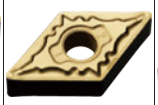
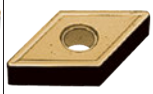
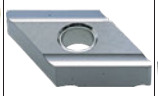
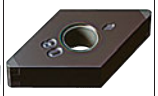
Right hand tool holder shown.

Order Number	Stock R	Stock L	Insert Number		DCON	LF	LDRED	WF	WF2	H	GAMF	DMIN	RE	Shim	Shim Pin	Clamp Lever	Clamp Screw *2	Wrench	Plug	Clamp Pin *2	Pin	Screw
A25RPDZNR/L15	●	●	DNMA DNMG DNMX DNMM DNGA DNGG	1504○○	25	200	65	17	6.7	23	13°	**32**	0.8	MLDP42	—	—	—	HKY15R HKY30R	HGM-PT1/4	HP43	P210AM	HSS03005
A32SPDZNR/L15	●	●		1504○○	32	250	75	22	8.2	30	13°	**40**	0.8	LLSDN42	LLP14	LLCL24	LLCS108S	HKY30R	HGM-PT3/8	—	—	—
A40TPDZNR/L15	●	●		1504○○	40	300	88	27	9.2	37	10°	**50**	0.8	LLSDN42	LLP14	LLCL24	LLCS108S	HKY30R	HGM-PT3/8	—	—	—
A50UPDZNR/L15	●	●		1504○○	50	350	105	35	12.2	47	9°	**63**	0.8	LLSDN42	LLP14	LLCL24	LLCS108S	HKY30R	HGM-PT3/8	—	—	—

*1 Pin Lock Type : A25RPDZNR/L15
*2 Clamp Torque (N • m) : LLCS108S=3.3, HP43=3.3

● : **Inventory maintained in Japan.**

·CHIP BREAKER EXAMPLE

Finish Cutting	Light Cutting	Medium Cutting	Medium Cutting	Medium Cutting	For Stainless Steel	G class	CBN/PCD
FP	LP	MP	MH	Standard	MM	L	
							
(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.
- When using insert with right and left hand chip breaker, please use left hand insert for right hand holder and right hand insert for left hand holder.

·RECOMMENDED CUTTING CONDITION

	Work Material	Hardness	Cutting Mode	l/d≤3 Cutting Speed (m/min)	l/d≤3 Feed (mm/rev)	l/d≤3 Depth of Cut (mm)	l/d=3–4 Cutting Speed (m/min)	l/d=3–4 Feed (mm/rev)	l/d=3–4 Depth of Cut (mm)
P	Carbon Steel Alloy Steel	180–350HB	Medium	110 (80–140)	0.25 (0.1–0.4)	–5.0	110 (80–140)	0.2 (0.1–0.3)	–4.0
M	Stainless Steel	≤200HB	Medium	80 (60–100)	0.2 (0.1–0.3)	–4.0	70 (50–100)	0.15 (0.1–0.25)	–3.0
K	Gray Cast Iron	Tensile Strength ≤350MPa	Medium	80 (60–100)	0.25 (0.1–0.4)	–5.0	80 (60–100)	0.2 (0.1–0.3)	–4.0

MWLN

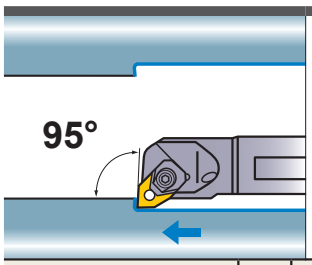
M TYPE BORING BARS

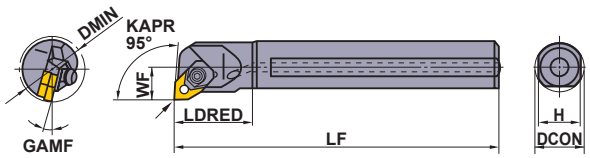
With coolant hole

Product Information

95° KAPR

GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 237
TECHNICAL INFO >> 1971
TURNING INSERTS >> 130
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966





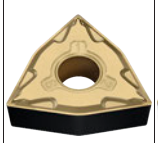
Right hand (R) only for the standard.

Order Number	Stock	Insert Number		Dimensions(mm)								Shim	Shim Pin	Clamp Bridge	Side Lock Plate	Spring	Clamp Screw *	Wrench	Plug
	R			DCON	LF	LDRED	WF	H	GAMF	DMIN	RE								
A50UMWLNR08	●	WNMA WNMG	0804	50	350	80	35	63	9°	63	0.8	WPS WC43	CCP44	CCK13	CPT24	MES2	SLCS105	HKY25R HKY40R	HGM-PT3/8

* Clamp Torque (N • m) : SLCS105=7.0

● : **Inventory maintained in Japan.**

·CHIP BREAKER EXAMPLE

Finish Cutting	Light Cutting	Medium Cutting	Medium Cutting	Medium Cutting	Medium to Rough Cutting	For Stainless Steel
FP	LP	MP	MH	Standard	RP	MM
						
(08)	(08)	(06,08)	(08)	(08)	(08)	(06,8)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.
- When using insert with right and left hand chip breaker, please use left hand insert for right hand holder and right hand insert for left hand holder.

·RECOMMENDED CUTTING CONDITION

	Work Material	Hardness	Cutting Mode	l/d≤3			l/d=3—4		
				Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
P	Carbon Steel Alloy Steel	180—350HB	Medium	110 (80—140)	0.25 (0.1—0.4)	—5.0	110 (80—140)	0.2 (0.1—0.3)	—4.0
M	Stainless Steel	≤200HB	Medium	80 (60—100)	0.2 (0.1—0.3)	—4.0	70 (50—100)	0.15 (0.1—0.25)	—3.0
K	Gray Cast Iron	Tensile Strength ≤350MPa	Medium	80 (60—100)	0.25 (0.1—0.4)	—5.0	80 (60—100)	0.2 (0.1—0.3)	—4.0

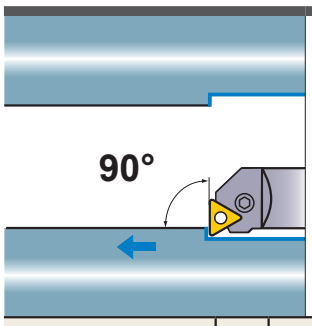
DPTF

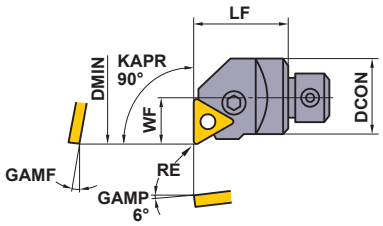
D TYPE BORING HEAD

Product Information

90° KAPR

GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 232
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966
TURNING INSERTS >> 121
PCD TURNING INSERTS >> 269
TECHNICAL INFO >> 1971
STANDARD ARBOR FOR D TYPE BORING HEAD >> 450





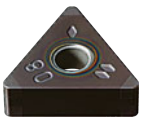
Right hand tool holder only.

Order Number	Stock	Insert Number		Dimensions(mm)						Shim	Shim Pin	Clamp Lever	Clamp Screw *	Wrench
	R			DCON	LF	WF	GAMF	DMIN	RE					
DPTF132R	●	TNMA TNMG TNMM TNGA TNGG	1604○○	32	40	20	12°	**40**	0.8	LLSTN32	LLP13	LLCL13	LLCS106	HKY25R
DPTF140R	●		2204○○	40	50	25	10°	**50**	0.8	LLSTN42	LLP14	LLCL14	LLCS108	HKY30R

* Clamp Torque (N • m) : LLCS106=2.2, LLCS108=3.3

● : **Inventory maintained in Japan.**

·CHIP BREAKER EXAMPLE

Finish Cutting	Light Cutting	Medium Cutting	Medium Cutting	Medium Cutting	For Stainless Steel	G class	CBN/PCD
FP	LP	MP	MH	Standard	MM	R/L	
							
(16)	(16)	(16)	(16)	(16,22)	(16,22)	(16,22)	(16)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.
- When using insert with right and left hand chip breaker, please use left hand insert for right hand holder and right hand insert for left hand holder.

·RECOMMENDED CUTTING CONDITION

	Work Material	Hardness	Cutting Mode	l/d≤3			l/d=3–4		
				Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
P	Carbon Steel Alloy Steel	180–350HB	Medium	110 (80–140)	0.25 (0.1–0.4)	–5.0	110 (80–140)	0.2 (0.1–0.3)	–4.0
M	Stainless Steel	≤200HB	Medium	80 (60–100)	0.2 (0.1–0.3)	–4.0	70 (50–100)	0.15 (0.1–0.25)	–3.0
K	Gray Cast Iron	Tensile Strength ≤350MPa	Medium	80 (60–100)	0.25 (0.1–0.4)	–5.0	80 (60–100)	0.2 (0.1–0.3)	–4.0

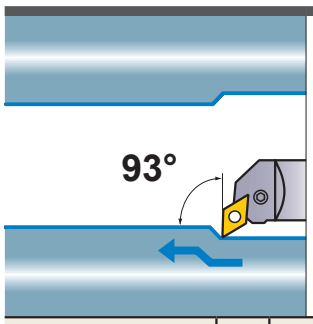
DPDU

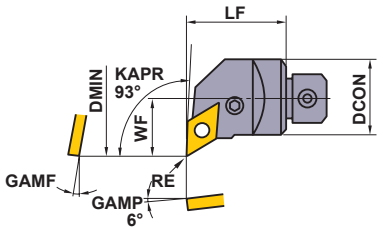
D TYPE BORING HEAD

Product Information

93° KAPR

GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 226
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966
TURNING INSERTS >> 108
PCD TURNING INSERTS >> 267
TECHNICAL INFO >> 1971
STANDARD ARBOR FOR D TYPE BORING HEAD >> 450





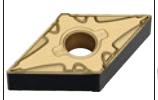
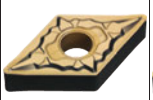
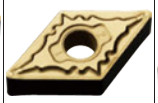
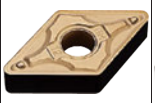
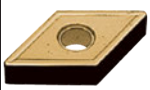
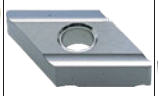
Right hand tool holder only.

Order Number	Stock	Insert Number		Dimensions(mm)						Shim	Shim Pin	Clamp Lever	Clamp Screw *	Wrench
	R			DCON	LF	WF	GAMF	DMIN	RE					
DPDU132R	●	DNMA DNMG DNMX DNMM DNGA DNGG	1504○○	32	40	25	10°	**50**	0.8	LLSDN42	LLP14	LLCL24	LLCS108	HKY30R
DPDU140R	●		1504○○	40	50	30	9°	**60**	0.8	LLSDN42	LLP14	LLCL24	LLCS108	HKY30R

* Clamp Torque (N • m) : LLCS108=3.3

● : **Inventory maintained in Japan.**

·CHIP BREAKER EXAMPLE

Finish Cutting	Light Cutting	Medium Cutting	Medium Cutting	Medium Cutting	For Stainless Steel	G class	CBN/PCD
FP	LP	MP	MH	Standard	MM	L	
							
(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.
- When using insert with right and left hand chip breaker, please use left hand insert for right hand holder and right hand insert for left hand holder.

·RECOMMENDED CUTTING CONDITION

	Work Material	Hardness	Cutting Mode	l/d≤3			l/d=3–4		
				Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
P	Carbon Steel Alloy Steel	180–350HB	Medium	110 (80–140)	0.25 (0.1–0.4)	–5.0	110 (80–140)	0.2 (0.1–0.3)	–4.0
M	Stainless Steel	≤200HB	Medium	80 (60–100)	0.2 (0.1–0.3)	–4.0	70 (50–100)	0.15 (0.1–0.25)	–3.0
K	Gray Cast Iron	Tensile Strength ≤350MPa	Medium	80 (60–100)	0.25 (0.1–0.4)	–5.0	80 (60–100)	0.2 (0.1–0.3)	–4.0

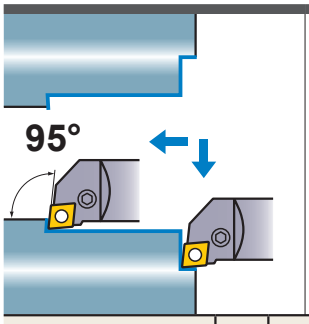
DPCL

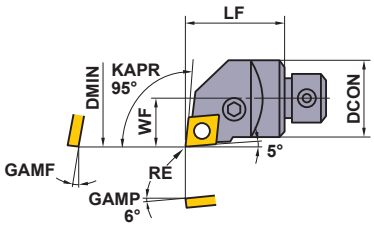
D TYPE BORING HEAD

Product Information

95° KAPR

GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 222
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966
TURNING INSERTS >> 102
PCD TURNING INSERTS >> 266
TECHNICAL INFO >> 1971
STANDARD ARBOR FOR D TYPE BORING HEAD >> 450





Right hand tool holder only.

Order Number	Stock	Insert Number		Dimensions(mm)						Shim	Shim Pin	Clamp Lever	Clamp Screw *	Wrench
	R			DCON	LF	WF	GAMF	DMIN	RE					
DPCL132R	●	CNMA CNMG CNMM CNGG	1204○○	32	40	20	12°	**40**	0.8	LLSCN42	LLP14	LLCL14	LLCS108	HKY30R
DPCL140R	●		1204○○	40	50	25	10°	**50**	0.8	LLSCN42	LLP14	LLCL14	LLCS108	HKY30R

* Clamp Torque (N • m) : LLCS108=3.3

● : **Inventory maintained in Japan.**

·CHIP BREAKER EXAMPLE

Finish Cutting	Light Cutting	Light Cutting	Light Cutting	Medium Cutting	Medium Cutting	For Stainless Steel	CBN/PCD
FP	SA	LP	LM	MP	Standard	MM	
(12)	(12)	(12)	(12)	(12)	(12)	(12)	(12)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.
- When using insert with right and left hand chip breaker, please use left hand insert for right hand holder and right hand insert for left hand holder.

·RECOMMENDED CUTTING CONDITION

	Work Material	Hardness	Cutting Mode	l/d≤3			l/d=3—4		
				Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
P	Carbon Steel Alloy Steel	180—350HB	Medium	110 (80—140)	0.25 (0.1—0.4)	—5.0	110 (80—140)	0.2 (0.1—0.3)	—4.0
M	Stainless Steel	≤200HB	Medium	80 (60—100)	0.2 (0.1—0.3)	—4.0	70 (50—100)	0.15 (0.1—0.25)	—3.0
K	Gray Cast Iron	Tensile Strength ≤350MPa	Medium	80 (60—100)	0.25 (0.1—0.4)	—5.0	80 (60—100)	0.2 (0.1—0.3)	—4.0

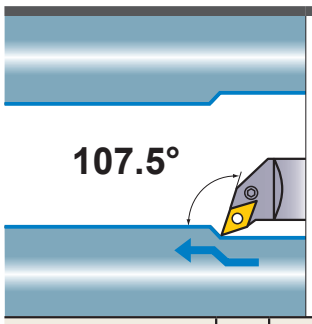
DPDH

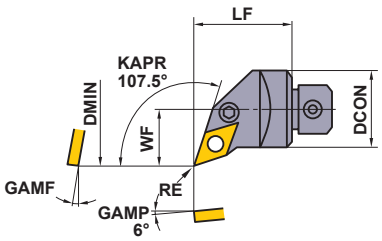
D TYPE BORING HEAD

Product Information

107° 30′ KAPR

GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 226
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966
TURNING INSERTS >> 108
PCD TURNING INSERTS >> 267
TECHNICAL INFO >> 1971
STANDARD ARBOR FOR D TYPE BORING HEAD >> 450





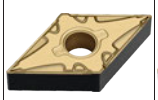
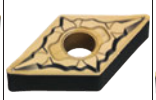
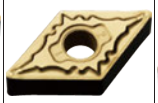
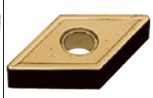
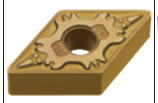
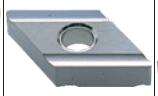
Right hand tool holder only.

Order Number	Stock	Insert Number		Dimensions(mm)						Shim	Shim Pin	Clamp Lever	Clamp Screw *	Wrench
	R			DCON	LF	WF	GAMF	DMIN	RE					
DPDH132R	●	DNMA DNMG DNMM DNGA DNGG	1504○○	32	40	25	10°	**50**	0.8	LLSDN42	LLP14	LLCL24	LLCS108	HKY30R
DPDH140R	●		1504○○	40	50	30	9°	**60**	0.8	LLSDN42	LLP14	LLCL24	LLCS108	HKY30R

* Clamp Torque (N • m) : LLCS108=3.3

● : **Inventory maintained in Japan.**

·CHIP BREAKER EXAMPLE

Finish Cutting	Light Cutting	Medium Cutting	Medium Cutting	Medium Cutting	For Stainless Steel	G class	CBN/PCD
FP	LP	MP	MH	Standard	MM	L	
							
(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.
- When using insert with right and left hand chip breaker, please use left hand insert for right hand holder and right hand insert for left hand holder.

·RECOMMENDED CUTTING CONDITION

	Work Material	Hardness	Cutting Mode	l/d≤3			l/d=3—4		
				Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
P	Carbon Steel Alloy Steel	180—350HB	Medium	110 (80—140)	0.25 (0.1—0.4)	—5.0	110 (80—140)	0.2 (0.1—0.3)	—4.0
M	Stainless Steel	≤200HB	Medium	80 (60—100)	0.2 (0.1—0.3)	—4.0	70 (50—100)	0.15 (0.1—0.25)	—3.0
K	Gray Cast Iron	Tensile Strength ≤350MPa	Medium	80 (60—100)	0.25 (0.1—0.4)	—5.0	80 (60—100)	0.2 (0.1—0.3)	—4.0

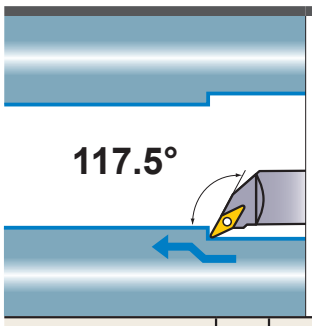
DPVP

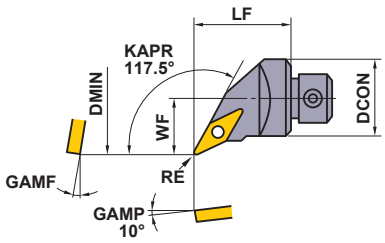
D TYPE BORING HEAD

Product Information

117° 30′ KAPR

GRADES AND CHIP BREAKERS >> 38
CBN TURNING INSERTS >> 235
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966
TURNING INSERTS >> 128
PCD TURNING INSERTS >> 270
TECHNICAL INFO >> 1971





Right hand tool holder only.

Order Number	Stock	Insert Number		Dimensions(mm)						Shim	Lock Pin	Lock Screw *	Stop Ring	Wrench
	R			DCON	LF	WF	GAMF	DMIN	RE					
DPVP132R	●	VNMG VNGA VNGG	1604○○	32	40	25	13°	**50**	0.8	PV322	P11S	HSP05008C	E03	HKY25R
DPVP140R	●		1604○○	40	50	30	13°	**60**	0.8	PV322	P11S	HSP05008C	E03	HKY25R

* Clamp Torque (N • m) : HSP05008C=2.5

● : **Inventory maintained in Japan.**

·CHIP BREAKER EXAMPLE

Finish Cutting	Light Cutting	Medium Cutting	Medium Cutting	For Stainless Steel	G class	PCD	CBN
FP	LP	MP	MH	MM	L	L-F	
(16)	(16)	(16)	(16)	(16)	(16)	(16)	(16)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.
- When using insert with right and left hand chip breaker, please use left hand insert for right hand holder and right hand insert for left hand holder.

·RECOMMENDED CUTTING CONDITION

	Work Material	Hardness	Cutting Mode	l/d≤3			l/d=3—4		
				Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
P	Carbon Steel Alloy Steel	180—350HB	Medium	110 (80—140)	0.25 (0.1—0.4)	—5.0	110 (80—140)	0.2 (0.1—0.3)	—4.0
M	Stainless Steel	≤200HB	Medium	80 (60—100)	0.2 (0.1—0.3)	—4.0	70 (50—100)	0.15 (0.1—0.25)	—3.0
K	Gray Cast Iron	Tensile Strength ≤350MPa	Medium	80 (60—100)	0.25 (0.1—0.4)	—5.0	80 (60—100)	0.2 (0.1—0.3)	—4.0

B1 Arbor

Product Information

SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966
TECHNICAL INFO >> 1971

STANDARD ARBOR FOR D TYPE BORING HEAD

① B ② 1 ③ 32 ④ 32

①Designation

②Arbor Length (mm)

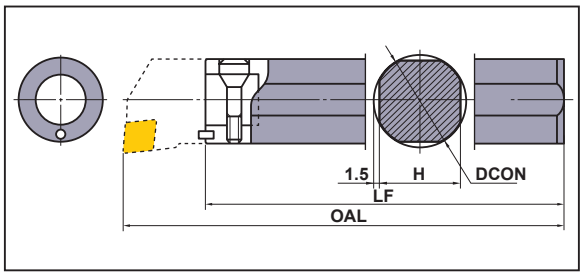
Symbol	DCON	LF	OAL
1	32	260	300
	40	310	360

③Arbor Diameter (mm)

Symbol	Diameter(DCON)
32	32
40	40

④Head Diameter (mm)

Symbol	Diameter(DCON)
32	32
40	40



Order Number	Stock	Dimensions (mm)				Set Bolt	Wrench	Head Order Number
		DCON	LF	H	OAL			
B13232	●	32	260	29	300	SD32	HKY60R	DP○○132R
B14040	●	40	310	37	360	SD40	HKY60R	DP○○140R

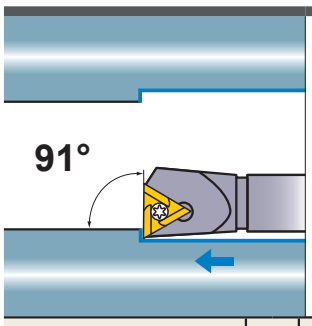
S-STFE

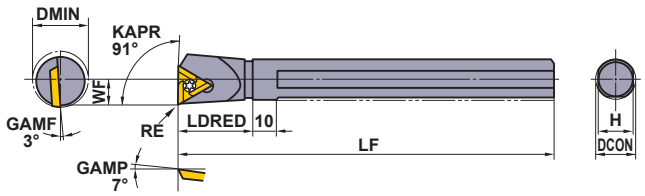
AL TYPE BORING BARS

Product Information

91° KAPR

GRADES AND CHIP BREAKERS >> 38
PCD TURNING INSERTS >> 284
TECHNICAL INFO >> 1971
TURNING INSERTS >> 157
SPARE PARTS >> 1927
ISO13399 PROPERTY >> 1966





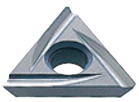
Right hand tool holder shown.

Order Number	Stock R	Stock L	Insert Number		DCON	LF	LDRED	WF	H	DMIN	RE	* Clamp Screw	Wrench
					Dimensions(mm)								
S16RSTFER/L16	●	●	TEGX...R/L	1603○○	16	200	30	11	14.6	**20**	0.4	FC400890T	TKY10F
S20RSTFER/L16	●	●		1603○○	20	200	37	13	18	**25**	0.4	FC400890T	TKY10F
S25SSTFER/L16	●	●		1603○○	25	250	40	17	23	**32**	0.4	FC400890T	TKY10F

* Clamp Torque (N • m) : FC400890T=2.5

● : **Inventory maintained in Japan.**

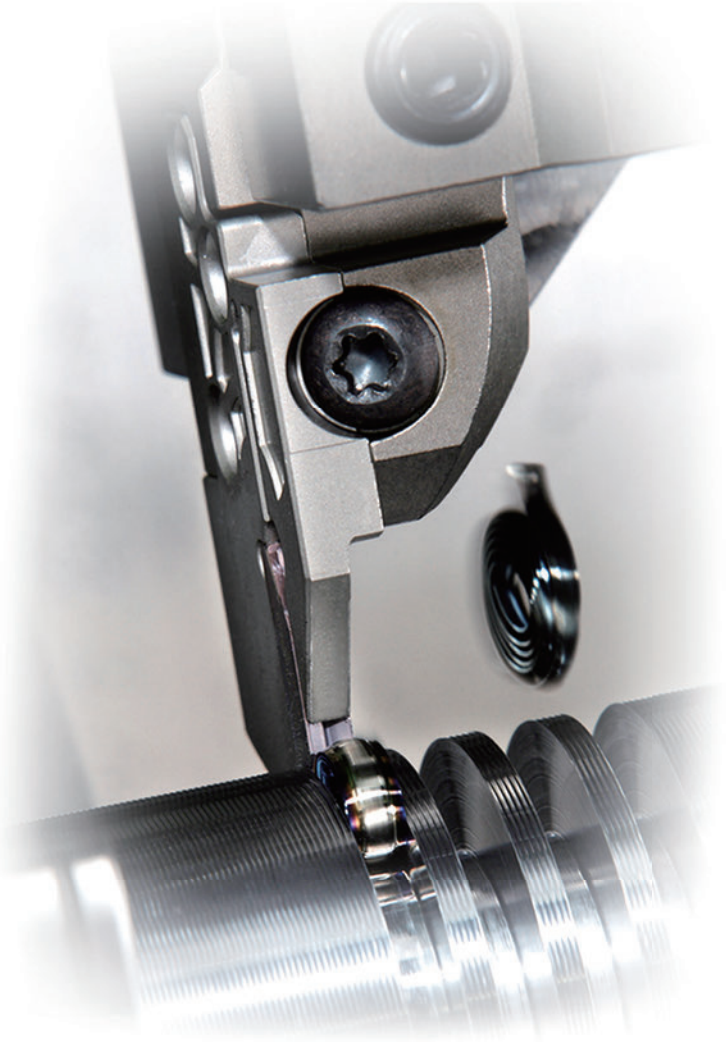
·CHIP BREAKER EXAMPLE

Medium Cutting	PCD	PCD
R/L  (16)	R/L (16)	(16)

- The insert photos are only examples. The letters refer to the chip breaker and the bracketed dimension are refers to the inscribed circle.
- When using insert with right and left hand chip breaker, please use left hand insert for right hand holder and right hand insert for left hand holder.

·RECOMMENDED CUTTING CONDITION

	Work Material	Grade	Cutting Speed (m/min)	l/d=3 Feed (mm/rev)	l/d=3 Depth of Cut (mm)	l/d=4 Feed (mm/rev)	l/d=4 Depth of Cut (mm)	l/d=5 Feed (mm/rev)	l/d=5 Depth of Cut (mm)	l/d=6 Feed (mm/rev)	l/d=6 Depth of Cut (mm)
N	Aluminium Alloy	**HTi10**	400 (200—600)	0.15 (0.05—0.25)	—3.0	0.15 (0.05—0.25)	—3.0	0.1 (0.05—0.2)	—2.5	0.1 (0.05—0.2)	—1.0
		MD220	800 (200—1500)	0.15 (0.05—0.25)	—3.0	0.15 (0.05—0.25)	—3.0	0.1 (0.05—0.2)	—2.5	0.1 (0.05—0.2)	—1.0



TURNING TOOLS
GROOVING

GY SERIES 454
GY SERIES ORDER NUMBER 460
GY INSERTS 462
STANDARD OF GROOVING TOOLS 466
EXTERNAL GROOVING 468
GY SERIES 468
UG HOLDER 554
MG HOLDER 557
SMG HOLDER 560
INTERNAL GROOVING 562
GY SERIES 562
MICRO-MINI 579
MICRO-MINI TWIN 580
F TYPE BORING BARS 584
D TYPE BORING HEAD 586

★Arranged by Alphabetical order

C-F/HR	579	FSL51/52	584	SMG	560
CG-RS	580	GY	468, 562	UGH	554
DPT	586	MG	557		

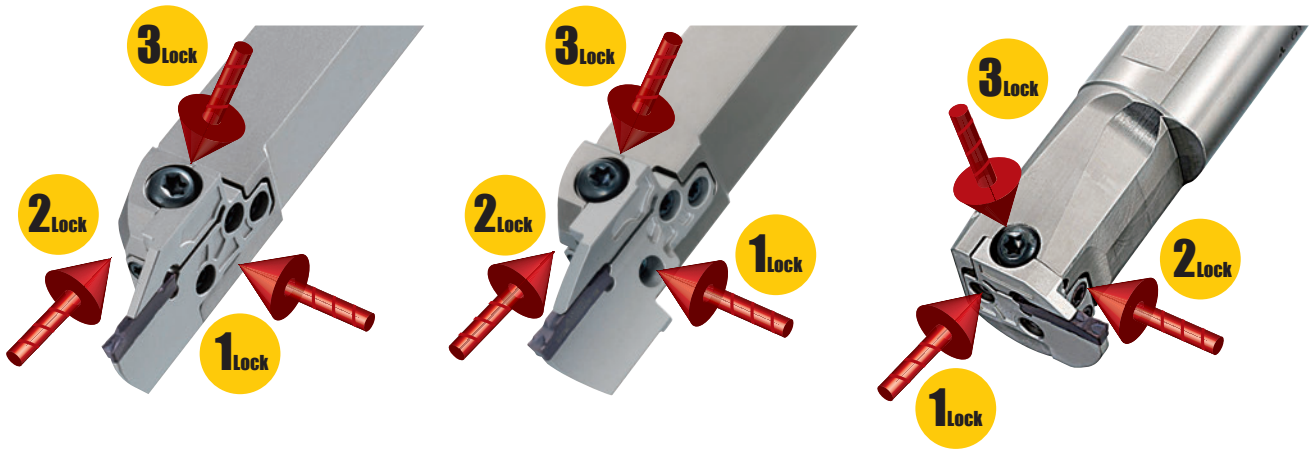
GY SERIES

GY series offers ultimate rigidity and accuracy for stable grooving.Easy to use modular blade system allows flexible tool management but maintains an overall strength comparable to a mono block type holder.

New Tri Lock System for increased stability and performance!

Innovative Tri Lock System

- Mitsubishi Materials has developed a new and unique, modular blade system.
  The Tri-Lock system ensures the blade is securely fixed in 3 directions (side, front and top) giving high rigidity for a stable grooving performance.

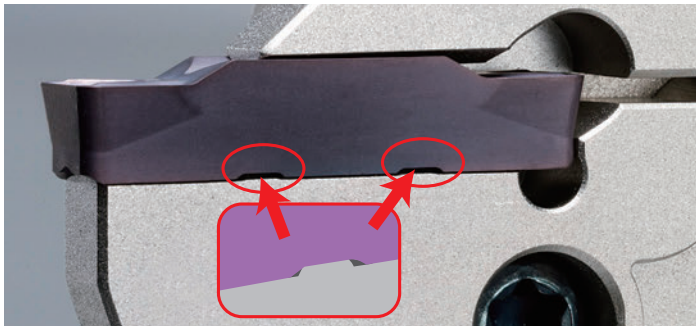


A wide variety of products with assorted combinations to consolidate necessary tools for diverse grooving applications.

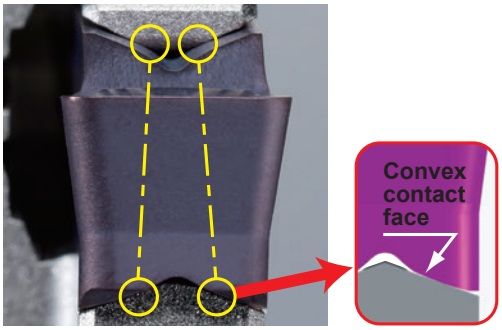
Original insert design leading the way to new grooving applications !

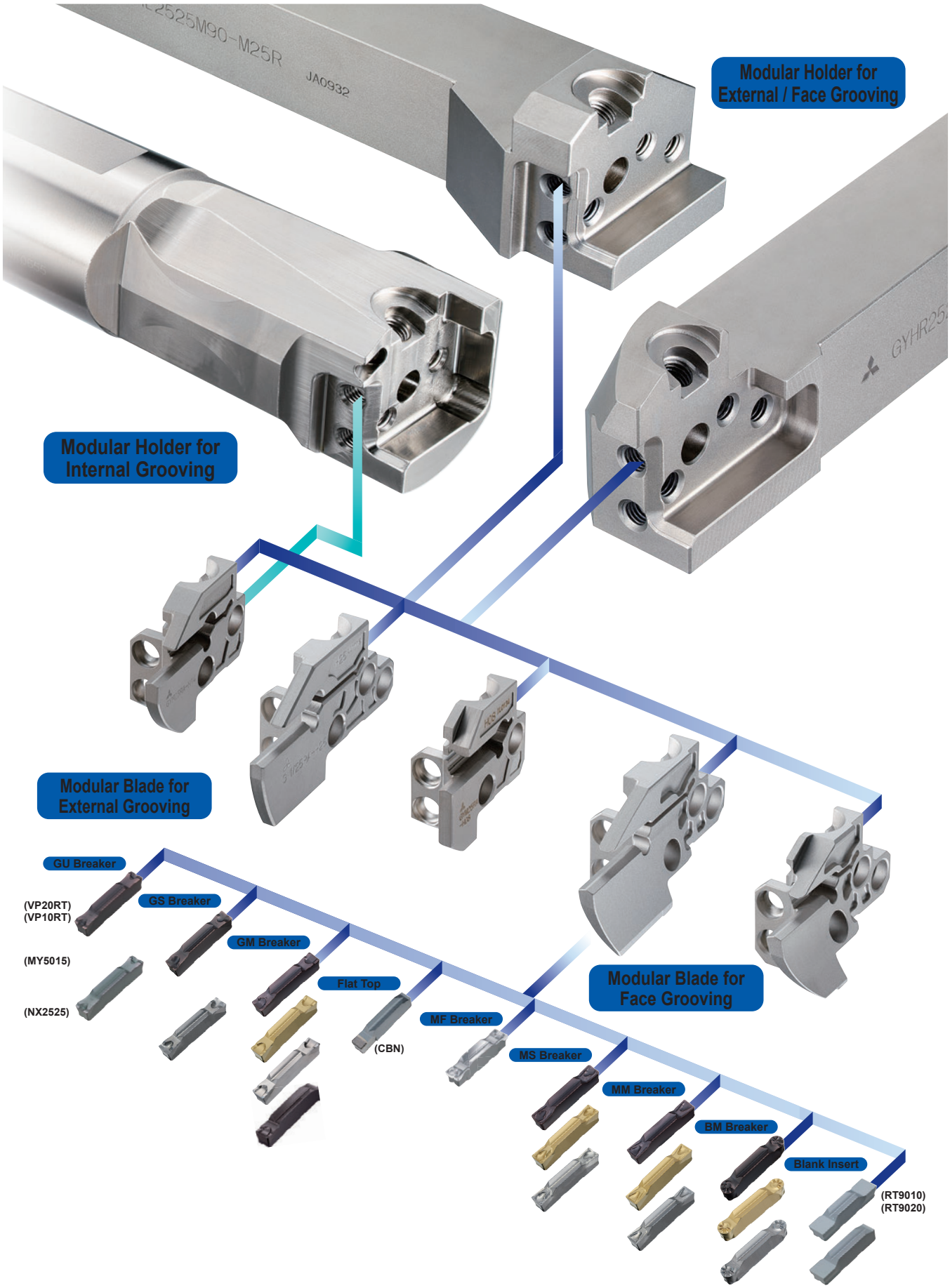
Highly reliable insert clamping

- Safety keys prevent insert movement.



- The convex geometry ensures high precision clamping.

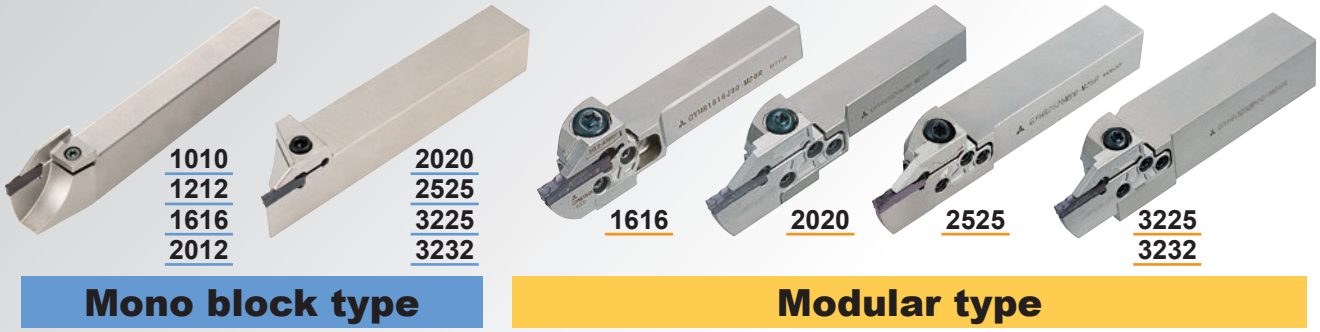



Modular Holder for External / Face Grooving
Modular Holder for Internal Grooving
Modular Blade for External Grooving
Modular Blade for Face Grooving
GU Breaker
(VP20RT)
(VP10RT)
GS Breaker
(MY5015)
GM Breaker
(NX2525)
Flat Top
(CBN)
MF Breaker
MS Breaker
MM Breaker
BM Breaker
Blank Insert
(RT9010)
(RT9020)

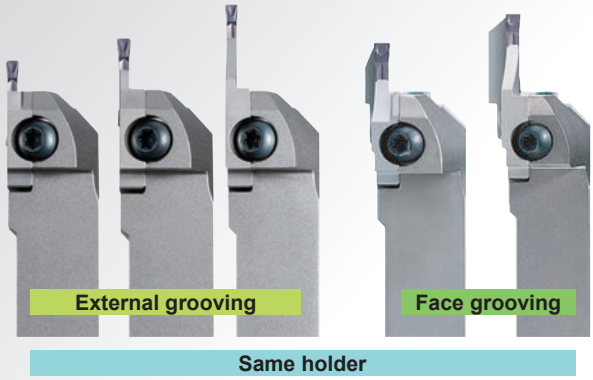
A wide selection of holders and inserts available for diverse grooving applications.

External • Face holders

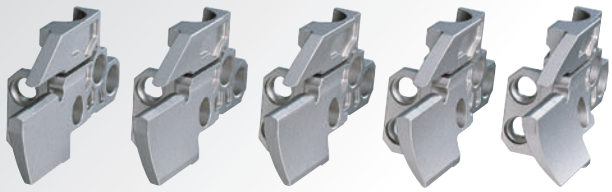
Corresponding blades to a variety of modular holders with different shank sizes.



A wide selection of holders and inserts available for diverse grooving applications



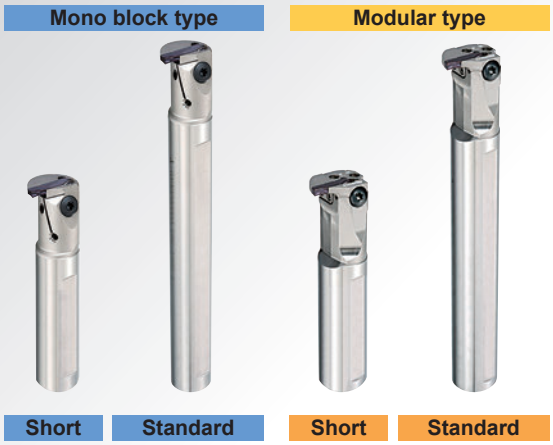
Applicable for various diameters of face grooves by the wide array of modular blades with different grooving diameters.



Internal holders

A wide range of holders available from minimum diameter of ø25mm.

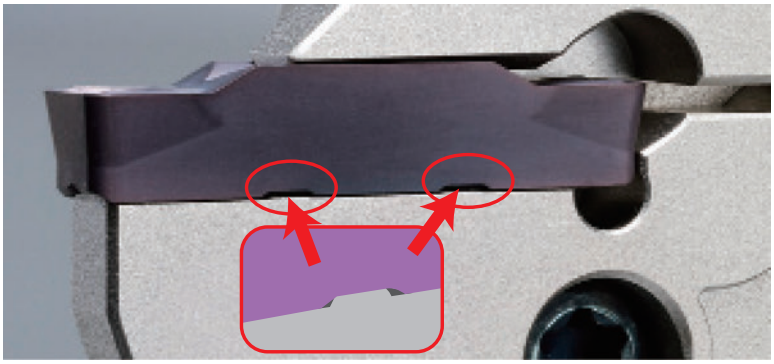
Short shank types are standard stocked.



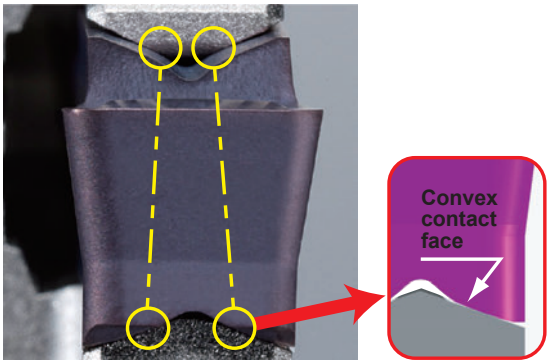
Original insert design leading the way to new grooving applications.

Highly reliable insert clamping

Safety keys prevent insert movement.

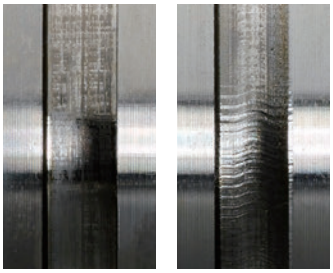


The convex geometry ensures high precision clamping.



Comparison of finished surface

GY series can achieve stable machining at the cutting conditions which created vibration with a conventional modular type tool.



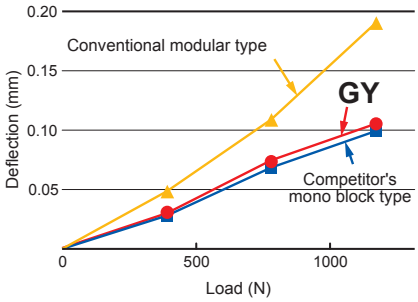
GY | Conventional modular type

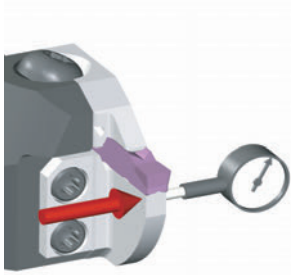
<Cutting Conditions>

Workpiece	: SCM440
Insert width	: 5mm
Cutting speed	: 150m/min
Feed	: 0.2mm/rev
Groove depth	: 23mm

Rigidity comparison

The GY series provides rigidity comparable to a mono block type grooving tool.



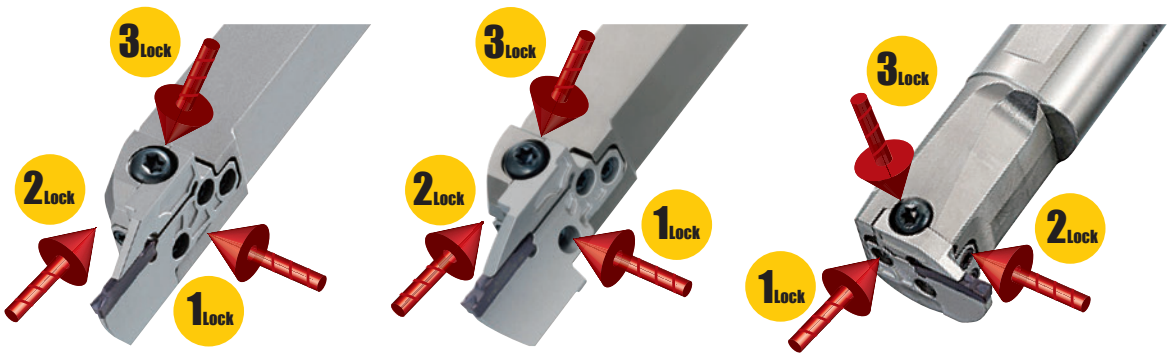


(Tool body for 5mm insert)

New TRI-LOCK System for increased stability and performance!

TRI-LOCK System

The TRI-LOCK system ensures the blade is securely fixed in 3 directions (side, front and top), giving high rigidity for stable grooving performance.

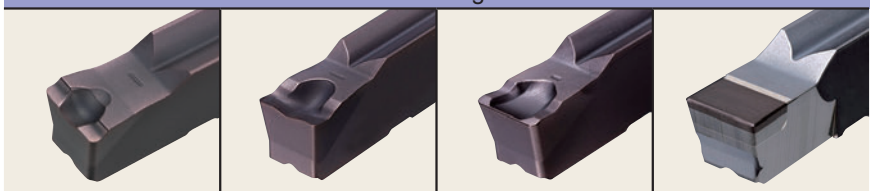


INSERT

A WIDE SELECTION OF INSERTS

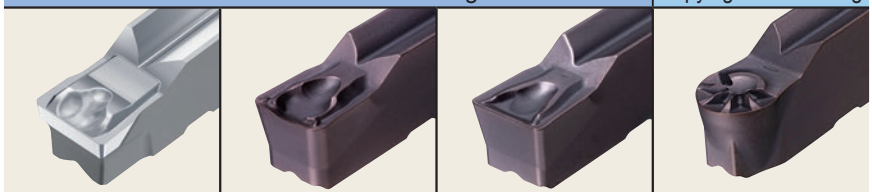
Breaker system

Grooving



GUBreaker (For Gummy Steel)	GSBreaker (Low feeds)	GMBreaker (Medium feeds)	GFGS (For hardened steel)

For Multifunctional Grooving / Copying/For recessing



MFBreaker (G class)	MSBreaker (Low feeds)	MMBreaker (Medium feeds)	BMBreaker

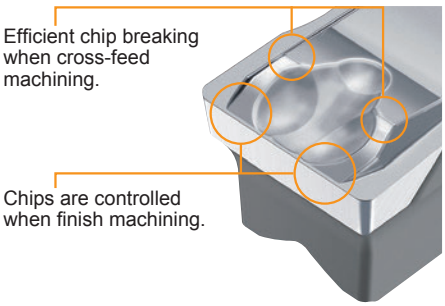
Cutting Off

GUBreaker (For Gummy Steel)	GSBreaker (Low feeds)	GMBreaker (Medium feeds)	R/L05-GMBreaker (Medium feeds)

Selection of groove widths

Different corner radii available

MF Breaker

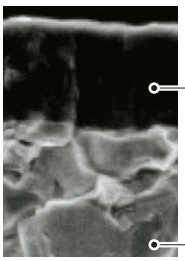


INSERT GRADE

Work Material / Machining Condition	P Steel	M Stainless Steel	K Cast Iron	S Heat resistant Alloy / Titanium Alloy	H Hardened steel
Stable	NX2525				BC8110
	MY5015		MY5015	VP10RT	
Machining Condition	VP10RT	VP10RT		RT9010	MB8025
			VP10RT		
	VP20RT	VP20RT	VP20RT	VP20RT	
Unstable					

Note1) VP20RT is the first recommended grade for materials other than hardened steel.
Note2) For VP10RT, VP20RT and MY5015, wet cutting is recommended.

VP20RT (1st Recommendation)

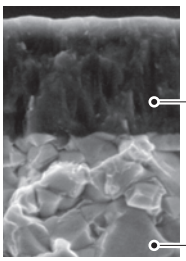


- PVD coated grade suitable for a wide range of applications. The combination of a special tough cemented carbide substrate with MIRACLE coating provides an excellent balance of wear and fracture resistance.

MIRACLE Coating

Tough cemented carbide substrate (HRA90.5)

VP10RT (2nd Recommendation)

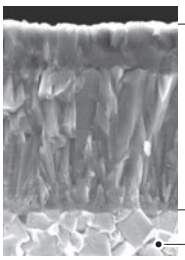


- PVD coated grade with a cemented carbide substrate harder than VP20RT. For use on difficult to cut materials and for extending tool life.

MIRACLE Coating

Tough cemented carbide substrate (HRA92.0)

MY5015



- MY5015 is a CVD coated grade with excellent wear resistance even at high temperatures. It provides longer tool life when machining cast and ductile cast irons. Also suitable for high speed continuous cutting of steels.

CVD Coated Carbide

Tough cemented carbide substrate

RT9010

- First recommended grade for Titanium alloys.
  Not recommended for use on non-ferrous alloys.

NX2525

- NX2525, a cermet grade for finish machining of steels and for good surface finishes at lower cutting speeds.

BC8110

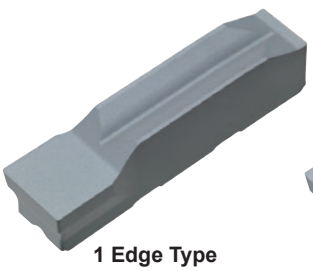
- A CBN coated grade for continuous cutting, which provides longer life when machining hardened steel.

MB8025

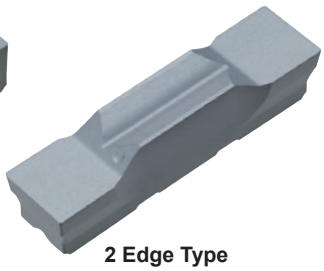
- MB8025 is a sintered CBN grade for hardened steel.

BLANK INSERTS

- Blank inserts for custom grinding



1 Edge Type



2 Edge Type

*** Insert blank is not suitable for machining without grinding.**
Refer to the following URL for more information.

RT9010/RT9020 for insert blank

- First recommendation on insert blank is RT9020 due to the tougher carbide substrate and suitable for a wide range of application.
  RT9010 is a harder substrate than RT9020 and is ideal for long tool life on stable cutting applications.
  Coating is recommended for application on steel, stainless steel and cast iron materials.

GY SERIES ORDER NUMBER

INSERT

① GY ② 2 ③ M ④ 0300 ⑤ F ⑥ 030 ⑦ N ⑧ 05 – ⑨ M ⑩ F

①Series Description

②Number of Teeth

1	1 Edge Type
2	2 Edge Type

③Peripheral

G	Ground
M	Sintered
B	Blank

④Groove Width

0150	1.50mm
0200	2.00mm
⋮	⋮
0800	8.00mm

⑤Seat Size *1

C	1.50mm
D	2.00mm 2.24mm
E	2.39mm 2.50mm 2.74mm
F	3.00mm 3.18mm 3.24mm
G	4.00mm 4.24mm
H	4.75mm 5.00mm 5.24mm
J	6.00mm 6.31mm 6.35mm
K	8.00mm

⑥Corner Radius

010	0.10mm
015	0.15mm
⋮	⋮
400	4.00mm

⑦Hand

N	Neutral
R	Right
L	Left

⑧Lead angle (R/L type insert)

05	5°

⑨Application 1

G	Grooving/Cutting off
M	Multifunctional
B	Copying (Ball shape)

⑩Application 2

U	For Gummy Steel
F	Finishing
S	Low feeds
M	Medium feeds

CBN INSERT

① GY ② 1 ③ G ④ 0300 ⑤ F ⑥ 020 ⑦ N – ⑨ G ⑪ F ⑫ GS

⑪Application 3

F	Flat Top

⑫Honing Type

GS	General Purpose

*1 Select a seat size with the same symbol as that of modular blade and mono block holder.

MODULAR BLADE

● EXTERNAL/INTERNAL/FOR RECESSING

① GY ② M25 ③ R ④ A – ⑤ F ⑥ 12 *3

①Series Description

②Modular Blade Size

M20
M25

③Hand

R	Right
L	Left

④Modular Blade Type

A	Standard Type
B	Reinforced Type
C	For recessing
D	Face Grooving

⑤Seat Size *1

D	2.00mm 2.24mm
E	2.39mm 2.50mm 2.74mm
F	3.00mm 3.18mm 3.24mm
G	4.00mm 4.24mm
H	4.75mm 5.00mm 5.24mm
J	6.00mm 6.31mm 6.35mm

⑥Max. Groove Depth *2

005	0.5mm
06	6mm
⋮	⋮
25	25mm

● FACE GROOVING

① GY ② M25 ③ R ④ D – ⑤ F ⑥ 12 – ⑦ 050

⑦Min. Groove Diameter

035	35mm
040	40mm
⋮	⋮
250	250mm

*1 Select a seat size with the same symbol as that of the insert.
*2 The maximum groove depth is a value when used for external grooving and changes according to the insert used.
*3 GYM20R/LA-◯10, GYM20R/LA-◯12, GYM25R/LA-◯12 and GYM25R/LA-◯14 can be used for both external and internal grooving.

EXTERNAL/FACE GROOVING/FOR RECESSING

MONO BLOCK HOLDER

①	②	③	④	⑤	⑥		⑦	⑧
GY	P	R	2525	M	00	–	K	25

①Series Description

②Holder Type

S	Mono block type for Swiss style lathes
P	With mono block offset
Q	Without mono block offset
H	Modular holder

③Hand of Holder

R	Right
L	Left

④Shank Diameter(H x W)

1010	10mmx10mm
1212	12mmx12mm
1616	16mmx16mm
2012	20mmx12mm
2020	20mmx20mm
2525	25mmx25mm
3225	32mmx25mm
3232	32mmx32mm

⑤Holder Length

J	110mm
JX	120mm
K	125mm
M	150mm
P	170mm

⑥Angle

00	0°
50	50°
90	90°

⑦Seat Size *1

C	1.50mm
D	2.00mm 2.24mm
E	2.39mm 2.50mm 2.74mm
F	3.00mm 3.18mm 3.24mm
G	4.00mm 4.24mm
H	4.75mm 5.00mm 5.24mm
J	6.00mm 6.31mm 6.35mm
K	8.00mm

⑧Max. Groove Depth

06	6mm
08	8mm
⋮	⋮
25	25mm

MODULAR HOLDER

①	②	③	④	⑤	⑥		⑨	⑩
GY	H	R	2525	M	00	–	M25	R

⑨Modular Blade Size

M20
M25

⑩Hand of Modular Blade

R	Right
L	Left

*1 Select a seat size with the same symbol as that of the insert.

INTERNAL

MONO BLOCK HOLDER

①	②	③	④	⑤	⑥	⑦		⑧	⑨
GY	A	R	20	K	90	A	–	F	06

①Series Description

②Holder Type

A	Mono Block
D	Modular holder

③Hand of Holder

R	Right
L	Left

④Shank Diameter

20	20mm
25	25mm
32	32mm
40	40mm
50	50mm

⑤Holder Length

K	125mm
L	140mm
M	150mm
P	170mm
Q	180mm
R	200mm
S	250mm
T	300mm

⑥Angle

90	90°

⑦Neck Length

A	30mm
B	40mm
C	50mm
D	60mm
F	80mm

⑧Seat Size *1

D	2.00mm 2.24mm
E	2.39mm 2.50mm 2.74mm
F	3.00mm 3.18mm 3.24mm
G	4.00mm 4.24mm
H	4.75mm 5.00mm 5.24mm
J	6.00mm 6.31mm 6.24mm

⑨Max. Groove Depth

06	6mm
07	7mm

MODULAR HOLDER

①	②	③	④	⑤	⑥	⑦		⑩	⑪
GY	D	R	40	M	90	D	–	M25	L

⑩Modular Blade Size

M20
M25

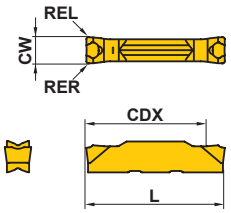
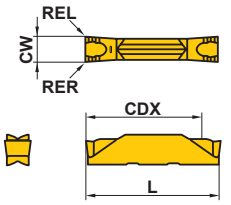
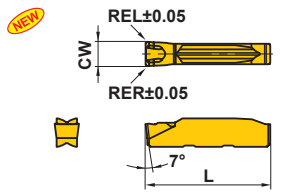
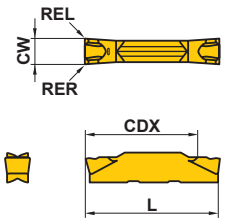
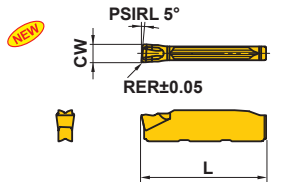
⑪Hand of Modular Blade

R	Right
L	Left

*1 Select a seat size with the same symbol as that of the insert.

GY INSERTS

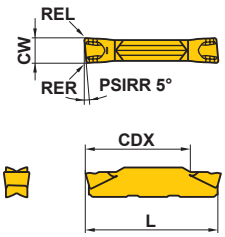
INSERTS

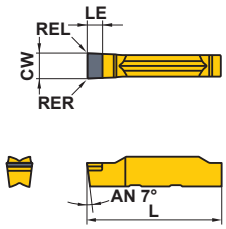
Applications	Geometry	Order Number	Stock: Coated VP10RT	Coated VP20RT	Coated MY5015	Cermet NX2525	Carbide	Carbide RT9010	Carbide RT9020	CBN MB8025	Seat Size	Dimensions (mm) CW Grooving Width	CW Tolerance	RER/L	CDX	*2 L
For Grooving / Cutting off	**GU Breaker** (For gummy steel) 	GY2M0200D020N-GU	●	●		●					D	2.00	±0.03	0.2	19.7	20.70
		GY2M0239E020N-GU	●	●		●					E	2.39	±0.03	0.2	19.8	20.70
		GY2M0250E020N-GU	●	●		●					E	2.50	±0.03	0.2	19.5	20.70
		GY2M0300F030N-GU	●	●		●					F	3.00	±0.03	0.3	19.3	20.70
		GY2M0318F030N-GU	●	●		●					F	3.18	±0.03	0.3	19.3	20.70
		GY2M0400G030N-GU	●	●		●					G	4.00	±0.04	0.3	24.2	25.65
		GY2M0475H040N-GU	●	●		●					H	4.75	±0.04	0.4	24.2	25.65
		GY2M0500H040N-GU	●	●		●					H	5.00	±0.04	0.4	24.2	25.65
		GY2M0600J040N-GU	●	●		●					J	6.00	±0.04	0.4	24.2	25.65
		GY2M0635J040N-GU	●	●		●					J	6.35	±0.04	0.4	24.2	25.65
	GS Breaker (Low feeds) 	GY2M0150C010N-GS	●	●		●					C	1.50	±0.03	0.1	13.4	14.70
		GY2M0200D020N-GS	●	●		●					D	2.00	±0.03	0.2	18.7	20.70
		GY2M0239E020N-GS	●	●		●					E	2.39	±0.03	0.2	18.5	20.70
		GY2M0250E020N-GS	●	●		●					E	2.50	±0.03	0.2	18.5	20.70
		GY2M0300F020N-GS	●	●		●					F	3.00	±0.03	0.2	18.5	20.70
		GY2M0318F020N-GS	●	●		●					F	3.18	±0.03	0.2	18.5	20.70
		GY2M0400G020N-GS	●	●		●					G	4.00	±0.04	0.2	23.9	25.65
		GY2M0475H030N-GS	●	●		●					H	4.75	±0.04	0.3	23.9	25.65
		GY2M0500H030N-GS	●	●		●					H	5.00	±0.04	0.3	24.0	25.65
		GY2M0600J030N-GS	●	●		●					J	6.00	±0.04	0.3	24.1	25.65
		GY2M0635J030N-GS	●	●		●					J	6.35	±0.04	0.3	24.1	25.65
		GY2M0800K030N-GS	●	●							K	8.00	±0.04	0.3	29.1	30.50
	GM Breaker (Medium feeds) NEW 	GY1M0200D020N-GM	●	●	●						D	2.00	±0.03	0.2	—	20.70
		GY1M0250E020N-GM	●	●	●						E	2.50	±0.03	0.2	—	20.70
		GY1M0300F030N-GM	●	●	●						F	3.00	±0.03	0.3	—	20.70
		GY1M0400G030N-GM	●	●	●						G	4.00	±0.04	0.3	—	25.65
		GY1M0500H040N-GM	●	●	●						H	5.00	±0.04	0.4	—	25.65
	GM Breaker (Medium feeds) 	GY2M0150C020N-GM	●	●		●					C	1.50	±0.03	0.2	13.9	14.70
		GY2M0200D020N-GM	●	●	●	●					D	2.00	±0.03	0.2	19.4	20.70
		GY2M0239E020N-GM	●	●	●	●					E	2.39	±0.03	0.2	19.4	20.70
		GY2M0250E020N-GM	●	●	●	●					E	2.50	±0.03	0.2	19.4	20.70
		GY2M0300F030N-GM	●	●	●	●					F	3.00	±0.03	0.3	19.4	20.70
		GY2M0318F030N-GM	●	●	●	●					F	3.18	±0.03	0.3	19.4	20.70
		GY2M0400G030N-GM	●	●	●	●					G	4.00	±0.04	0.3	24.4	25.65
		GY2M0475H040N-GM	●	●	●	●					H	4.75	±0.04	0.4	24.3	25.65
		GY2M0500H040N-GM	●	●	●	●					H	5.00	±0.04	0.4	24.3	25.65
		GY2M0600J040N-GM	●	●	●	●					J	6.00	±0.04	0.4	24.3	25.65
		GY2M0635J040N-GM	●	●	●	●					J	6.35	±0.04	0.4	24.3	25.65
		GY2M0800K050N-GM	●	●	●						K	8.00	±0.04	0.5	29.3	30.50
For Cutting off	**R/L05-GM Breaker** NEW  Left hand insert shown.	GY1M0200D020R05-GM	●	●							D	2.00	±0.03	0.2	—	20.80
		GY1M0200D020L05-GM	●	●							D	2.00	±0.03	0.2	—	20.80
		GY1M0300F030R05-GM	●	●							F	3.00	±0.03	0.3	—	20.85
		GY1M0300F030L05-GM	●	●							F	3.00	±0.03	0.3	—	20.85

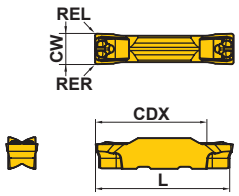
*2 The dimension depends on the breaker. Refer to the "L dimension tolerance conversion table".

● : Inventory maintained in Japan. (10 inserts in one case) (CBN inserts are available in 1 piece in one case.)

Applications	Geometry	Order Number	Stock: Coated VP10RT	Coated VP20RT	Cermet MY5015	Cermet NX2525	Carbide	Carbide RT9010	Carbide RT9020	CBN BC8110	CBN MB8025	Seat Size	Dimensions (mm): CW Grooving Width	CW Tolerance	RER/L	CDX	*2 L	LE
For Cutting off	**R/L05-GM Breaker**	GY2M0200D020R05-GM	●	●								D	2.00	±0.03	0.2	19.5	20.80	—
		GY2M0200D020L05-GM	●	●								D	2.00	±0.03	0.2	19.5	20.80	—
		GY2M0250E020R05-GM	●	●								E	2.50	±0.03	0.2	19.5	20.825	—
		GY2M0250E020L05-GM	●	●								E	2.50	±0.03	0.2	19.5	20.825	—
		GY2M0300F030R05-GM	●	●								F	3.00	±0.03	0.3	19.5	20.85	—
		GY2M0300F030L05-GM	●	●								F	3.00	±0.03	0.3	19.5	20.85	—
		GY2M0400G030R05-GM	●	●								G	4.00	±0.04	0.3	24.5	25.85	—
		GY2M0400G030L05-GM	●	●								G	4.00	±0.04	0.3	24.5	25.85	—
		GY2M0500H040R05-GM	●	●								H	5.00	±0.04	0.4	24.5	25.95	—
	Right hand insert shown.	GY2M0500H040L05-GM	●	●								H	5.00	±0.04	0.4	24.5	25.95	—
For Grooving	**Flat Top** (For hardened steel)	GY1G0200D020N-GFGS								●	●	D	2.00	±0.03	0.2	—	20.70	2.7
		GY1G0239E020N-GFGS								●	●	E	2.39	±0.03	0.2	—	20.70	2.7
		GY1G0250E020N-GFGS								●	●	E	2.50	±0.03	0.2	—	20.70	2.7
		GY1G0300F020N-GFGS								●	●	F	3.00	±0.03	0.2	—	20.70	2.7
		GY1G0318F020N-GFGS								●	●	F	3.18	±0.03	0.2	—	20.70	2.7
		GY1G0400G020N-GFGS								●	●	G	4.00	±0.03	0.2	—	25.65	2.7
		GY1G0475H020N-GFGS								●	●	H	4.75	±0.03	0.2	—	25.65	2.7
		GY1G0500H020N-GFGS								●	●	H	5.00	±0.03	0.2	—	25.65	2.7
		GY1G0600J020N-GFGS								●		J	6.00	±0.03	0.2	—	25.65	2.7
For Multifunctional Grooving	**MF Breaker** (Finishing)	GY2G0200D020N-MF	●	●		●		●				D	2.00	±0.02	0.2	19.5	21.05	—
		*1GY2G0224D015N-MF	●	●		●		●				D	2.24	±0.02	0.15	19.8	21.05	—
		GY2G0239E020N-MF	●	●		●		●				E	2.39	±0.02	0.2	19.2	21.05	—
		GY2G0250E020N-MF	●	●		●		●				E	2.50	±0.02	0.2	19.4	21.05	—
		*1GY2G0274E020N-MF	●	●		●		●				E	2.74	±0.02	0.2	19.7	21.05	—
		GY2G0300F020N-MF	●	●		●		●				F	3.00	±0.02	0.2	19.5	21.05	—
		GY2G0300F040N-MF	●	●		●		●				F	3.00	±0.02	0.4	19.3	21.05	—
		GY2G0318F020N-MF	●	●		●		●				F	3.18	±0.02	0.2	19.5	21.05	—
		GY2G0318F040N-MF	●	●		●		●				F	3.18	±0.02	0.4	19.3	21.05	—
		*1GY2G0324F020N-MF	●	●		●		●				F	3.24	±0.02	0.2	19.5	21.05	—
		GY2G0400G020N-MF	●	●		●		●				G	4.00	±0.02	0.2	24.9	25.95	—
		GY2G0400G040N-MF	●	●		●		●				G	4.00	±0.02	0.4	24.7	25.95	—
		GY2G0400G080N-MF	●	●		●		●				G	4.00	±0.02	0.8	24.3	25.95	—
		*1GY2G0424G020N-MF	●	●		●		●				G	4.24	±0.02	0.2	24.9	25.95	—
		GY2G0475H020N-MF	●	●		●		●				H	4.75	±0.02	0.2	24.4	25.95	—
		GY2G0475H040N-MF	●	●		●		●				H	4.75	±0.02	0.4	24.2	25.95	—
		GY2G0475H080N-MF	●	●		●		●				H	4.75	±0.02	0.8	23.8	25.95	—
		GY2G0500H020N-MF	●	●		●		●				H	5.00	±0.02	0.2	24.4	25.95	—
		GY2G0500H040N-MF	●	●		●		●				H	5.00	±0.02	0.4	24.2	25.95	—
		GY2G0500H080N-MF	●	●		●		●				H	5.00	±0.02	0.8	23.8	25.95	—
		*1GY2G0524H020N-MF	●	●		●		●				H	5.24	±0.02	0.2	24.4	25.95	—
		GY2G0600J020N-MF	●	●		●		●				J	6.00	±0.02	0.2	24.4	25.95	—
		GY2G0600J040N-MF	●	●		●		●				J	6.00	±0.02	0.4	24.2	25.95	—
		GY2G0600J080N-MF	●	●		●		●				J	6.00	±0.02	0.8	23.8	25.95	—
		*1GY2G0631J020N-MF	●	●		●		●				J	6.31	±0.02	0.2	24.4	25.95	—
		GY2G0635J020N-MF	●	●		●		●				J	6.35	±0.02	0.2	24.4	25.95	—
		GY2G0635J040N-MF	●	●		●		●				J	6.35	±0.02	0.4	24.2	25.95	—
		GY2G0635J080N-MF	●	●		●		●				J	6.35	±0.02	0.8	23.8	25.95	—



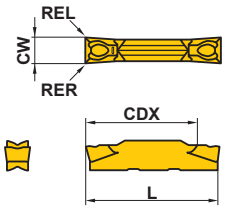
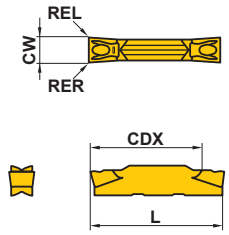
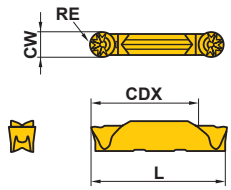
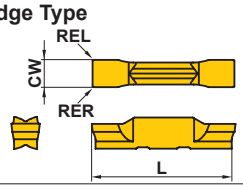
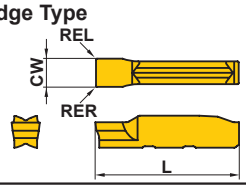




*1 Circlip corresponding width of cut

■ = MIRACLE SIGMA

INSERTS

Applications	Geometry	Order Number	Stock: Coated VP10RT	Coated VP20RT	Coated MY5015	Cermet NX2525		Carbide RT9010	Carbide RT9020	CBN MB8025	Seat Size	Dimensions (mm) CW Grooving Width	CW Tolerance	RE RER/L	CDX	*2 L
For Multifunctional Grooving	**MS Breaker** (Low feeds) 	GY2M0200D020N-MS	●	●	●	●					D	2.00	±0.03	0.2	19.1	20.70
		GY2M0250E020N-MS	●	●	●	●					E	2.50	±0.03	0.2	19.1	20.70
		GY2M0300F020N-MS	●	●	●	●					F	3.00	±0.03	0.2	19.2	20.70
		GY2M0300F040N-MS	●	●	●	●					F	3.00	±0.03	0.4	18.9	20.70
		GY2M0400G020N-MS	●	●	●	●					G	4.00	±0.04	0.2	24.2	25.65
		GY2M0400G040N-MS	●	●	●	●					G	4.00	±0.04	0.4	23.9	25.65
		GY2M0500H040N-MS	●	●	●	●					H	5.00	±0.04	0.4	23.9	25.65
		GY2M0500H080N-MS	●	●	●	●					H	5.00	±0.04	0.8	23.5	25.65
		GY2M0600J040N-MS	●	●	●	●					J	6.00	±0.04	0.4	23.9	25.65
		GY2M0600J080N-MS	●	●	●	●					J	6.00	±0.04	0.8	23.5	25.65
		GY2M0800K080N-MS	●	●	●						K	8.00	±0.04	0.8	28.5	30.50
	MM Breaker (Medium feeds) 	GY2M0200D020N-MM	●	●	●	●					D	2.00	±0.03	0.2	19.1	20.70
		GY2M0250E020N-MM	●	●	●	●					E	2.50	±0.03	0.2	19.1	20.70
		GY2M0300F020N-MM	●	●	●	●					F	3.00	±0.03	0.2	19.1	20.70
		GY2M0300F040N-MM	●	●	●	●					F	3.00	±0.03	0.4	18.9	20.70
		GY2M0300F080N-MM	●	●	●	●					F	3.00	±0.03	0.8	18.5	20.70
		GY2M0400G020N-MM	●	●	●	●					G	4.00	±0.04	0.2	24.1	25.65
		GY2M0400G040N-MM	●	●	●	●					G	4.00	±0.04	0.4	23.9	25.65
		GY2M0400G080N-MM	●	●	●	●					G	4.00	±0.04	0.8	23.5	25.65
		GY2M0500H040N-MM	●	●	●	●					H	5.00	±0.04	0.4	23.9	25.65
		GY2M0500H080N-MM	●	●	●	●					H	5.00	±0.04	0.8	23.5	25.65
		GY2M0600J040N-MM	●	●	●	●					J	6.00	±0.04	0.4	23.9	25.65
		GY2M0600J080N-MM	●	●	●	●					J	6.00	±0.04	0.8	23.5	25.65
		GY2M0800K080N-MM	●	●	●						K	8.00	±0.04	0.8	28.5	30.50
		GY2M0800K120N-MM	●	●	●						K	8.00	±0.04	1.2	28.1	30.50
For Copying / For Recessing	**BM Breaker** 	GY2M0200D100N-BM	●	●	●	●					D	2.00	±0.03	1.00	19.5	20.90
		GY2M0250E125N-BM	●	●	●	●					E	2.50	±0.03	1.25	19.3	20.90
		GY2M0300F150N-BM	●	●	●	●					F	3.00	±0.03	1.50	19.0	20.90
		GY2M0318F159N-BM	●	●	●	●					F	3.18	±0.03	1.59	18.9	20.90
		GY2M0400G200N-BM	●	●	●	●					G	4.00	±0.04	2.00	23.4	25.80
		GY2M0475H238N-BM	●	●	●	●					H	4.75	±0.04	2.38	22.9	25.80
		GY2M0500H250N-BM	●	●	●	●					H	5.00	±0.04	2.50	22.8	25.80
		GY2M0600J300N-BM	●	●	●	●					J	6.00	±0.04	3.00	22.5	25.90
		GY2M0635J318N-BM	●	●	●	●					J	6.35	±0.04	3.18	22.3	25.90
		GY2M0800K400N-BM	●	●	●						K	8.00	±0.04	4.00	26.5	30.80
Blank *1	**2 Edge Type** 	GY2B0220D020N				●		●	●		D	2.20	±0.10	0.2	—	21.05
		GY2B0270E020N				●		●	●		E	2.70	±0.10	0.2	—	21.05
		GY2B0340F020N				●		●	●		F	3.40	±0.10	0.2	—	21.05
		GY2B0420G020N				●		●	●		G	4.20	±0.10	0.2	—	26.00
		GY2B0520H020N				●		●	●		H	5.20	±0.10	0.2	—	26.00
		GY2B0655J020N				●		●	●		J	6.55	±0.10	0.2	—	26.00
	1 Edge Type 	GY1B0220D020N				●		●	●		D	2.20	±0.10	0.2	—	21.07
		GY1B0270E020N				●		●	●		E	2.70	±0.10	0.2	—	21.10
		GY1B0340F020N				●		●	●		F	3.40	±0.10	0.2	—	21.00
		GY1B0420G020N				●		●	●		G	4.20	±0.10	0.2	—	25.86
		GY1B0520H020N				●		●	●		H	5.20	±0.10	0.2	—	25.90
		GY1B0655J020N				●		●	●		J	6.55	±0.10	0.2	—	25.90

*1 **Insert blank is not suitable for machining without grinding.**
*2 The dimension depends on the breaker. Refer to the "L dimension tolerance conversion table".

● : **Inventory maintained in Japan. (10 inserts in one case)**

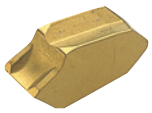
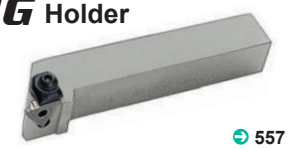
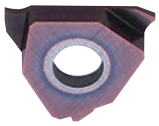
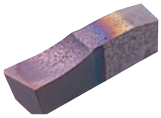
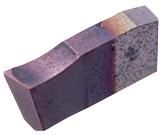
L dimension tolerance conversion table

Grooving Width CW (mm)	*1 Dimensions L (mm)	*2 Dimensional tolerance (mm) versus standard dimension (L) of each breaker						
		GU	GS/GM	MS/MM	R/L-GM	Flat Top	MF	BM
1.50	14.70		0					
2.00	20.70	0	0	0	0.10	0	0.35	0.20
2.24	*3 (20.7)						0.35	
2.39	20.70	0	0			0	0.35	
2.50	20.70	0	0	0	0.125	0	0.35	0.20
2.74	*3 (20.7)						0.35	
3.00	20.70	0	0	0	0.15	0	0.35	0.20
3.18	20.70	0	0			0	0.35	0.20
3.24	*3 (20.7)						0.35	
4.00	25.65	0	0	0	0.20	0	0.30	0.15
4.24	*3 (25.65)						0.30	
4.75	25.65	0	0			0	0.30	0.15
5.00	25.65	0	0	0	0.30	0	0.30	0.15
5.24	*3 (25.65)						0.30	
6.00	25.65	0	0	0		0	0.30	0.25
6.31	*3 (25.65)						0.30	
6.35	25.65	0	0				0.30	0.25
8.00	30.50		0	0				0.30

*1 This value is used at the described holder dimension.
*2 ■ when there is no applicable breaker.
*3 The standard dimensions shown here use an approximate insert width.

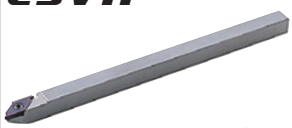
CLASSIFICATION

EXTERNAL CUTTING

Name of Tool Holder	Insert Shape	Features	Groove Width According to Cutting Mode (mm)					
			Shallow Grooving	Deep Grooving	Cutting Off	Copying	Recessing	Face Grooving
GY Series ➲ 468		● Modular blade type ● Clamp-on type. ● The modular blade allows for high rigidity and accuracy. (Tri Lock System) ● Various insert types. ● Mono block type ● Spring clamp type.	1.5 2 2.24 2.39 2.5 2.74 3 3.18 3.24 4 4.24 4.75 5 5.24 6 6.31 6.35 8	1.5 2 2.24 2.39 2.5 2.74 3 3.18 3.24 4 4.24 4.75 5 5.24 6 6.31 6.35 8	1.5 2 2.24 2.39 2.5 2.74 3 3.18 3.24 4 4.24 4.75 5 5.24 6 6.31 6.35 8	2 2.5 3 3.18 4 4.75 5 6 6.35 8	2 2.5 3 3.18 4 4.75 5 6 6.35	2 2.24 2.39 2.5 2.74 3 3.18 3.24 4 4.24 4.75 5 5.24 6 6.31 6.35
UG Holder ➲ 554		● Spring clamp type. ● Strengthened insert clamping. ● Block and blade type and solid type series. ● Maximum cut off diameter : 120mm.	2.2 3.1 4.1 5.1	2.2 3.1 4.1 5.1	2.2 3.1 4.1 5.1			
MG Holder  ➲ 557		● Clamp-on type. ● Precision class insert. ● Positive insert suffers from negligible chattering and thus produces a good finished surface.	1.25 | 6					
SMG Holder ➲ 560		● Screw-on type. ● Precision class insert. ● Positive insert suffers from negligible chattering and thus produces a good finished surface.	0.5 | 1.3					
SMALL TOOLS **GTAH GTBH GTCH** ➲ 361		● For gang type tool posts. ● Small Shank : 8mm–16mm ● Possible to control the back clamping. ● High rigidity due to design of vertical insert. ● Economical due to the design of three-corner inserts.	0.3 | 3.0					
CTAH ➲ 364		● For gang type tool posts. ● Small Shank : 8mm–16mm ● Due to the design of handed tool holders, able to minimize accumulation of workpieces. ● High rigidity due to design of vertical insert. ● Maximum cut off diameter : 12mm	0.7 1.0 1.5 2.0	0.7 1.0 1.5 2.0	0.7 1.0 1.5 2.0			
CTBH ➲ 366		● For gang type tool posts. ● Small Shank : 10mm–16mm ● Single holder for inserts for back turning and cutting off. ● High rigidity due to design of vertical insert. ● Maximum cut off diameter : 16mm	1.5 2.0	1.5 2.0	1.5 2.0			
CTCH ➲ 367		● For gang type tool posts. ● Small Shank : 10mm,12mm ● High cutting edge sharpness and excellent chip discharge. ● Maximum cut off diameter : 20mm	2.2 2.5	2.2 2.5	2.2 2.5			
CTDH ➲ 368		● For gang type tool posts. ● Small Shank : 16mm ● High cutting edge sharpness and excellent chip discharge. ● Maximum cut off diameter : 23–35mm	2.5	2.5	2.5			
CTEH ➲ 369		● For gang type tool posts. ● Small Shank : 16mm ● High cutting edge sharpness and excellent chip discharge. ● Maximum cut off diameter : 23–35mm	3.0	3.0	3.0			

CLASSIFICATION

EXTERNAL CUTTING

	Name of Tool Holder	Insert Shape	Features	Groove Width According to Cutting Mode (mm)				
				Shallow Grooving	Deep Grooving	Cutting Off	Copying	Face Grooving
SMALL TOOLS	CSVH  374		● For cam type tool posts. ● Small Shank : 7–12mm ● Single holder responds to front turning, back turning, grooving, threading and cutting off operations. ● The most suitable for machining of small parts with work diameter 5mm or smaller. ● Maximum groove depth : 0.3–2.5mm ● Maximum cut off diameter : 3–5mm	0.25 I 1.5		0.6 I 1.5		

INTERNAL CUTTING

Name of Tool Holder	Insert Shape	Features	Min. Cutting Diameter (mm)	Groove Width (mm)	Max. Groove Depth (mm)
GY Series 562		● Modular blade type ● Clamp-on type. ● The modular blade allows for high rigidity and accuracy. (Tri Lock System) ● Various insert types. ● Mono block type ● Spring clamp type.	25	2 I 6.35	4 I 13
FSL5 584		● Screw-on type. ● Precision class insert. ● Holder is capable of performing both grooving and threading. ● Maximum groove depth : 3mm.	10	1.2 I 4.0	1.0 I 3.0
DPT4 586		● Pin lock type. ● Precision class insert. ● Exchangable head type.	40	1.25 I 4.5	1.2 I 4.5
MICRO-MINI TWIN Boring Bars 580	–	● Solid carbide type. ● Economical due to single holder with two cutting edges.	3.0	1.0 I 2.0	1.0 I 2.0
MICRO-MINI Boring Bars 579	–	● Solid carbide type. ● Insert can be ground to suit the application.	3.2	2.0 I 3.0	1.0 I 2.0

GY

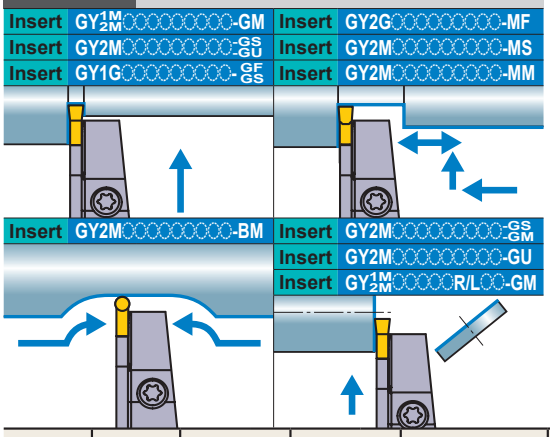
External for Swiss style lathes

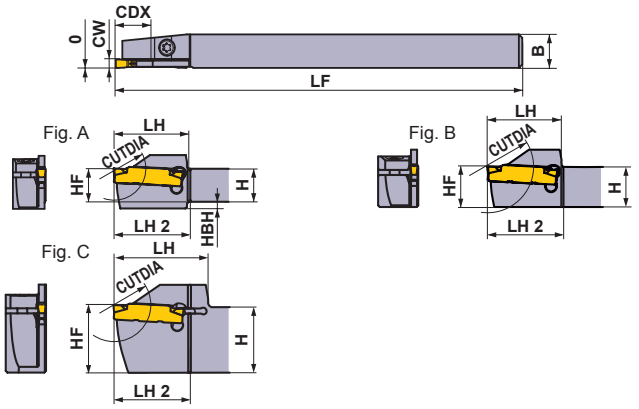
External turning

Product Information

Recommended Cutting Condition >> 496
INSERTS >> 462
Technical Info >> 1971
IDENTIFICATION >> 460
SPARE PARTS >> 1927
ISO13399 Property >> 1966

1 00° type holder





Right hand tool holder shown.

Seat Size	CW	CDX *4	CUTDIA	Type	Hand (R/L)	Order Number Holder	Stock	Fig.
C	1.50	11	22	Mono Block	R	GYSR1010JX00-C11	●	A
					L	GYSL1010JX00-C11	●	A
		13	26	Mono Block	R	GYSR1212JX00-C13	●	B
					L	GYSL1212JX00-C13	●	B
		17 *1	34 *2	Mono Block	R	GYSR1616JX00-C17	●	B
					L	GYSL1616JX00-C17	●	B
		18 *1	36 *2	Mono Block	R	GYSR2012JX00-C18	●	C
					L	GYSL2012JX00-C18	●	C
D	2.00 2.24	11	22	Mono Block	R	GYSR1010JX00-D11	●	A
					L	GYSL1010JX00-D11	●	A
		13	26	Mono Block	R	GYSR1212JX00-D13	●	B
					L	GYSL1212JX00-D13	●	B
		17	34	Mono Block	R	GYSR1616JX00-D17	●	B
					L	GYSL1616JX00-D17	●	B
		18	36	Mono Block	R	GYSR2012JX00-D18	●	C
					L	GYSL2012JX00-D18	●	C
E	2.39 2.50 2.74	11	22	Mono Block	R	GYSR1010JX00-E11	●	A
					L	GYSL1010JX00-E11	●	A
		13	26	Mono Block	R	GYSR1212JX00-E13	●	B
					L	GYSL1212JX00-E13	●	B
		17	34	Mono Block	R	GYSR1616JX00-E17	●	B
					L	GYSL1616JX00-E17	●	B
		18	36	Mono Block	R	GYSR2012JX00-E18	●	C
					L	GYSL2012JX00-E18	●	C
F	3.00 3.18 3.24	11	22	Mono Block	R	GYSR1010JX00-F11	●	A
					L	GYSL1010JX00-F11	●	A
		13	26	Mono Block	R	GYSR1212JX00-F13	●	B
					L	GYSL1212JX00-F13	●	B
		17	34	Mono Block	R	GYSR1616JX00-F17	●	B
					L	GYSL1616JX00-F17	●	B
		18	36	Mono Block	R	GYSR2012JX00-F18	●	C
					L	GYSL2012JX00-F18	●	C

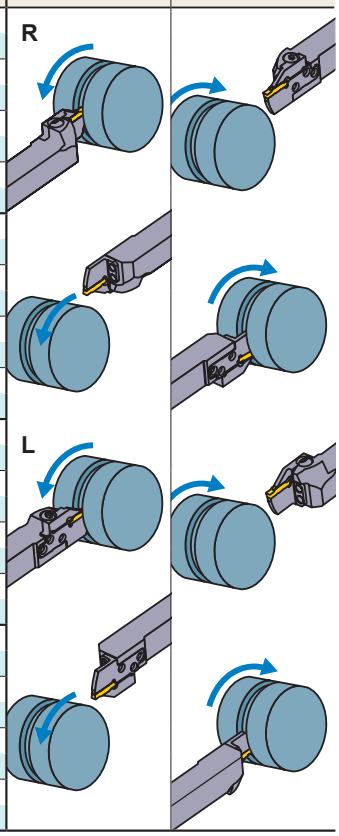
*1 The maximum groove depth varies according to the insert used.
*2 The maximum cut off diameter **CUTDIA** varies according to the insert used.
*3 Dimensions shown are when the gauge insert is used. If other insert geometries are used then **LF**, **LH** and **LH 2** values may vary.
*4 The maximum groove depth is limited by the workpiece diameter.

● : **Inventory maintained in Japan.**

SPARE PARTS

Holder	Clamp Screw	Wrench
GYSR/L1010JX00-◌11	CS350990T (Clamp Torque : 2.5N·m)	TKY10R
GYSR/L1212JX00-◌13		
GYSR/L2012JX00-◌18		
GYSR/L1616JX00-◌17	TS4SBL (Clamp Torque : 3.5N·m)	TKY15R

Dimensions (mm) *3							Cutting Mode	
H	B	LF	LH	LH 2	HF	HBH	Clockwise	Anticlockwise
10	10	120	22	16	10	2		
10	10	120	22	16	10	2		
12	12	120	22	16	12	—		
12	12	120	22	16	12	—		
16	16	120	27	17	16	—		
16	16	120	27	17	16	—		
20	12	120	28	16	20	—		
20	12	120	28	16	20	—		
10	10	120	22	23	10	2		
10	10	120	22	23	10	2		
12	12	120	22	23	12	—		
12	12	120	22	23	12	—		
16	16	120	27	24	16	—		
16	16	120	27	24	16	—		
20	12	120	28	23	20	—		
20	12	120	28	23	20	—		
10	10	120	22	23	10	2		
10	10	120	22	23	10	2		
12	12	120	22	23	12	—		
12	12	120	22	23	12	—		
16	16	120	27	24	16	—		
16	16	120	27	24	16	—		
20	12	120	28	23	20	—		
20	12	120	28	23	20	—		
10	10	120	22	23	10	2		
10	10	120	22	23	10	2		
12	12	120	22	23	12	—		
12	12	120	22	23	12	—		
16	16	120	27	24	16	—		
16	16	120	27	24	16	—		
20	12	120	28	23	20	—		
20	12	120	28	23	20	—		



Insert selection

Seat Size	Geometry name
C	GY◌◌0150C◌◌◌◌◌–Breaker shown below
D	GY◌◌0200/0224D◌◌◌◌◌–Breaker shown below
E	GY◌◌0239/0250/0274E◌◌◌◌◌–Breaker shown below
F	GY◌◌0300/0318/0324F◌◌◌◌◌–Breaker shown below

For grooving/cutting off breaker

Seat Size	Breaker / CW	GU (For gummy steel)	GS (Low)	GM (Medium)	05-GM (Cutting off)	GFGS (Hardened steel)
		Neutral	Neutral	Neutral	With hand	Neutral
C	1.50mm		●	●		
D	2.00mm	●	●	●	●	●
E	2.39mm	●	●	●		●
	2.50mm	●	●	●	●	●
F	3.00mm	●	●	●	●	●
	3.18mm	●	●	●		●

For multifunctional grooving breaker

Seat Size	Breaker / CW	MF (Finish)	MS (Low)	MM (Medium)	BM (Copying, Recessing)
					Ball shape
D	2.00mm	●	●	●	●
	2.24mm	●			
E	2.39mm	●			
	2.50mm	●	●	●	●
	2.74mm	●			
F	3.00mm				●
	RE 0.2	●	●	●	
	RE 0.4	●	●	●	
	RE 0.8			●	
	3.18mm				●
	RE 0.2	●			
	RE 0.4	●			
	3.24mm	●			

● : Standard insert with dimensions

GY

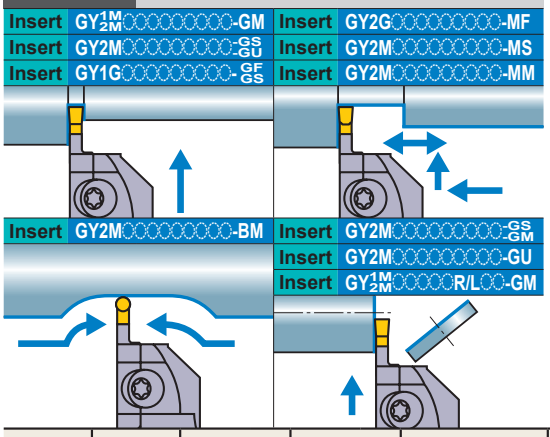
CW(Cutting width) 2.00, 2.24

External turning

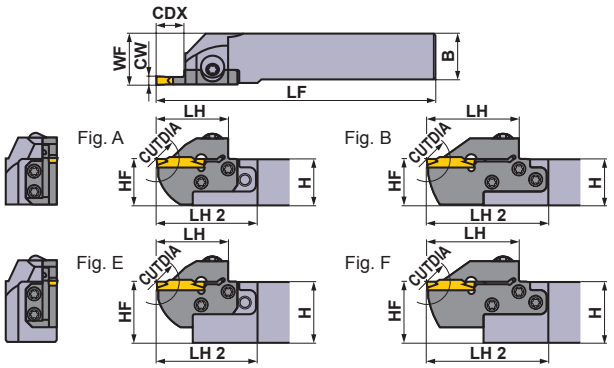
Product Information

Recommended Cutting Condition >> 496
INSERTS >> 462
Technical Info >> 1971
IDENTIFICATION >> 460
SPARE PARTS >> 1927
ISO13399 Property >> 1966

1 00° type holder



(Note 1) Please order the modular blade and modular holder separately.
(Note 2) Please set the right hand modular blade at the right hand holder and the left hand modular blade at the left hand holder.

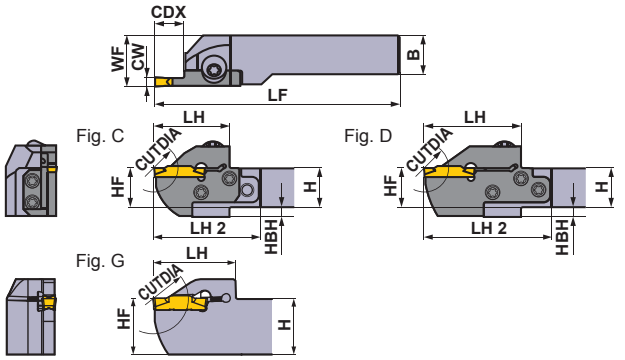


Right hand tool holder shown.

Seat Size	CW	CDX	CUTDIA	Type	Hand (R/L)	Order Number Holder	Stock	Modular Blade	Stock	Fig.
D	2.00 2.24	6	12	Modular	R	GYHR1616J00-M20R	●	GYM20RA-D06	●	C
					L	GYHL1616J00-M20L	●	GYM20LA-D06	●	C
				Mono Block	R	GYQR2020K00-D06	●	—	—	G
					L	GYQL2020K00-D06	●	—	—	G
				Modular	R	GYHR2020K00-M20R	●	GYM20RA-D06	●	A
					L	GYHL2020K00-M20L	●	GYM20LA-D06	●	A
				Modular	R	GYHR2020K00-M25R	●	GYM25RA-D06	●	C
					L	GYHL2020K00-M25L	●	GYM25LA-D06	●	C
				Mono Block	R	GYQR2525M00-D06	●	—	—	G
					L	GYQL2525M00-D06	●	—	—	G
				Modular	R	GYHR2525M00-M25R	●	GYM25RA-D06	●	A
					L	GYHL2525M00-M25L	●	GYM25LA-D06	●	A
				Modular	R	GYHR3225P00-M25R	●	GYM25RA-D06	●	E
					L	GYHL3225P00-M25L	●	GYM25LA-D06	●	E
				Modular	R	GYHR3232P00-M25R	●	GYM25RA-D06	●	E
					L	GYHL3232P00-M25L	●	GYM25LA-D06	●	E
		10	20	Modular	R	GYHR1616J00-M20R	●	GYM20RA-D10	●	C
					L	GYHL1616J00-M20L	●	GYM20LA-D10	●	C
				Modular	R	GYHR2020K00-M20R	●	GYM20RA-D10	●	A
					L	GYHL2020K00-M20L	●	GYM20LA-D10	●	A
		12	24	Modular	R	GYHR2020K00-M25R	●	GYM25RA-D12	●	C
					L	GYHL2020K00-M25L	●	GYM25LA-D12	●	C
				Modular	R	GYHR2525M00-M25R	●	GYM25RA-D12	●	A
					L	GYHL2525M00-M25L	●	GYM25LA-D12	●	A
				Modular	R	GYHR3225P00-M25R	●	GYM25RA-D12	●	E
					L	GYHL3225P00-M25L	●	GYM25LA-D12	●	E
				Modular	R	GYHR3232P00-M25R	●	GYM25RA-D12	●	E
					L	GYHL3232P00-M25L	●	GYM25LA-D12	●	E
		18 *4	36	Modular	R	GYHR1616J00-M20R	●	GYM20RB-D18	●	D
					L	GYHL1616J00-M20L	●	GYM20LB-D18	●	D
				Mono Block	R	GYQR2020K00-D18	●	—	—	G
					L	GYQL2020K00-D18	●	—	—	G
				Modular	R	GYHR2020K00-M20R	●	GYM20RB-D18	●	B
					L	GYHL2020K00-M20L	●	GYM20LB-D18	●	B

*1 The maximum groove depth varies according to the insert used.
*2 The maximum cut off diameter **CUTDIA** varies according to the insert used.
*3 Dimensions shown are when the gauge insert is used. If other insert geometries are used then **LF**, **LH**, **LH 2** and **WF** values may vary.
*4 The maximum groove depth is limited by the workpiece diameter.

● : **Inventory maintained in Japan.**



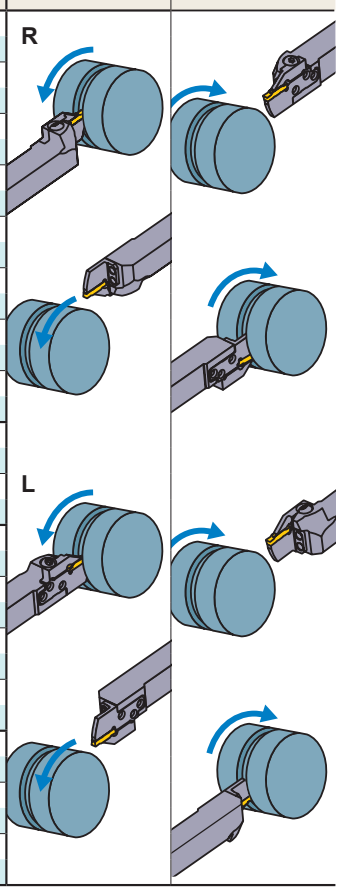
Right hand tool holder shown.

* Wrench : ① : Clamp Screw, ② : Blade Screw

SPARE PARTS

Holder	Clamp Screw	Blade Screw (5 pcs.)	Wrench *
GYQR/L○○○○○○○○-○○○	HSC05030 (Clamp Torque : 7.0N·m)	—	HKY40R
GYHR/L○○○○○○○○-M20R/L	GY06013M (Clamp Torque : 6.0N·m)	TS407 (Clamp Torque : 3.5N·m)	①TKY30R ②TKY15D
GYHR/L○○○○○○○○-M25R/L		TS55 (Clamp Torque : 5.0N·m)	①TKY30R ②TKY25D

Dimensions (mm) *3								Cutting Mode	
H	B	LF	LH	LH 2	HF	WF	HBH	Clockwise	Anticlockwise
16	16	104	28	44	16	20	4	R	
16	16	104	28	44	16	20	4		
20	20	125	36	—	20	20.15	—		
20	20	125	36	—	20	20.15	—		
20	20	119	28	43	20	23	—		
20	20	119	28	43	20	23	—		
20	20	117	31	52	20	26	5		
20	20	117	31	52	20	26	5		
25	25	150	36	—	25	25.15	—		
25	25	150	36	—	25	25.15	—		
25	25	142	31	49	25	28	—		
25	25	142	31	49	25	28	—		
32	25	162	31	49	32	28	—		
32	25	162	31	49	32	28	—		
32	32	162	31	49	32	35	—		
32	32	162	31	49	32	35	—		
16	16	110	34	50	16	20	4		
16	16	110	34	50	16	20	4		
20	20	125	34	49	20	23	—	L	
20	20	125	34	49	20	23	—		
20	20	125	39	60	20	26	5		
20	20	125	39	60	20	26	5		
25	25	150	39	57	25	28	—		
25	25	150	39	57	25	28	—		
32	25	170	39	57	32	28	—		
32	25	170	39	57	32	28	—		
32	32	170	39	57	32	35	—		
32	32	170	39	57	32	35	—		
16	16	116	40	56	16	20	4		
16	16	116	40	56	16	20	4		
20	20	125	39	—	20	20.1	—		
20	20	125	39	—	20	20.1	—		
20	20	131	40	55	20	23	—		
20	20	131	40	55	20	23	—		



Insert selection

Seat Size	Geometry name
D	GY○○0200/0224D○○○○○–Breaker shown below

For grooving/cutting off breaker

Seat Size	Breaker / CW	GU (For gummy steel)	GS (Low)	GM (Medium)	05-GM (Cutting off)	GFGS (Hardened steel)
		Neutral	Neutral	Neutral	With hand	Neutral
D	2.00mm	●	●	●	●	●

For multifunctional grooving breaker

Seat Size	Breaker / CW	MF (Finish)	MS (Low)	MM (Medium)	BM (Copying, Recessing)
					Ball shape
D	2.00mm	●	●	●	●
	2.24mm	●			

● : Standard insert with dimensions

GY

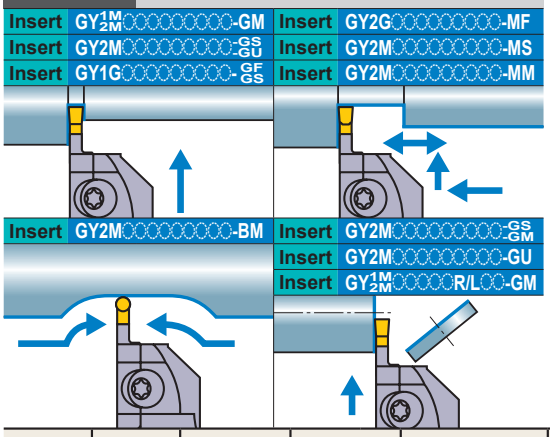
CW(Cutting width) 2.00, 2.24

External turning

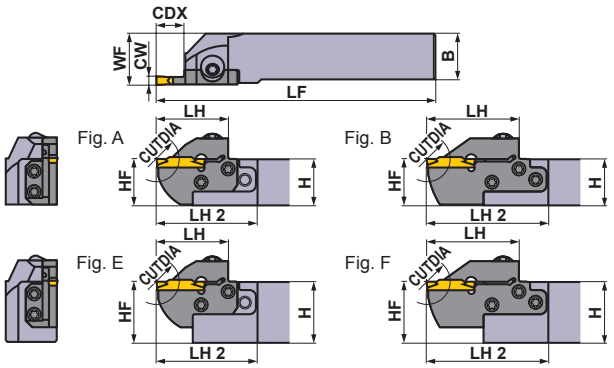
Product Information

Recommended Cutting Condition >> 496
INSERTS >> 462
Technical Info >> 1971
IDENTIFICATION >> 460
SPARE PARTS >> 1927
ISO13399 Property >> 1966

1 00° type holder



(Note 1) Please order the modular blade and modular holder separately.
(Note 2) Please set the right hand modular blade at the right hand holder and the left hand modular blade at the left hand holder.

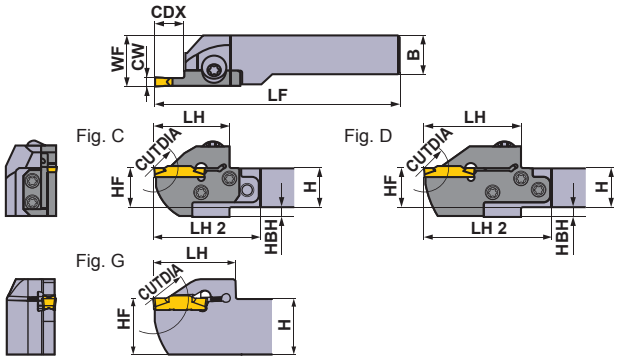


Right hand tool holder shown.

Seat Size	CW	CDX	CUTDIA	Type	Hand (R/L)	Order Number Holder	Stock	Modular Blade	Stock	Fig.
D	2.00 2.24	20 *1	40 *2	Modular	R	GYHR2020K00-M25R	●	GYM25RA-D20	●	D
					L	GYHL2020K00-M25L	●	GYM25LA-D20	●	D
				Mono Block	R	GYQR2525M00-D20	●	—	—	G
					L	GYQL2525M00-D20	●	—	—	G
				Modular	R	GYHR2525M00-M25R	●	GYM25RA-D20	●	B
					L	GYHL2525M00-M25L	●	GYM25LA-D20	●	B
				Modular	R	GYHR3225P00-M25R	●	GYM25RA-D20	●	F
					L	GYHL3225P00-M25L	●	GYM25LA-D20	●	F
				Modular	R	GYHR3232P00-M25R	●	GYM25RA-D20	●	F
					L	GYHL3232P00-M25L	●	GYM25LA-D20	●	F

*1 The maximum groove depth varies according to the insert used.
*2 The maximum cut off diameter **CUTDIA** varies according to the insert used.
*3 Dimensions shown are when the gauge insert is used. If other insert geometries are used then **LF**, **LH**, **LH 2** and **WF** values may vary.
*4 The maximum groove depth is limited by the workpiece diameter.

● : **Inventory maintained in Japan.**



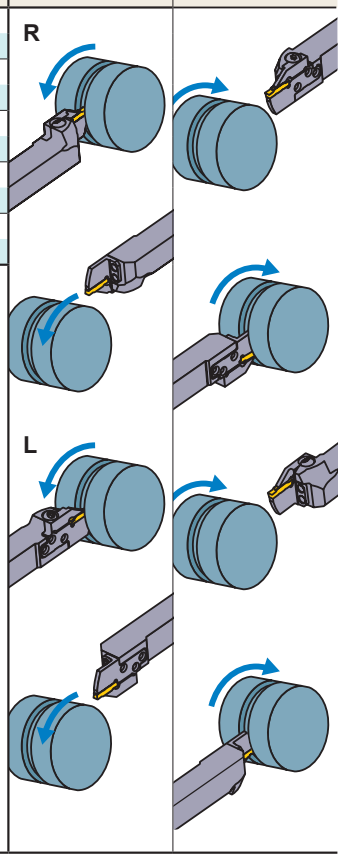
Right hand tool holder shown.

* Wrench : ① : Clamp Screw, ② : Blade Screw

SPARE PARTS

Holder	Clamp Screw	Blade Screw (5 pcs.)	Wrench *
GYQR/L○○○○○○○○○-○○○○	HSC05030 (Clamp Torque : 7.0N·m)	—	HKY40R
GYHR/L○○○○○○○○○-M20R/L	GY06013M (Clamp Torque : 6.0N·m)	TS407 (Clamp Torque : 3.5N·m)	①TKY30R ②TKY15D
GYHR/L○○○○○○○○○-M25R/L		TS55 (Clamp Torque : 5.0N·m)	①TKY30R ②TKY25D

Dimensions (mm)								Cutting Mode	
H	B	LF	LH	LH 2	HF	WF	HBH	Clockwise	Anticlockwise
20	20	131	45	66	20	26	5		
20	20	131	45	66	20	26	5		
25	25	150	41	—	25	25.1	—		
25	25	150	41	—	25	25.1	—		
25	25	156	45	63	25	28	—		
25	25	156	45	63	25	28	—		
32	25	176	45	63	32	28	—		
32	25	176	45	63	32	28	—		
32	32	176	45	63	32	35	—		
32	32	176	45	63	32	35	—		



Insert selection

Seat Size	Geometry name
D	GY○○0200/0224D○○○○○–Breaker shown below

For grooving/cutting off breaker

Seat Size	Breaker / CW	GU (For gummy steel)	GS (Low)	GM (Medium)	05-GM (Cutting off)	GFGS (Hardened steel)
		Neutral	Neutral	Neutral	With hand	Neutral
D	2.00mm	●	●	●	●	●

For multifunctional grooving breaker

Seat Size	Breaker / CW	MF (Finish)	MS (Low)	MM (Medium)	BM (Copying, Recessing)
					Ball shape
D	2.00mm	●	●	●	●
	2.24mm	●			

● : Standard insert with dimensions

GY

CW(Cutting width) 2.39, 2.50, 2.74

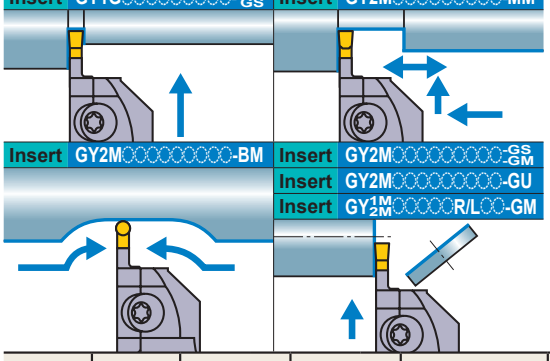
External turning

Product Information

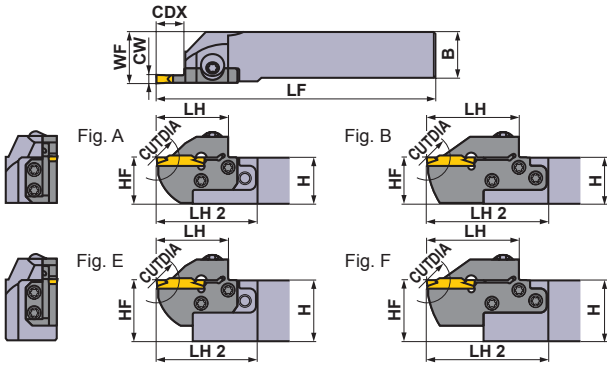
Recommended Cutting Condition >> 496
INSERTS >> 462
Technical Info >> 1971
IDENTIFICATION >> 460
SPARE PARTS >> 1927
ISO13399 Property >> 1966

1 00° type holder

Insert	GY1M/2M○○○○○○○○○-GM	Insert	GY2G○○○○○○○○○-MF
Insert	GY2M○○○○○○○○○-GS/-GU	Insert	GY2M○○○○○○○○○-MS
Insert	GY1G○○○○○○○○○-GF/GS	Insert	GY2M○○○○○○○○○-MM
Insert	GY2M○○○○○○○○○-BM	Insert	GY2M○○○○○○○○○-GS/GM
		Insert	GY2M○○○○○○○○○-GU
		Insert	GY1M/2M○○○○○R/L○○-GM



(Note 1) Please order the modular blade and modular holder separately.
(Note 2) Please set the right hand modular blade at the right hand holder and the left hand modular blade at the left hand holder.

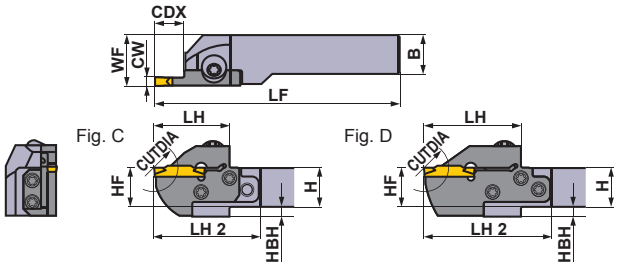


Right hand tool holder shown.

Seat Size	CW	CDX	CUTDIA	Type	Hand (R/L)	Order Number Holder	Stock	Modular Blade	Stock	Fig.
E	2.39 2.50 2.74	6	12	Modular	R	GYHR1616J00-M20R	●	GYM20RA-E06	●	C
					L	GYHL1616J00-M20L	●	GYM20LA-E06	●	C
				Modular	R	GYHR2020K00-M20R	●	GYM20RA-E06	●	A
					L	GYHL2020K00-M20L	●	GYM20LA-E06	●	A
				Modular	R	GYHR2020K00-M25R	●	GYM25RA-E06	●	C
					L	GYHL2020K00-M25L	●	GYM25LA-E06	●	C
				Modular	R	GYHR2525M00-M25R	●	GYM25RA-E06	●	A
					L	GYHL2525M00-M25L	●	GYM25LA-E06	●	A
				Modular	R	GYHR3225P00-M25R	●	GYM25RA-E06	●	E
					L	GYHL3225P00-M25L	●	GYM25LA-E06	●	E
				Modular	R	GYHR3232P00-M25R	●	GYM25RA-E06	●	E
					L	GYHL3232P00-M25L	●	GYM25LA-E06	●	E
		10	20	Modular	R	GYHR1616J00-M20R	●	GYM20RA-E10	●	C
					L	GYHL1616J00-M20L	●	GYM20LA-E10	●	C
				Modular	R	GYHR2020K00-M20R	●	GYM20RA-E10	●	A
					L	GYHL2020K00-M20L	●	GYM20LA-E10	●	A
		12	24	Modular	R	GYHR2020K00-M25R	●	GYM25RA-E12	●	C
					L	GYHL2020K00-M25L	●	GYM25LA-E12	●	C
				Modular	R	GYHR2525M00-M25R	●	GYM25RA-E12	●	A
					L	GYHL2525M00-M25L	●	GYM25LA-E12	●	A
				Modular	R	GYHR3225P00-M25R	●	GYM25RA-E12	●	E
					L	GYHL3225P00-M25L	●	GYM25LA-E12	●	E
				Modular	R	GYHR3232P00-M25R	●	GYM25RA-E12	●	E
					L	GYHL3232P00-M25L	●	GYM25LA-E12	●	E
		18 *4	36	Modular	R	GYHR1616J00-M20R	●	GYM20RB-E18	●	D
					L	GYHL1616J00-M20L	●	GYM20LB-E18	●	D
				Modular	R	GYHR2020K00-M20R	●	GYM20RB-E18	●	B
					L	GYHL2020K00-M20L	●	GYM20LB-E18	●	B
		20 *1	40 *2	Modular	R	GYHR2020K00-M25R	●	GYM25RA-E20	●	D
					L	GYHL2020K00-M25L	●	GYM25LA-E20	●	D
				Modular	R	GYHR2525M00-M25R	●	GYM25RA-E20	●	B
					L	GYHL2525M00-M25L	●	GYM25LA-E20	●	B
				Modular	R	GYHR3225P00-M25R	●	GYM25RA-E20	●	F
					L	GYHL3225P00-M25L	●	GYM25LA-E20	●	F
				Modular	R	GYHR3232P00-M25R	●	GYM25RA-E20	●	F
					L	GYHL3232P00-M25L	●	GYM25LA-E20	●	F

*1 The maximum groove depth varies according to the insert used.
*2 The maximum cut off diameter **CUTDIA** varies according to the insert used.
*3 Dimensions shown are when the gauge insert is used. If other insert geometries are used then **LF**, **LH**, **LH 2** and **WF** values may vary.
*4 The maximum groove depth is limited by the workpiece diameter.

● : **Inventory maintained in Japan.**



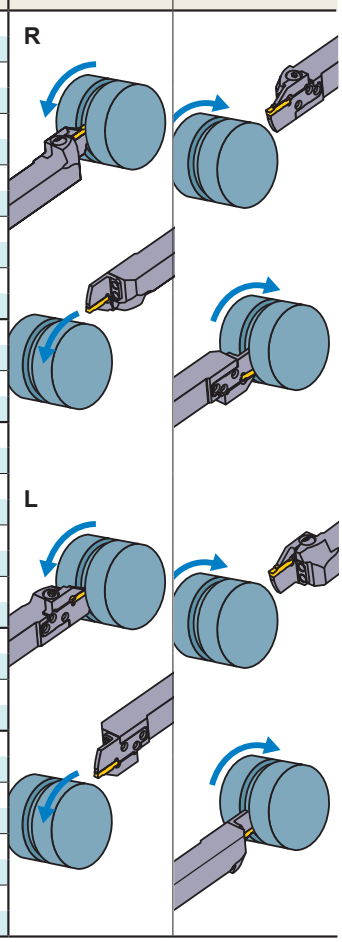
Right hand tool holder shown.

* Wrench : ① : Clamp Screw, ② : Blade Screw

SPARE PARTS

Holder	Clamp Screw	Blade Screw (5 pcs.)	Wrench *
GYQR/L○○○○○○○○○-○○○	HSC05030 (Clamp Torque : 7.0N·m)	—	HKY40R
GYHR/L○○○○○○○○-M20R/L	GY06013M (Clamp Torque : 6.0N·m)	TS407 (Clamp Torque : 3.5N·m)	①TKY30R ②TKY15D
GYHR/L○○○○○○○○-M25R/L		TS55 (Clamp Torque : 5.0N·m)	①TKY30R ②TKY25D

Dimensions (mm) *3								Cutting Mode	
H	B	LF	LH	LH 2	HF	WF	HBH	Clockwise	Anticlockwise
16	16	104	28	44	16	20	4		
16	16	104	28	44	16	20	4		
20	20	119	28	43	20	23	—		
20	20	119	28	43	20	23	—		
20	20	117	31	52	20	26	5		
20	20	117	31	52	20	26	5		
25	25	142	31	49	25	28	—		
25	25	142	31	49	25	28	—		
32	25	162	31	49	32	28	—		
32	25	162	31	49	32	28	—		
32	32	162	31	49	32	35	—		
32	32	162	31	49	32	35	—		
16	16	110	34	50	16	20	4		
16	16	110	34	50	16	20	4		
20	20	125	34	49	20	23	—		
20	20	125	34	49	20	23	—		
20	20	125	39	60	20	26	5		
20	20	125	39	60	20	26	5		
25	25	150	39	57	25	28	—		
25	25	150	39	57	25	28	—		
32	25	170	39	57	32	28	—		
32	25	170	39	57	32	28	—		
32	32	170	39	57	32	35	—		
32	32	170	39	57	32	35	—		
16	16	116	40	56	16	20	4		
16	16	116	40	56	16	20	4		
20	20	131	40	55	20	23	—		
20	20	131	40	55	20	23	—		
20	20	131	45	66	20	26	5		
20	20	131	45	66	20	26	5		
25	25	156	45	63	25	28	—		
25	25	156	45	63	25	28	—		
32	25	176	45	63	32	28	—		
32	25	176	45	63	32	28	—		
32	32	176	45	63	32	35	—		
32	32	176	45	63	32	35	—		



Insert selection

Seat Size	Geometry name
E	GY○○0239/0250/0274E○○○○–Breaker shown below

For grooving/cutting off breaker

Seat Size	Breaker / CW	GU (For gummy steel)	GS (Low)	GM (Medium)	05-GM (Cutting off)	GFGS (Hardened steel)
		Neutral	Neutral	Neutral	With hand	Neutral
E	2.39mm	●	●	●		●
	2.50mm	●	●	●	●	●

For multifunctional grooving breaker

Seat Size	Breaker / CW	MF (Finish)	MS (Low)	MM (Medium)	BM (Copying, Recessing)
					Ball shape
E	2.39mm	●			
	2.50mm	●	●	●	●
	2.74mm	●			

● : Standard insert with dimensions

GY

CW(Cutting width) 3.00, 3.18, 3.24

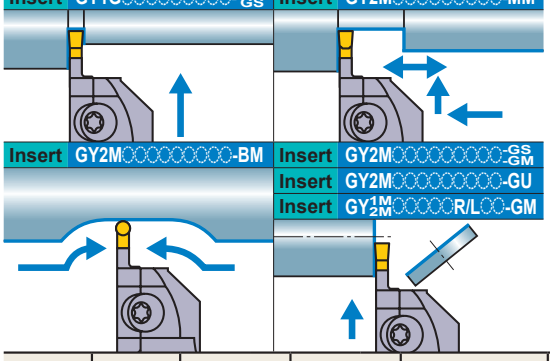
External turning

Product Information

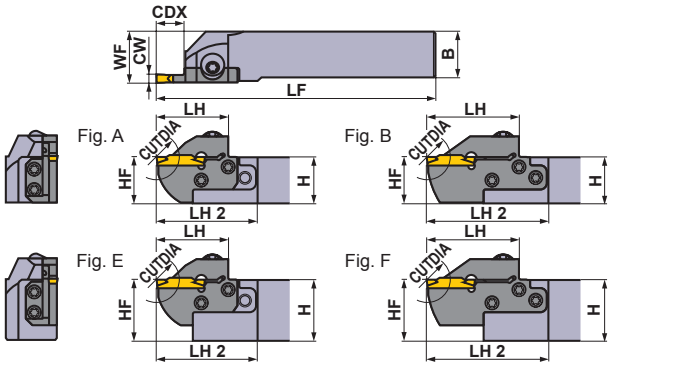
Recommended Cutting Condition >> 496
INSERTS >> 462
Technical Info >> 1971
IDENTIFICATION >> 460
SPARE PARTS >> 1927
ISO13399 Property >> 1966

1 00° type holder

Insert	GY1M/2M○○○○○○○○○○-GM	Insert	GY2G○○○○○○○○○○-MF
Insert	GY2M○○○○○○○○○○-GS/-GU	Insert	GY2M○○○○○○○○○○-MS
Insert	GY1G○○○○○○○○○○-GF/GS	Insert	GY2M○○○○○○○○○○-MM
Insert	GY2M○○○○○○○○○○-BM	Insert	GY2M○○○○○○○○○○-GS/GM
		Insert	GY2M○○○○○○○○○○-GU
		Insert	GY1M/2M○○○○○R/L○○-GM



(Note 1) Please order the modular blade and modular holder separately.
(Note 2) Please set the right hand modular blade at the right hand holder and the left hand modular blade at the left hand holder.

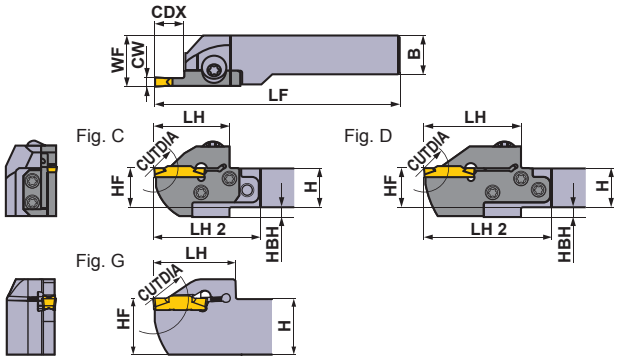


Right hand tool holder shown.

Seat Size	CW	CDX	CUTDIA	Type	Hand (R/L)	Order Number Holder	Stock	Modular Blade	Stock	Fig.
F	3.00 3.18 3.24	6	12	Modular	R	GYHR1616J00-M20R	●	GYM20RA-F06	●	C
					L	GYHL1616J00-M20L	●	GYM20LA-F06	●	C
				Mono Block	R	GYQR2020K00-F06	●	—	—	G
					L	GYQL2020K00-F06	●	—	—	G
				Modular	R	GYHR2020K00-M20R	●	GYM20RA-F06	●	A
					L	GYHL2020K00-M20L	●	GYM20LA-F06	●	A
				Modular	R	GYHR2020K00-M25R	●	GYM25RA-F06	●	C
					L	GYHL2020K00-M25L	●	GYM25LA-F06	●	C
				Mono Block	R	GYQR2525M00-F06	●	—	—	G
					L	GYQL2525M00-F06	●	—	—	G
				Modular	R	GYHR2525M00-M25R	●	GYM25RA-F06	●	A
					L	GYHL2525M00-M25L	●	GYM25LA-F06	●	A
				Modular	R	GYHR3225P00-M25R	●	GYM25RA-F06	●	E
					L	GYHL3225P00-M25L	●	GYM25LA-F06	●	E
				Modular	R	GYHR3232P00-M25R	●	GYM25RA-F06	●	E
					L	GYHL3232P00-M25L	●	GYM25LA-F06	●	E
		10	20	Modular	R	GYHR1616J00-M20R	●	GYM20RA-F10	●	C
					L	GYHL1616J00-M20L	●	GYM20LA-F10	●	C
				Modular	R	GYHR2020K00-M20R	●	GYM20RA-F10	●	A
					L	GYHL2020K00-M20L	●	GYM20LA-F10	●	A
		12	24	Modular	R	GYHR2020K00-M25R	●	GYM25RA-F12	●	C
					L	GYHL2020K00-M25L	●	GYM25LA-F12	●	C
				Modular	R	GYHR2525M00-M25R	●	GYM25RA-F12	●	A
					L	GYHL2525M00-M25L	●	GYM25LA-F12	●	A
				Modular	R	GYHR3225P00-M25R	●	GYM25RA-F12	●	E
					L	GYHL3225P00-M25L	●	GYM25LA-F12	●	E
				Modular	R	GYHR3232P00-M25R	●	GYM25RA-F12	●	E
					L	GYHL3232P00-M25L	●	GYM25LA-F12	●	E
		18 *4	36	Modular	R	GYHR1616J00-M20R	●	GYM20RB-F18	●	D
					L	GYHL1616J00-M20L	●	GYM20LB-F18	●	D
				Mono Block	R	GYQR2020K00-F18	●	—	—	G
					L	GYQL2020K00-F18	●	—	—	G
				Modular	R	GYHR2020K00-M20R	●	GYM20RB-F18	●	B
					L	GYHL2020K00-M20L	●	GYM20LB-F18	●	B

*1 The maximum groove depth varies according to the insert used.
*2 The maximum cut off diameter **CUTDIA** varies according to the insert used.
*3 Dimensions shown are when the gauge insert is used. If other insert geometries are used then **LF**, **LH**, **LH 2** and **WF** values may vary.
*4 The maximum groove depth is limited by the workpiece diameter.

● : **Inventory maintained in Japan.**



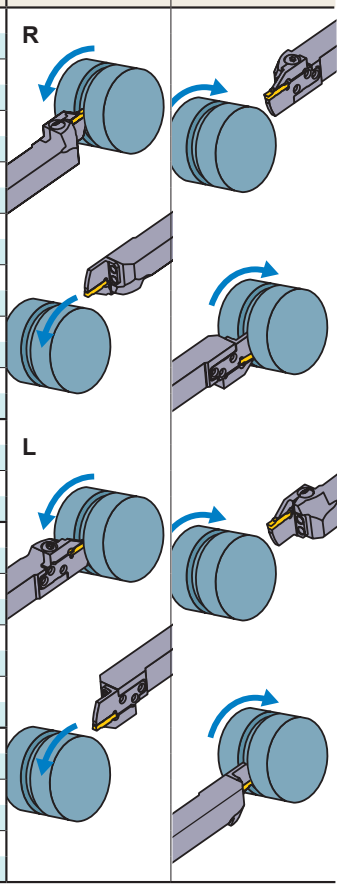
Right hand tool holder shown.

* Wrench : ① : Clamp Screw, ② : Blade Screw

SPARE PARTS

Holder	Clamp Screw	Blade Screw (5 pcs.)	Wrench *
GYQR/L○○○○○○○○-○○○	HSC05030 (Clamp Torque : 7.0N·m)	—	HKY40R
GYHR/L○○○○○○○○-M20R/L	GY06013M (Clamp Torque : 6.0N·m)	TS407 (Clamp Torque : 3.5N·m)	①TKY30R ②TKY15D
GYHR/L○○○○○○○○-M25R/L		TS55 (Clamp Torque : 5.0N·m)	①TKY30R ②TKY25D

Dimensions (mm) *3								Cutting Mode	
H	B	LF	LH	LH 2	HF	WF	HBH	Clockwise	Anticlockwise
16	16	104	28	44	16	20	4	R	
16	16	104	28	44	16	20	4		
20	20	125	36	—	20	20.3	—		
20	20	125	36	—	20	20.3	—		
20	20	119	28	43	20	23	—		
20	20	119	28	43	20	23	—		
20	20	117	31	52	20	26	5		
20	20	117	31	52	20	26	5		
25	25	150	36	—	25	25.3	—		
25	25	150	36	—	25	25.3	—		
25	25	142	31	49	25	28	—		
25	25	142	31	49	25	28	—		
32	25	162	31	49	32	28	—		
32	25	162	31	49	32	28	—		
32	32	162	31	49	32	35	—		
32	32	162	31	49	32	35	—		
16	16	110	34	50	16	20	4	L	
16	16	110	34	50	16	20	4		
20	20	125	34	49	20	23	—		
20	20	125	34	49	20	23	—		
20	20	125	39	60	20	26	5		
20	20	125	39	60	20	26	5		
25	25	150	39	57	25	28	—		
25	25	150	39	57	25	28	—		
32	25	170	39	57	32	28	—		
32	25	170	39	57	32	28	—		
32	32	170	39	57	32	35	—		
32	32	170	39	57	32	35	—		
16	16	116	40	56	16	20	4		
16	16	116	40	56	16	20	4		
20	20	125	39	—	20	20.25	—		
20	20	125	39	—	20	20.25	—		
20	20	131	40	55	20	23	—		
20	20	131	40	55	20	23	—		



Insert selection

Seat Size	Geometry name
F	GY○○0239/0250/0274E○○○○–Breaker shown below

For grooving/cutting off breaker

Seat Size	Breaker / CW	GU (For gummy steel)	GS (Low)	GM (Medium)	05-GM (Cutting off)	GFGS (Hardened steel)
		Neutral	Neutral	Neutral	With hand	Neutral
F	3.00mm	●	●	●	●	●
	3.18mm	●	●	●		●

For multifunctional grooving breaker

Seat Size	Breaker / CW	MF (Finish)	MS (Low)	MM (Medium)	BM (Copying, Recessing)
					Ball shape
F	3.00mm				●
	RE 0.2	●	●	●	
	RE 0.4	●	●	●	
	RE 0.8			●	
	3.18mm				●
	RE 0.2	●			
	RE 0.4	●			
	3.24mm	●			

● : Standard insert with dimensions

GY

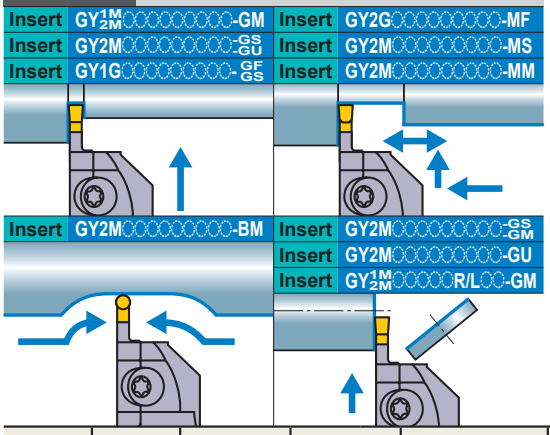
CW(Cutting width) 3.00, 3.18, 3.24

External turning

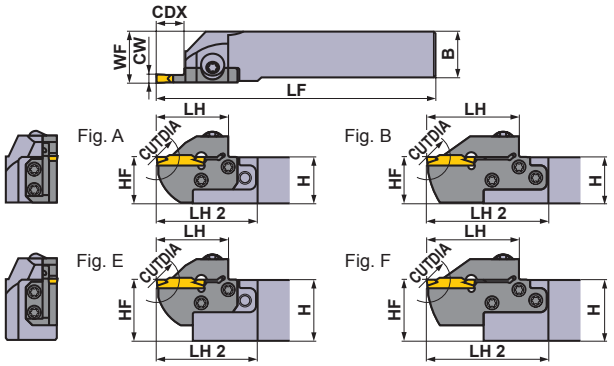
Product Information

Recommended Cutting Condition >> 496
INSERTS >> 462
Technical Info >> 1971
IDENTIFICATION >> 460
SPARE PARTS >> 1927
ISO13399 Property >> 1966

1 00° type holder



(Note 1) Please order the modular blade and modular holder separately.
(Note 2) Please set the right hand modular blade at the right hand holder and the left hand modular blade at the left hand holder.



Right hand tool holder shown.

Seat Size	CW	CDX	CUTDIA	Type	Hand (R/L)	Order Number Holder	Stock	Modular Blade	Stock	Fig.
F	3.00 3.18 3.24	20 *1	40 *2	Modular	R	GYHR2020K00-M25R	●	GYM25RA-F20	●	D
					L	GYHL2020K00-M25L	●	GYM25LA-F20	●	D
				Mono Block	R	GYQR2525M00-F20	●	—	—	G
					L	GYQL2525M00-F20	●	—	—	G
				Modular	R	GYHR2525M00-M25R	●	GYM25RA-F20	●	B
					L	GYHL2525M00-M25L	●	GYM25LA-F20	●	B
				Modular	R	GYHR3225P00-M25R	●	GYM25RA-F20	●	F
					L	GYHL3225P00-M25L	●	GYM25LA-F20	●	F
				Modular	R	GYHR3232P00-M25R	●	GYM25RA-F20	●	F
					L	GYHL3232P00-M25L	●	GYM25LA-F20	●	F

*1 The maximum groove depth varies according to the insert used.
*2 The maximum cut off diameter **CUTDIA** varies according to the insert used.
*3 Dimensions shown are when the gauge insert is used. If other insert geometries are used then **LF**, **LH**, **LH 2** and **WF** values may vary.
*4 The maximum groove depth is limited by the workpiece diameter.

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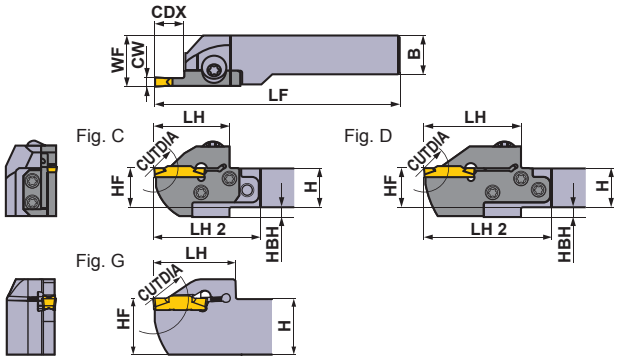


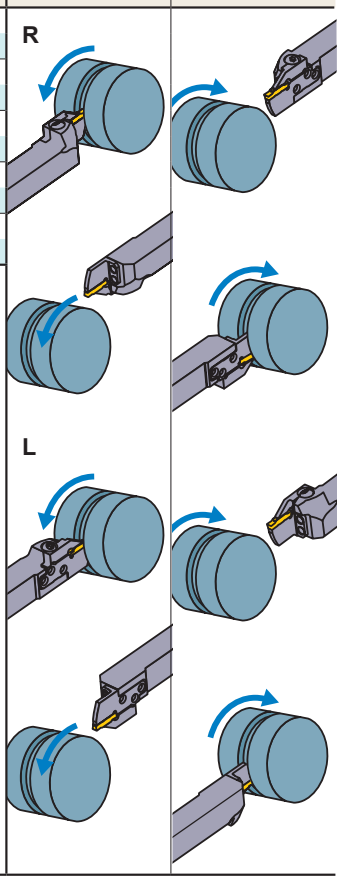
Right hand tool holder shown.

* Wrench : ① : Clamp Screw, ② : Blade Screw

SPARE PARTS

Holder	Clamp Screw	Blade Screw (5 pcs.)	Wrench *
GYQR/L○○○○○○○○-○○○○	HSC05030 (Clamp Torque : 7.0N·m)	—	HKY40R
GYHR/L○○○○○○○○-M20R/L	GY06013M (Clamp Torque : 6.0N·m)	TS407 (Clamp Torque : 3.5N·m)	①TKY30R ②TKY15D
GYHR/L○○○○○○○○-M25R/L		TS55 (Clamp Torque : 5.0N·m)	①TKY30R ②TKY25D

Dimensions (mm)								Cutting Mode	
H	B	LF	LH	LH 2	HF	WF	HBH	Clockwise	Anticlockwise
20	20	131	45	66	20	26	5		
20	20	131	45	66	20	26	5		
25	25	150	41	—	25	25.25	—		
25	25	150	41	—	25	25.25	—		
25	25	156	45	63	25	28	—		
25	25	156	45	63	25	28	—		
32	25	176	45	63	32	28	—		
32	25	176	45	63	32	28	—		
32	32	176	45	63	32	35	—		
32	32	176	45	63	32	35	—		



Insert selection

Seat Size	Geometry name
F	GY○○0239/0250/0274E○○○○−Breaker shown below

For grooving/cutting off breaker

Seat Size	Breaker / CW	GU (For gummy steel)	GS (Low)	GM (Medium)	05-GM (Cutting off)	GFGS (Hardened steel)
		Neutral	Neutral	Neutral	With hand	Neutral
F	3.00mm	●	●	●	●	●
	3.18mm	●	●	●		●

For multifunctional grooving breaker

Seat Size	Breaker / CW	MF (Finish)	MS (Low)	MM (Medium)	BM (Copying, Recessing)
					Ball shape
F	3.00mm				●
	RE 0.2	●	●	●	
	RE 0.4	●	●	●	
	RE 0.8			●	
	3.18mm				●
	RE 0.2	●			
	RE 0.4	●			
	3.24mm	●			

● : Standard insert with dimensions

GY

CW(Cutting width) 4.00, 4.24

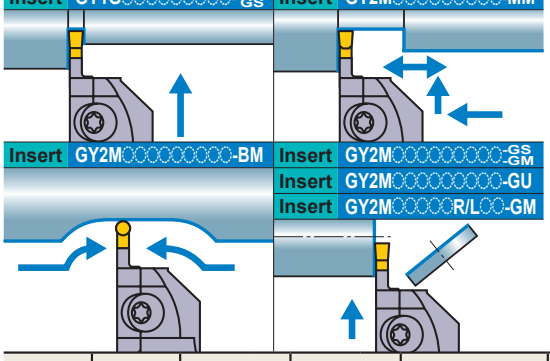
External turning

Product Information

Recommended Cutting Condition >> 496
INSERTS >> 462
Technical Info >> 1971
IDENTIFICATION >> 460
SPARE PARTS >> 1927
ISO13399 Property >> 1966

1 00° type holder

Insert	GY1M/2M○○○○○○○○○-GM	Insert	GY2G○○○○○○○○○-MF
Insert	GY2M○○○○○○○○○-GS/-GU	Insert	GY2M○○○○○○○○○-MS
Insert	GY1G○○○○○○○○○-GF/GS	Insert	GY2M○○○○○○○○○-MM
Insert	GY2M○○○○○○○○○-BM	Insert	GY2M○○○○○○○○○-GS/-GM
		Insert	GY2M○○○○○○○○○-GU
		Insert	GY2M○○○○○R/L○○-GM



(Note 1) Please order the modular blade and modular holder separately.
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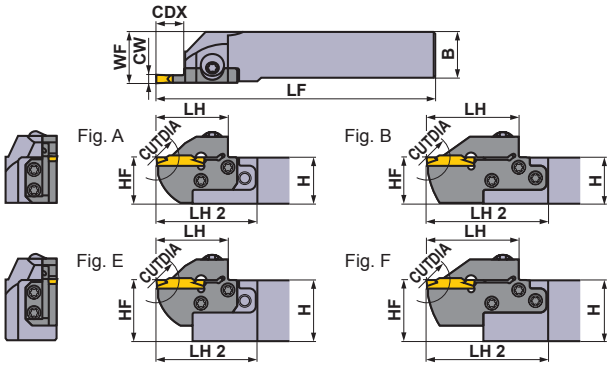

Right hand tool holder shown.

Seat Size	CW	CDX	CUTDIA	Type	Hand (R/L)	Order Number Holder	Stock	Modular Blade	Stock	Fig.
G	4.00 4.24	8	16	Mono Block	R	GYQR2020K00-G08	●	—	—	G
					L	GYQL2020K00-G08	●	—	—	G
				Modular	R	GYHR2020K00-M25R	●	GYM25RA-G08	●	C
					L	GYHL2020K00-M25L	●	GYM25LA-G08	●	C
				Mono Block	R	GYQR2525M00-G08	●	—	—	G
					L	GYQL2525M00-G08	●	—	—	G
				Modular	R	GYHR2525M00-M25R	●	GYM25RA-G08	●	A
					L	GYHL2525M00-M25L	●	GYM25LA-G08	●	A
				Modular	R	GYHR3225P00-M25R	●	GYM25RA-G08	●	E
					L	GYHL3225P00-M25L	●	GYM25LA-G08	●	E
				Modular	R	GYHR3232P00-M25R	●	GYM25RA-G08	●	E
					L	GYHL3232P00-M25L	●	GYM25LA-G08	●	E
		12	24	Modular	R	GYHR1616J00-M20R	●	GYM20RA-G12	●	C
					L	GYHL1616J00-M20L	●	GYM20LA-G12	●	C
				Modular	R	GYHR2020K00-M20R	●	GYM20RA-G12	●	A
					L	GYHL2020K00-M20L	●	GYM20LA-G12	●	A
		14	28	Modular	R	GYHR2020K00-M25R	●	GYM25RA-G14	●	C
					L	GYHL2020K00-M25L	●	GYM25LA-G14	●	C
				Modular	R	GYHR2525M00-M25R	●	GYM25RA-G14	●	A
					L	GYHL2525M00-M25L	●	GYM25LA-G14	●	A
				Modular	R	GYHR3225P00-M25R	●	GYM25RA-G14	●	E
					L	GYHL3225P00-M25L	●	GYM25LA-G14	●	E
				Modular	R	GYHR3232P00-M25R	●	GYM25RA-G14	●	E
					L	GYHL3232P00-M25L	●	GYM25LA-G14	●	E
		25 ∗1	50 ∗2	Mono Block	R	GYQR2020K00-G25	●	—	—	H
					L	GYQL2020K00-G25	●	—	—	H
				Modular	R	GYHR2020K00-M25R	●	GYM25RA-G25	●	D
					L	GYHL2020K00-M25L	●	GYM25LA-G25	●	D
				Mono Block	R	GYQR2525M00-G25	●	—	—	G
					L	GYQL2525M00-G25	●	—	—	G
				Modular	R	GYHR2525M00-M25R	●	GYM25RA-G25	●	B
					L	GYHL2525M00-M25L	●	GYM25LA-G25	●	B
				Modular	R	GYHR3225P00-M25R	●	GYM25RA-G25	●	F
					L	GYHL3225P00-M25L	●	GYM25LA-G25	●	F
				Modular	R	GYHR3232P00-M25R	●	GYM25RA-G25	●	F
					L	GYHL3232P00-M25L	●	GYM25LA-G25	●	F

∗1 The maximum groove depth varies according to the insert used.
∗2 The maximum cut off diameter **CUTDIA** varies according to the insert used.
∗3 Dimensions shown are when the gauge insert is used. If other insert geometries are used then **LF**, **LH**, **LH 2** and **WF** values may vary.

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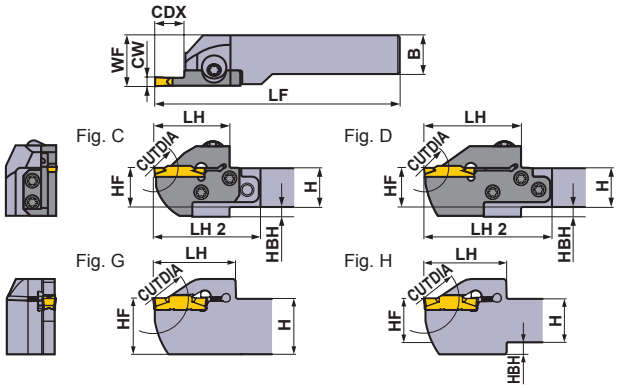


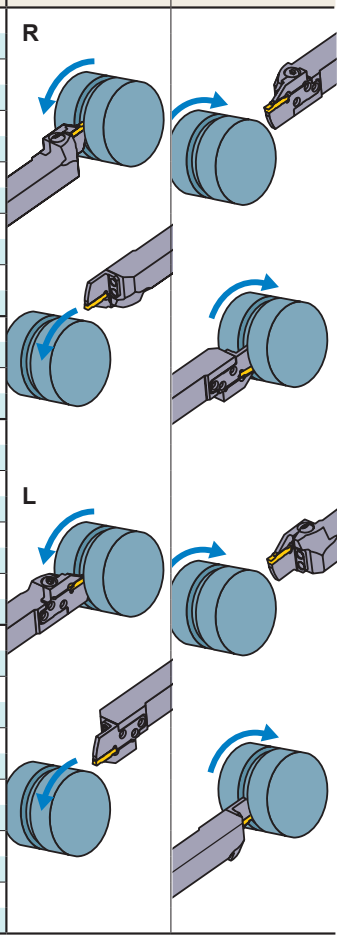
Right hand tool holder shown.

* Wrench : ① : Clamp Screw, ② : Blade Screw

SPARE PARTS

Holder	Clamp Screw	Blade Screw (5 pcs.)	Wrench *
GYQR/L○○○○○○○○○-○○○○	HSC05030 (Clamp Torque : 7.0N·m)	—	HKY40R
GYHR/L○○○○○○○○-M20R/L	GY06013M (Clamp Torque : 6.0N·m)	TS407 (Clamp Torque : 3.5N·m)	①TKY30R ②TKY15D
GYHR/L○○○○○○○○-M25R/L		TS55 (Clamp Torque : 5.0N·m)	①TKY30R ②TKY25D

Dimensions (mm) *3								Cutting Mode	
H	B	LF	LH	LH 2	HF	WF	HBH	Clockwise	Anticlockwise
20	20	125	41	—	20	20.35	—		
20	20	125	41	—	20	20.35	—		
20	20	119	33	54	20	26	5		
20	20	119	33	54	20	26	5		
25	25	150	41	—	25	25.35	—		
25	25	150	41	—	25	25.35	—		
25	25	144	33	51	25	28	—		
25	25	144	33	51	25	28	—		
32	25	164	33	51	32	28	—		
32	25	164	33	51	32	28	—		
32	32	164	33	51	32	35	—		
32	32	164	33	51	32	35	—		
16	16	110	34	50	16	20	4		
16	16	110	34	50	16	20	4		
20	20	125	34	49	20	23	—		
20	20	125	34	49	20	23	—		
20	20	125	39	60	20	26	5		
20	20	125	39	60	20	26	5		
25	25	150	39	57	25	28	—		
25	25	150	39	57	25	28	—		
32	25	170	39	57	32	28	—		
32	25	170	39	57	32	28	—		
32	32	170	39	57	32	35	—		
32	32	170	39	57	32	35	—		
20	20	125	46	—	20	20.35	4		
20	20	125	46	—	20	20.35	4		
20	20	136	50	71	20	26	5		
20	20	136	50	71	20	26	5		
25	25	150	46	—	25	25.35	—		
25	25	150	46	—	25	25.35	—		
25	25	161	50	68	25	28	—		
25	25	161	50	68	25	28	—		
32	25	181	50	68	32	28	—		
32	25	181	50	68	32	28	—		
32	32	181	50	68	32	35	—		
32	32	181	50	68	32	35	—		



Insert selection

Seat Size	Geometry name
G	GY○○0239/0250/0274E○○○○–Breaker shown below

For grooving/cutting off breaker

Seat Size	Breaker / CW	GU (For gummy steel)	GS (Low)	GM (Medium)	05-GM (Cutting off)	GFGS (Hardened steel)
		Neutral	Neutral	Neutral	With hand	Neutral
G	4.00mm	●	●	●	●	●

For multifunctional grooving breaker

Seat Size	Breaker / CW	MF (Finish)	MS (Low)	MM (Medium)	BM (Copying, Recessing)
					Ball shape
G	4.00mm				●
	RE 0.2	●	●	●	
	RE 0.4	●	●	●	
	RE 0.8	●		●	
	4.24mm	●			

● : Standard insert with dimensions

GY

CW(Cutting width) 4.75, 5.00, 5.24

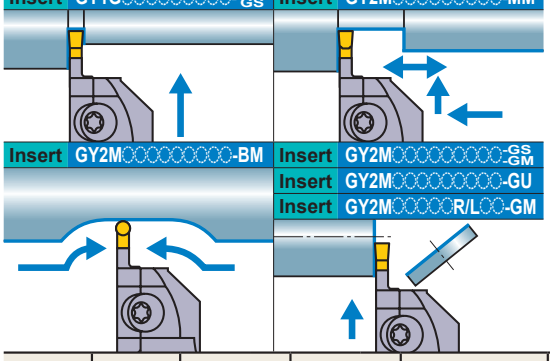
External turning

Product Information

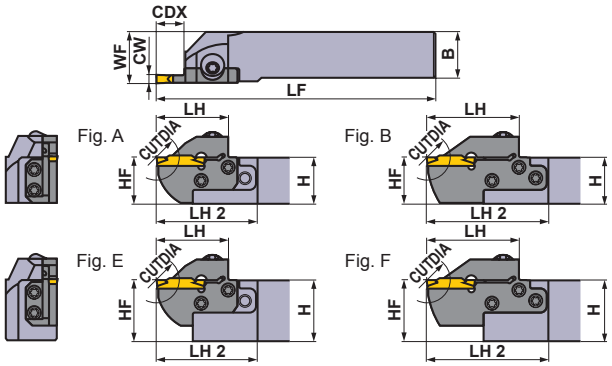
Recommended Cutting Condition >> 496
INSERTS >> 462
Technical Info >> 1971
IDENTIFICATION >> 460
SPARE PARTS >> 1927
ISO13399 Property >> 1966

1 00° type holder

Insert	GY1M/2M○○○○○○○○○-GM	Insert	GY2G○○○○○○○○○-MF
Insert	GY2M○○○○○○○○○-GS/-GU	Insert	GY2M○○○○○○○○○-MS
Insert	GY1G○○○○○○○○○-GF/GS	Insert	GY2M○○○○○○○○○-MM
Insert	GY2M○○○○○○○○○-BM	Insert	GY2M○○○○○○○○○-GS/-GM
		Insert	GY2M○○○○○○○○○-GU
		Insert	GY2M○○○○○R/L○○-GM



(Note 1) Please order the modular blade and modular holder separately.
(Note 2) Please set the right hand modular blade at the right hand holder and the left hand modular blade at the left hand holder.

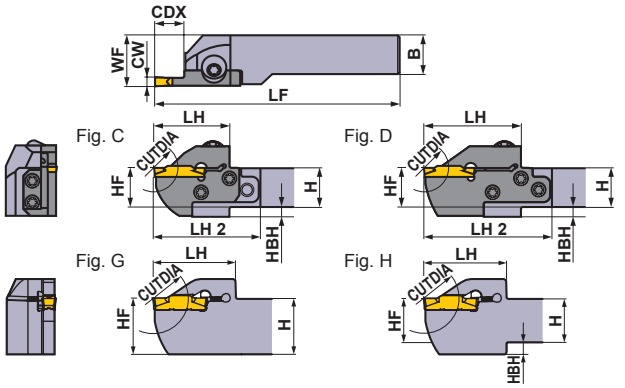


Right hand tool holder shown.

Seat Size	CW	CDX	CUTDIA	Type	Hand (R/L)	Order Number Holder	Stock	Modular Blade	Stock	Fig.
H	4.75 5.00 5.24	8	16	Mono Block	R	GYQR2020K00-H08	●	–	–	G
					L	GYQL2020K00-H08	●	–	–	G
				Modular	R	GYHR2020K00-M25R	●	GYM25RA-H08	●	C
					L	GYHL2020K00-M25L	●	GYM25LA-H08	●	C
				Mono Block	R	GYQR2525M00-H08	●	–	–	G
					L	GYQL2525M00-H08	●	–	–	G
				Modular	R	GYHR2525M00-M25R	●	GYM25RA-H08	●	A
					L	GYHL2525M00-M25L	●	GYM25LA-H08	●	A
				Modular	R	GYHR3225P00-M25R	●	GYM25RA-H08	●	E
					L	GYHL3225P00-M25L	●	GYM25LA-H08	●	E
				Modular	R	GYHR3232P00-M25R	●	GYM25RA-H08	●	E
					L	GYHL3232P00-M25L	●	GYM25LA-H08	●	E
		12	24	Modular	R	GYHR1616J00-M20R	●	GYM20RA-H12	●	C
					L	GYHL1616J00-M20L	●	GYM20LA-H12	●	C
				Modular	R	GYHR2020K00-M20R	●	GYM20RA-H12	●	A
					L	GYHL2020K00-M20L	●	GYM20LA-H12	●	A
		14	28	Modular	R	GYHR2020K00-M25R	●	GYM25RA-H14	●	C
					L	GYHL2020K00-M25L	●	GYM25LA-H14	●	C
				Modular	R	GYHR2525M00-M25R	●	GYM25RA-H14	●	A
					L	GYHL2525M00-M25L	●	GYM25LA-H14	●	A
				Modular	R	GYHR3225P00-M25R	●	GYM25RA-H14	●	E
					L	GYHL3225P00-M25L	●	GYM25LA-H14	●	E
				Modular	R	GYHR3232P00-M25R	●	GYM25RA-H14	●	E
					L	GYHL3232P00-M25L	●	GYM25LA-H14	●	E
		25 *1	50 *2	Mono Block	R	GYQR2020K00-H25	●	–	–	H
					L	GYQL2020K00-H25	●	–	–	H
				Modular	R	GYHR2020K00-M25R	●	GYM25RA-H25	●	D
					L	GYHL2020K00-M25L	●	GYM25LA-H25	●	D
				Mono Block	R	GYQR2525M00-H25	●	–	–	G
					L	GYQL2525M00-H25	●	–	–	G
				Modular	R	GYHR2525M00-M25R	●	GYM25RA-H25	●	B
					L	GYHL2525M00-M25L	●	GYM25LA-H25	●	B
				Modular	R	GYHR3225P00-M25R	●	GYM25RA-H25	●	F
					L	GYHL3225P00-M25L	●	GYM25LA-H25	●	F
				Modular	R	GYHR3232P00-M25R	●	GYM25RA-H25	●	F
					L	GYHL3232P00-M25L	●	GYM25LA-H25	●	F

*1 The maximum groove depth varies according to the insert used.
*2 The maximum cut off diameter **CUTDIA** varies according to the insert used.
*3 Dimensions shown are when the gauge insert is used. If other insert geometries are used then **LF**, **LH**, **LH 2** and **WF** values may vary.

● : **Inventory maintained in Japan.**



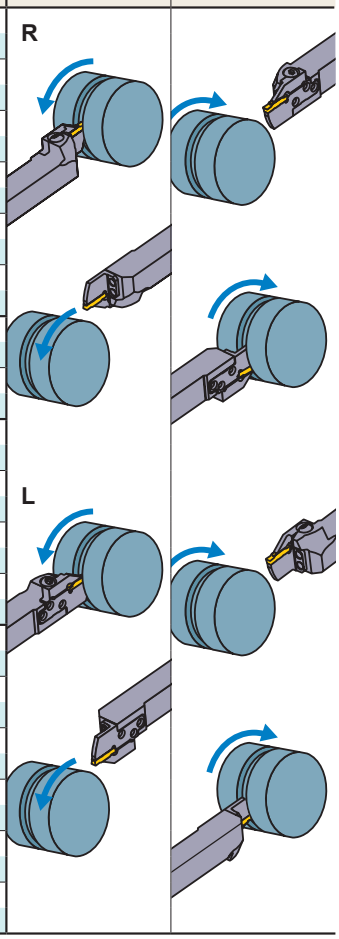
Right hand tool holder shown.

* Wrench : ① : Clamp Screw, ② : Blade Screw

SPARE PARTS

Holder	Clamp Screw	Blade Screw (5 pcs.)	Wrench *
GYQR/L○○○○○○○○○-○○○○	HSC05030 (Clamp Torque : 7.0N·m)	—	HKY40R
GYHR/L○○○○○○○○-M20R/L	GY06013M (Clamp Torque : 6.0N·m)	TS407 (Clamp Torque : 3.5N·m)	①TKY30R ②TKY15D
GYHR/L○○○○○○○○-M25R/L		TS55 (Clamp Torque : 5.0N·m)	①TKY30R ②TKY25D

Dimensions (mm) *3								Cutting Mode	
H	B	LF	LH	LH 2	HF	WF	HBH	Clockwise	Anticlockwise
20	20	125	41	—	20	20.35	—		
20	20	125	41	—	20	20.35	—		
20	20	119	33	54	20	26	5		
20	20	119	33	54	20	26	5		
25	25	150	41	—	25	25.35	—		
25	25	150	41	—	25	25.35	—		
25	25	144	33	51	25	28	—		
25	25	144	33	51	25	28	—		
32	25	164	33	51	32	28	—		
32	25	164	33	51	32	28	—		
32	32	164	33	51	32	35	—		
32	32	164	33	51	32	35	—		
16	16	110	34	50	16	20	4		
16	16	110	34	50	16	20	4		
20	20	125	34	49	20	23	—		
20	20	125	34	49	20	23	—		
20	20	125	39	60	20	26	5		
20	20	125	39	60	20	26	5		
25	25	150	39	57	25	28	—		
25	25	150	39	57	25	28	—		
32	25	170	39	57	32	28	—		
32	25	170	39	57	32	28	—		
32	32	170	39	57	32	35	—		
32	32	170	39	57	32	35	—		
20	20	125	46	—	20	20.35	4		
20	20	125	46	—	20	20.35	4		
20	20	136	50	71	20	26	5		
20	20	136	50	71	20	26	5		
25	25	150	46	—	25	25.35	—		
25	25	150	46	—	25	25.35	—		
25	25	161	50	68	25	28	—		
25	25	161	50	68	25	28	—		
32	25	181	50	68	32	28	—		
32	25	181	50	68	32	28	—		
32	32	181	50	68	32	35	—		
32	32	181	50	68	32	35	—		



Insert selection

Seat Size	Geometry name
H	GY○○0475/0500/0524H○○○○–Breaker shown below

For grooving/cutting off breaker

Seat Size	Breaker / CW	GU (For gummy steel)	GS (Low)	GM (Medium)	05-GM (Cutting off)	GFGS (Hardened steel)
		Neutral	Neutral	Neutral	With hand	Neutral
H	4.75mm	●	●	●		●
	5.00mm	●	●	●	●	●

For multifunctional grooving breaker

Seat Size	Breaker / CW	MF (Finish)	MS (Low)	MM (Medium)	BM (Copying, Recessing)
					Ball shape
H	4.75mm				●
	RE 0.2	●			
	RE 0.4	●			
	RE 0.8	●			
	5.00mm				●
	RE 0.2	●			
	RE 0.4	●	●	●	
	RE 0.8	●	●	●	
	5.24mm	●			

● : Standard insert with dimensions

GY

CW(Cutting width) 6.00, 6.31, 6.35

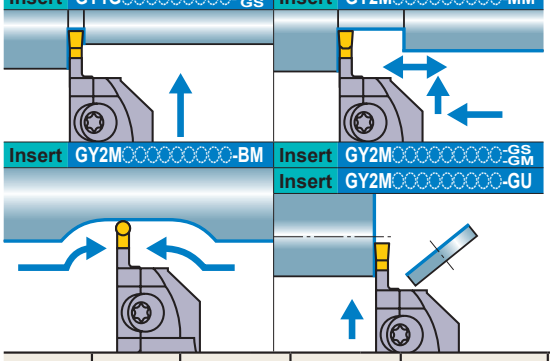
External turning

Product Information

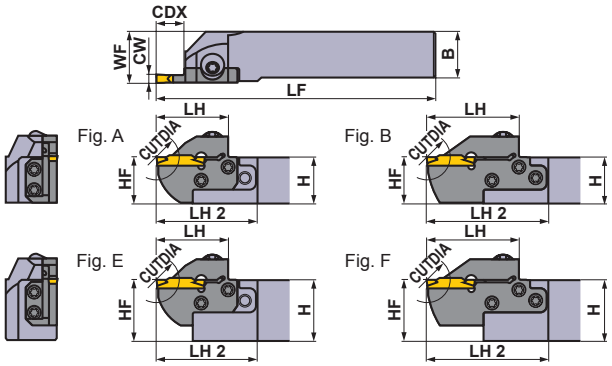
Recommended Cutting Condition >> 496
INSERTS >> 462
Technical Info >> 1971
IDENTIFICATION >> 460
SPARE PARTS >> 1927
ISO13399 Property >> 1966

1 00° type holder

Insert	GY2M○○○○○○○○○○-GM	Insert	GY2G○○○○○○○○○○-MF
Insert	GY2M○○○○○○○○○○-GS -GU	Insert	GY2M○○○○○○○○○○-MS
Insert	GY1G○○○○○○○○○○- GF GS	Insert	GY2M○○○○○○○○○○-MM
Insert	GY2M○○○○○○○○○○-BM	Insert	GY2M○○○○○○○○○○-GS -GM
		Insert	GY2M○○○○○○○○○○-GU



(Note 1) Please order the modular blade and modular holder separately.
(Note 2) Please set the right hand modular blade at the right hand holder and the left hand modular blade at the left hand holder.

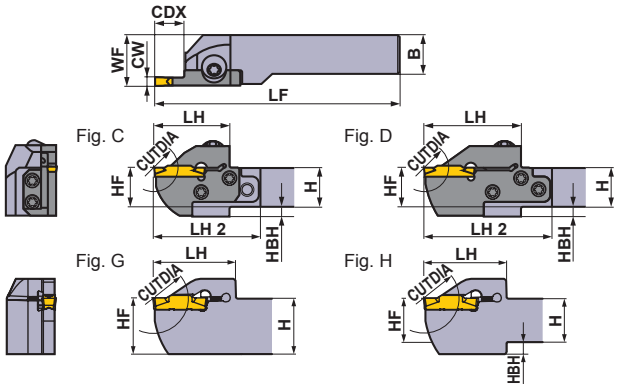


Right hand tool holder shown.

Seat Size	CW	CDX	CUTDIA	Type	Hand (R/L)	Order Number Holder	Stock	Modular Blade	Stock	Fig.
J	6.00 6.31 6.35	8	16	Mono Block	R	GYQR2020K00-J08	●	—	—	G
					L	GYQL2020K00-J08	●	—	—	G
				Modular	R	GYHR2020K00-M25R	●	GYM25RA-J08	●	C
					L	GYHL2020K00-M25L	●	GYM25LA-J08	●	C
				Mono Block	R	GYQR2525M00-J08	●	—	—	G
					L	GYQL2525M00-J08	●	—	—	G
				Modular	R	GYHR2525M00-M25R	●	GYM25RA-J08	●	A
					L	GYHL2525M00-M25L	●	GYM25LA-J08	●	A
				Modular	R	GYHR3225P00-M25R	●	GYM25RA-J08	●	E
					L	GYHL3225P00-M25L	●	GYM25LA-J08	●	E
				Modular	R	GYHR3232P00-M25R	●	GYM25RA-J08	●	E
					L	GYHL3232P00-M25L	●	GYM25LA-J08	●	E
		14	28	Modular	R	GYHR2020K00-M25R	●	GYM25RA-J14	●	C
					L	GYHL2020K00-M25L	●	GYM25LA-J14	●	C
				Modular	R	GYHR2525M00-M25R	●	GYM25RA-J14	●	A
					L	GYHL2525M00-M25L	●	GYM25LA-J14	●	A
				Modular	R	GYHR3225P00-M25R	●	GYM25RA-J14	●	E
					L	GYHL3225P00-M25L	●	GYM25LA-J14	●	E
				Modular	R	GYHR3232P00-M25R	●	GYM25RA-J14	●	E
					L	GYHL3232P00-M25L	●	GYM25LA-J14	●	E
		25 *1	50 *2	Mono Block	R	GYQR2020K00-J25	●	—	—	H
					L	GYQL2020K00-J25	●	—	—	H
				Modular	R	GYHR2020K00-M25R	●	GYM25RA-J25	●	D
					L	GYHL2020K00-M25L	●	GYM25LA-J25	●	D
				Mono Block	R	GYQR2525M00-J25	●	—	—	G
					L	GYQL2525M00-J25	●	—	—	G
				Modular	R	GYHR2525M00-M25R	●	GYM25RA-J25	●	B
					L	GYHL2525M00-M25L	●	GYM25LA-J25	●	B
				Modular	R	GYHR3225P00-M25R	●	GYM25RA-J25	●	F
					L	GYHL3225P00-M25L	●	GYM25LA-J25	●	F
				Modular	R	GYHR3232P00-M25R	●	GYM25RA-J25	●	F
					L	GYHL3232P00-M25L	●	GYM25LA-J25	●	F

*1 The maximum groove depth varies according to the insert used.
*2 The maximum cut off diameter **CUTDIA** varies according to the insert used.
*3 Dimensions shown are when the gauge insert is used. If other insert geometries are used then **LF**, **LH**, **LH 2** and **WF** values may vary.

● : **Inventory maintained in Japan.**



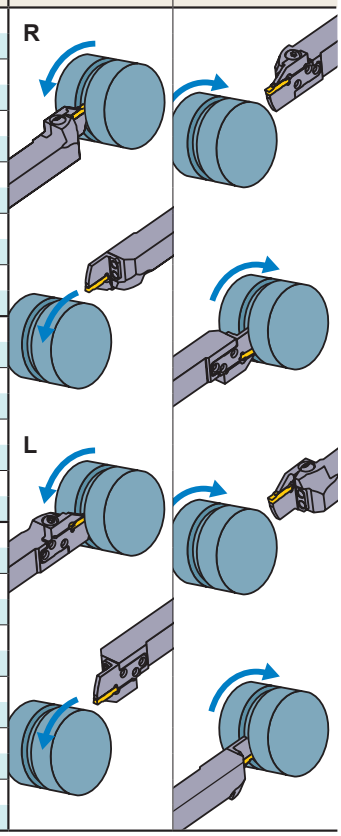
Right hand tool holder shown.

* Wrench : ① : Clamp Screw, ② : Blade Screw

SPARE PARTS

Holder	Clamp Screw	Blade Screw (5 pcs.)	Wrench *
GYQR/L○○○○○○○○○○○○	HSC05030 (Clamp Torque : 7.0N·m)	—	HKY40R
GYHR/L○○○○○○○○-M25R/L	GY06013M (Clamp Torque : 6.0N·m)	TS55 (Clamp Torque : 5.0N·m)	①TKY30R ②TKY25D

Dimensions (mm) *3								Cutting Mode	
H	B	LF	LH	LH 2	HF	WF	HBH	Clockwise	Anticlockwise
20	20	125	41	—	20	20.35	—		
20	20	125	41	—	20	20.35	—		
20	20	119	33	54	20	26	5		
20	20	119	33	54	20	26	5		
25	25	150	41	—	25	25.35	—		
25	25	150	41	—	25	25.35	—		
25	25	144	33	51	25	28	—		
25	25	144	33	51	25	28	—		
32	25	164	33	51	32	28	—		
32	25	164	33	51	32	28	—		
32	32	164	33	51	32	35	—		
32	32	164	33	51	32	35	—		
20	20	125	39	60	20	26	5		
20	20	125	39	60	20	26	5		
25	25	150	39	57	25	28	—		
25	25	150	39	57	25	28	—		
32	25	170	39	57	32	28	—		
32	25	170	39	57	32	28	—		
32	32	170	39	57	32	35	—		
32	32	170	39	57	32	35	—		
20	20	125	46	—	20	20.35	4		
20	20	125	46	—	20	20.35	4		
20	20	136	50	71	20	26	5		
20	20	136	50	71	20	26	5		
25	25	150	46	—	25	25.35	—		
25	25	150	46	—	25	25.35	—		
25	25	161	50	68	25	28	—		
25	25	161	50	68	25	28	—		
32	25	181	50	68	32	28	—		
32	25	181	50	68	32	28	—		
32	32	181	50	68	32	35	—		
32	32	181	50	68	32	35	—		



Insert selection

Seat Size	Geometry name
J	GY○○0600/0631/0635J○○○○○–Breaker shown below

For grooving/cutting off breaker

Seat Size	Breaker / CW	GU (For gummy steel)	GS (Low)	GM (Medium)	05-GM (Cutting off)	GFGS (Hardened steel)
		Neutral	Neutral	Neutral	With hand	Neutral
J	6.00mm	●	●	●		●
	6.35mm	●	●	●		

For multifunctional grooving breaker

Seat Size	Breaker / CW	MF (Finish)	MS (Low)	MM (Medium)	BM (Copying, Recessing)
					Ball shape
J	6.00mm				●
	RE 0.2	●			
	RE 0.4	●	●	●	
	RE 0.8	●	●	●	
	6.31mm	●			
	6.35mm				●
	RE 0.2	●			
	RE 0.4	●			
	RE 0.8	●			

● : Standard insert with dimensions

GY

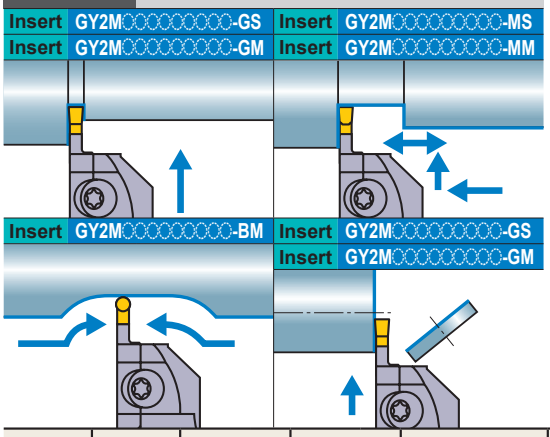
CW(Cutting width) 8.00

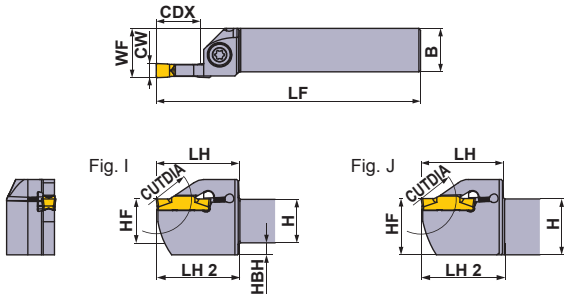
External turning

Product Information

Recommended Cutting Condition >> 496
INSERTS >> 462
Technical Info >> 1971
IDENTIFICATION >> 460
SPARE PARTS >> 1927
ISO13399 Property >> 1966

1 00° type holder



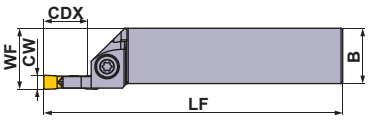


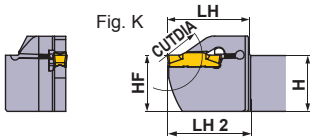
Right hand tool holder shown.

Seat Size	CW	CDX	CUTDIA	Type	Hand (R/L)	Order Number Holder	Stock	Modular Blade	Stock	Fig.
K	8.00	25 *1	50 *2	Mono Block	R	**GYPR2525M00-K25**	●	—	—	I
					L	**GYPL2525M00-K25**	●	—	—	I
				Mono Block	R	**GYPR3225P00-K25**	●	—	—	J
					L	**GYPL3225P00-K25**	●	—	—	J
				Mono Block	R	**GYPR3232P00-K25**	●	—	—	K
					L	**GYPL3232P00-K25**	●	—	—	K

*1 The maximum groove depth varies according to the insert used.
*2 The maximum cut off diameter **CUTDIA** varies according to the insert used.
*3 Dimensions shown are when the gauge insert is used. If other insert geometries are used then **LF**, **LH**, **LH 2** and **WF** values may vary.

● : **Inventory maintained in Japan.**



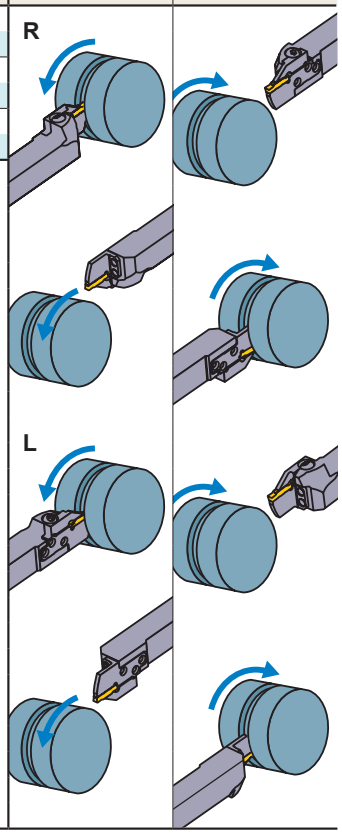


Right hand tool holder shown.

SPARE PARTS

Holder	Clamp Screw	Wrench
GYPR/L○○○○○○00-K25	GY06013M (Clamp Torque : 6.0N·m)	TKY30R

Dimensions (mm) *3								Cutting Mode	
H	B	LF	LH	LH 2	HF	WF	HBH	Clockwise	Anticlockwise
25	25	150	47	48	25	28	7		
25	25	150	47	48	25	28	7		
32	25	170	47	48	32	28	—		
32	25	170	47	48	32	28	—		
32	32	170	47	48	32	35	—		
32	32	170	47	48	32	35	—		



Insert selection

Seat Size	Geometry name
K	GY○○0800K○○○○–Breaker shown below

For grooving/cutting off breaker

Seat Size	Breaker / CW	GU (For gummy steel)	GS (Low)	GM (Medium)	05-GM (Cutting off)	GFGS (Hardened steel)
		Neutral	Neutral	Neutral	With hand	Neutral
K	8.00mm		●	●		

For multifunctional grooving breaker

Seat Size	Breaker / CW	MF (Finish)	MS (Low)	MM (Medium)	BM (Copying, Recessing)
					Ball shape
K	8.00mm				●
	RE 0.8		●	●	
	RE 1.2			●	

● : Standard insert with dimensions

GY

CW(Cutting width) 2.00-2.74

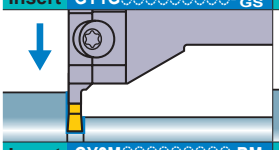
EXTERNAL GROOVING(90° type holder)

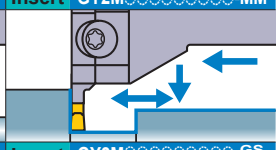
Product Information

Recommended Cutting Condition >> 496
INSERTS >> 462
Technical Info >> 1971
IDENTIFICATION >> 460
SPARE PARTS >> 1927
ISO13399 Property >> 1966

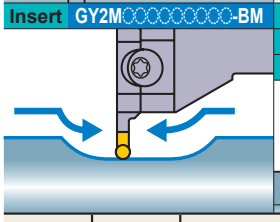
2 90° type holder

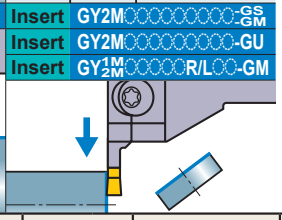
Insert GY1M/2M○○○○○○○○○-GM
Insert GY2M○○○○○○○○○-GS/-GU
Insert GY1G○○○○○○○○○-GF/GS
Insert GY2G○○○○○○○○○-MF
Insert GY2M○○○○○○○○○-MS
Insert GY2M○○○○○○○○○-MM



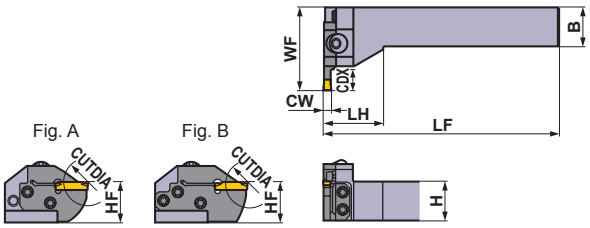


Insert GY2M○○○○○○○○○-BM
Insert GY2M○○○○○○○○○-GS/GM
Insert GY2M○○○○○○○○○-GU
Insert GY1M/2M○○○○○R/L○○-GM





(Note 1) Please order the modular blade and modular holder separately.
(Note 2) Please set the left hand modular blade at the right hand holder and the right hand modular blade at the left hand holder.



Right hand tool holder shown.

Seat Size	CW	CDX	CUTDIA	Type	Hand (R/L)	Order Number Holder	Stock	Modular Blade	Stock	Fig.
D	2.00 2.24	6	12	Modular	R	GYHR2020K90-M20L	●	GYM20LA-D06	●	A
					L	GYHL2020K90-M20R	●	GYM20RA-D06	●	A
				Modular	R	GYHR2525M90-M25L	●	GYM25LA-D06	●	A
					L	GYHL2525M90-M25R	●	GYM25RA-D06	●	A
		10	20	Modular	R	GYHR2020K90-M20L	●	GYM20LA-D10	●	A
					L	GYHL2020K90-M20R	●	GYM20RA-D10	●	A
		12	24	Modular	R	GYHR2525M90-M25L	●	GYM25LA-D12	●	A
					L	GYHL2525M90-M25R	●	GYM25RA-D12	●	A
		18 *4	36	Modular	R	GYHR2020K90-M20L	●	GYM20LB-D18	●	B
					L	GYHL2020K90-M20R	●	GYM20RB-D18	●	B
		20 *1	40 *2	Modular	R	GYHR2525M90-M25L	●	GYM25LA-D20	●	B
					L	GYHL2525M90-M25R	●	GYM25RA-D20	●	B
E	2.39 2.50 2.74	6	12	Modular	R	GYHR2020K90-M20L	●	GYM20LA-E06	●	A
					L	GYHL2020K90-M20R	●	GYM20RA-E06	●	A
				Modular	R	GYHR2525M90-M25L	●	GYM25LA-E06	●	A
					L	GYHL2525M90-M25R	●	GYM25RA-E06	●	A
		10	20	Modular	R	GYHR2020K90-M20L	●	GYM20LA-E10	●	A
					L	GYHL2020K90-M20R	●	GYM20RA-E10	●	A
		12	24	Modular	R	GYHR2525M90-M25L	●	GYM25LA-E12	●	A
					L	GYHL2525M90-M25R	●	GYM25RA-E12	●	A
		18 *4	36	Modular	R	GYHR2020K90-M20L	●	GYM20LB-E18	●	B
					L	GYHL2020K90-M20R	●	GYM20RB-E18	●	B
		20 *1	40 *2	Modular	R	GYHR2525M90-M25L	●	GYM25LA-E20	●	B
					L	GYHL2525M90-M25R	●	GYM25RA-E20	●	B

*1 The maximum groove depth varies according to the insert used.
*2 The maximum cut off diameter **CUTDIA** varies according to the insert used.
*3 Dimensions shown are when the gauge insert is used. If other insert geometries are used then **LF**, **LH** and **WF** values may vary.
*4 The maximum groove depth is limited by the workpiece diameter.

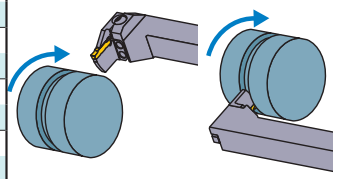
● : **Inventory maintained in Japan.**

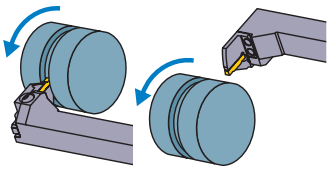
* Wrench : ① : Clamp Screw, ② : Blade Screw

SPARE PARTS

Holder	Clamp Screw	Blade Screw (5 pcs.)	Wrench *
GYHR2020K90-M20L	GY06013M (Clamp Torque : 6.0N·m)	TS407 (Clamp Torque : 3.5N·m)	①TKY30R ②TKY15D
GYHL2020K90-M20R			
GYHR2525M90-M25L		TS55 (Clamp Torque : 5.0N·m)	①TKY30R ②TKY25D
GYHL2525M90-M25R			

Dimensions (mm) *3						Cutting Mode
H	B	LF	LH	HF	WF	
20	20	125	35	20	39	R
20	20	125	35	20	39	
25	25	150	38	25	45	
25	25	150	38	25	45	
20	20	125	35	20	45	
20	20	125	35	20	45	
25	25	150	38	25	53	
25	25	150	38	25	53	
20	20	125	35	20	51	
20	20	125	35	20	51	
25	25	150	38	25	59	
25	25	150	38	25	59	
20	20	125	35	20	39	L
20	20	125	35	20	39	
25	25	150	38	25	45	
25	25	150	38	25	45	
20	20	125	35	20	45	
20	20	125	35	20	45	
25	25	150	38	25	53	
25	25	150	38	25	53	
20	20	125	35	20	51	
20	20	125	35	20	51	
25	25	150	38	25	59	
25	25	150	38	25	59	





Insert selection

Seat Size	Geometry name
D	GY○○0200/0224D○○○○○–Breaker shown below
E	GY○○0239/0250/0274E○○○○○–Breaker shown below

For grooving/cutting off breaker

Seat Size	CW \ Breaker	GU (For gummy steel)	GS (Low)	GM (Medium)	05-GM (Cutting off)	GFGS (Hardened steel)
		Neutral	Neutral	Neutral	With hand	Neutral
D	2.00mm	●	●	●	●	●
E	2.39mm	●	●	●		●
	2.50mm	●	●	●	●	●

For multifunctional grooving breaker

Seat Size	CW \ Breaker	MF (Finish)	MS (Low)	MM (Medium)	BM (Copying, Recessing)
					Ball shape
D	2.00mm	●	●	●	●
	2.24mm	●			
E	2.39mm	●			
	2.50mm	●	●	●	●
	2.74mm	●			

● : Standard insert with dimensions

GY

CW(Cutting width) 3.00–4.24

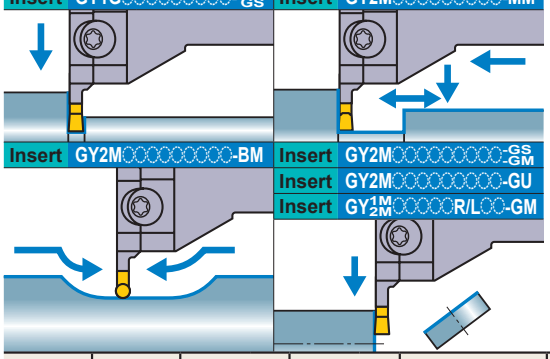
EXTERNAL GROOVING(90° type holder)

Product Information

Recommended Cutting Condition >> 496
INSERTS >> 462
Technical Info >> 1971
IDENTIFICATION >> 460
SPARE PARTS >> 1927
ISO13399 Property >> 1966

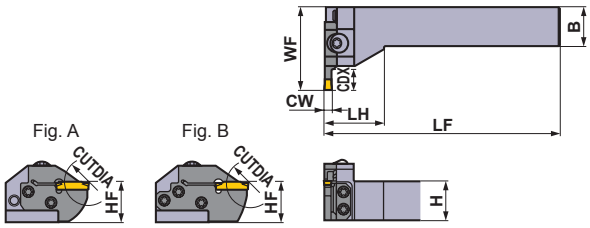
2 90° type holder

Insert GY1M/2M○○○○○○○○○-GM
Insert GY2M○○○○○○○○○-GS/-GU
Insert GY1G○○○○○○○○○-GF/GS
Insert GY2G○○○○○○○○○-MF
Insert GY2M○○○○○○○○○-MS
Insert GY2M○○○○○○○○○-MM



Insert GY2M○○○○○○○○○-BM
Insert GY2M○○○○○○○○○-GS/GM
Insert GY2M○○○○○○○○○-GU
Insert GY1M/2M○○○○○R/L○○-GM

(Note 1) Please order the modular blade and modular holder separately.
(Note 2) Please set the left hand modular blade at the right hand holder and the right hand modular blade at the left hand holder.



Right hand tool holder shown.

Seat Size	CW	CDX	CUTDIA	Type	Hand (R/L)	Order Number Holder	Stock	Modular Blade	Stock	Fig.
F	3.00 3.18 3.24	6	12	Modular	R	GYHR2020K90-M20L	●	GYM20LA-F06	●	A
					L	GYHL2020K90-M20R	●	GYM20RA-F06	●	A
				Modular	R	GYHR2525M90-M25L	●	GYM25LA-F06	●	A
					L	GYHL2525M90-M25R	●	GYM25RA-F06	●	A
		10	20	Modular	R	GYHR2020K90-M20L	●	GYM20LA-F10	●	A
					L	GYHL2020K90-M20R	●	GYM20RA-F10	●	A
		12	24	Modular	R	GYHR2525M90-M25L	●	GYM25LA-F12	●	A
					L	GYHL2525M90-M25R	●	GYM25RA-F12	●	A
		18 *4	36	Modular	R	GYHR2020K90-M20L	●	GYM20LB-F18	●	B
					L	GYHL2020K90-M20R	●	GYM20RB-F18	●	B
		20 *1	40 *2	Modular	R	GYHR2525M90-M25L	●	GYM25LA-F20	●	B
					L	GYHL2525M90-M25R	●	GYM25RA-F20	●	B
G	4.00 4.24	8	16	Modular	R	GYHR2525M90-M25L	●	GYM25LA-G08	●	A
					L	GYHL2525M90-M25R	●	GYM25RA-G08	●	A
		12	24	Modular	R	GYHR2020K90-M20L	●	GYM20LA-G12	●	A
					L	GYHL2020K90-M20R	●	GYM20RA-G12	●	A
		14	28	Modular	R	GYHR2525M90-M25L	●	GYM25LA-G14	●	A
					L	GYHL2525M90-M25R	●	GYM25RA-G14	●	A
		25 *1	50 *2	Modular	R	GYHR2525M90-M25L	●	GYM25LA-G25	●	B
					L	GYHL2525M90-M25R	●	GYM25RA-G25	●	B

*1 The maximum groove depth varies according to the insert used.
*2 The maximum cut off diameter **CUTDIA** varies according to the insert used.
*3 Dimensions shown are when the gauge insert is used. If other insert geometries are used then **LF**, **LH** and **WF** values may vary.
*4 The maximum groove depth is limited by the workpiece diameter.

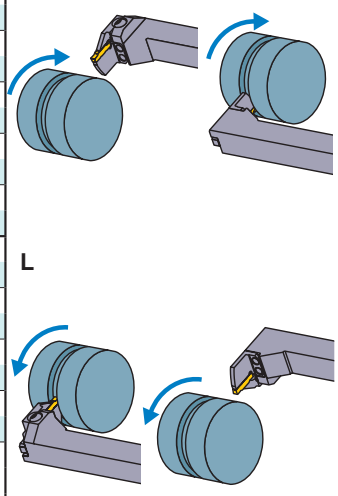
● : **Inventory maintained in Japan.**

* Wrench : ① : Clamp Screw, ② : Blade Screw

SPARE PARTS

Holder	Clamp Screw	Blade Screw (5 pcs.)	Wrench *
GYHR2020K90-M20L	GY06013M (Clamp Torque : 6.0N·m)	TS407 (Clamp Torque : 3.5N·m)	①TKY30R ②TKY15D
GYHL2020K90-M20R			
GYHR2525M90-M25L		TS55 (Clamp Torque : 5.0N·m)	①TKY30R ②TKY25D
GYHL2525M90-M25R			

Dimensions (mm) *3						Cutting Mode
H	B	LF	LH	HF	WF	
20	20	125	35	20	39	R
20	20	125	35	20	39	
25	25	150	38	25	45	
25	25	150	38	25	45	
20	20	125	35	20	45	
20	20	125	35	20	45	
25	25	150	38	25	53	
25	25	150	38	25	53	
20	20	125	35	20	51	
20	20	125	35	20	51	
25	25	150	38	25	59	
25	25	150	38	25	59	
25	25	150	38	25	47	L
25	25	150	38	25	47	
20	20	125	35	20	45	
20	20	125	35	20	45	
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	64	
25	25	150	38	25	64	



Insert selection

Seat Size	Geometry name
F	GY○○0300/0318/0324F○○○○−Breaker shown below
G	GY○○0400/0424G○○○○−Breaker shown below

For grooving/cutting off breaker

Seat Size	CW \ Breaker	GU (For gummy steel)	GS (Low)	GM (Medium)	05-GM (Cutting off)	GFGS (Hardened steel)
		Neutral	Neutral	Neutral	With hand	Neutral
F	3.00mm	●	●	●	●	●
	3.18mm	●	●	●		●
G	4.00mm	●	●	●	●	●

For multifunctional grooving breaker

Seat Size	CW \ Breaker	MF (Finish)	MS (Low)	MM (Medium)	BM (Copying, Recessing)
					Ball shape
F	3.00mm				●
	RE 0.2	●	●	●	
	RE 0.4	●	●	●	
	RE 0.8			●	
	3.18mm				●
	RE 0.2	●			
	RE 0.4	●			
	3.24mm	●			
G	4.00mm				●
	RE 0.2	●	●	●	
	RE 0.4	●	●	●	
	RE 0.8	●		●	
	4.24mm	●			

● : Standard insert with dimensions

GY

CW(Cutting width) 4.75-6.35

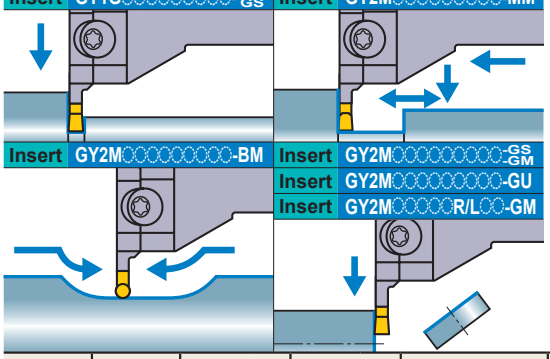
EXTERNAL GROOVING(90° type holder)

Product Information

Recommended Cutting Condition >> 496
INSERTS >> 462
Technical Info >> 1971
IDENTIFICATION >> 460
SPARE PARTS >> 1927
ISO13399 Property >> 1966

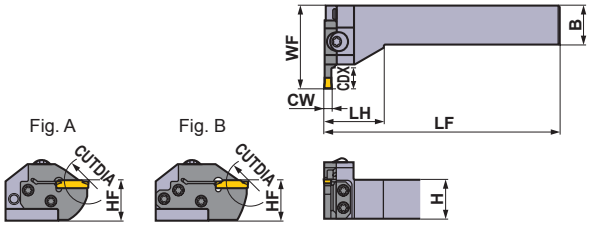
2 90° type holder

Insert GY1M/2M○○○○○○○○○-GM
Insert GY2M○○○○○○○○○-GS/-GU
Insert GY1G○○○○○○○○○-GF/GS
Insert GY2G○○○○○○○○○-MF
Insert GY2M○○○○○○○○○-MS
Insert GY2M○○○○○○○○○-MM



Insert GY2M○○○○○○○○○-BM
Insert GY2M○○○○○○○○○-GS/-GM
Insert GY2M○○○○○○○○○-GU
Insert GY2M○○○○○R/L○○-GM

(Note 1) Please order the modular blade and modular holder separately.
(Note 2) Please set the left hand modular blade at the right hand holder and the right hand modular blade at the left hand holder.



Right hand tool holder shown.

Seat Size	CW	CDX	CUTDIA	Type	Hand (R/L)	Order Number Holder	Stock	Modular Blade	Stock	Fig.
H	4.75 5.00 5.24	8	16	Modular	R	GYHR2525M90-M25L	●	GYM25LA-H08	●	A
					L	GYHL2525M90-M25R	●	GYM25RA-H08	●	A
		12	24	Modular	R	GYHR2020K90-M20L	●	GYM20LA-H12	●	A
					L	GYHL2020K90-M20R	●	GYM20RA-H12	●	A
		14	28	Modular	R	GYHR2525M90-M25L	●	GYM25LA-H14	●	A
					L	GYHL2525M90-M25R	●	GYM25RA-H14	●	A
		25 *1	50 *2	Modular	R	GYHR2525M90-M25L	●	GYM25LA-H25	●	B
					L	GYHL2525M90-M25R	●	GYM25RA-H25	●	B
J	6.00 6.31 6.35	8	16	Modular	R	GYHR2525M90-M25L	●	GYM25LA-J08	●	A
					L	GYHL2525M90-M25R	●	GYM25RA-J08	●	A
		14	28	Modular	R	GYHR2525M90-M25L	●	GYM25LA-J14	●	A
					L	GYHL2525M90-M25R	●	GYM25RA-J14	●	A
		25 *1	50 *2	Modular	R	GYHR2525M90-M25L	●	GYM25LA-J25	●	B
					L	GYHL2525M90-M25R	●	GYM25RA-J25	●	B

*1 The maximum groove depth varies according to the insert used.
*2 The maximum cut off diameter **CUTDIA** varies according to the insert used.
*3 Dimensions shown are when the gauge insert is used. If other insert geometries are used then **LF**, **LH** and **WF** values may vary.

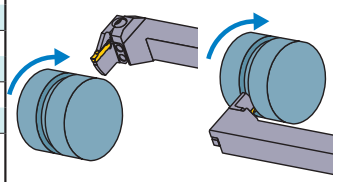
● : **Inventory maintained in Japan.**

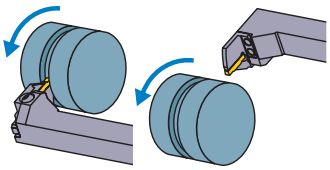
* Wrench : ① : Clamp Screw, ② : Blade Screw

SPARE PARTS

Holder Number	Clamp Screw	Blade Screw (5 pcs.)	Wrench *
GYHR2020K90-M20L	GY06013M (Clamp Torque : 6.0N·m)	TS407 (Clamp Torque : 3.5N·m)	①TKY30R ②TKY15D
GYHL2020K90-M20R			
GYHR2525M90-M25L		TS55 (Clamp Torque : 5.0N·m)	①TKY30R ②TKY25D
GYHL2525M90-M25R			

Dimensions (mm) *3						Cutting Mode
H	B	LF	LH	HF	WF	
25	25	150	38	25	47	R
25	25	150	38	25	47	
20	20	125	35	20	45	
20	20	125	35	20	45	
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	64	
25	25	150	38	25	64	
25	25	150	38	25	47	L
25	25	150	38	25	47	
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	64	
25	25	150	38	25	64	





Insert selection

Seat Size	Geometry name
H	GY○○0475/0500/0524H○○○○–Breaker shown below
J	GY○○0600/0631/0635J○○○○–Breaker shown below

For grooving/cutting off breaker

Seat Size	Breaker / CW	GU (For gummy steel) Neutral	GS (Low) Neutral	GM (Medium) Neutral	05-GM (Cutting off) With hand	GFGS (Hardened steel) Neutral
H	4.75mm	●	●	●		●
	5.00mm	●	●	●	●	●
J	6.00mm	●	●	●		●
	6.35mm	●	●	●		

For multifunctional grooving breaker

Seat Size	Breaker / CW	MF (Finish)	MS (Low)	MM (Medium)	BM (Copying, Recessing) Ball shape
H	4.75mm				●
	RE 0.2	●			
	RE 0.4	●			
	RE 0.8	●			
	5.00mm				●
	RE 0.2	●			
	RE 0.4	●	●	●	
	RE 0.8	●	●	●	
	5.24mm	●			
J	6.00mm				●
	RE 0.2	●			
	RE 0.4	●	●	●	
	RE 0.8	●	●	●	
	6.31mm	●			
	6.35mm				●
	RE 0.2	●			
	RE 0.4	●			
	RE 0.8	●			

● : Standard insert with dimensions

GY

CW(Cutting width) 2.00-6.35

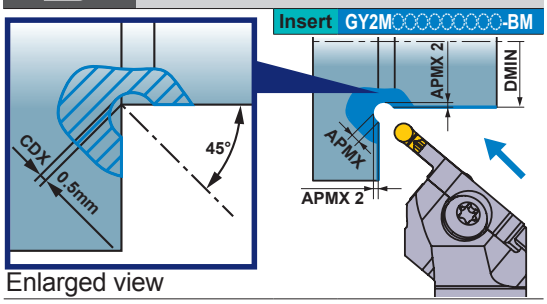
FOR EXTERNAL RECESSING

Product Information

Recommended Cutting Condition >> 496
INSERTS >> 462
Technical Info >> 1971
IDENTIFICATION >> 460
SPARE PARTS >> 1927
ISO13399 Property >> 1966

3 For 50° recessing holder

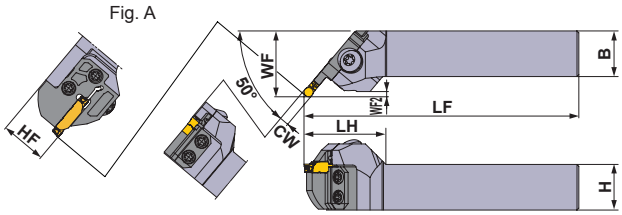
Insert GY2M○○○○○○○○○-BM



Enlarged view

(Note 1) Please order the modular blade and modular holder separately.
(Note 2) Please set the left hand modular blade at the right hand holder and the right hand modular blade at the left hand holder.

Fig. A



Right hand tool holder shown.

Seat Size	CW	CDX	DMIN	APMX	APMX 2	Type	Hand (R/L)	Order Number Holder	Stock	Modular Blade	Stock	Fig.
D	2.00	0.5	30	1.5	0.646	Modular	R	GYHR2020K50-M20L	●	GYM20LC-D005	●	A
							L	GYHL2020K50-M20R	●	GYM20RC-D005	●	A
						Modular	R	GYHR2525M50-M25L	●	GYM25LC-D005	●	A
							L	GYHL2525M50-M25R	●	GYM25RC-D005	●	A
E	2.50			1.75	0.72	Modular	R	GYHR2020K50-M20L	●	GYM20LC-E005	●	A
							L	GYHL2020K50-M20R	●	GYM20RC-E005	●	A
						Modular	R	GYHR2525M50-M25L	●	GYM25LC-E005	●	A
							L	GYHL2525M50-M25R	●	GYM25RC-E005	●	A
F	3.00 3.18			2	0.793	Modular	R	GYHR2020K50-M20L	●	GYM20LC-F005	●	A
							L	GYHL2020K50-M20R	●	GYM20RC-F005	●	A
						Modular	R	GYHR2525M50-M25L	●	GYM25LC-F005	●	A
							L	GYHL2525M50-M25R	●	GYM25RC-F005	●	A
G	4.00		20	2.5	0.939	Modular	R	GYHR2020K50-M20L	●	GYM20LC-G005	●	A
							L	GYHL2020K50-M20R	●	GYM20RC-G005	●	A
						Modular	R	GYHR2525M50-M25L	●	GYM25LC-G005	●	A
							L	GYHL2525M50-M25R	●	GYM25RC-G005	●	A
H	4.75 5.00			2.88	1.049	Modular	R	GYHR2020K50-M20L	●	GYM20LC-H005	●	A
							L	GYHL2020K50-M20R	●	GYM20RC-H005	●	A
						Modular	R	GYHR2525M50-M25L	●	GYM25LC-H005	●	A
							L	GYHL2525M50-M25R	●	GYM25RC-H005	●	A
J	6.00 6.35			3.5	1.232	Modular	R	GYHR2525M50-M25L	●	GYM25LC-J005	●	A
							L	GYHL2525M50-M25R	●	GYM25RC-J005	●	A

*1 Cannot be used because external and face grooving blade interferes with the work.
*2 Dimensions shown are when the gauge insert is used. If other insert geometries are used then **LF**, **LH**, **WF** and **WF2** values may vary.

● : **Inventory maintained in Japan.**

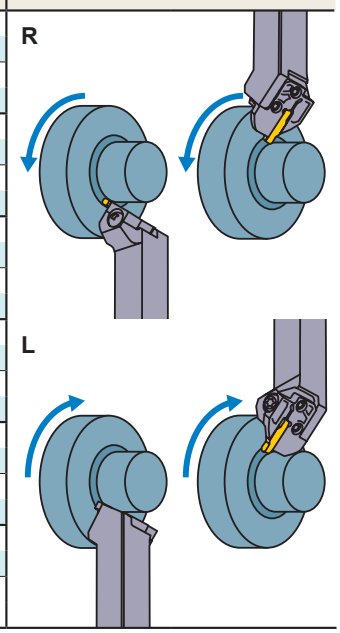
* Wrench : ① : Clamp Screw, ② : Blade Screw

SPARE PARTS

Holder	Clamp Screw	Blade Screw (5 pcs.)	Wrench *
GYHR/L2020K50-M20R/L	GY06013M (Clamp Torque : 6.0N·m)	TS407 (Clamp Torque : 3.5N·m)	①TKY30R ②TKY25D
GYHR/L2525M50-M25R/L		TS55 (Clamp Torque : 5.0N·m)	①TKY30R ②TKY25D

Dimensions (mm) *2						
H	B	LF	LH	HF	WF	WF2
20	20	125	40	20	32	1.6
20	20	125	40	20	32	1.6
25	25	150	45	25	35	1.6
25	25	150	45	25	35	1.6
20	20	125	40	20	32	1.8
20	20	125	40	20	32	1.8
25	25	150	45	25	35	1.8
25	25	150	45	25	35	1.8
20	20	125	40	20	32	2.0
20	20	125	40	20	32	2.0
25	25	150	45	25	35	2.0
25	25	150	45	25	35	2.0
20	20	125	40	20	32	2.4
20	20	125	40	20	32	2.4
25	25	150	45	25	35	2.4
25	25	150	45	25	35	2.4
20	20	125	40	20	33	2.8
20	20	125	40	20	33	2.8
25	25	150	45	25	36	2.8
25	25	150	45	25	36	2.8
25	25	150	44	25	36	3.4
25	25	150	44	25	36	3.4

Cutting Mode



Insert selection

Geometry name
GY2M○○○○○○○○○N-BM

For multifunctional grooving breaker		
Seat Size	Breaker / CW	BM (Copying, Recessing) Ball shape
D	2.00mm	●
E	2.50mm	●
F	3.00mm	●
	3.18mm	●
G	4.00mm	●
H	4.75mm	●
	5.00mm	●
J	6.00mm	●
	6.35mm	●

● : Standard insert with dimensions

RECOMMENDED CUTTING SPEED (m/min) [For External Grooving]

	Work Material	Hardness	Grade	Cutting Speed (m/min)
P	Mild Steel	≤160HB	VP20RT	100–220
			VP10RT	110–230
			NX2525	90–210
	Carbon Steel Alloy Steel	160–280HB	VP20RT	80–180
			VP10RT	90–190
			MY5015	110–250
			NX2525	70–170
		280HB≤	VP20RT	60–140
			VP10RT	70–150
			MY5015	90–210
			NX2525	55–135
M	Stainless Steel	≤270HB	VP20RT	60–140
			VP10RT	70–150
K	Gray Cast Iron	Tensile Strength ≤300MPa	VP20RT	80–180
			VP10RT	90–190
			MY5015	140–300
	Ductile Cast Iron	Tensile Strength ≤800MPa	VP20RT	60–140
			VP10RT	70–150
			MY5015	90–210
S	Heat Resistant Alloy Titanium Alloy	–	VP20RT	30–60
			VP10RT	40–70
			RT9010	40–70
H	Hardened steel	50HRC≤	BC8110	80–120
			MB8025	80–120

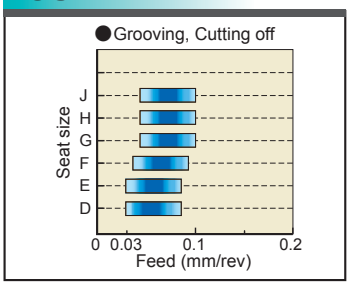
(Note 1) **VP20RT** is the first recommended grade for materials other than hardened steel.
(Note 2) For VP10RT, VP20RT and MY5015, wet cutting is recommended.

RECOMMENDED CUTTING CONDITIONS [For External Grooving]

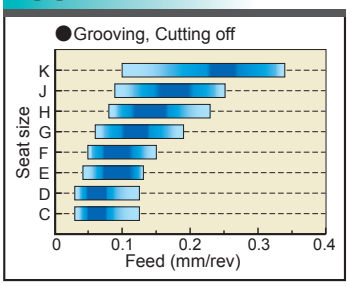
*Recommended cutting conditions when combining a GYHR/L2525M00/90-M24R\L modular holder and GYM25R/LA-○○○ modular blade.

Recommended feed rate and depth of cut

GU BREAKER



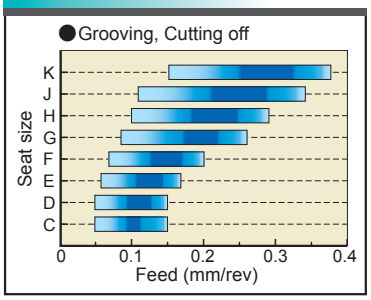
GS BREAKER



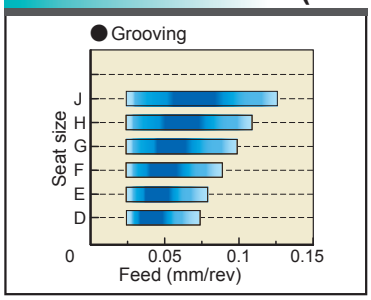
: 1st recommended area

	Seat Size Insert Width (mm)
C	1.50
D	2.00 2.24
E	2.39 2.50 2.74
F	3.00 3.18 3.24
G	4.00 4.24
H	4.75 5.00 5.24
J	6.00 6.31 6.35
K	8.00

GM BREAKER

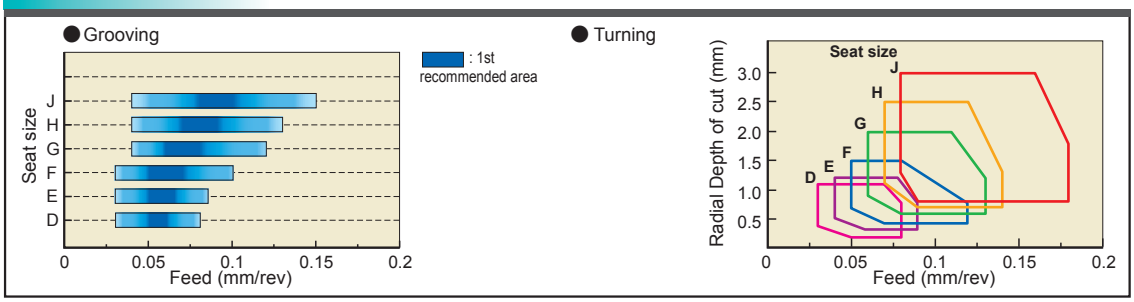


FLAT TOP GFGS (CBN)

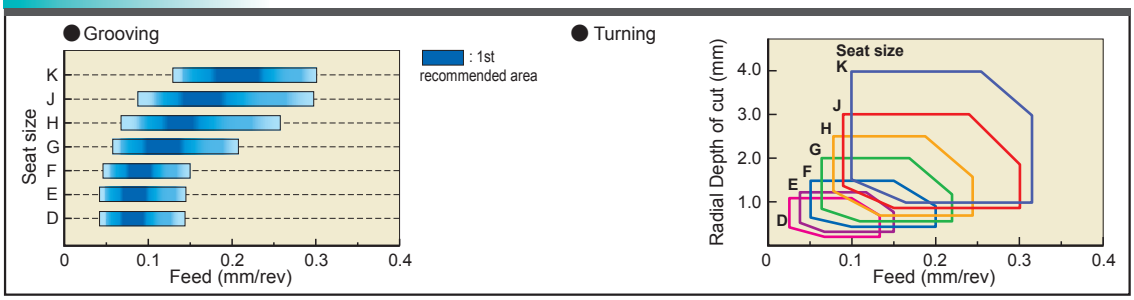


	Seat Size Insert Width (mm)
C	1.50
D	2.00 2.24
E	2.39 2.50 2.74
F	3.00 3.18 3.24
G	4.00 4.24
H	4.75 5.00 5.24
J	6.00 6.31 6.35
K	8.00

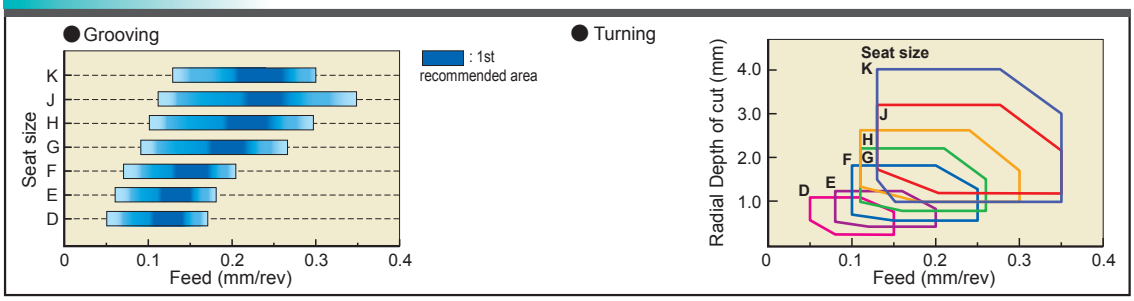
MF BREAKER



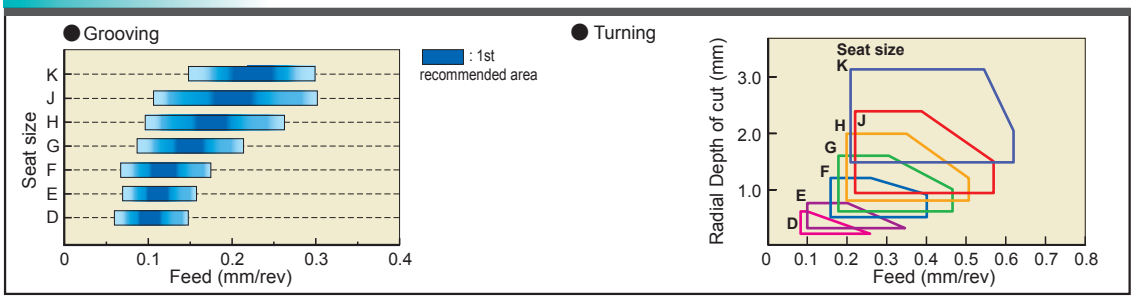
MS BREAKER



MM BREAKER



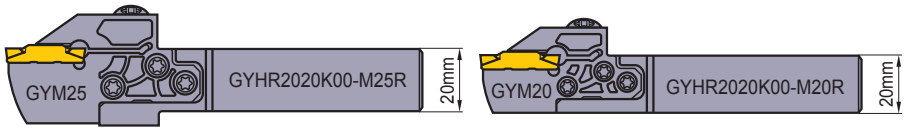
BM BREAKER



RECOMMENDED CUTTING CONDITIONS [For External Grooving]

(Note) Lower the recommended cutting speed given in the table by 20% and 40% respectively when combining the following modular holders and modular blades.

● Decrease the feed rate by 20%.

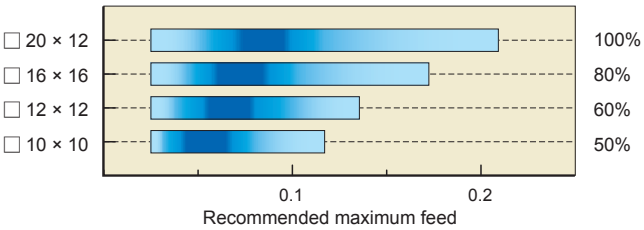


(20mm×20mm Square holder)

● Decrease the feed rate by 40%.

(16mm×16mm Square holder)

In the case of mono block type holder for Swiss style lathes

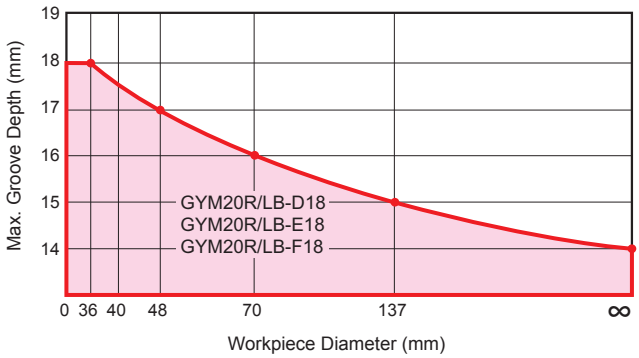


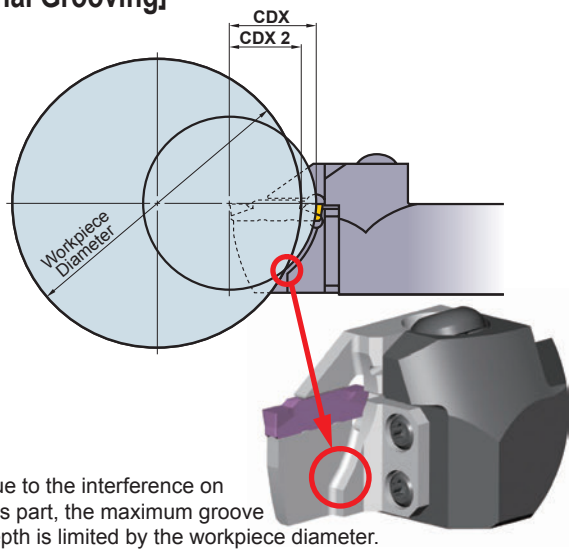
Please refer to the tables above on recommended cutting conditions for external grooving.
Apply the percentage ratio shown on each shank size with the values in the table.

LIMITATION OF THE MAXIMUM GROOVE DEPTH [For External Grooving]

•When using the modular blade GYM○○R/LA-○○○
The maximum groove depth is not limited by the workpiece diameter.

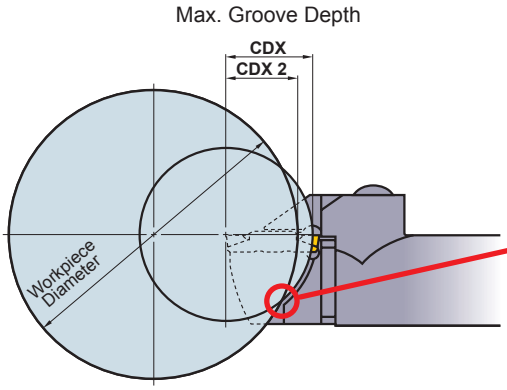
•When using the modular blade GYM○○R/LB-○○○
The maximum groove depth is limited by the workpiece diameter.



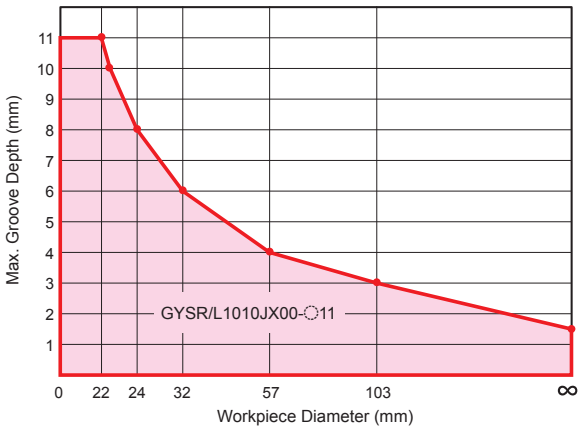


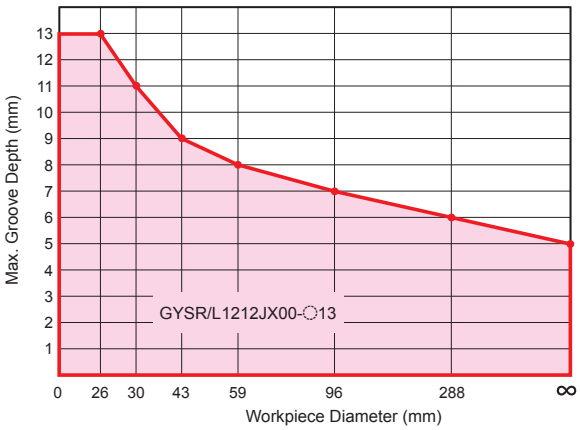
Due to the interference on this part, the maximum groove depth is limited by the workpiece diameter.

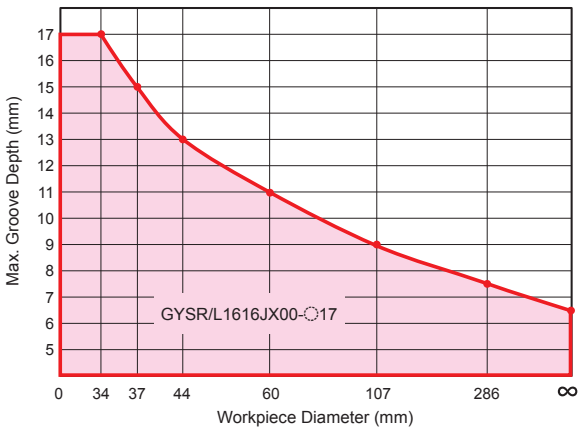
•In the case of mono block type holder for Swiss style lathes
The maximum groove depth is limited by the workpiece diameter.

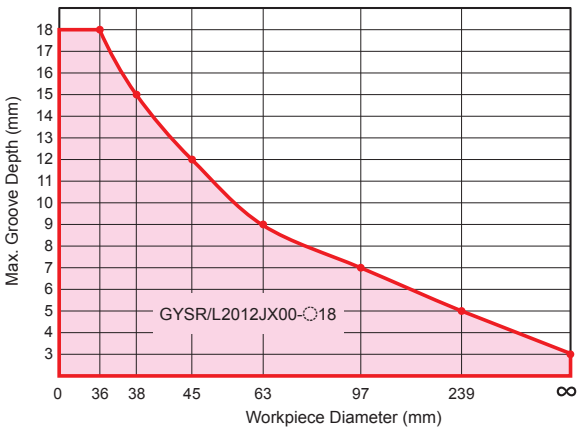


Due to interference, the maximum groove depth is limited by the workpiece diameter.







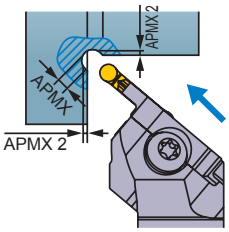


RECOMMENDED CUTTING SPEED (m/min) [For External Recessing]

	Work Material	Hardness	Grade	Cutting Speed (m/min) 50–250
P	Mild Steel	≤180HB	VP20RT	80–180
			VP10RT	90–190
	Carbon Steel, Alloy Steel	180–280HB	VP20RT	60–140
			VP10RT	70–150
			MY5015	90–210
			NX2525	55–135
	Carbon Steel, Alloy Steel	280–350HB	VP20RT	50–110
			VP10RT	60–120
			MY5015	80–160
			NX2525	45–105
M	Stainless Steel	≤350HB	VP20RT	50–110
			VP10RT	60–120
K	Gray Cast Iron	Tensile Strength ≤350MPa	VP20RT	60–140
			VP10RT	70–150
			MY5015	90–210
	Ductile Cast Iron	Tensile Strength ≤800MPa	VP20RT	50–110
			VP10RT	60–120
			MY5015	80–160
S	Titanium Alloy	–	VP20RT	30–60
			VP10RT	40–70
	Heat Resistant Alloy	–	VP20RT	30–60
			VP10RT	40–70

(Note 1) VP20RT is the first recommended grade for materials other than hardened steel.
(Note 2) For VP10RT, VP20RT and MY5015, wet cutting is recommended.

DISTANCE FROM WORK SURFACE TO RECESS DEPTH

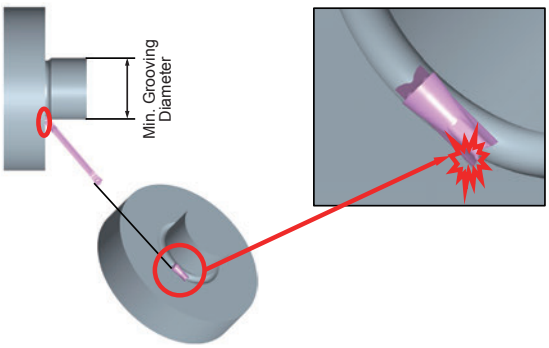


Grooving Width CW (mm)	Recess depth APMX (mm)	Distance from work surface to recess depth APMX 2 (mm)
2.00	1.50	0.646
2.50	1.75	0.720
3.00	2.00	0.793
3.18	2.09	0.819
4.00	2.50	0.939
4.75	2.88	1.049
5.00	3.00	1.086
6.00	3.50	1.232
6.35	3.68	1.283

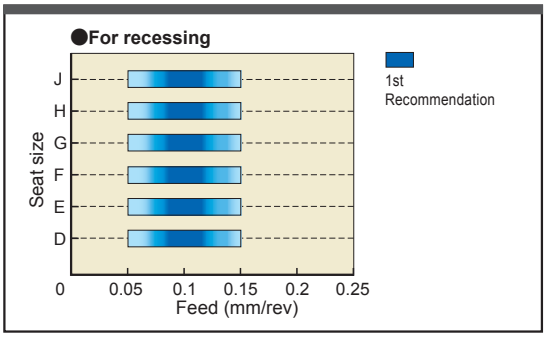
BM BREAKER

Minimum grooving diameter

Ensure the tool is suitable for the diameter being machined. Refer to the Min. Grooving Diameter D1 as shown in the table on the "page number" to avoid a collision with the workpiece shown below.



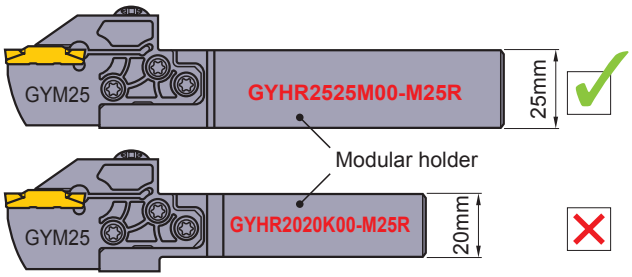
Recommended feed rate and depth of cut



TOOL SELECTION

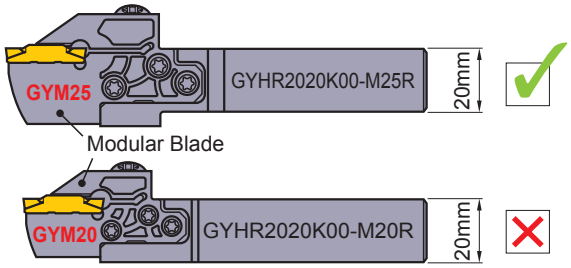
Notes when selecting the tool body

Precautions when selecting a modular holder.



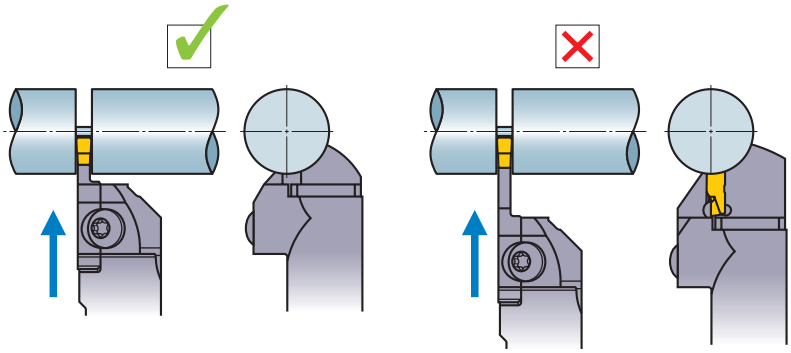
●Select a modular holder with the largest possible shank size to maintain mounting rigidity.

Modular blade (1)



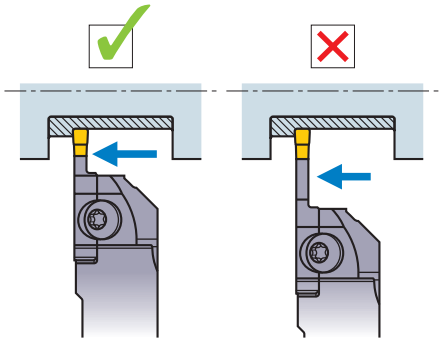
●If there is no restriction for use, select the largest modular blade for the same shank size.

Modular blade (2)



●Select the shortest possible blade suitable for the application.

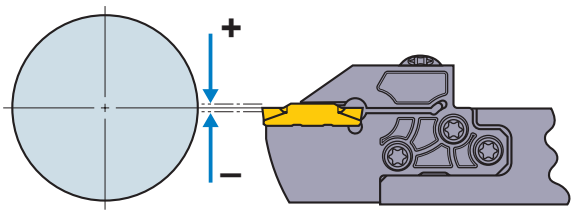
Modular blade (3)



●Select the shortest possible blade suitable for the application.

Notes when setting the tool

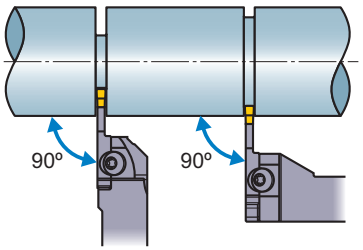
Setting of cutting edge height



<Grooving/Cross-feed machining>
Set the cutting edge height to ±0.1mm parallel to the central axis.

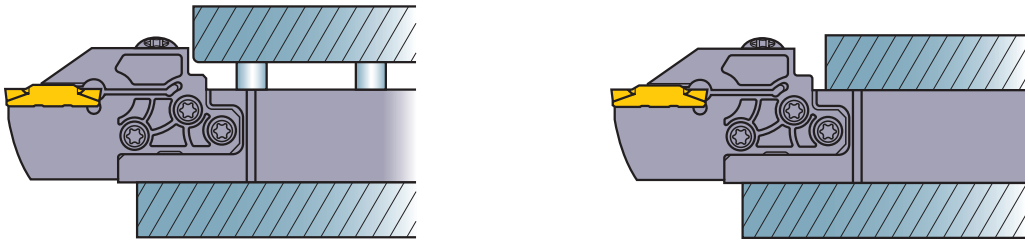
<Cutting off>
Set the cutting edge height to 0–+0.2mm parallel to the central axis.

Tool body setting angle



●Set the insert perpendicular to the central axis.

Overhang

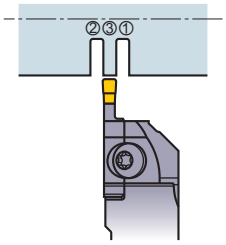


●When setting the tool, ensure that the overhang is as short as possible and avoid the step difference part as above figure shows.

MACHINING RECOMMENDATIONS

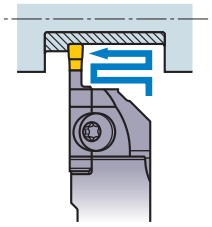
Notes on multi-functional machining (MF,MS,MM and BM breakers)

Machining narrow grooves



●It is recommended to carry out plunging in several passes. Following the steps above makes it difficult for chips to elongate. This also improves the accuracy of workpiece wall surface.

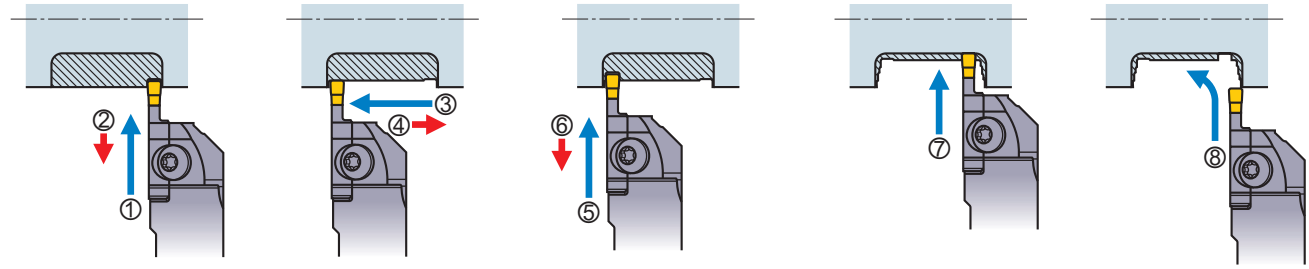
Machining wide grooves



●It is recommended that cross-feed machining is used.

Machining wide grooves

ROUGHING → FINISHING



①Carry out grooving.
②Retract the tool approx 0.1mm.

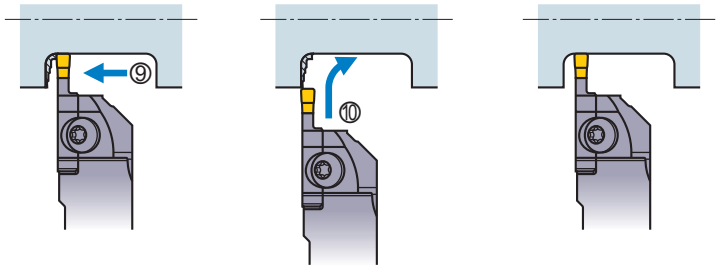
③Carry out cross feed machining.
④Retract the tool approx 0.1mm.

⑤Carry out grooving.
⑥Retract the tool approx 0.1mm.
* Repeat the steps ①–⑥.

⑦Carry out grooving to the end point of the corner radius.

⑧Machining of the wall surface, corner radius and bottom face should be carried out in one process.

FINISHING

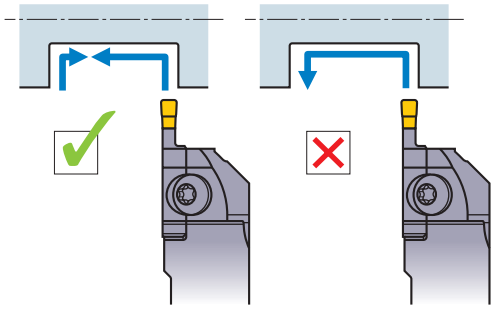


⑨Stop at the bottom of the corner radius.

⑩Machine the counter wall to the corner radius in one process.

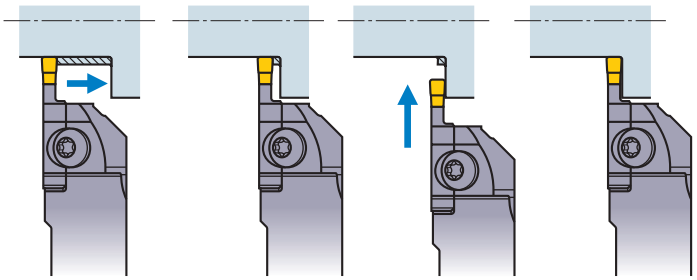
⑪Finish machining.

Precautions when finishing walls



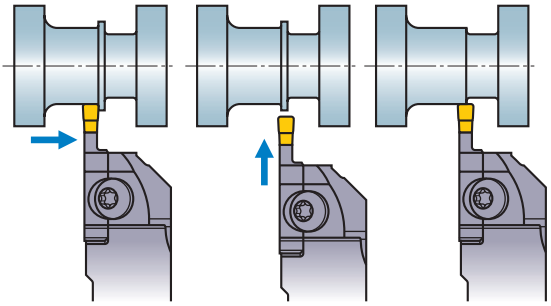
●To produce high accuracy walls using MS or MM breaker insert, do not carry out back turning. Plunging is recommended.

Wall machining



●When machining a wall, chip jamming can occur. In this case, stop cross feed machining just before the wall (at a point less than the insert width) then remove the remaining material by plunging.

Machining of a ring section

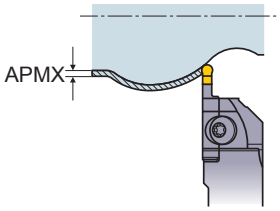


●When a ring remains in a cross feed end process, finish cross feed machining 1–1.5mm short of the end point, then remove the ring by plunging.

MACHINING RECOMMENDATIONS

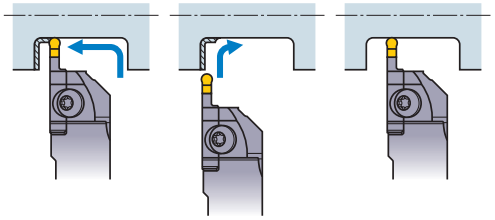
Notes on multi-functional machining (BM breaker)

Copying



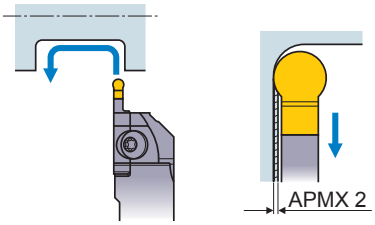
●With the BM breaker insert, 3 dimensional copying is possible.
Set the depth of cut (APMX) to 40% less than the insert width.

Roughing



●Use plunging and cross-feed machining.
When machining the corner, vibration is likely to occur.
To avoid this, reduce the feed by 50%.

Finishing



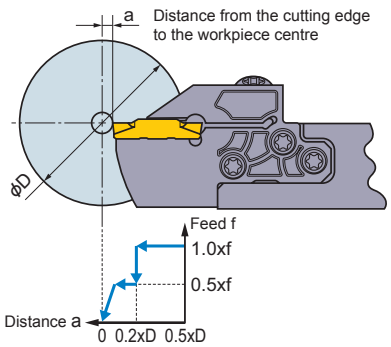
Insert	APMX 2 (mm)
GY2M0200D100N-BM	0.05
GY2M0250E125N-BM	0.10
GY2M0300F150N-BM	0.15
GY2M0318F159N-BM	
GY2M0400G200N-BM	0.20
GY2M0475H238N-BM	0.24
GY2M0500H250N-BM	
GY2M0600J300N-BM	0.30
GY2M0635J318N-BM	
GY2M0800K400N-BM	0.40

●Carry out finishing in one process.
For the depth of cut (APMX 2) when back turning, refer to the table on the right.

Notes for cutting off

Feed

<Feed>

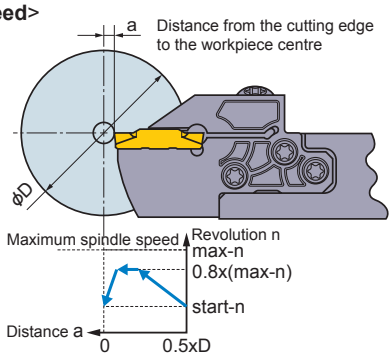


●When the cutting edge approaches the centre, reduce the feed by 50%.

●If necessary, stop the feed prior to reaching the centre of the workpiece to prevent it falling under its own weight.

Revolution

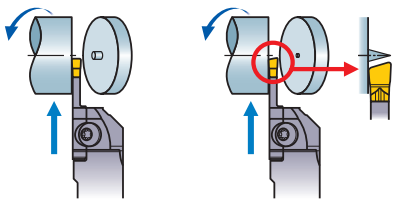
<Spindle speed>



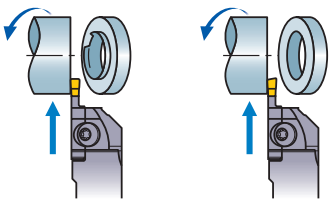
●When using constant cutting speed during a cutting off cycle, it is recommended to limit the spindle speed to 80% of maximum to ensure stability.

●To prevent the workpiece from being expelled, lower the spindle speed before finishing the grooving operation.

Insert



Neutral insert　　Handed insert



Neutral insert　　Handed insert

●When there is a centre stub on solid bar work or burrs are formed on pipe material, it is possible to decrease them by using a handed insert.
With a handed insert, machining tends to be less stable when compared to using a neutral insert.
Pay special attention to avoid fracturing of the cutting edge and decrease the feed when necessary.

GY

CW(Cutting width) 2.00, 2.24

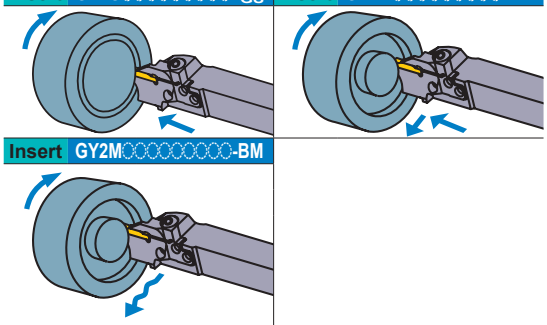
FACE GROOVING

Product Information

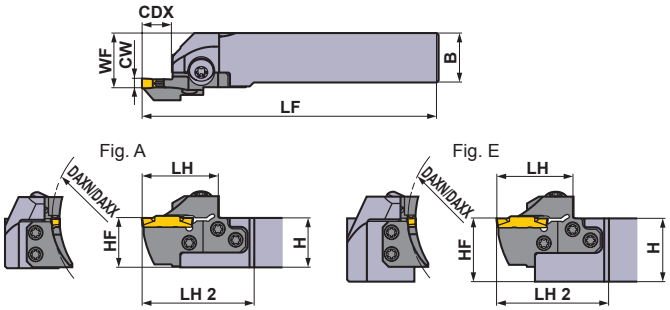
Recommended Cutting Condition >> 548
INSERTS >> 462
Technical Info >> 1971
IDENTIFICATION >> 460
SPARE PARTS >> 1927
ISO13399 Property >> 1966

4 00° type holder

Insert	GY1M/2M○○○○○○○○○○-GM	Insert	GY2G○○○○○○○○○○-MF
Insert	GY2M○○○○○○○○○○-GS/-GU	Insert	GY2M○○○○○○○○○○-MS
Insert	GY1G○○○○○○○○○○-GF/GS	Insert	GY2M○○○○○○○○○○-MM
Insert	GY2M○○○○○○○○○○-BM		



(Note 1) Please order the modular blade and modular holder separately.
(Note 2) Please set the right hand modular blade at the right hand holder and the left hand modular blade at the left hand holder.



Right hand tool holder shown.

Seat Size	CW	DAXN	DAXX	CDX	Type	Hand (R/L)	Order Number Holder	Stock	Modular Blade	Stock	Fig.
D	2.00 2.24	40	50	12	Modular	R	GYHR2020K00-M25R	●	GYM25RD-D12-040	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-D12-040	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-D12-040	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-D12-040	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-D12-040	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-D12-040	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-D12-040	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-D12-040	●	E
		50	60	12	Modular	R	GYHR2020K00-M25R	●	GYM25RD-D12-050	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-D12-050	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-D12-050	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-D12-050	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-D12-050	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-D12-050	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-D12-050	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-D12-050	●	E
		60	75	12	Modular	R	GYHR2020K00-M25R	●	GYM25RD-D12-060	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-D12-060	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-D12-060	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-D12-060	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-D12-060	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-D12-060	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-D12-060	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-D12-060	●	E
		75	100	12	Modular	R	GYHR2020K00-M25R	●	GYM25RD-D12-075	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-D12-075	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-D12-075	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-D12-075	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-D12-075	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-D12-075	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-D12-075	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-D12-075	●	E

*1 Dimensions shown are when gauge insert is used. If other insert geometries are used then **LF**, **LH**, **LH 2**, and **WF** values may vary.

● : **Inventory maintained in Japan.**

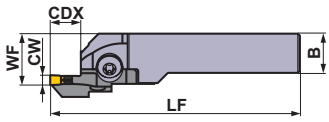
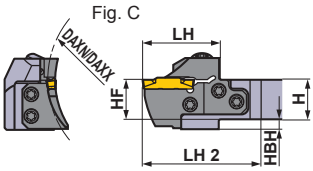


Fig. C



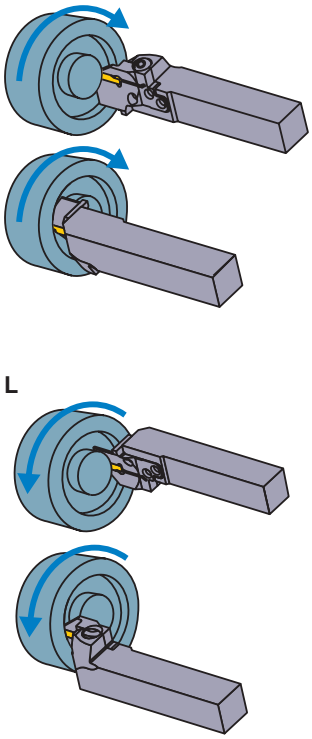
Right hand tool holder shown.

* Wrench : ① : Clamp Screw, ② : Blade Screw

SPARE PARTS

Holder	Clamp Screw	Blade Screw (5 pcs.)	Wrench *
GYHR/L2020K00-M25R/L	GY06013M (Clamp Torque : 6.0N·m)	TS55 (Clamp Torque : 5.0N·m)	①TKY30R ②TKY25D
GYHR/L2525M00-M25R/L			
GYHR/L3225P00-M25R/L			
GYHR/L3232P00-M25R/L			

Dimensions (mm) *1								Cutting Mode
H	B	LF	LH	LH 2	HF	WF	HBH	
20	20	125	39	60	20	26	5	R
20	20	125	39	60	20	26	5	
25	25	150	39	57	25	28	—	
25	25	150	39	57	25	28	—	
32	25	170	39	57	32	28	—	
32	25	170	39	57	32	28	—	
32	32	170	39	57	32	35	—	
32	32	170	39	57	32	35	—	
20	20	125	39	60	20	26	5	
20	20	125	39	60	20	26	5	
25	25	150	39	57	25	28	—	
25	25	150	39	57	25	28	—	
32	25	170	39	57	32	28	—	
32	25	170	39	57	32	28	—	
32	32	170	39	57	32	35	—	
32	32	170	39	57	32	35	—	
20	20	125	39	60	20	26	5	L
20	20	125	39	60	20	26	5	
25	25	150	39	57	25	28	—	
25	25	150	39	57	25	28	—	
32	25	170	39	57	32	28	—	
32	25	170	39	57	32	28	—	
32	32	170	39	57	32	35	—	
32	32	170	39	57	32	35	—	
20	20	125	39	60	20	26	5	
20	20	125	39	60	20	26	5	
25	25	150	39	57	25	28	—	
25	25	150	39	57	25	28	—	
32	25	170	39	57	32	28	—	
32	25	170	39	57	32	28	—	
32	32	170	39	57	32	35	—	
32	32	170	39	57	32	35	—	



Insert selection

Seat Size	Geometry name
D	GY○○0200/0224D○○○○○−Breaker shown below

For grooving/cutting off breaker

Seat Size	Breaker / CW	GU (For gummy steel)	GS (Low)	GM (Medium)	GFGS (Hardened steel)
D	2.00mm	●	●	●	●

For multifunctional grooving breaker

Seat Size	Breaker / CW	MF (Finish)	MS (Low)	MM (Medium)	BM (Copying)
					Ball shape
D	2.00mm	●	●	●	●
	2.24mm	●			

● : Standard insert with dimensions

GY

CW(Cutting width) 2.00, 2.24

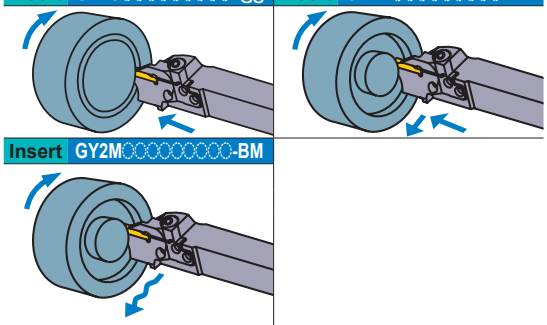
FACE GROOVING

Product Information

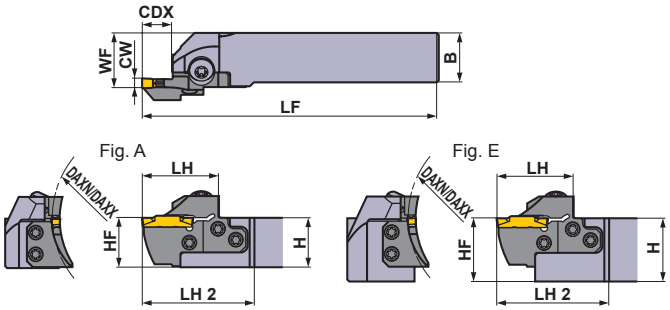
Recommended Cutting Condition >> 548
INSERTS >> 462
Technical Info >> 1971
IDENTIFICATION >> 460
SPARE PARTS >> 1927
ISO13399 Property >> 1966

4 00° type holder

Insert	GY1M/2M○○○○○○○○○○-GM	Insert	GY2G○○○○○○○○○○-MF
Insert	GY2M○○○○○○○○○○-GS/-GU	Insert	GY2M○○○○○○○○○○-MS
Insert	GY1G○○○○○○○○○○-GF/GS	Insert	GY2M○○○○○○○○○○-MM
Insert	GY2M○○○○○○○○○○-BM		



(Note 1) Please order the modular blade and modular holder separately.
(Note 2) Please set the right hand modular blade at the right hand holder and the left hand modular blade at the left hand holder.



Right hand tool holder shown.

Seat Size	CW	DAXN	DAXX	CDX	Type	Hand (R/L)	Order Number: Holder	Stock	Modular Blade	Stock	Fig.
D	2.00 2.24	100	150	12	Modular	R	GYHR2020K00-M25R	●	GYM25RD-D12-100	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-D12-100	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-D12-100	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-D12-100	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-D12-100	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-D12-100	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-D12-100	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-D12-100	●	E
		135	200	12	Modular	R	GYHR2020K00-M25R	●	GYM25RD-D12-135	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-D12-135	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-D12-135	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-D12-135	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-D12-135	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-D12-135	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-D12-135	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-D12-135	●	E
		180	250	12	Modular	R	GYHR2020K00-M25R	●	GYM25RD-D12-180	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-D12-180	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-D12-180	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-D12-180	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-D12-180	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-D12-180	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-D12-180	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-D12-180	●	E

*1 Dimensions shown are when gauge insert is used. If other insert geometries are used then **LF**, **LH**, **LH 2**, and **WF** values may vary.

● : **Inventory maintained in Japan.**

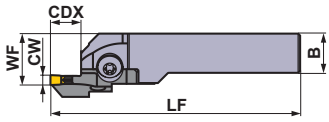
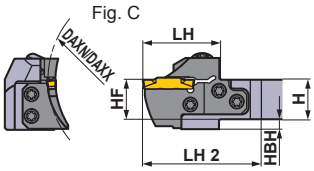


Fig. C



Right hand tool holder shown.

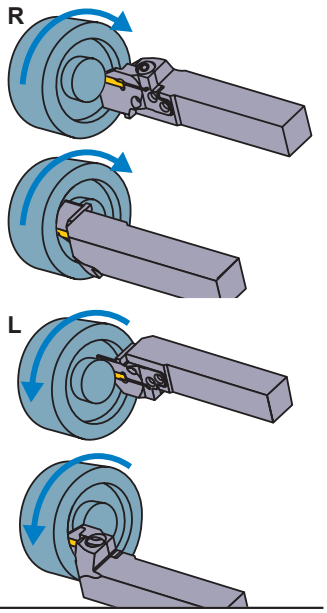
* Wrench : ① : Clamp Screw, ② : Blade Screw

SPARE PARTS

Holder	Clamp Screw	Blade Screw (5 pcs.)	Wrench *
GYHR/L2020K00-M25R/L	GY06013M (Clamp Torque : 6.0N·m)	TS55 (Clamp Torque : 5.0N·m)	①TKY30R ②TKY25D
GYHR/L2525M00-M25R/L			
GYHR/L3225P00-M25R/L			
GYHR/L3232P00-M25R/L			

Dimensions (mm) *1							
H	B	LF	LH	LH 2	HF	WF	HBH
20	20	125	39	60	20	26	5
20	20	125	39	60	20	26	5
25	25	150	39	57	25	28	—
25	25	150	39	57	25	28	—
32	25	170	39	57	32	28	—
32	25	170	39	57	32	28	—
32	32	170	39	57	32	35	—
32	32	170	39	57	32	35	—
20	20	125	39	60	20	26	5
20	20	125	39	60	20	26	5
25	25	150	39	57	25	28	—
25	25	150	39	57	25	28	—
32	25	170	39	57	32	28	—
32	25	170	39	57	32	28	—
32	32	170	39	57	32	35	—
32	32	170	39	57	32	35	—
20	20	125	39	60	20	26	5
20	20	125	39	60	20	26	5
25	25	150	39	57	25	28	—
25	25	150	39	57	25	28	—
32	25	170	39	57	32	28	—
32	25	170	39	57	32	28	—
32	32	170	39	57	32	35	—
32	32	170	39	57	32	35	—

Cutting Mode



Insert selection

Seat Size	Geometry name
D	GY○○0200/0224D○○○○−Breaker shown below

For grooving/cutting off breaker

Seat Size	CW \ Breaker	GU (For gummy steel)	GS (Low)	GM (Medium)	GFGS (Hardened steel)
D	2.00mm	●	●	●	●

For multifunctional grooving breaker

Seat Size	CW \ Breaker	MF (Finish)	MS (Low)	MM (Medium)	BM (Copying)
					Ball shape
D	2.00mm	●	●	●	●
	2.24mm	●			

● : Standard insert with dimensions

GY

CW(Cutting width) 2.39, 2.50, 2.74

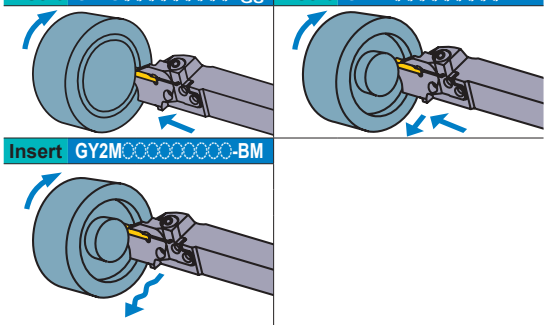
FACE GROOVING

Product Information

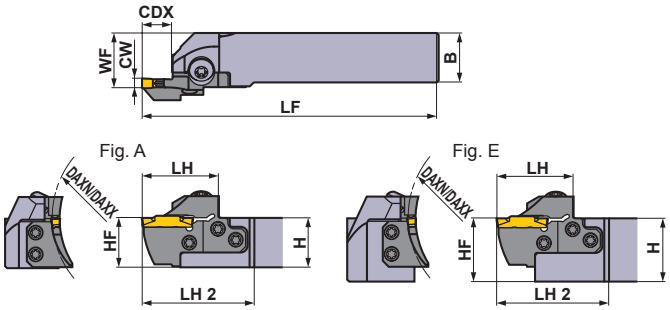
Recommended Cutting Condition >> 548
INSERTS >> 462
Technical Info >> 1971
IDENTIFICATION >> 460
SPARE PARTS >> 1927
ISO13399 Property >> 1966

4 00° type holder

Insert	GY1M/2M○○○○○○○○○○-GM	Insert	GY2G○○○○○○○○○○-MF
Insert	GY2M○○○○○○○○○○-GS/-GU	Insert	GY2M○○○○○○○○○○-MS
Insert	GY1G○○○○○○○○○○-GF/GS	Insert	GY2M○○○○○○○○○○-MM
Insert	GY2M○○○○○○○○○○-BM		



(Note 1) Please order the modular blade and modular holder separately.
(Note 2) Please set the right hand modular blade at the right hand holder and the left hand modular blade at the left hand holder.



Right hand tool holder shown.

Seat Size	CW	DAXN	DAXX	CDX	Type	Hand (R/L)	Order Number Holder	Stock	Modular Blade	Stock	Fig.
E	2.39 2.50 2.74	40	50	12	Modular	R	GYHR2020K00-M25R	●	GYM25RD-E12-040	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-E12-040	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-E12-040	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-E12-040	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-E12-040	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-E12-040	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-E12-040	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-E12-040	●	E
		50	60	12	Modular	R	GYHR2020K00-M25R	●	GYM25RD-E12-050	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-E12-050	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-E12-050	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-E12-050	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-E12-050	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-E12-050	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-E12-050	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-E12-050	●	E
		60	75	12	Modular	R	GYHR2020K00-M25R	●	GYM25RD-E12-060	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-E12-060	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-E12-060	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-E12-060	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-E12-060	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-E12-060	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-E12-060	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-E12-060	●	E
		75	100	12	Modular	R	GYHR2020K00-M25R	●	GYM25RD-E12-075	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-E12-075	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-E12-075	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-E12-075	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-E12-075	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-E12-075	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-E12-075	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-E12-075	●	E

∗1 Dimensions shown are when gauge insert is used. If other insert geometries are used then **LF**, **LH**, **LH 2**, and **WF** values may vary.

● : **Inventory maintained in Japan.**

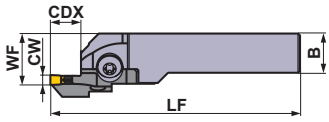
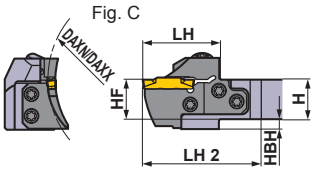


Fig. C



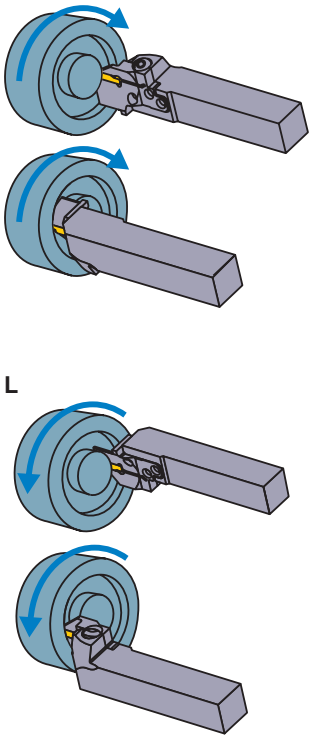
Right hand tool holder shown.

* Wrench : ① : Clamp Screw, ② : Blade Screw

SPARE PARTS

Holder Number	Clamp Screw	Blade Screw (5 pcs.)	Wrench *
GYHR/L2020K00-M25R/L	GY06013M (Clamp Torque : 6.0N·m)	TS55 (Clamp Torque : 5.0N·m)	①TKY30R ②TKY25D
GYHR/L2525M00-M25R/L			
GYHR/L3225P00-M25R/L			
GYHR/L3232P00-M25R/L			

Dimensions (mm) *1								Cutting Mode
H	B	LF	LH	LH 2	HF	WF	HBH	
20	20	125	39	60	20	26	5	R
20	20	125	39	60	20	26	5	
25	25	150	39	57	25	28	—	
25	25	150	39	57	25	28	—	
32	25	170	39	57	32	28	—	
32	25	170	39	57	32	28	—	
32	32	170	39	57	32	35	—	
32	32	170	39	57	32	35	—	
20	20	125	39	60	20	26	5	
20	20	125	39	60	20	26	5	
25	25	150	39	57	25	28	—	
25	25	150	39	57	25	28	—	
32	25	170	39	57	32	28	—	
32	25	170	39	57	32	28	—	
32	32	170	39	57	32	35	—	
32	32	170	39	57	32	35	—	
20	20	125	39	60	20	26	5	L
20	20	125	39	60	20	26	5	
25	25	150	39	57	25	28	—	
25	25	150	39	57	25	28	—	
32	25	170	39	57	32	28	—	
32	25	170	39	57	32	28	—	
32	32	170	39	57	32	35	—	
32	32	170	39	57	32	35	—	
20	20	125	39	60	20	26	5	
20	20	125	39	60	20	26	5	
25	25	150	39	57	25	28	—	
25	25	150	39	57	25	28	—	
32	25	170	39	57	32	28	—	
32	25	170	39	57	32	28	—	
32	32	170	39	57	32	35	—	
32	32	170	39	57	32	35	—	



Insert selection

Seat Size	Geometry name
E	GY○○0239/0250/0274E○○○○–Breaker shown below

For grooving/cutting off breaker

Seat Size	CW \ Breaker	GU (For gummy steel)	GS (Low)	GM (Medium)	GFGS (Hardened steel)
E	2.39mm	●	●	●	●
	2.50mm	●	●	●	●

For multifunctional grooving breaker

Seat Size	CW \ Breaker	MF (Finish)	MS (Low)	MM (Medium)	BM (Copying)
					Ball shape
E	2.39mm	●			
	2.50mm	●	●	●	●
	2.74mm	●			

● : Standard insert with dimensions

GY

CW(Cutting width) 2.39, 2.50, 2.74

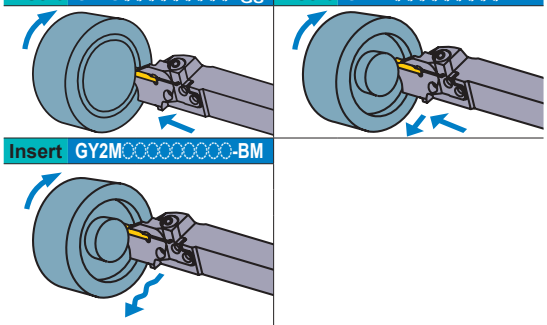
FACE GROOVING

Product Information

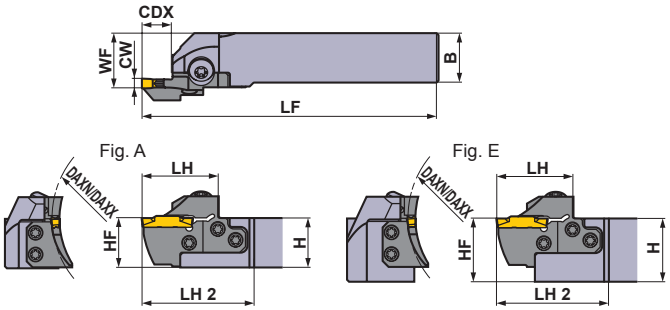
Recommended Cutting Condition >> 548
INSERTS >> 462
Technical Info >> 1971
IDENTIFICATION >> 460
SPARE PARTS >> 1927
ISO13399 Property >> 1966

4 00° type holder

Insert	GY1M/2M○○○○○○○○○○-GM	Insert	GY2G○○○○○○○○○○-MF
Insert	GY2M○○○○○○○○○○-GS/-GU	Insert	GY2M○○○○○○○○○○-MS
Insert	GY1G○○○○○○○○○○-GF/GS	Insert	GY2M○○○○○○○○○○-MM
Insert	GY2M○○○○○○○○○○-BM		



(Note 1) Please order the modular blade and modular holder separately.
(Note 2) Please set the right hand modular blade at the right hand holder and the left hand modular blade at the left hand holder.



Right hand tool holder shown.

Seat Size	CW	DAXN	DAXX	CDX	Type	Hand (R/L)	Order Number Holder	Stock	Modular Blade	Stock	Fig.
E	2.39 2.50 2.74	100	150	12	Modular	R	GYHR2020K00-M25R	●	GYM25RD-E12-100	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-E12-100	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-E12-100	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-E12-100	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-E12-100	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-E12-100	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-E12-100	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-E12-100	●	E
		135	200	12	Modular	R	GYHR2020K00-M25R	●	GYM25RD-E12-135	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-E12-135	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-E12-135	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-E12-135	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-E12-135	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-E12-135	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-E12-135	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-E12-135	●	E
		180	250	12	Modular	R	GYHR2020K00-M25R	●	GYM25RD-E12-180	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-E12-180	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-E12-180	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-E12-180	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-E12-180	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-E12-180	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-E12-180	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-E12-180	●	E

*1 Dimensions shown are when gauge insert is used. If other insert geometries are used then **LF**, **LH**, **LH 2**, and **WF** values may vary.

● : **Inventory maintained in Japan.**

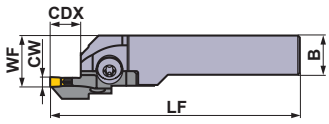
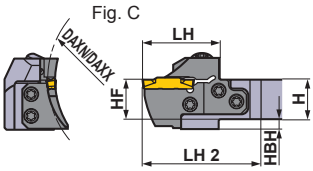


Fig. C



Right hand tool holder shown.

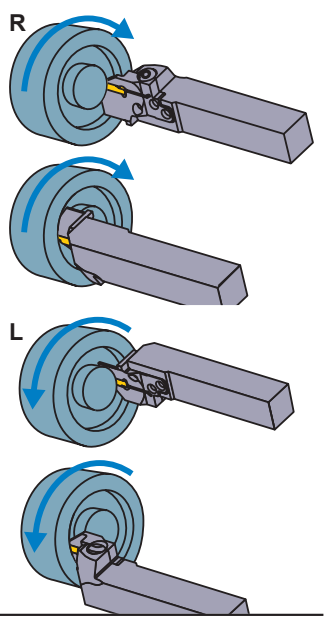
* Wrench : ① : Clamp Screw, ② : Blade Screw

SPARE PARTS

Holder	Clamp Screw	Blade Screw (5 pcs.)	Wrench *
GYHR/L2020K00-M25R/L	GY06013M (Clamp Torque : 6.0N·m)	TS55 (Clamp Torque : 5.0N·m)	①TKY30R ②TKY25D
GYHR/L2525M00-M25R/L			
GYHR/L3225P00-M25R/L			
GYHR/L3232P00-M25R/L			

Dimensions (mm) *1							
H	B	LF	LH	LH 2	HF	WF	HBH
20	20	125	39	60	20	26	5
20	20	125	39	60	20	26	5
25	25	150	39	57	25	28	—
25	25	150	39	57	25	28	—
32	25	170	39	57	32	28	—
32	25	170	39	57	32	28	—
32	32	170	39	57	32	35	—
32	32	170	39	57	32	35	—
20	20	125	39	60	20	26	5
20	20	125	39	60	20	26	5
25	25	150	39	57	25	28	—
25	25	150	39	57	25	28	—
32	25	170	39	57	32	28	—
32	25	170	39	57	32	28	—
32	32	170	39	57	32	35	—
32	32	170	39	57	32	35	—
20	20	125	39	60	20	26	5
20	20	125	39	60	20	26	5
25	25	150	39	57	25	28	—
25	25	150	39	57	25	28	—
32	25	170	39	57	32	28	—
32	25	170	39	57	32	28	—
32	32	170	39	57	32	35	—
32	32	170	39	57	32	35	—

Cutting Mode



Insert selection

Seat Size	Geometry name
E	GY○○0239/0250/0274E○○○○–Breaker shown below

For grooving/cutting off breaker

Seat Size	CW \ Breaker	GU (For gummy steel)	GS (Low)	GM (Medium)	GFGS (Hardened steel)
E	2.39mm	●	●	●	●
	2.50mm	●	●	●	●

For multifunctional grooving breaker

Seat Size	CW \ Breaker	MF (Finish)	MS (Low)	MM (Medium)	BM (Copying)
					Ball shape
E	2.39mm	●			
	2.50mm	●	●	●	●
	2.74mm	●			

● : Standard insert with dimensions

GY

CW(Cutting width) 3.00, 3.18, 3.24

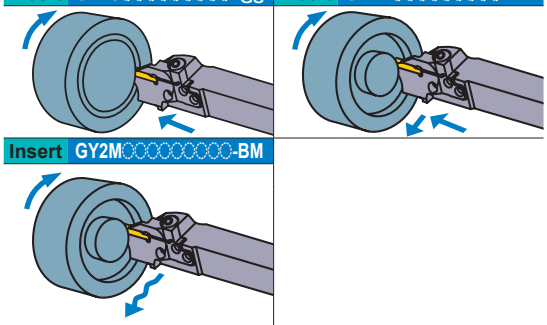
FACE GROOVING

Product Information

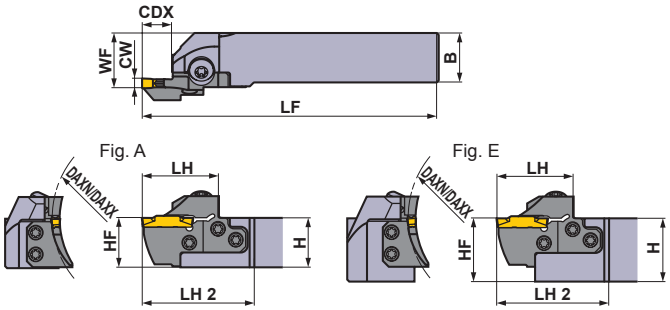
Recommended Cutting Condition >> 548
INSERTS >> 462
Technical Info >> 1971
IDENTIFICATION >> 460
SPARE PARTS >> 1927
ISO13399 Property >> 1966

4 00° type holder

Insert	GY1M/2M○○○○○○○○○○-GM	Insert	GY2G○○○○○○○○○○-MF
Insert	GY2M○○○○○○○○○○-GS/-GU	Insert	GY2M○○○○○○○○○○-MS
Insert	GY1G○○○○○○○○○○-GF/GS	Insert	GY2M○○○○○○○○○○-MM
Insert	GY2M○○○○○○○○○○-BM		



(Note 1) Please order the modular blade and modular holder separately.
(Note 2) Please set the right hand modular blade at the right hand holder and the left hand modular blade at the left hand holder.



Right hand tool holder shown.

Seat Size	CW	DAXN	DAXX	CDX	Type	Hand (R/L)	Order Number Holder	Stock	Modular Blade	Stock	Fig.
F	3.00 3.18 3.24	35	40	12	Modular	R	GYHR2020K00-M25R	●	GYM25RD-F12-035	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-F12-035	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-F12-035	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-F12-035	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-F12-035	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-F12-035	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-F12-035	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-F12-035	●	E
		40	50	12	Modular	R	GYHR2020K00-M25R	●	GYM25RD-F12-040	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-F12-040	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-F12-040	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-F12-040	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-F12-040	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-F12-040	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-F12-040	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-F12-040	●	E
		50	60	12	Modular	R	GYHR2020K00-M25R	●	GYM25RD-F12-050	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-F12-050	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-F12-050	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-F12-050	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-F12-050	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-F12-050	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-F12-050	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-F12-050	●	E

*1 Dimensions shown are when gauge insert is used. If other insert geometries are used then **LF**, **LH**, **LH 2**, and **WF** values may vary.

● : **Inventory maintained in Japan.**

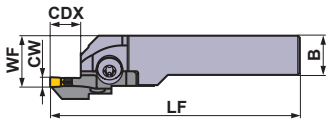
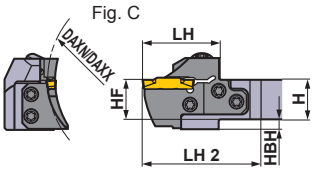


Fig. C



Right hand tool holder shown.

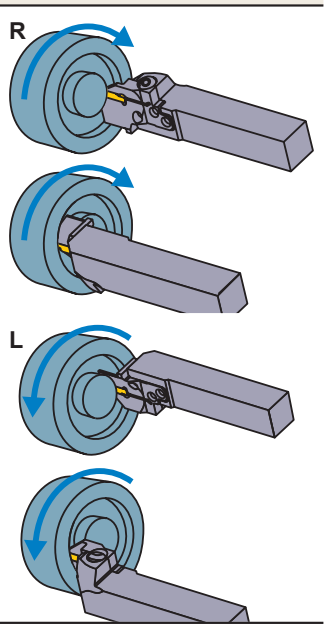
* Wrench : ① : Clamp Screw, ② : Blade Screw

SPARE PARTS

Holder	Clamp Screw	Blade Screw (5 pcs.)	Wrench *
GYHR/L2020K00-M25R/L	GY06013M (Clamp Torque : 6.0N·m)	TS55 (Clamp Torque : 5.0N·m)	①TKY30R ②TKY25D
GYHR/L2525M00-M25R/L			
GYHR/L3225P00-M25R/L			
GYHR/L3232P00-M25R/L			

Dimensions (mm) *1							
H	B	LF	LH	LH 2	HF	WF	HBH
20	20	125	39	60	20	26	5
20	20	125	39	60	20	26	5
25	25	150	39	57	25	28	—
25	25	150	39	57	25	28	—
32	25	170	39	57	32	28	—
32	25	170	39	57	32	28	—
32	32	170	39	57	32	35	—
32	32	170	39	57	32	35	—
20	20	125	39	60	20	26	5
20	20	125	39	60	20	26	5
25	25	150	39	57	25	28	—
25	25	150	39	57	25	28	—
32	25	170	39	57	32	28	—
32	25	170	39	57	32	28	—
32	32	170	39	57	32	35	—
32	32	170	39	57	32	35	—
20	20	125	39	60	20	26	5
20	20	125	39	60	20	26	5
25	25	150	39	57	25	28	—
25	25	150	39	57	25	28	—
32	25	170	39	57	32	28	—
32	25	170	39	57	32	28	—
32	32	170	39	57	32	35	—
32	32	170	39	57	32	35	—

Cutting Mode



Insert selection

Seat Size	Geometry name
F	GY○○0300/0318/0324F○○○○–Breaker shown below

For grooving/cutting off breaker

Seat Size	CW \ Breaker	GU (For gummy steel)	GS (Low)	GM (Medium)	GFGS (Hardened steel)
F	3.00mm	●	●	●	●
	3.18mm	●	●	●	●

For multifunctional grooving breaker

Seat Size	CW \ Breaker	MF (Finish)	MS (Low)	MM (Medium)	BM (Copying)
					Ball shape
F	3.00mm				●
	RE 0.2	●	●	●	
	RE 0.4	●	●	●	
	RE 0.8			●	
	3.18mm				●
	RE 0.2	●			
	RE 0.4	●			
	3.24mm	●			

● : Standard insert with dimensions

GY

CW(Cutting width) 3.00, 3.18, 3.24

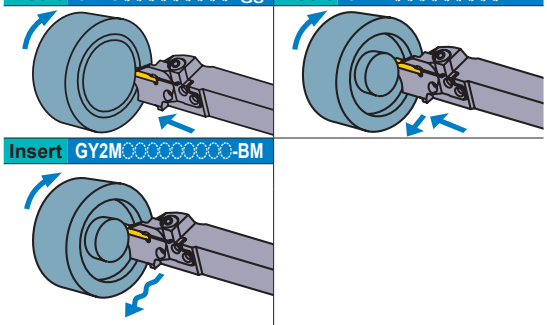
FACE GROOVING

Product Information

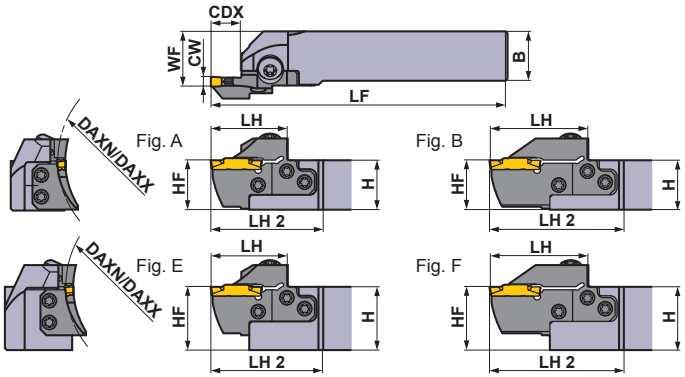
Recommended Cutting Condition >> 548
INSERTS >> 462
Technical Info >> 1971
IDENTIFICATION >> 460
SPARE PARTS >> 1927
ISO13399 Property >> 1966

4 00° type holder

Insert	GY1M/2M○○○○○○○○○○-GM	Insert	GY2G○○○○○○○○○○-MF
Insert	GY2M○○○○○○○○○○-GS/-GU	Insert	GY2M○○○○○○○○○○-MS
Insert	GY1G○○○○○○○○○○-GF/GS	Insert	GY2M○○○○○○○○○○-MM
Insert	GY2M○○○○○○○○○○-BM		



(Note 1) Please order the modular blade and modular holder separately.
(Note 2) Please set the right hand modular blade at the right hand holder and the left hand modular blade at the left hand holder.

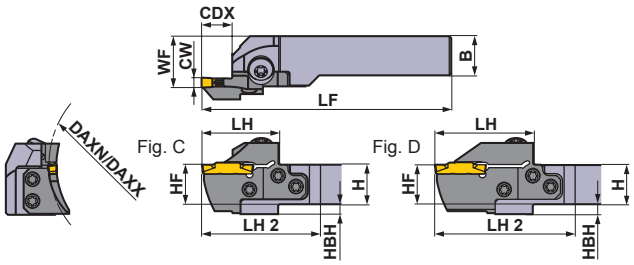


Right hand tool holder shown.

Seat Size	CW	DAXN	DAXX	CDX	Type	Hand (R/L)	Order Number: Holder	Stock	Modular Blade	Stock	Fig.
F	3.00 3.18 3.24	60	75	12	Modular	R	GYHR2020K00-M25R	●	GYM25RD-F12-060	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-F12-060	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-F12-060	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-F12-060	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-F12-060	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-F12-060	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-F12-060	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-F12-060	●	E
				20 *2	Modular	R	GYHR2020K00-M25R	●	GYM25RD-F20-060	●	D
						L	GYHL2020K00-M25L	●	GYM25LD-F20-060	●	D
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-F20-060	●	B
						L	GYHL2525M00-M25L	●	GYM25LD-F20-060	●	B
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-F20-060	●	F
						L	GYHL3225P00-M25L	●	GYM25LD-F20-060	●	F
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-F20-060	●	F
						L	GYHL3232P00-M25L	●	GYM25LD-F20-060	●	F
		75	100	12	Modular	R	GYHR2020K00-M25R	●	GYM25RD-F12-075	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-F12-075	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-F12-075	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-F12-075	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-F12-075	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-F12-075	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-F12-075	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-F12-075	●	E
				20 *2	Modular	R	GYHR2020K00-M25R	●	GYM25RD-F20-075	●	D
						L	GYHL2020K00-M25L	●	GYM25LD-F20-075	●	D
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-F20-075	●	B
						L	GYHL2525M00-M25L	●	GYM25LD-F20-075	●	B
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-F20-075	●	F
						L	GYHL3225P00-M25L	●	GYM25LD-F20-075	●	F
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-F20-075	●	F
						L	GYHL3232P00-M25L	●	GYM25LD-F20-075	●	F

*1 Dimensions shown are when gauge insert is used. If other insert geometries are used then **LF**, **LH**, **LH 2**, and **WF** values may vary.
*2 The maximum groove depth varies according to the insert used.

● : **Inventory maintained in Japan.**



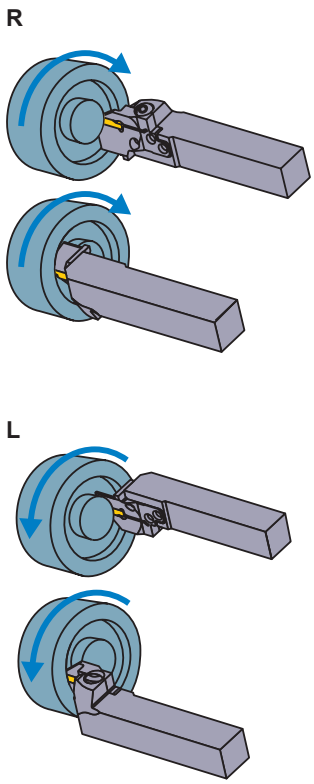
Right hand tool holder shown.

* Wrench : ① : Clamp Screw, ② : Blade Screw

SPARE PARTS

Holder	Clamp Screw	Blade Screw (5 pcs.)	Wrench *
GYHR/L2020K00-M25R/L	GY06013M (Clamp Torque : 6.0N·m)	TS55 (Clamp Torque : 5.0N·m)	①TKY30R ②TKY25D
GYHR/L2525M00-M25R/L			
GYHR/L3225P00-M25R/L			
GYHR/L3232P00-M25R/L			

Dimensions (mm) *1								Cutting Mode
H	B	LF	LH	LH 2	HF	WF	HBH	
20	20	125	39	60	20	26	5	R
20	20	125	39	60	20	26	5	
25	25	150	39	57	25	28	—	
25	25	150	39	57	25	28	—	
32	25	170	39	57	32	28	—	
32	25	170	39	57	32	28	—	
32	32	170	39	57	32	35	—	
32	32	170	39	57	32	35	—	
20	20	131	45	66	20	26	5	
20	20	131	45	66	20	26	5	
25	25	156	45	63	25	28	—	
25	25	156	45	63	25	28	—	
32	25	176	45	63	32	28	—	
32	25	176	45	63	32	28	—	
32	32	176	45	63	32	35	—	
32	32	176	45	63	32	35	—	
20	20	125	39	60	20	26	5	L
20	20	125	39	60	20	26	5	
25	25	150	39	57	25	28	—	
25	25	150	39	57	25	28	—	
32	25	170	39	57	32	28	—	
32	25	170	39	57	32	28	—	
32	32	170	39	57	32	35	—	
32	32	170	39	57	32	35	—	
20	20	131	45	66	20	26	5	
20	20	131	45	66	20	26	5	
25	25	156	45	63	25	28	—	
25	25	156	45	63	25	28	—	
32	25	176	45	63	32	28	—	
32	25	176	45	63	32	28	—	
32	32	176	45	63	32	35	—	
32	32	176	45	63	32	35	—	



Insert selection

Seat Size	Geometry name
F	GY○○0300/0318/0324F○○○○–Breaker shown below

For grooving/cutting off breaker

Seat Size	CW \ Breaker	GU (For gummy steel)	GS (Low)	GM (Medium)	GFGS (Hardened steel)
F	3.00mm	●	●	●	●
	3.18mm	●	●	●	●

For multifunctional grooving breaker

Seat Size	CW \ Breaker	MF (Finish)	MS (Low)	MM (Medium)	BM (Copying)
					Ball shape
F	3.00mm				●
	RE 0.2	●	●	●	
	RE 0.4	●	●	●	
	RE 0.8			●	
	3.18mm				●
	RE 0.2	●			
	RE 0.4	●			
	3.24mm	●			

● : Standard insert with dimensions

GY

CW(Cutting width) 3.00, 3.18, 3.24

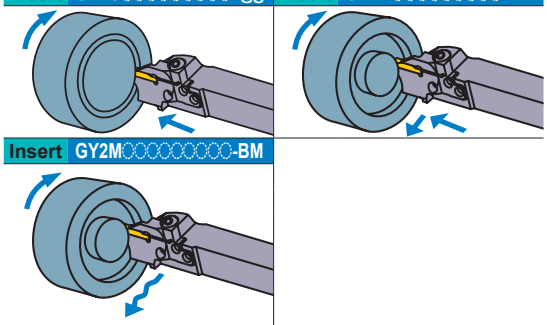
FACE GROOVING

Product Information

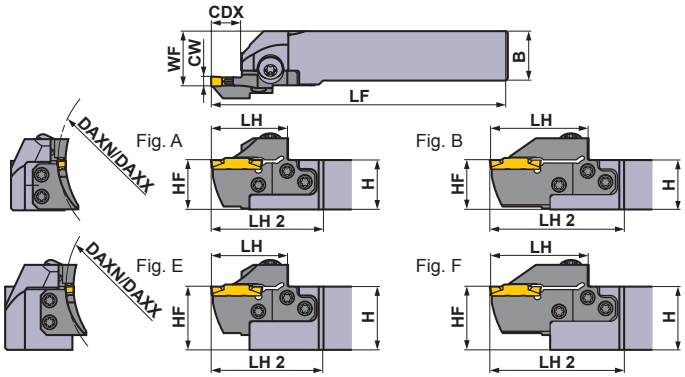
Recommended Cutting Condition >> 548
INSERTS >> 462
Technical Info >> 1971
IDENTIFICATION >> 460
SPARE PARTS >> 1927
ISO13399 Property >> 1966

4 00° type holder

Insert	GY1M/2M○○○○○○○○○○-GM	Insert	GY2G○○○○○○○○○○-MF
Insert	GY2M○○○○○○○○○○-GS/-GU	Insert	GY2M○○○○○○○○○○-MS
Insert	GY1G○○○○○○○○○○-GF/GS	Insert	GY2M○○○○○○○○○○-MM
Insert	GY2M○○○○○○○○○○-BM		



(Note 1) Please order the modular blade and modular holder separately.
(Note 2) Please set the right hand modular blade at the right hand holder and the left hand modular blade at the left hand holder.

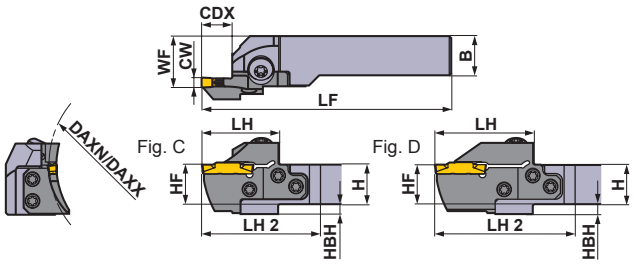


Right hand tool holder shown.

Seat Size	CW	DAXN	DAXX	CDX	Type	Hand (R/L)	Order Number: Holder	Stock	Modular Blade	Stock	Fig.
F	3.00 3.18 3.24	100	150	12	Modular	R	GYHR2020K00-M25R	●	GYM25RD-F12-100	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-F12-100	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-F12-100	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-F12-100	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-F12-100	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-F12-100	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-F12-100	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-F12-100	●	E
				20 *2	Modular	R	GYHR2020K00-M25R	●	GYM25RD-F20-100	●	D
						L	GYHL2020K00-M25L	●	GYM25LD-F20-100	●	D
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-F20-100	●	B
						L	GYHL2525M00-M25L	●	GYM25LD-F20-100	●	B
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-F20-100	●	F
						L	GYHL3225P00-M25L	●	GYM25LD-F20-100	●	F
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-F20-100	●	F
						L	GYHL3232P00-M25L	●	GYM25LD-F20-100	●	F
		135	200	12	Modular	R	GYHR2020K00-M25R	●	GYM25RD-F12-135	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-F12-135	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-F12-135	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-F12-135	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-F12-135	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-F12-135	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-F12-135	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-F12-135	●	E
				20 *2	Modular	R	GYHR2020K00-M25R	●	GYM25RD-F20-135	●	D
						L	GYHL2020K00-M25L	●	GYM25LD-F20-135	●	D
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-F20-135	●	B
						L	GYHL2525M00-M25L	●	GYM25LD-F20-135	●	B
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-F20-135	●	F
						L	GYHL3225P00-M25L	●	GYM25LD-F20-135	●	F
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-F20-135	●	F
						L	GYHL3232P00-M25L	●	GYM25LD-F20-135	●	F

*1 Dimensions shown are when gauge insert is used. If other insert geometries are used then **LF**, **LH**, **LH 2**, and **WF** values may vary.
*2 The maximum groove depth varies according to the insert used.

● : **Inventory maintained in Japan.**



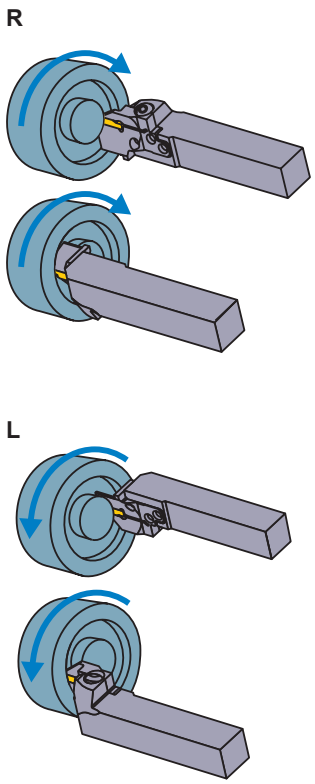
Right hand tool holder shown.

* Wrench : ① : Clamp Screw, ② : Blade Screw

SPARE PARTS

Holder	Clamp Screw	Blade Screw (5 pcs.)	Wrench *
GYHR/L2020K00-M25R/L	GY06013M (Clamp Torque : 6.0N·m)	TS55 (Clamp Torque : 5.0N·m)	①TKY30R ②TKY25D
GYHR/L2525M00-M25R/L			
GYHR/L3225P00-M25R/L			
GYHR/L3232P00-M25R/L			

Dimensions (mm) *1								Cutting Mode
H	B	LF	LH	LH 2	HF	WF	HBH	
20	20	125	39	60	20	26	5	R
20	20	125	39	60	20	26	5	
25	25	150	39	57	25	28	—	
25	25	150	39	57	25	28	—	
32	25	170	39	57	32	28	—	
32	25	170	39	57	32	28	—	
32	32	170	39	57	32	35	—	
32	32	170	39	57	32	35	—	
20	20	131	45	66	20	26	5	
20	20	131	45	66	20	26	5	
25	25	156	45	63	25	28	—	
25	25	156	45	63	25	28	—	
32	25	176	45	63	32	28	—	
32	25	176	45	63	32	28	—	
32	32	176	45	63	32	35	—	
32	32	176	45	63	32	35	—	
20	20	125	39	60	20	26	5	L
20	20	125	39	60	20	26	5	
25	25	150	39	57	25	28	—	
25	25	150	39	57	25	28	—	
32	25	170	39	57	32	28	—	
32	25	170	39	57	32	28	—	
32	32	170	39	57	32	35	—	
32	32	170	39	57	32	35	—	
20	20	131	45	66	20	26	5	
20	20	131	45	66	20	26	5	
25	25	156	45	63	25	28	—	
25	25	156	45	63	25	28	—	
32	25	176	45	63	32	28	—	
32	25	176	45	63	32	28	—	
32	32	176	45	63	32	35	—	
32	32	176	45	63	32	35	—	



Insert selection

Seat Size	Geometry name
F	GY○○0300/0318/0324F○○○○–Breaker shown below

For grooving/cutting off breaker

Seat Size	CW \ Breaker	GU (For gummy steel)	GS (Low)	GM (Medium)	GFGS (Hardened steel)
F	3.00mm	●	●	●	●
	3.18mm	●	●	●	●

For multifunctional grooving breaker

Seat Size	CW \ Breaker	MF (Finish)	MS (Low)	MM (Medium)	BM (Copying)
					Ball shape
F	3.00mm				●
	RE 0.2	●	●	●	
	RE 0.4	●	●	●	
	RE 0.8			●	
	3.18mm				●
	RE 0.2	●			
	RE 0.4	●			
	3.24mm	●			

● : Standard insert with dimensions

GY

CW(Cutting width) 3.00, 3.18, 3.24

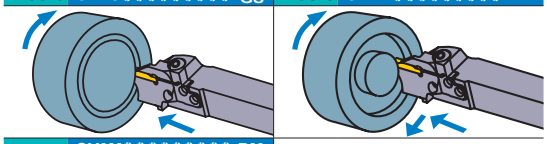
FACE GROOVING

Product Information

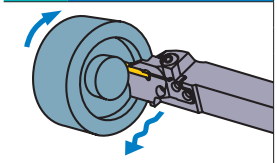
Recommended Cutting Condition >> 548
INSERTS >> 462
Technical Info >> 1971
IDENTIFICATION >> 460
SPARE PARTS >> 1927
ISO13399 Property >> 1966

4 00° type holder

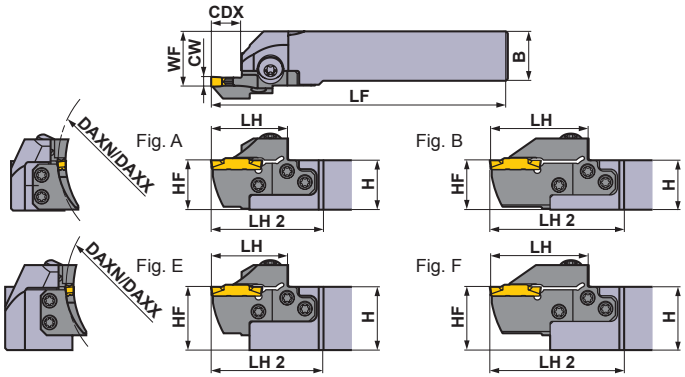
Insert	GY1M/2M○○○○○○○○○○-GM	Insert	GY2G○○○○○○○○○○-MF
Insert	GY2M○○○○○○○○○○-GS/-GU	Insert	GY2M○○○○○○○○○○-MS
Insert	GY1G○○○○○○○○○○-GF/GS	Insert	GY2M○○○○○○○○○○-MM



Insert GY2M○○○○○○○○○○-BM



(Note 1) Please order the modular blade and modular holder separately.
(Note 2) Please set the right hand modular blade at the right hand holder and the left hand modular blade at the left hand holder.

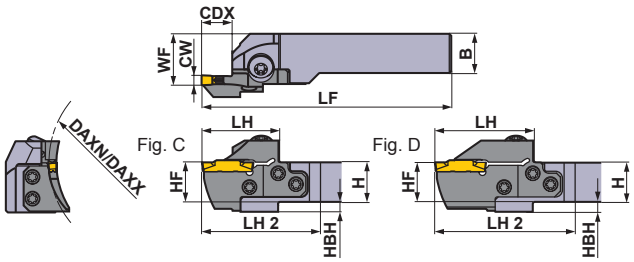


Right hand tool holder shown.

Seat Size	CW	DAXN	DAXX	CDX	Type	Hand (R/L)	Order Number Holder	Stock	Modular Blade	Stock	Fig.
F	3.00 3.18 3.24	180	250	12	Modular	R	GYHR2020K00-M25R	●	GYM25RD-F12-180	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-F12-180	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-F12-180	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-F12-180	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-F12-180	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-F12-180	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-F12-180	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-F12-180	●	E
				20 *2	Modular	R	GYHR2020K00-M25R	●	GYM25RD-F20-180	●	D
						L	GYHL2020K00-M25L	●	GYM25LD-F20-180	●	D
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-F20-180	●	B
						L	GYHL2525M00-M25L	●	GYM25LD-F20-180	●	B
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-F20-180	●	F
						L	GYHL3225P00-M25L	●	GYM25LD-F20-180	●	F
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-F20-180	●	F
						L	GYHL3232P00-M25L	●	GYM25LD-F20-180	●	F
		225	999	12	Modular	R	GYHR2020K00-M25R	●	GYM25RD-F12-225	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-F12-225	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-F12-225	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-F12-225	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-F12-225	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-F12-225	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-F12-225	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-F12-225	●	E
				20 *2	Modular	R	GYHR2020K00-M25R	●	GYM25RD-F20-225	●	D
						L	GYHL2020K00-M25L	●	GYM25LD-F20-225	●	D
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-F20-225	●	B
						L	GYHL2525M00-M25L	●	GYM25LD-F20-225	●	B
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-F20-225	●	F
						L	GYHL3225P00-M25L	●	GYM25LD-F20-225	●	F
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-F20-225	●	F
						L	GYHL3232P00-M25L	●	GYM25LD-F20-225	●	F

*1 Dimensions shown are when gauge insert is used. If other insert geometries are used then **LF**, **LH**, **LH 2**, and **WF** values may vary.
*2 The maximum groove depth varies according to the insert used.

● : **Inventory maintained in Japan.**



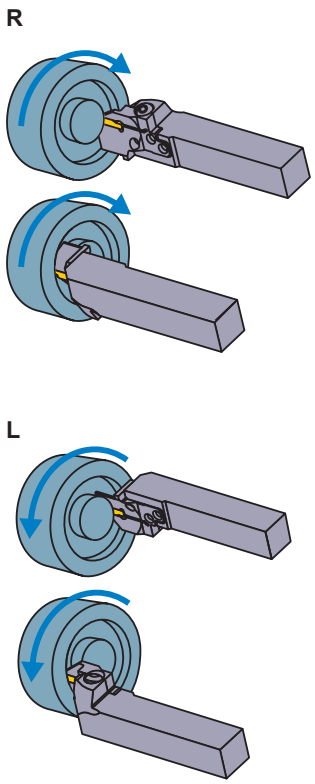
Right hand tool holder shown.

* Wrench : ① : Clamp Screw, ② : Blade Screw

SPARE PARTS

Holder	Clamp Screw	Blade Screw (5 pcs.)	Wrench *
GYHR/L2020K00-M25R/L	GY06013M (Clamp Torque : 6.0N·m)	TS55 (Clamp Torque : 5.0N·m)	①TKY30R ②TKY25D
GYHR/L2525M00-M25R/L			
GYHR/L3225P00-M25R/L			
GYHR/L3232P00-M25R/L			

Dimensions (mm) *1								Cutting Mode
H	B	LF	LH	LH 2	HF	WF	HBH	
20	20	125	39	60	20	26	5	R
20	20	125	39	60	20	26	5	
25	25	150	39	57	25	28	—	
25	25	150	39	57	25	28	—	
32	25	170	39	57	32	28	—	
32	25	170	39	57	32	28	—	
32	32	170	39	57	32	35	—	
32	32	170	39	57	32	35	—	
20	20	131	45	66	20	26	5	
20	20	131	45	66	20	26	5	
25	25	156	45	63	25	28	—	
25	25	156	45	63	25	28	—	
32	25	176	45	63	32	28	—	
32	25	176	45	63	32	28	—	
32	32	176	45	63	32	35	—	
32	32	176	45	63	32	35	—	
20	20	125	39	60	20	26	5	L
20	20	125	39	60	20	26	5	
25	25	150	39	57	25	28	—	
25	25	150	39	57	25	28	—	
32	25	170	39	57	32	28	—	
32	25	170	39	57	32	28	—	
32	32	170	39	57	32	35	—	
32	32	170	39	57	32	35	—	
20	20	131	45	66	20	26	5	
20	20	131	45	66	20	26	5	
25	25	156	45	63	25	28	—	
25	25	156	45	63	25	28	—	
32	25	176	45	63	32	28	—	
32	25	176	45	63	32	28	—	
32	32	176	45	63	32	35	—	
32	32	176	45	63	32	35	—	



Insert selection

Seat Size	Geometry name
F	GY○○0300/0318/0324F○○○○−Breaker shown below

For grooving/cutting off breaker

Seat Size	CW \ Breaker	GU (For gummy steel)	GS (Low)	GM (Medium)	GFGS (Hardened steel)
F	3.00mm	●	●	●	●
	3.18mm	●	●	●	●

For multifunctional grooving breaker

Seat Size	CW \ Breaker	MF (Finish)	MS (Low)	MM (Medium)	BM (Copying)
					Ball shape
F	3.00mm				●
	RE 0.2	●	●	●	
	RE 0.4	●	●	●	
	RE 0.8			●	
	3.18mm				●
	RE 0.2	●			
	RE 0.4	●			
	3.24mm	●			

● : Standard insert with dimensions

GY

CW(Cutting width) 4.00, 4.24

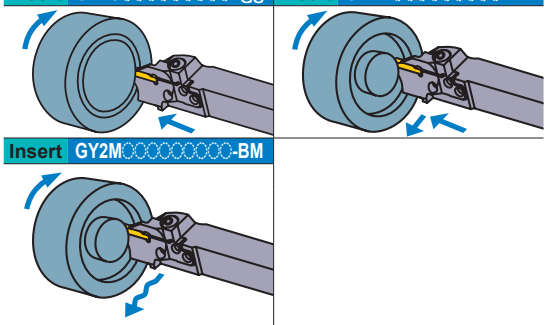
FACE GROOVING

Product Information

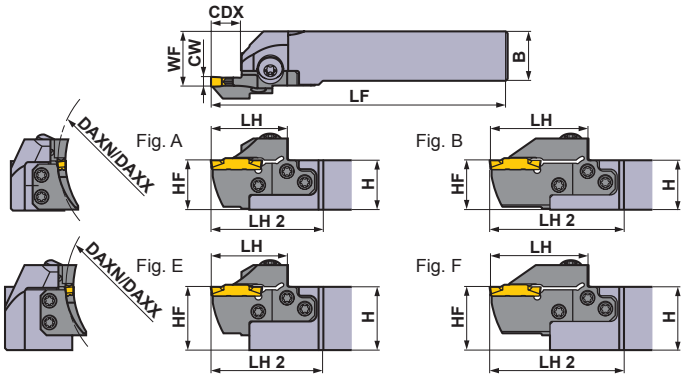
Recommended Cutting Condition >> 548
INSERTS >> 462
Technical Info >> 1971
IDENTIFICATION >> 460
SPARE PARTS >> 1927
ISO13399 Property >> 1966

4 00° type holder

Insert	GY1M/2M○○○○○○○○○○-GM	Insert	GY2G○○○○○○○○○○-MF
Insert	GY2M○○○○○○○○○○-GS/-GU	Insert	GY2M○○○○○○○○○○-MS
Insert	GY1G○○○○○○○○○○-GF/GS	Insert	GY2M○○○○○○○○○○-MM
Insert	GY2M○○○○○○○○○○-BM		



(Note 1) Please order the modular blade and modular holder separately.
(Note 2) Please set the right hand modular blade at the right hand holder and the left hand modular blade at the left hand holder.

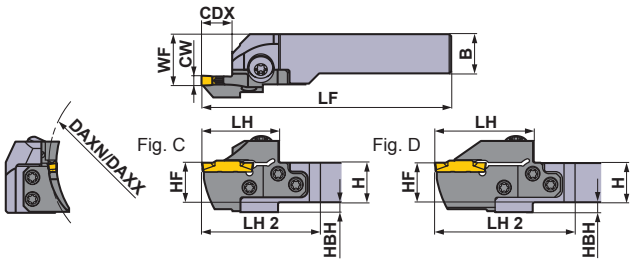


Right hand tool holder shown.

Seat Size	CW	DAXN	DAXX	CDX	Type	Hand (R/L)	Order Number: Holder	Stock	Modular Blade	Stock	Fig.
G	4.00 4.24	40	50	14	Modular	R	GYHR2020K00-M25R	●	GYM25RD-G14-040	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-G14-040	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-G14-040	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-G14-040	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-G14-040	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-G14-040	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-G14-040	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-G14-040	●	E
		50	60	14	Modular	R	GYHR2020K00-M25R	●	GYM25RD-G14-050	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-G14-050	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-G14-050	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-G14-050	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-G14-050	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-G14-050	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-G14-050	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-G14-050	●	E
		60	85	14	Modular	R	GYHR2020K00-M25R	●	GYM25RD-G14-060	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-G14-060	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-G14-060	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-G14-060	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-G14-060	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-G14-060	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-G14-060	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-G14-060	●	E
				25 *2	Modular	R	GYHR2020K00-M25R	●	GYM25RD-G25-060	●	D
						L	GYHL2020K00-M25L	●	GYM25LD-G25-060	●	D
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-G25-060	●	B
						L	GYHL2525M00-M25L	●	GYM25LD-G25-060	●	B
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-G25-060	●	F
						L	GYHL3225P00-M25L	●	GYM25LD-G25-060	●	F
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-G25-060	●	F
						L	GYHL3232P00-M25L	●	GYM25LD-G25-060	●	F

*1 Dimensions shown are when gauge insert is used. If other insert geometries are used then **LF**, **LH**, **LH 2**, and **WF** values may vary.
*2 The maximum groove depth varies according to the insert used.

● : **Inventory maintained in Japan.**



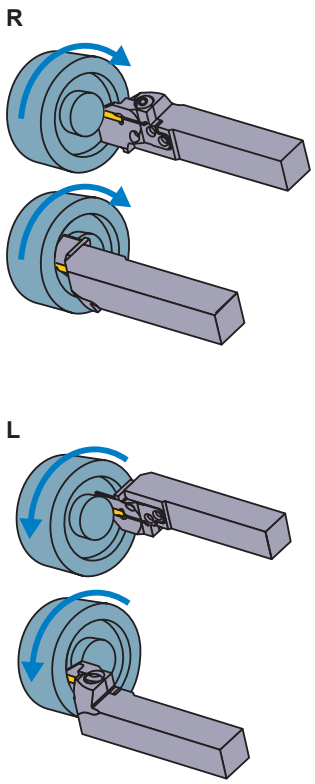
Right hand tool holder shown.

* Wrench : ① : Clamp Screw, ② : Blade Screw

SPARE PARTS

Holder	Clamp Screw	Blade Screw (5 pcs.)	Wrench *
GYHR/L2020K00-M25R/L	GY06013M (Clamp Torque : 6.0N·m)	TS55 (Clamp Torque : 5.0N·m)	①TKY30R ②TKY25D
GYHR/L2525M00-M25R/L			
GYHR/L3225P00-M25R/L			
GYHR/L3232P00-M25R/L			

Dimensions (mm) *1								Cutting Mode
H	B	LF	LH	LH 2	HF	WF	HBH	
20	20	125	39	60	20	26	5	R
20	20	125	39	60	20	26	5	
25	25	150	39	57	25	28	—	
25	25	150	39	57	25	28	—	
32	25	170	39	57	32	28	—	
32	25	170	39	57	32	28	—	
32	32	170	39	57	32	35	—	
32	32	170	39	57	32	35	—	
20	20	125	39	60	20	26	5	
20	20	125	39	60	20	26	5	
25	25	150	39	57	25	28	—	
25	25	150	39	57	25	28	—	
32	25	170	39	57	32	28	—	
32	25	170	39	57	32	28	—	
32	32	170	39	57	32	35	—	
32	32	170	39	57	32	35	—	
20	20	125	39	60	20	26	5	L
20	20	125	39	60	20	26	5	
25	25	150	39	57	25	28	—	
25	25	150	39	57	25	28	—	
32	25	170	39	57	32	28	—	
32	25	170	39	57	32	28	—	
32	32	170	39	57	32	35	—	
32	32	170	39	57	32	35	—	
20	20	136	50	71	20	26	5	
20	20	136	50	71	20	26	5	
25	25	161	50	68	25	28	—	
25	25	161	50	68	25	28	—	
32	25	181	50	68	32	28	—	
32	25	181	50	68	32	28	—	
32	32	181	50	68	32	35	—	
32	32	181	50	68	32	35	—	



Insert selection

Seat Size	Geometry name
G	GY○○0400/0424G○○○○○−Breaker shown below

For grooving/cutting off breaker

Seat Size	Breaker / CW	GU (For gummy steel)	GS (Low)	GM (Medium)	GFGS (Hardened steel)
G	4.00mm	●	●	●	●

For multifunctional grooving breaker

Seat Size	Breaker / CW	MF (Finish)	MS (Low)	MM (Medium)	BM (Copying)
					Ball shape
G	4.00mm				●
	RE 0.2	●	●	●	
	RE 0.4	●	●	●	
	RE 0.8	●		●	
	4.24mm	●			

● : Standard insert with dimensions

GY

CW(Cutting width) 4.00, 4.24

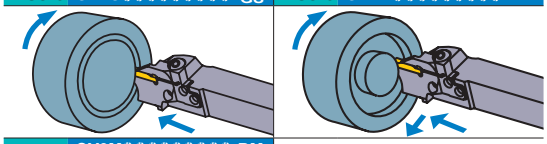
FACE GROOVING

Product Information

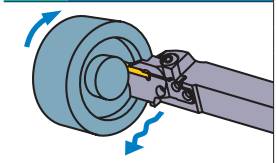
Recommended Cutting Condition >> 548
INSERTS >> 462
Technical Info >> 1971
IDENTIFICATION >> 460
SPARE PARTS >> 1927
ISO13399 Property >> 1966

4 00° type holder

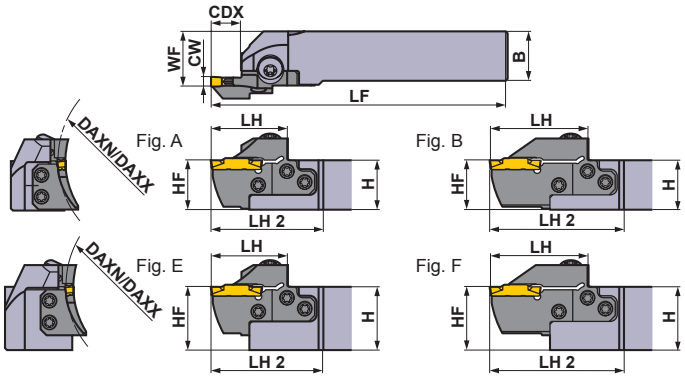
Insert	GY1M/2M○○○○○○○○○○-GM	Insert	GY2G○○○○○○○○○○-MF
Insert	GY2M○○○○○○○○○○-GS/-GU	Insert	GY2M○○○○○○○○○○-MS
Insert	GY1G○○○○○○○○○○-GF/GS	Insert	GY2M○○○○○○○○○○-MM



Insert GY2M○○○○○○○○○○-BM



(Note 1) Please order the modular blade and modular holder separately.
(Note 2) Please set the right hand modular blade at the right hand holder and the left hand modular blade at the left hand holder.

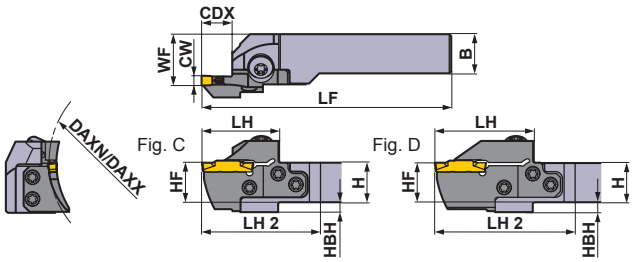


Right hand tool holder shown.

Seat Size	CW	DAXN	DAXX	CDX	Type	Hand (R/L)	Order Number: Holder	Stock	Modular Blade	Stock	Fig.
G	4.00 4.24	85	125	14	Modular	R	GYHR2020K00-M25R	●	GYM25RD-G14-085	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-G14-085	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-G14-085	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-G14-085	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-G14-085	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-G14-085	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-G14-085	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-G14-085	●	E
				25 *2	Modular	R	GYHR2020K00-M25R	●	GYM25RD-G25-085	●	D
						L	GYHL2020K00-M25L	●	GYM25LD-G25-085	●	D
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-G25-085	●	B
						L	GYHL2525M00-M25L	●	GYM25LD-G25-085	●	B
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-G25-085	●	F
						L	GYHL3225P00-M25L	●	GYM25LD-G25-085	●	F
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-G25-085	●	F
						L	GYHL3232P00-M25L	●	GYM25LD-G25-085	●	F
		125	200	14	Modular	R	GYHR2020K00-M25R	●	GYM25RD-G14-125	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-G14-125	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-G14-125	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-G14-125	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-G14-125	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-G14-125	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-G14-125	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-G14-125	●	E
				25 *2	Modular	R	GYHR2020K00-M25R	●	GYM25RD-G25-125	●	D
						L	GYHL2020K00-M25L	●	GYM25LD-G25-125	●	D
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-G25-125	●	B
						L	GYHL2525M00-M25L	●	GYM25LD-G25-125	●	B
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-G25-125	●	F
						L	GYHL3225P00-M25L	●	GYM25LD-G25-125	●	F
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-G25-125	●	F
						L	GYHL3232P00-M25L	●	GYM25LD-G25-125	●	F

*1 Dimensions shown are when gauge insert is used. If other insert geometries are used then **LF**, **LH**, **LH 2**, and **WF** values may vary.
*2 The maximum groove depth varies according to the insert used.

● : **Inventory maintained in Japan.**



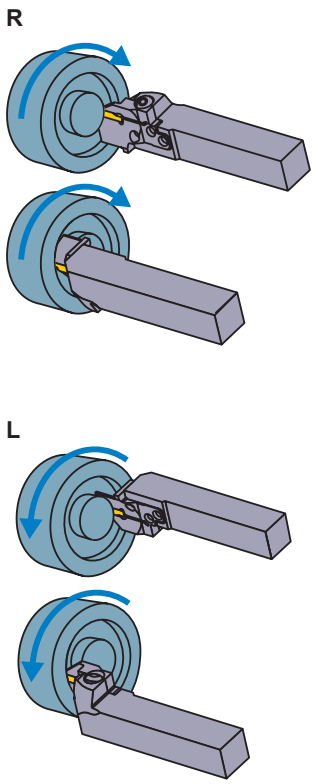
Right hand tool holder shown.

* Wrench : ① : Clamp Screw, ② : Blade Screw

SPARE PARTS

Holder	Clamp Screw	Blade Screw (5 pcs.)	Wrench *
GYHR/L2020K00-M25R/L	GY06013M (Clamp Torque : 6.0N·m)	TS55 (Clamp Torque : 5.0N·m)	①TKY30R ②TKY25D
GYHR/L2525M00-M25R/L			
GYHR/L3225P00-M25R/L			
GYHR/L3232P00-M25R/L			

Dimensions (mm) *1								Cutting Mode
H	B	LF	LH	LH 2	HF	WF	HBH	
20	20	125	39	60	20	26	5	R
20	20	125	39	60	20	26	5	
25	25	150	39	57	25	28	—	
25	25	150	39	57	25	28	—	
32	25	170	39	57	32	28	—	
32	25	170	39	57	32	28	—	
32	32	170	39	57	32	35	—	
32	32	170	39	57	32	35	—	
20	20	136	50	71	20	26	5	
20	20	136	50	71	20	26	5	
25	25	161	50	68	25	28	—	
25	25	161	50	68	25	28	—	
32	25	181	50	68	32	28	—	
32	25	181	50	68	32	28	—	
32	32	181	50	68	32	35	—	
32	32	181	50	68	32	35	—	
20	20	125	39	60	20	26	5	L
20	20	125	39	60	20	26	5	
25	25	150	39	57	25	28	—	
25	25	150	39	57	25	28	—	
32	25	170	39	57	32	28	—	
32	25	170	39	57	32	28	—	
32	32	170	39	57	32	35	—	
32	32	170	39	57	32	35	—	
20	20	136	50	71	20	26	5	
20	20	136	50	71	20	26	5	
25	25	161	50	68	25	28	—	
25	25	161	50	68	25	28	—	
32	25	181	50	68	32	28	—	
32	25	181	50	68	32	28	—	
32	32	181	50	68	32	35	—	
32	32	181	50	68	32	35	—	



Insert selection

Seat Size	Geometry name
G	GY○○0400/0424G○○○○−Breaker shown below

For grooving/cutting off breaker

Seat Size	Breaker / CW	GU (For gummy steel)	GS (Low)	GM (Medium)	GFGS (Hardened steel)
G	4.00mm	●	●	●	●

For multifunctional grooving breaker

Seat Size	Breaker / CW	MF (Finish)	MS (Low)	MM (Medium)	BM (Copying)
					Ball shape
G	4.00mm				●
	RE 0.2	●	●	●	
	RE 0.4	●	●	●	
	RE 0.8	●		●	
	4.24mm	●			

● : Standard insert with dimensions

GY

CW(Cutting width) 4.00, 4.24

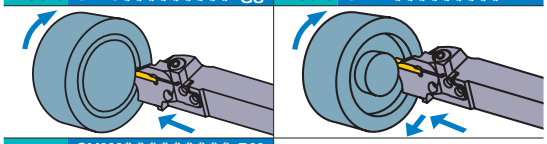
FACE GROOVING

Product Information

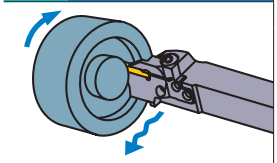
Recommended Cutting Condition >> 548
INSERTS >> 462
Technical Info >> 1971
IDENTIFICATION >> 460
SPARE PARTS >> 1927
ISO13399 Property >> 1966

4 00° type holder

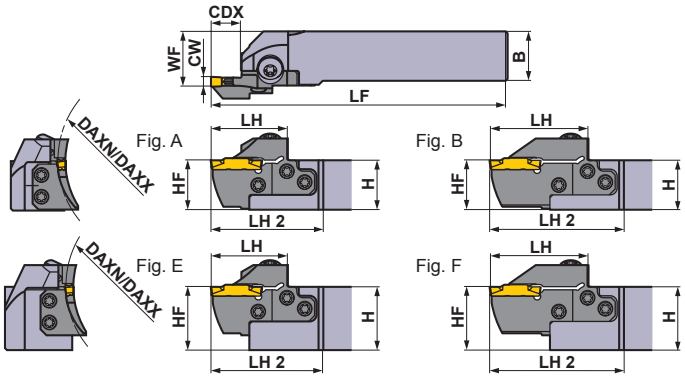
Insert	GY1M/2M○○○○○○○○○○-GM	Insert	GY2G○○○○○○○○○○-MF
Insert	GY2M○○○○○○○○○○-GS/-GU	Insert	GY2M○○○○○○○○○○-MS
Insert	GY1G○○○○○○○○○○-GF/GS	Insert	GY2M○○○○○○○○○○-MM



Insert GY2M○○○○○○○○○○-BM



(Note 1) Please order the modular blade and modular holder separately.
(Note 2) Please set the right hand modular blade at the right hand holder and the left hand modular blade at the left hand holder.

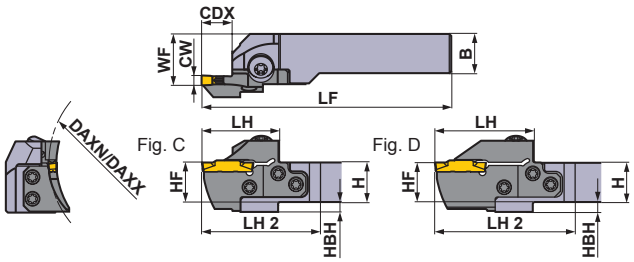


Right hand tool holder shown.

Seat Size	CW	DAXN	DAXX	CDX	Type	Hand (R/L)	Order Number: Holder	Stock	Modular Blade	Stock	Fig.
G	4.00 4.24	180	280	14	Modular	R	GYHR2020K00-M25R	●	GYM25RD-G14-180	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-G14-180	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-G14-180	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-G14-180	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-G14-180	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-G14-180	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-G14-180	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-G14-180	●	E
				25 *2	Modular	R	GYHR2020K00-M25R	●	GYM25RD-G25-180	●	D
						L	GYHL2020K00-M25L	●	GYM25LD-G25-180	●	D
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-G25-180	●	B
						L	GYHL2525M00-M25L	●	GYM25LD-G25-180	●	B
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-G25-180	●	F
						L	GYHL3225P00-M25L	●	GYM25LD-G25-180	●	F
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-G25-180	●	F
						L	GYHL3232P00-M25L	●	GYM25LD-G25-180	●	F
		250	999	14	Modular	R	GYHR2020K00-M25R	●	GYM25RD-G14-250	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-G14-250	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-G14-250	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-G14-250	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-G14-250	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-G14-250	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-G14-250	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-G14-250	●	E
				25 *2	Modular	R	GYHR2020K00-M25R	●	GYM25RD-G25-250	●	D
						L	GYHL2020K00-M25L	●	GYM25LD-G25-250	●	D
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-G25-250	●	B
						L	GYHL2525M00-M25L	●	GYM25LD-G25-250	●	B
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-G25-250	●	F
						L	GYHL3225P00-M25L	●	GYM25LD-G25-250	●	F
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-G25-250	●	F
						L	GYHL3232P00-M25L	●	GYM25LD-G25-250	●	F

*1 Dimensions shown are when gauge insert is used. If other insert geometries are used then **LF**, **LH**, **LH 2**, and **WF** values may vary.
*2 The maximum groove depth varies according to the insert used.

● : **Inventory maintained in Japan.**



Right hand tool holder shown.

* Wrench : ① : Clamp Screw, ② : Blade Screw

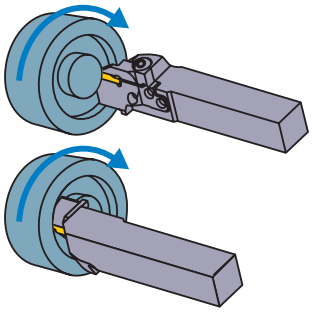
SPARE PARTS

Holder	Clamp Screw	Blade Screw (5 pcs.)	Wrench *
GYHR/L2020K00-M25R/L	GY06013M (Clamp Torque : 6.0N·m)	TS55 (Clamp Torque : 5.0N·m)	①TKY30R ②TKY25D
GYHR/L2525M00-M25R/L			
GYHR/L3225P00-M25R/L			
GYHR/L3232P00-M25R/L			

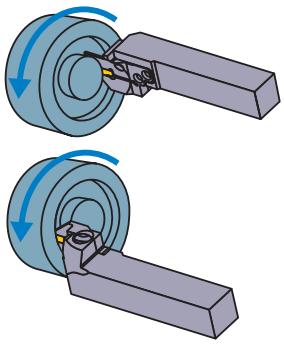
Dimensions (mm) *1							
H	B	LF	LH	LH 2	HF	WF	HBH
20	20	125	39	60	20	26	5
20	20	125	39	60	20	26	5
25	25	150	39	57	25	28	—
25	25	150	39	57	25	28	—
32	25	170	39	57	32	28	—
32	25	170	39	57	32	28	—
32	32	170	39	57	32	35	—
32	32	170	39	57	32	35	—
20	20	136	50	71	20	26	5
20	20	136	50	71	20	26	5
25	25	161	50	68	25	28	—
25	25	161	50	68	25	28	—
32	25	181	50	68	32	28	—
32	25	181	50	68	32	28	—
32	32	181	50	68	32	35	—
32	32	181	50	68	32	35	—
20	20	125	39	60	20	26	5
20	20	125	39	60	20	26	5
25	25	150	39	57	25	28	—
25	25	150	39	57	25	28	—
32	25	170	39	57	32	28	—
32	25	170	39	57	32	28	—
32	32	170	39	57	32	35	—
32	32	170	39	57	32	35	—
20	20	136	50	71	20	26	5
20	20	136	50	71	20	26	5
25	25	161	50	68	25	28	—
25	25	161	50	68	25	28	—
32	25	181	50	68	32	28	—
32	25	181	50	68	32	28	—
32	32	181	50	68	32	35	—
32	32	181	50	68	32	35	—

Cutting Mode

R



L



Insert selection

Seat Size	Geometry name
G	GY○○0400/0424G○○○○○−Breaker shown below

For grooving/cutting off breaker

Seat Size	Breaker / CW	GU (For gummy steel)	GS (Low)	GM (Medium)	GFGS (Hardened steel)
G	4.00mm	●	●	●	●

For multifunctional grooving breaker

Seat Size	Breaker / CW	MF (Finish)	MS (Low)	MM (Medium)	BM (Copying)
					Ball shape
G	4.00mm				●
	RE 0.2	●	●	●	
	RE 0.4	●	●	●	
	RE 0.8	●		●	
	4.24mm	●			

● : Standard insert with dimensions

GY

CW(Cutting width) 4.75, 5.00, 5.24

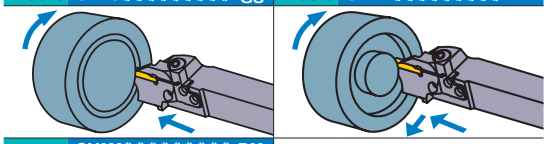
FACE GROOVING

Product Information

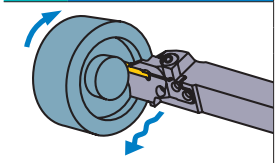
Recommended Cutting Condition >> 548
INSERTS >> 462
Technical Info >> 1971
IDENTIFICATION >> 460
SPARE PARTS >> 1927
ISO13399 Property >> 1966

4 00° type holder

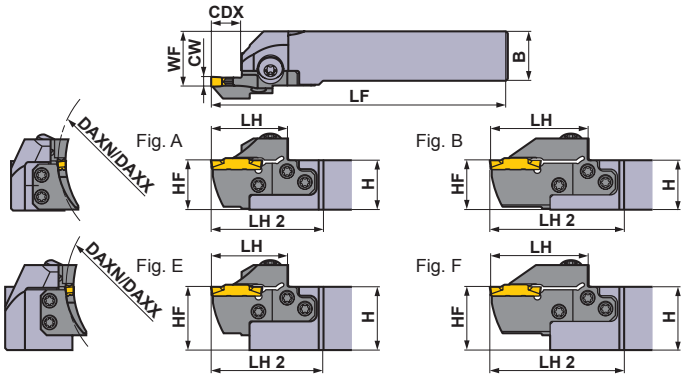
Insert	GY1M/2M○○○○○○○○○○-GM	Insert	GY2G○○○○○○○○○○-MF
Insert	GY2M○○○○○○○○○○-GS/-GU	Insert	GY2M○○○○○○○○○○-MS
Insert	GY1G○○○○○○○○○○-GF/GS	Insert	GY2M○○○○○○○○○○-MM



Insert GY2M○○○○○○○○○○-BM



(Note 1) Please order the modular blade and modular holder separately.
(Note 2) Please set the right hand modular blade at the right hand holder and the left hand modular blade at the left hand holder.

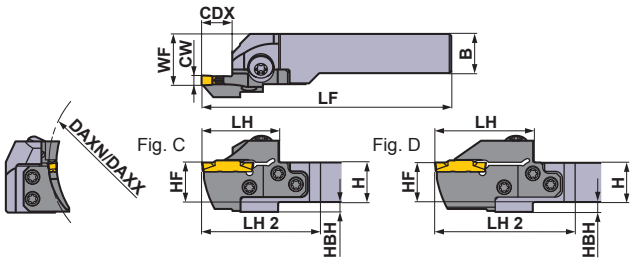


Right hand tool holder shown.

Seat Size	CW	DAXN	DAXX	CDX	Type	Hand (R/L)	Order Number: Holder	Stock	Modular Blade	Stock	Fig.
H	4.75 5.00 5.24	50	60	14	Modular	R	GYHR2020K00-M25R	●	GYM25RD-H14-050	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-H14-050	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-H14-050	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-H14-050	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-H14-050	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-H14-050	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-H14-050	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-H14-050	●	E
		60	85	14	Modular	R	GYHR2020K00-M25R	●	GYM25RD-H14-060	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-H14-060	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-H14-060	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-H14-060	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-H14-060	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-H14-060	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-H14-060	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-H14-060	●	E
				25 *2	Modular	R	GYHR2020K00-M25R	●	GYM25RD-H25-060	●	D
						L	GYHL2020K00-M25L	●	GYM25LD-H25-060	●	D
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-H25-060	●	B
						L	GYHL2525M00-M25L	●	GYM25LD-H25-060	●	B
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-H25-060	●	F
						L	GYHL3225P00-M25L	●	GYM25LD-H25-060	●	F
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-H25-060	●	F
						L	GYHL3232P00-M25L	●	GYM25LD-H25-060	●	F

*1 Dimensions shown are when gauge insert is used. If other insert geometries are used then **LF**, **LH**, **LH 2**, and **WF** values may vary.
*2 The maximum groove depth varies according to the insert used.

● : **Inventory maintained in Japan.**



Right hand tool holder shown.

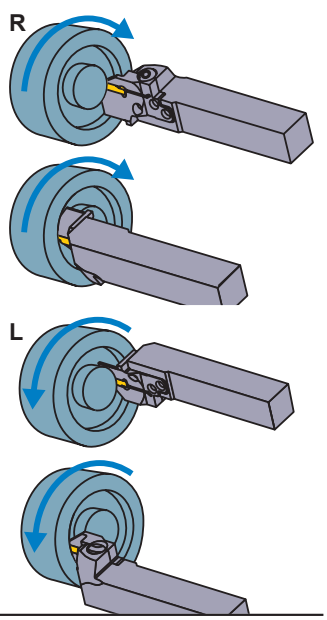
* Wrench : ① : Clamp Screw, ② : Blade Screw

SPARE PARTS

Holder	Clamp Screw	Blade Screw (5 pcs.)	Wrench *
GYHR/L2020K00-M25R/L	GY06013M (Clamp Torque : 6.0N·m)	TS55 (Clamp Torque : 5.0N·m)	①TKY30R ②TKY25D
GYHR/L2525M00-M25R/L			
GYHR/L3225P00-M25R/L			
GYHR/L3232P00-M25R/L			

Dimensions (mm) *1							
H	B	LF	LH	LH 2	HF	WF	HBH
20	20	125	39	60	20	26	5
20	20	125	39	60	20	26	5
25	25	150	39	57	25	28	—
25	25	150	39	57	25	28	—
32	25	170	39	57	32	28	—
32	25	170	39	57	32	28	—
32	32	170	39	57	32	35	—
32	32	170	39	57	32	35	—
20	20	125	39	60	20	26	5
20	20	125	39	60	20	26	5
25	25	150	39	57	25	28	—
25	25	150	39	57	25	28	—
32	25	170	39	57	32	28	—
32	25	170	39	57	32	28	—
32	32	170	39	57	32	35	—
32	32	170	39	57	32	35	—
20	20	136	50	71	20	26	5
20	20	136	50	71	20	26	5
25	25	161	50	68	25	28	—
25	25	161	50	68	25	28	—
32	25	181	50	68	32	28	—
32	25	181	50	68	32	28	—
32	32	181	50	68	32	35	—
32	32	181	50	68	32	35	—

Cutting Mode



Insert selection

Seat Size	Geometry name
H	GY○○0475/0500/0524H○○○○–Breaker shown below

For grooving/cutting off breaker

Seat Size	CW \ Breaker	GU (For gummy steel)	GS (Low)	GM (Medium)	GFGS (Hardened steel)
H	4.75mm	●	●	●	●
	5.00mm	●	●	●	●

For multifunctional grooving breaker

Seat Size	CW \ Breaker	MF (Finish)	MS (Low)	MM (Medium)	BM (Copying)
					Ball shape
H	4.75mm				●
	RE 0.2	●			
	RE 0.4	●			
	RE 0.8	●			
	5.00mm				●
	RE 0.2	●			
	RE 0.4	●	●	●	
	RE 0.8	●	●	●	
	5.24mm	●			

● : Standard insert with dimensions

GY

CW(Cutting width) 4.75, 5.00, 5.24

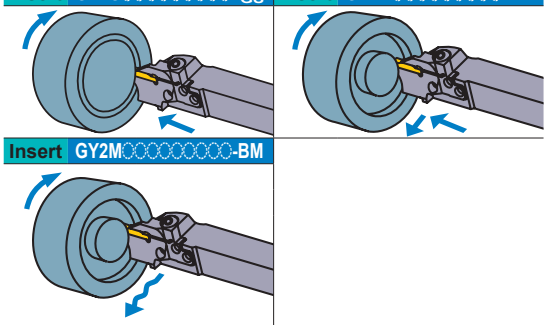
FACE GROOVING

Product Information

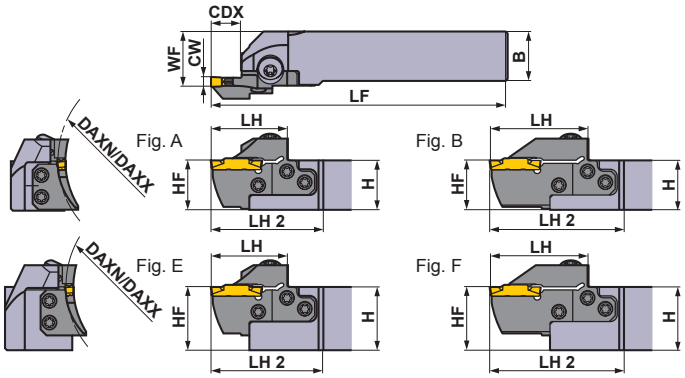
Recommended Cutting Condition >> 548
INSERTS >> 462
Technical Info >> 1971
IDENTIFICATION >> 460
SPARE PARTS >> 1927
ISO13399 Property >> 1966

4 00° type holder

Insert	GY1M/2M○○○○○○○○○○-GM	Insert	GY2G○○○○○○○○○○-MF
Insert	GY2M○○○○○○○○○○-GS/-GU	Insert	GY2M○○○○○○○○○○-MS
Insert	GY1G○○○○○○○○○○-GF/GS	Insert	GY2M○○○○○○○○○○-MM
Insert	GY2M○○○○○○○○○○-BM		



(Note 1) Please order the modular blade and modular holder separately.
(Note 2) Please set the right hand modular blade at the right hand holder and the left hand modular blade at the left hand holder.

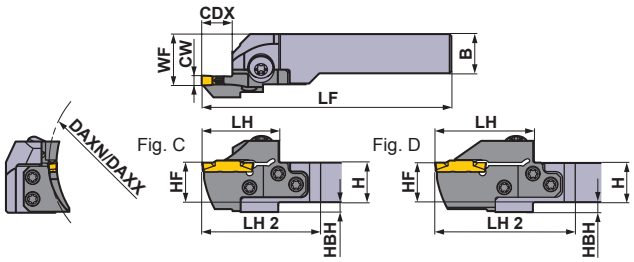


Right hand tool holder shown.

Seat Size	CW	DAXN	DAXX	CDX	Type	Hand (R/L)	Order Number: Holder	Stock	Modular Blade	Stock	Fig.
H	4.75 5.00 5.24	85	125	14	Modular	R	GYHR2020K00-M25R	●	GYM25RD-H14-085	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-H14-085	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-H14-085	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-H14-085	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-H14-085	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-H14-085	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-H14-085	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-H14-085	●	E
				25 *2	Modular	R	GYHR2020K00-M25R	●	GYM25RD-H25-085	●	D
						L	GYHL2020K00-M25L	●	GYM25LD-H25-085	●	D
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-H25-085	●	B
						L	GYHL2525M00-M25L	●	GYM25LD-H25-085	●	B
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-H25-085	●	F
						L	GYHL3225P00-M25L	●	GYM25LD-H25-085	●	F
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-H25-085	●	F
						L	GYHL3232P00-M25L	●	GYM25LD-H25-085	●	F
		125	200	14	Modular	R	GYHR2020K00-M25R	●	GYM25RD-H14-125	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-H14-125	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-H14-125	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-H14-125	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-H14-125	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-H14-125	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-H14-125	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-H14-125	●	E
				25 *2	Modular	R	GYHR2020K00-M25R	●	GYM25RD-H25-125	●	D
						L	GYHL2020K00-M25L	●	GYM25LD-H25-125	●	D
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-H25-125	●	B
						L	GYHL2525M00-M25L	●	GYM25LD-H25-125	●	B
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-H25-125	●	F
						L	GYHL3225P00-M25L	●	GYM25LD-H25-125	●	F
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-H25-125	●	F
						L	GYHL3232P00-M25L	●	GYM25LD-H25-125	●	F

*1 Dimensions shown are when gauge insert is used. If other insert geometries are used then **LF**, **LH**, **LH 2**, and **WF** values may vary.
*2 The maximum groove depth varies according to the insert used.

● : **Inventory maintained in Japan.**



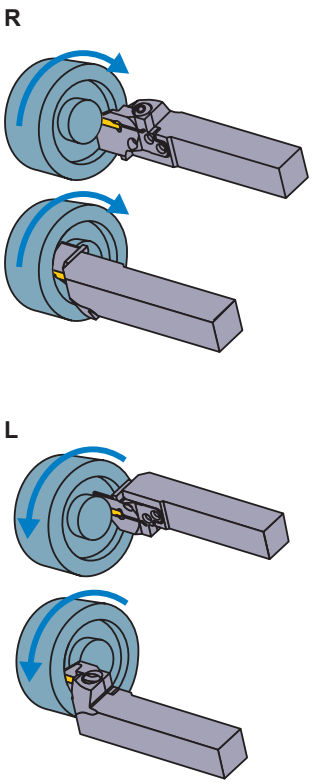
Right hand tool holder shown.

* Wrench : ① : Clamp Screw, ② : Blade Screw

SPARE PARTS

Holder	Clamp Screw	Blade Screw (5 pcs.)	Wrench *
GYHR/L2020K00-M25R/L	GY06013M (Clamp Torque : 6.0N·m)	TS55 (Clamp Torque : 5.0N·m)	①TKY30R ②TKY25D
GYHR/L2525M00-M25R/L			
GYHR/L3225P00-M25R/L			
GYHR/L3232P00-M25R/L			

Dimensions (mm) *1								Cutting Mode
H	B	LF	LH	LH 2	HF	WF	HBH	
20	20	125	39	60	20	26	5	R
20	20	125	39	60	20	26	5	
25	25	150	39	57	25	28	—	
25	25	150	39	57	25	28	—	
32	25	170	39	57	32	28	—	
32	25	170	39	57	32	28	—	
32	32	170	39	57	32	35	—	
32	32	170	39	57	32	35	—	
20	20	136	50	71	20	26	5	
20	20	136	50	71	20	26	5	
25	25	161	50	68	25	28	—	
25	25	161	50	68	25	28	—	
32	25	181	50	68	32	28	—	
32	25	181	50	68	32	28	—	
32	32	181	50	68	32	35	—	
32	32	181	50	68	32	35	—	
20	20	125	39	60	20	26	5	L
20	20	125	39	60	20	26	5	
25	25	150	39	57	25	28	—	
25	25	150	39	57	25	28	—	
32	25	170	39	57	32	28	—	
32	25	170	39	57	32	28	—	
32	32	170	39	57	32	35	—	
32	32	170	39	57	32	35	—	
20	20	136	50	71	20	26	5	
20	20	136	50	71	20	26	5	
25	25	161	50	68	25	28	—	
25	25	161	50	68	25	28	—	
32	25	181	50	68	32	28	—	
32	25	181	50	68	32	28	—	
32	32	181	50	68	32	35	—	
32	32	181	50	68	32	35	—	



Insert selection

Seat Size	Geometry name
H	GY○○0475/0500/0524H○○○○–Breaker shown below

For grooving/cutting off breaker

Seat Size	CW \ Breaker	GU (For gummy steel)	GS (Low)	GM (Medium)	GFGS (Hardened steel)
H	4.75mm	●	●	●	●
	5.00mm	●	●	●	●

For multifunctional grooving breaker

Seat Size	CW \ Breaker	MF (Finish)	MS (Low)	MM (Medium)	BM (Copying)
					Ball shape
H	4.75mm				●
	RE 0.2	●			
	RE 0.4	●			
	RE 0.8	●			
	5.00mm				●
	RE 0.2	●			
	RE 0.4	●	●	●	
	RE 0.8	●	●	●	
	5.24mm	●			

● : Standard insert with dimensions

GY

CW(Cutting width) 4.75, 5.00, 5.24

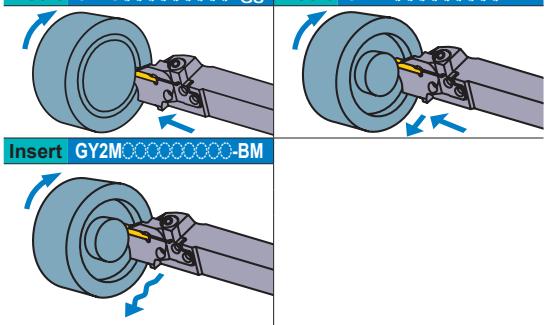
FACE GROOVING

Product Information

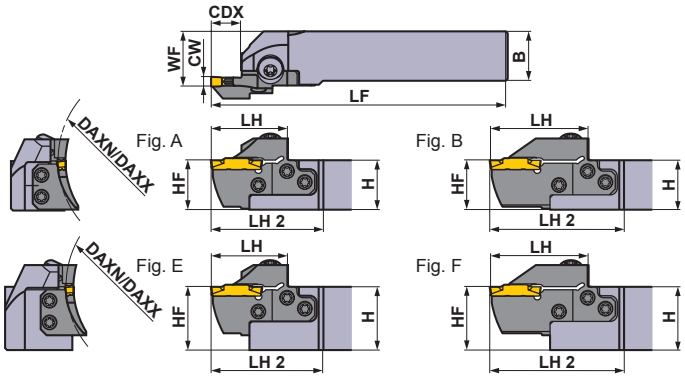
Recommended Cutting Condition >> 548
INSERTS >> 462
Technical Info >> 1971
IDENTIFICATION >> 460
SPARE PARTS >> 1927
ISO13399 Property >> 1966

4 00° type holder

Insert	GY1M/2M○○○○○○○○○○-GM	Insert	GY2G○○○○○○○○○○-MF
Insert	GY2M○○○○○○○○○○-GS/-GU	Insert	GY2M○○○○○○○○○○-MS
Insert	GY1G○○○○○○○○○○-GF/GS	Insert	GY2M○○○○○○○○○○-MM
Insert	GY2M○○○○○○○○○○-BM		



(Note 1) Please order the modular blade and modular holder separately.
(Note 2) Please set the right hand modular blade at the right hand holder and the left hand modular blade at the left hand holder.

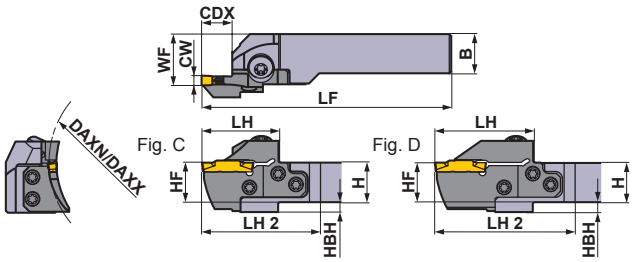


Right hand tool holder shown.

Seat Size	CW	DAXN	DAXX	CDX	Type	Hand (R/L)	Order Number: Holder	Stock	Modular Blade	Stock	Fig.
H	4.75 5.00 5.24	180	280	14	Modular	R	GYHR2020K00-M25R	●	GYM25RD-H14-180	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-H14-180	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-H14-180	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-H14-180	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-H14-180	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-H14-180	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-H14-180	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-H14-180	●	E
				25 *2	Modular	R	GYHR2020K00-M25R	●	GYM25RD-H25-180	●	D
						L	GYHL2020K00-M25L	●	GYM25LD-H25-180	●	D
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-H25-180	●	B
						L	GYHL2525M00-M25L	●	GYM25LD-H25-180	●	B
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-H25-180	●	F
						L	GYHL3225P00-M25L	●	GYM25LD-H25-180	●	F
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-H25-180	●	F
						L	GYHL3232P00-M25L	●	GYM25LD-H25-180	●	F
		250	999	14	Modular	R	GYHR2020K00-M25R	●	GYM25RD-H14-250	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-H14-250	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-H14-250	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-H14-250	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-H14-250	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-H14-250	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-H14-250	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-H14-250	●	E
				25 *2	Modular	R	GYHR2020K00-M25R	●	GYM25RD-H25-250	●	D
						L	GYHL2020K00-M25L	●	GYM25LD-H25-250	●	D
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-H25-250	●	B
						L	GYHL2525M00-M25L	●	GYM25LD-H25-250	●	B
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-H25-250	●	F
						L	GYHL3225P00-M25L	●	GYM25LD-H25-250	●	F
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-H25-250	●	F
						L	GYHL3232P00-M25L	●	GYM25LD-H25-250	●	F

*1 Dimensions shown are when gauge insert is used. If other insert geometries are used then **LF**, **LH**, **LH 2**, and **WF** values may vary.
*2 The maximum groove depth varies according to the insert used.

● : **Inventory maintained in Japan.**



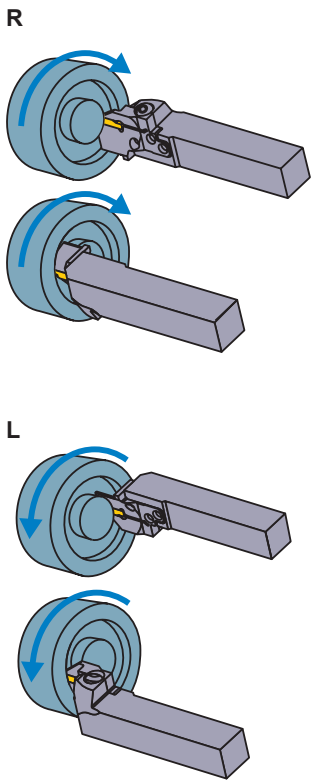
Right hand tool holder shown.

* Wrench : ① : Clamp Screw, ② : Blade Screw

SPARE PARTS

Holder	Clamp Screw	Blade Screw (5 pcs.)	Wrench *
GYHR/L2020K00-M25R/L	GY06013M (Clamp Torque : 6.0N·m)	TS55 (Clamp Torque : 5.0N·m)	①TKY30R ②TKY25D
GYHR/L2525M00-M25R/L			
GYHR/L3225P00-M25R/L			
GYHR/L3232P00-M25R/L			

Dimensions (mm) *1								Cutting Mode
H	B	LF	LH	LH 2	HF	WF	HBH	
20	20	125	39	60	20	26	5	R
20	20	125	39	60	20	26	5	
25	25	150	39	57	25	28	—	
25	25	150	39	57	25	28	—	
32	25	170	39	57	32	28	—	
32	25	170	39	57	32	28	—	
32	32	170	39	57	32	35	—	
32	32	170	39	57	32	35	—	
20	20	136	50	71	20	26	5	
20	20	136	50	71	20	26	5	
25	25	161	50	68	25	28	—	
25	25	161	50	68	25	28	—	
32	25	181	50	68	32	28	—	
32	25	181	50	68	32	28	—	
32	32	181	50	68	32	35	—	
32	32	181	50	68	32	35	—	
20	20	125	39	60	20	26	5	L
20	20	125	39	60	20	26	5	
25	25	150	39	57	25	28	—	
25	25	150	39	57	25	28	—	
32	25	170	39	57	32	28	—	
32	25	170	39	57	32	28	—	
32	32	170	39	57	32	35	—	
32	32	170	39	57	32	35	—	
20	20	136	50	71	20	26	5	
20	20	136	50	71	20	26	5	
25	25	161	50	68	25	28	—	
25	25	161	50	68	25	28	—	
32	25	181	50	68	32	28	—	
32	25	181	50	68	32	28	—	
32	32	181	50	68	32	35	—	
32	32	181	50	68	32	35	—	



Insert selection

Seat Size	Geometry name
H	GY○○0475/0500/0524H○○○○–Breaker shown below

For grooving/cutting off breaker

Seat Size	CW \ Breaker	GU (For gummy steel)	GS (Low)	GM (Medium)	GFGS (Hardened steel)
H	4.75mm	●	●	●	●
	5.00mm	●	●	●	●

For multifunctional grooving breaker

Seat Size	CW \ Breaker	MF (Finish)	MS (Low)	MM (Medium)	BM (Copying)
					Ball shape
H	4.75mm				●
	RE 0.2	●			
	RE 0.4	●			
	RE 0.8	●			
	5.00mm				●
	RE 0.2	●			
	RE 0.4	●	●	●	
	RE 0.8	●	●	●	
	5.24mm	●			

● : Standard insert with dimensions

GY

CW(Cutting width) 6.00, 6.31, 6.35

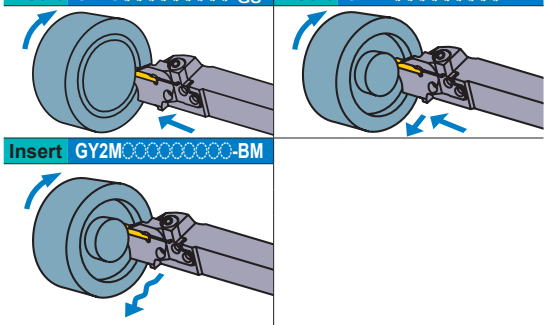
FACE GROOVING

Product Information

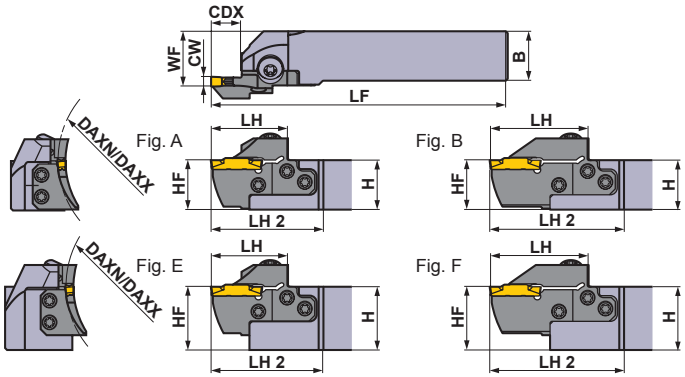
Recommended Cutting Condition >> 548
INSERTS >> 462
Technical Info >> 1971
IDENTIFICATION >> 460
SPARE PARTS >> 1927
ISO13399 Property >> 1966

4 00° type holder

Insert	GY2M○○○○○○○○○○-GS/GM	Insert	GY2G○○○○○○○○○○-MF
Insert	GY2M○○○○○○○○○○-GU	Insert	GY2M○○○○○○○○○○-MS
Insert	GY1G○○○○○○○○○○-GF/GS	Insert	GY2M○○○○○○○○○○-MM
Insert	GY2M○○○○○○○○○○-BM		



(Note 1) Please order the modular blade and modular holder separately.
(Note 2) Please set the right hand modular blade at the right hand holder and the left hand modular blade at the left hand holder.

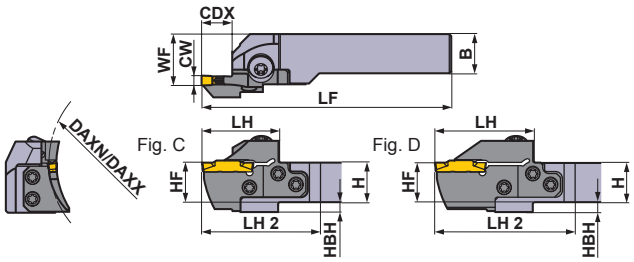


Right hand tool holder shown.

Seat Size	CW	DAXN	DAXX	CDX	Type	Hand (R/L)	Order Number: Holder	Stock	Modular Blade	Stock	Fig.
J	6.00 6.31 6.35	50	70	14	Modular	R	GYHR2020K00-M25R	●	GYM25RD-J14-050	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-J14-050	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-J14-050	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-J14-050	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-J14-050	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-J14-050	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-J14-050	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-J14-050	●	E
		70	110	14	Modular	R	GYHR2020K00-M25R	●	GYM25RD-J14-070	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-J14-070	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-J14-070	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-J14-070	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-J14-070	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-J14-070	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-J14-070	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-J14-070	●	E
				25 *2	Modular	R	GYHR2020K00-M25R	●	GYM25RD-J25-070	●	D
						L	GYHL2020K00-M25L	●	GYM25LD-J25-070	●	D
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-J25-070	●	B
						L	GYHL2525M00-M25L	●	GYM25LD-J25-070	●	B
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-J25-070	●	F
						L	GYHL3225P00-M25L	●	GYM25LD-J25-070	●	F
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-J25-070	●	F
						L	GYHL3232P00-M25L	●	GYM25LD-J25-070	●	F

*1 Dimensions shown are when gauge insert is used. If other insert geometries are used then **LF**, **LH**, **LH 2**, and **WF** values may vary.
*2 The maximum groove depth varies according to the insert used.

● : **Inventory maintained in Japan.**



Right hand tool holder shown.

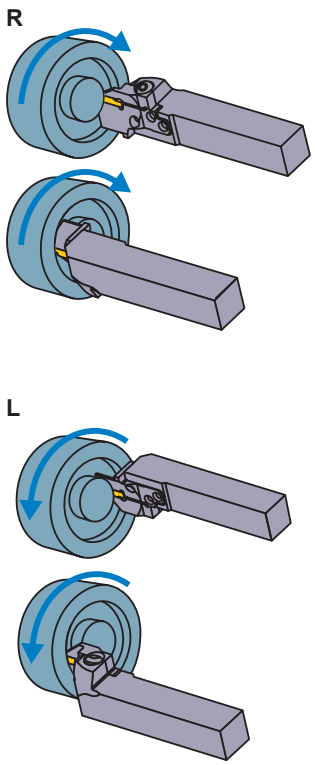
* Wrench : ① : Clamp Screw, ② : Blade Screw

SPARE PARTS

Holder	Clamp Screw	Blade Screw (5 pcs.)	Wrench *
GYHR/L2020K00-M25R/L	GY06013M (Clamp Torque : 6.0N·m)	TS55 (Clamp Torque : 5.0N·m)	①TKY30R ②TKY25D
GYHR/L2525M00-M25R/L			
GYHR/L3225P00-M25R/L			
GYHR/L3232P00-M25R/L			

Dimensions (mm) *1							
H	B	LF	LH	LH 2	HF	WF	HBH
20	20	125	39	60	20	26	5
20	20	125	39	60	20	26	5
25	25	150	39	57	25	28	—
25	25	150	39	57	25	28	—
32	25	170	39	57	32	28	—
32	25	170	39	57	32	28	—
32	32	170	39	57	32	35	—
32	32	170	39	57	32	35	—
20	20	125	39	60	20	26	5
20	20	125	39	60	20	26	5
25	25	150	39	57	25	28	—
25	25	150	39	57	25	28	—
32	25	170	39	57	32	28	—
32	25	170	39	57	32	28	—
32	32	170	39	57	32	35	—
32	32	170	39	57	32	35	—
20	20	136	50	71	20	26	5
20	20	136	50	71	20	26	5
25	25	161	50	68	25	28	—
25	25	161	50	68	25	28	—
32	25	181	50	68	32	28	—
32	25	181	50	68	32	28	—
32	32	181	50	68	32	35	—
32	32	181	50	68	32	35	—

Cutting Mode



Insert selection

Seat Size	Geometry name
J	GY○○0600/0631/0635J○○○○–Breaker shown below

For grooving/cutting off breaker

Seat Size	CW \ Breaker	GU (For gummy steel)	GS (Low)	GM (Medium)	GFGS (Hardened steel)
J	6.00mm	●	●	●	●
	6.35mm	●	●	●	

For multifunctional grooving breaker

Seat Size	CW \ Breaker	MF (Finish)	MS (Low)	MM (Medium)	BM (Copying)
					Ball shape
J	6.00mm				●
	RE 0.2	●			
	RE 0.4	●	●	●	
	RE 0.8	●	●	●	
	6.31mm	●			
	6.35mm				●
	RE 0.2	●			
	RE 0.4	●			
	RE 0.8	●			

● : Standard insert with dimensions

GY

CW(Cutting width) 6.00, 6.31, 6.35

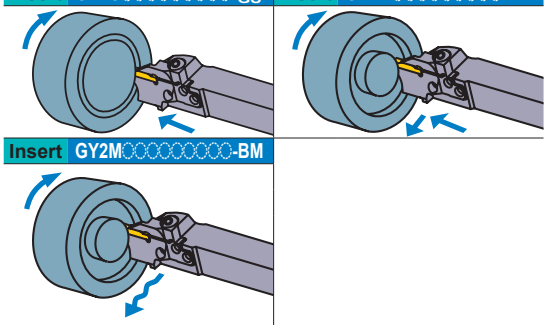
FACE GROOVING

Product Information

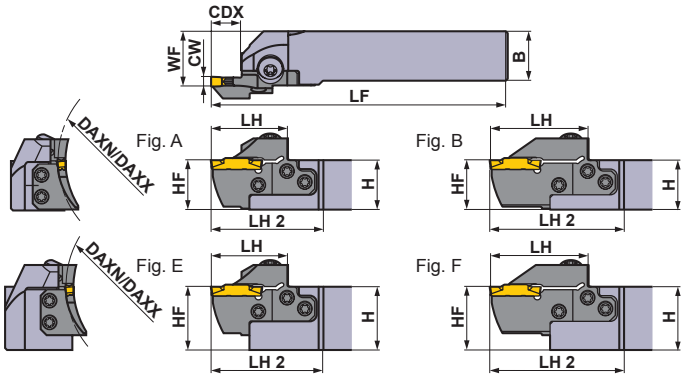
Recommended Cutting Condition >> 548
INSERTS >> 462
Technical Info >> 1971
IDENTIFICATION >> 460
SPARE PARTS >> 1927
ISO13399 Property >> 1966

4 00° type holder

Insert	GY2M○○○○○○○○○○-GS/GM	Insert	GY2G○○○○○○○○○○-MF
Insert	GY2M○○○○○○○○○○-GU	Insert	GY2M○○○○○○○○○○-MS
Insert	GY1G○○○○○○○○○○-GF/GS	Insert	GY2M○○○○○○○○○○-MM
Insert	GY2M○○○○○○○○○○-BM		



(Note 1) Please order the modular blade and modular holder separately.
(Note 2) Please set the right hand modular blade at the right hand holder and the left hand modular blade at the left hand holder.

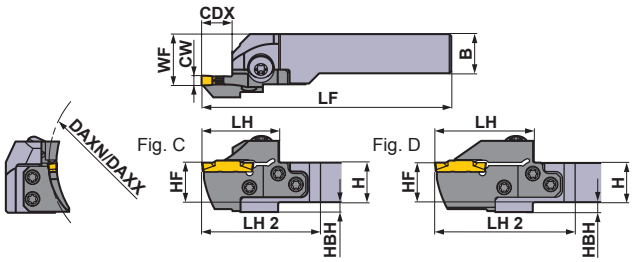


Right hand tool holder shown.

Seat Size	CW	DAXN	DAXX	CDX	Type	Hand (R/L)	Order Number: Holder	Stock	Modular Blade	Stock	Fig.
J	6.00 6.31 6.35	110	200	14	Modular	R	GYHR2020K00-M25R	●	GYM25RD-J14-110	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-J14-110	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-J14-110	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-J14-110	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-J14-110	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-J14-110	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-J14-110	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-J14-110	●	E
				25 *2	Modular	R	GYHR2020K00-M25R	●	GYM25RD-J25-110	●	D
						L	GYHL2020K00-M25L	●	GYM25LD-J25-110	●	D
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-J25-110	●	B
						L	GYHL2525M00-M25L	●	GYM25LD-J25-110	●	B
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-J25-110	●	F
						L	GYHL3225P00-M25L	●	GYM25LD-J25-110	●	F
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-J25-110	●	F
						L	GYHL3232P00-M25L	●	GYM25LD-J25-110	●	F

*1 Dimensions shown are when gauge insert is used. If other insert geometries are used then **LF**, **LH**, **LH 2**, and **WF** values may vary.
*2 The maximum groove depth varies according to the insert used.

● : **Inventory maintained in Japan.**



Right hand tool holder shown.

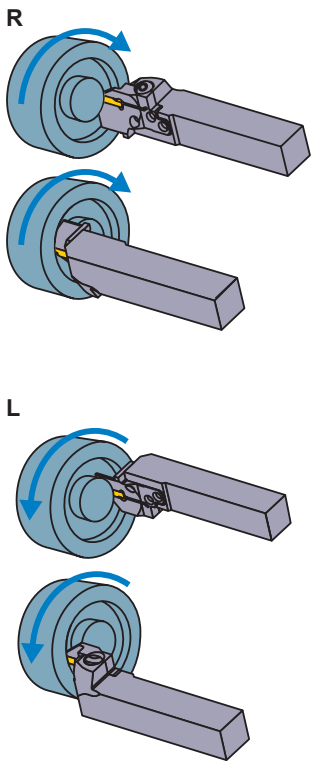
* Wrench : ① : Clamp Screw, ② : Blade Screw

SPARE PARTS

Holder	Clamp Screw	Blade Screw (5 pcs.)	Wrench *
GYHR/L2020K00-M25R/L	GY06013M (Clamp Torque : 6.0N·m)	TS55 (Clamp Torque : 5.0N·m)	①TKY30R ②TKY25D
GYHR/L2525M00-M25R/L			
GYHR/L3225P00-M25R/L			
GYHR/L3232P00-M25R/L			

Dimensions (mm)							
H	B	LF	LH	LH 2	HF	WF	HBH
20	20	125	39	60	20	26	5
20	20	125	39	60	20	26	5
25	25	150	39	57	25	28	—
25	25	150	39	57	25	28	—
32	25	170	39	57	32	28	—
32	25	170	39	57	32	28	—
32	32	170	39	57	32	35	—
32	32	170	39	57	32	35	—
20	20	136	50	71	20	26	5
20	20	136	50	71	20	26	5
25	25	161	50	68	25	28	—
25	25	161	50	68	25	28	—
32	25	181	50	68	32	28	—
32	25	181	50	68	32	28	—
32	32	181	50	68	32	35	—
32	32	181	50	68	32	35	—

Cutting Mode



Insert selection

Seat Size	Geometry name
J	GY○○0600/0631/0635J○○○○–Breaker shown below

For grooving/cutting off breaker

Seat Size	CW \ Breaker	GU (For gummy steel)	GS (Low)	GM (Medium)	GFGS (Hardened steel)
J	6.00mm	●	●	●	●
	6.35mm	●	●	●	

For multifunctional grooving breaker

Seat Size	CW \ Breaker	MF (Finish)	MS (Low)	MM (Medium)	BM (Copying)
					Ball shape
J	6.00mm				●
	RE 0.2	●			
	RE 0.4	●	●	●	
	RE 0.8	●	●	●	
	6.31mm	●			
	6.35mm				●
	RE 0.2	●			
	RE 0.4	●			
	RE 0.8	●			

● : Standard insert with dimensions

GY

CW(Cutting width) 6.00, 6.31, 6.35

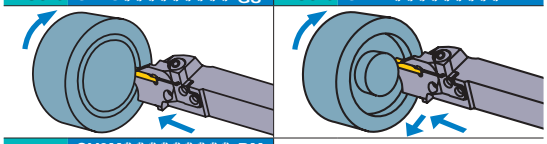
FACE GROOVING

Product Information

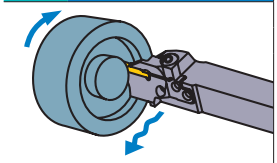
Recommended Cutting Condition >> 548
INSERTS >> 462
Technical Info >> 1971
IDENTIFICATION >> 460
SPARE PARTS >> 1927
ISO13399 Property >> 1966

4 00° type holder

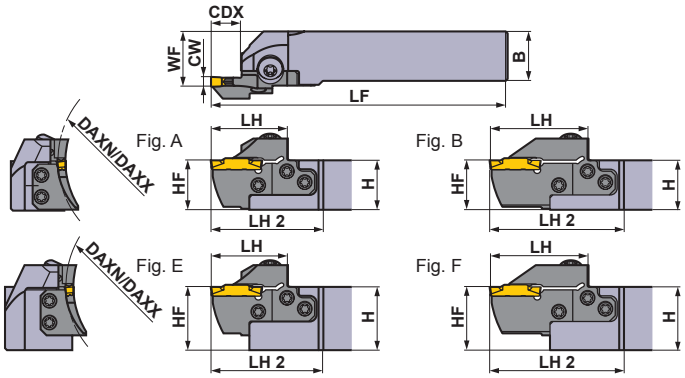
Insert	GY2M○○○○○○○○○○-GS/GM	Insert	GY2G○○○○○○○○○○-MF
Insert	GY2M○○○○○○○○○○-GU	Insert	GY2M○○○○○○○○○○-MS
Insert	GY1G○○○○○○○○○○-GF/GS	Insert	GY2M○○○○○○○○○○-MM



Insert GY2M○○○○○○○○○○-BM



(Note 1) Please order the modular blade and modular holder separately.
(Note 2) Please set the right hand modular blade at the right hand holder and the left hand modular blade at the left hand holder.

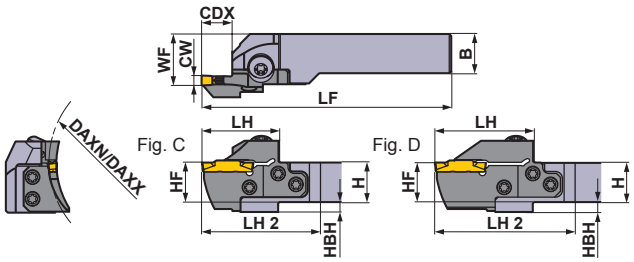


Right hand tool holder shown.

Seat Size	CW	DAXN	DAXX	CDX	Type	Hand (R/L)	Order Number: Holder	Stock	Modular Blade	Stock	Fig.
J	6.00 6.31 6.35	170	280	14	Modular	R	GYHR2020K00-M25R	●	GYM25RD-J14-170	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-J14-170	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-J14-170	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-J14-170	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-J14-170	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-J14-170	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-J14-170	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-J14-170	●	E
				25∗2	Modular	R	GYHR2020K00-M25R	●	GYM25RD-J25-170	●	D
						L	GYHL2020K00-M25L	●	GYM25LD-J25-170	●	D
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-J25-170	●	B
						L	GYHL2525M00-M25L	●	GYM25LD-J25-170	●	B
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-J25-170	●	F
						L	GYHL3225P00-M25L	●	GYM25LD-J25-170	●	F
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-J25-170	●	F
						L	GYHL3232P00-M25L	●	GYM25LD-J25-170	●	F
		250	999	14	Modular	R	GYHR2020K00-M25R	●	GYM25RD-J14-250	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-J14-250	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-J14-250	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-J14-250	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-J14-250	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-J14-250	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-J14-250	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-J14-250	●	E
				25∗2	Modular	R	GYHR2020K00-M25R	●	GYM25RD-J25-250	●	D
						L	GYHL2020K00-M25L	●	GYM25LD-J25-250	●	D
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-J25-250	●	B
						L	GYHL2525M00-M25L	●	GYM25LD-J25-250	●	B
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-J25-250	●	F
						L	GYHL3225P00-M25L	●	GYM25LD-J25-250	●	F
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-J25-250	●	F
						L	GYHL3232P00-M25L	●	GYM25LD-J25-250	●	F

∗1 Dimensions shown are when gauge insert is used. If other insert geometries are used then **LF**, **LH**, **LH 2**, and **WF** values may vary.
∗2 The maximum groove depth varies according to the insert used.

● : **Inventory maintained in Japan.**



Right hand tool holder shown.

* Wrench : ① : Clamp Screw, ② : Blade Screw

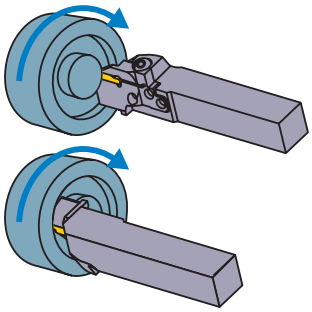
SPARE PARTS

Holder	Clamp Screw	Blade Screw (5 pcs.)	Wrench *
GYHR/L2020K00-M25R/L	GY06013M (Clamp Torque : 6.0N·m)	TS55 (Clamp Torque : 5.0N·m)	①TKY30R ②TKY25D
GYHR/L2525M00-M25R/L			
GYHR/L3225P00-M25R/L			
GYHR/L3232P00-M25R/L			

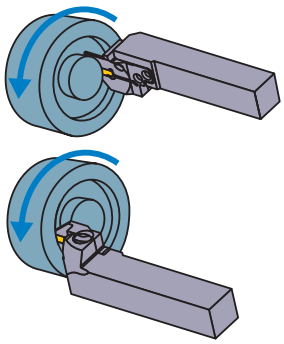
Dimensions (mm) *1							
H	B	LF	LH	LH 2	HF	WF	HBH
20	20	125	39	60	20	26	5
20	20	125	39	60	20	26	5
25	25	150	39	57	25	28	—
25	25	150	39	57	25	28	—
32	25	170	39	57	32	28	—
32	25	170	39	57	32	28	—
32	32	170	39	57	32	35	—
32	32	170	39	57	32	35	—
20	20	136	50	71	20	26	5
20	20	136	50	71	20	26	5
25	25	161	50	68	25	28	—
25	25	161	50	68	25	28	—
32	25	181	50	68	32	28	—
32	25	181	50	68	32	28	—
32	32	181	50	68	32	35	—
32	32	181	50	68	32	35	—
20	20	125	39	60	20	26	5
20	20	125	39	60	20	26	5
25	25	150	39	57	25	28	—
25	25	150	39	57	25	28	—
32	25	170	39	57	32	28	—
32	25	170	39	57	32	28	—
32	32	170	39	57	32	35	—
32	32	170	39	57	32	35	—
20	20	136	50	71	20	26	5
20	20	136	50	71	20	26	5
25	25	161	50	68	25	28	—
25	25	161	50	68	25	28	—
32	25	181	50	68	32	28	—
32	25	181	50	68	32	28	—
32	32	181	50	68	32	35	—
32	32	181	50	68	32	35	—

Cutting Mode

R



L



Insert selection

Seat Size	Geometry name
J	GY○○0600/0631/0635J○○○○–Breaker shown below

For grooving/cutting off breaker

Seat Size	CW \ Breaker	GU (For gummy steel)	GS (Low)	GM (Medium)	GFGS (Hardened steel)
J	6.00mm	●	●	●	●
	6.35mm	●	●	●	

For multifunctional grooving breaker

Seat Size	CW \ Breaker	MF (Finish)	MS (Low)	MM (Medium)	BM (Copying)
					Ball shape
J	6.00mm				●
	RE 0.2	●			
	RE 0.4	●	●	●	
	RE 0.8	●	●	●	
	6.31mm	●			
	6.35mm				●
	RE 0.2	●			
	RE 0.4	●			
	RE 0.8	●			

● : Standard insert with dimensions

GY

CW(Cutting width) 2.00-2.74

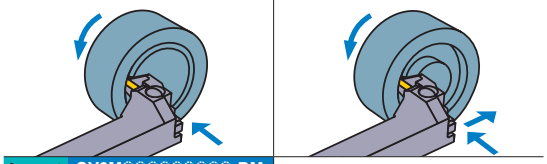
FACE GROOVING

Product Information

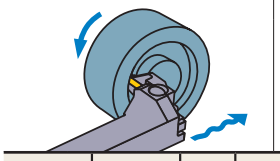
Recommended Cutting Condition >> 548
INSERTS >> 462
Technical Info >> 1971
IDENTIFICATION >> 460
SPARE PARTS >> 1927
ISO13399 Property >> 1966

5 90° type holder

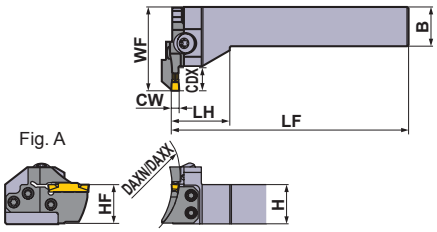
Insert	GY1M/2M○○○○○○○○○○-GM	Insert	GY2G○○○○○○○○○○-MF
Insert	GY2M○○○○○○○○○○-GS/-GU	Insert	GY2M○○○○○○○○○○-MS
Insert	GY1G○○○○○○○○○○-GF/GS	Insert	GY2M○○○○○○○○○○-MM



Insert GY2M○○○○○○○○○○-BM



(Note 1) Please order the modular blade and modular holder separately.
(Note 2) Please set the left hand modular blade at the right hand holder and the right hand modular blade at the left hand holder.



Right hand tool holder shown.

Seat Size	CW	DAXN	DAXX	CDX	Type	Hand (R/L)	Order Number Holder	Stock	Modular Blade	Stock	Fig.
D	2.00 2.24	40	50	12	Modular	R	GYHR2525M90-M25L	●	GYM25LD-D12-040	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-D12-040	●	A
		50	60	12	Modular	R	GYHR2525M90-M25L	●	GYM25LD-D12-050	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-D12-050	●	A
		60	75	12	Modular	R	GYHR2525M90-M25L	●	GYM25LD-D12-060	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-D12-060	●	A
		75	100	12	Modular	R	GYHR2525M90-M25L	●	GYM25LD-D12-075	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-D12-075	●	A
		100	150	12	Modular	R	GYHR2525M90-M25L	●	GYM25LD-D12-100	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-D12-100	●	A
		135	200	12	Modular	R	GYHR2525M90-M25L	●	GYM25LD-D12-135	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-D12-135	●	A
		180	250	12	Modular	R	GYHR2525M90-M25L	●	GYM25LD-D12-180	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-D12-180	●	A
E	2.39 2.50 2.74	40	50	12	Modular	R	GYHR2525M90-M25L	●	GYM25LD-E12-040	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-E12-040	●	A
		50	60	12	Modular	R	GYHR2525M90-M25L	●	GYM25LD-E12-050	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-E12-050	●	A
		60	75	12	Modular	R	GYHR2525M90-M25L	●	GYM25LD-E12-060	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-E12-060	●	A
		75	100	12	Modular	R	GYHR2525M90-M25L	●	GYM25LD-E12-075	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-E12-075	●	A
		100	150	12	Modular	R	GYHR2525M90-M25L	●	GYM25LD-E12-100	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-E12-100	●	A
		135	200	12	Modular	R	GYHR2525M90-M25L	●	GYM25LD-E12-135	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-E12-135	●	A
		180	250	12	Modular	R	GYHR2525M90-M25L	●	GYM25LD-E12-180	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-E12-180	●	A

*1 Dimensions shown are when gauge insert is used. If other insert geometries are used then **LF**, **LH** and **WF** values may vary.

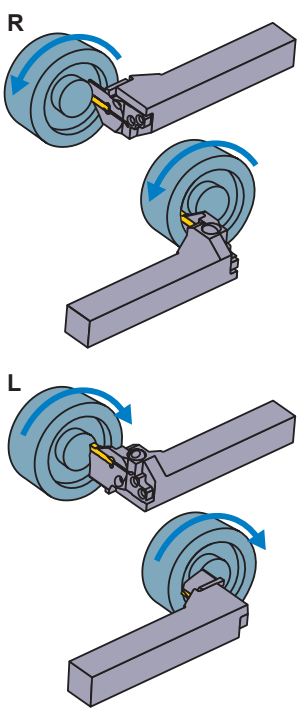
● : **Inventory maintained in Japan.**

* Wrench : ① : Clamp Screw, ② : Blade Screw

SPARE PARTS

Holder	Clamp Screw	Blade Screw (5 pcs.)	Wrench *
GYHR2525M90-M25L	GY06013M (Clamp Torque : 6.0N·m)	TS55 (Clamp Torque : 5.0N·m)	①TKY30R ②TKY25D
GYHL2525M90-M25R			

Dimensions (mm) *1						Cutting Mode
H	B	LF	LH	HF	WF	
25	25	150	38	25	53	R
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	53	L
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	53	



Insert selection

Seat Size	Geometry name
D	GY○○0200/0224D○○○○○−Breaker shown below
E	GY○○0239/0250/0274E○○○○○−Breaker shown below

For grooving/cutting off breaker

Seat Size	CW \ Breaker	GU (For gummy steel)	GS (Low)	GM (Medium)	GFGS (Hardened steel)
D	2.00mm	●	●	●	●
E	2.39mm	●	●	●	●
	2.50mm	●	●	●	●

For multifunctional grooving breaker

Seat Size	CW \ Breaker	MF (Finish)	MS (Low)	MM (Medium)	BM (Copying) Ball shape
D	2.00mm	●	●	●	●
	2.24mm	●			
E	2.39mm	●			
	2.50mm	●	●	●	●
	2.74mm	●			

● : Standard insert with dimensions

GY

CW(Cutting width) 3.00, 3.18, 3.24

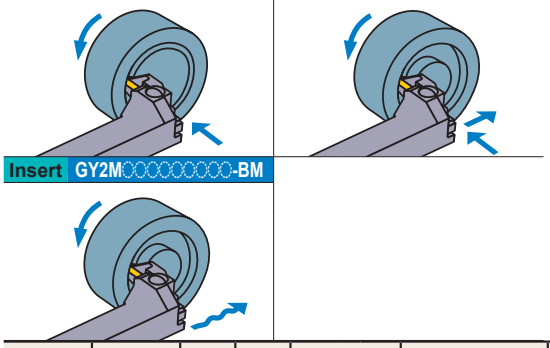
FACE GROOVING

Product Information

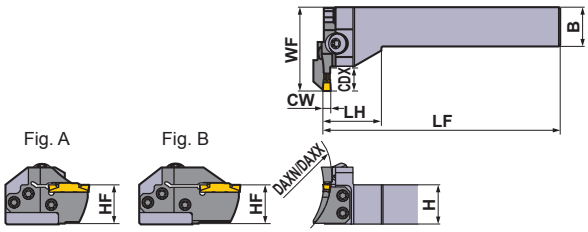
Recommended Cutting Condition >> 548
INSERTS >> 462
Technical Info >> 1971
IDENTIFICATION >> 460
SPARE PARTS >> 1927
ISO13399 Property >> 1966

5 90° type holder

Insert	GY1M/2M○○○○○○○○○○-GM	Insert	GY2G○○○○○○○○○○-MF
Insert	GY2M○○○○○○○○○○-GS/-GU	Insert	GY2M○○○○○○○○○○-MS
Insert	GY1G○○○○○○○○○○-GF/GS	Insert	GY2M○○○○○○○○○○-MM
Insert	GY2M○○○○○○○○○○-BM		



(Note 1) Please order the modular blade and modular holder separately.
(Note 2) Please set the left hand modular blade at the right hand holder and the right hand modular blade at the left hand holder.



Right hand tool holder shown.

Seat Size	CW	DAXN	DAXX	CDX	Type	Hand (R/L)	Order Number: Holder	Stock	Modular Blade	Stock	Fig.
F	3.00 3.18 3.24	35	40	12	Modular	R	GYHR2525M90-M25L	●	GYM25LD-F12-035	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-F12-035	●	A
		40	50	12	Modular	R	GYHR2525M90-M25L	●	GYM25LD-F12-040	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-F12-040	●	A
		50	60	12	Modular	R	GYHR2525M90-M25L	●	GYM25LD-F12-050	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-F12-050	●	A
		60	75	12	Modular	R	GYHR2525M90-M25L	●	GYM25LD-F12-060	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-F12-060	●	A
				20 *2	Modular	R	GYHR2525M90-M25L	●	GYM25LD-F20-060	●	B
						L	GYHL2525M90-M25R	●	GYM25RD-F20-060	●	B
		75	100	12	Modular	R	GYHR2525M90-M25L	●	GYM25LD-F12-075	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-F12-075	●	A
				20 *2	Modular	R	GYHR2525M90-M25L	●	GYM25LD-F20-075	●	B
						L	GYHL2525M90-M25R	●	GYM25RD-F20-075	●	B
		100	150	12	Modular	R	GYHR2525M90-M25L	●	GYM25LD-F12-100	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-F12-100	●	A
				20 *2	Modular	R	GYHR2525M90-M25L	●	GYM25LD-F20-100	●	B
						L	GYHL2525M90-M25R	●	GYM25RD-F20-100	●	B
		135	200	12	Modular	R	GYHR2525M90-M25L	●	GYM25LD-F12-135	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-F12-135	●	A
				20 *2	Modular	R	GYHR2525M90-M25L	●	GYM25LD-F20-135	●	B
						L	GYHL2525M90-M25R	●	GYM25RD-F20-135	●	B
		180	250	12	Modular	R	GYHR2525M90-M25L	●	GYM25LD-F12-180	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-F12-180	●	A
				20 *2	Modular	R	GYHR2525M90-M25L	●	GYM25LD-F20-180	●	B
						L	GYHL2525M90-M25R	●	GYM25RD-F20-180	●	B
		225	999	12	Modular	R	GYHR2525M90-M25L	●	GYM25LD-F12-225	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-F12-225	●	A
				20 *2	Modular	R	GYHR2525M90-M25L	●	GYM25LD-F20-225	●	B
						L	GYHL2525M90-M25R	●	GYM25RD-F20-225	●	B

*1 Dimensions shown are when gauge insert is used. If other insert geometries are used then **LF**, **LH** and **WF** values may vary.
*2 The maximum groove depth varies according to the insert used.

● : **Inventory maintained in Japan.**

* Wrench : ① : Clamp Screw, ② : Blade Screw

SPARE PARTS

Holder	Clamp Screw	Blade Screw (5 pcs.)	Wrench *
GYHR2525M90-M25L	GY06013M (Clamp Torque : 6.0N·m)	TS55 (Clamp Torque : 5.0N·m)	①TKY30R ②TKY25D
GYHL2525M90-M25R			

Dimensions (mm) *1						Cutting Mode
H	B	LF	LH	HF	WF	
25	25	150	38	25	53	R
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	59	
25	25	150	38	25	59	
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	59	
25	25	150	38	25	59	
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	59	
25	25	150	38	25	59	
25	25	150	38	25	53	L
25	25	150	38	25	53	
25	25	150	38	25	59	
25	25	150	38	25	59	
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	59	
25	25	150	38	25	59	
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	59	
25	25	150	38	25	59	
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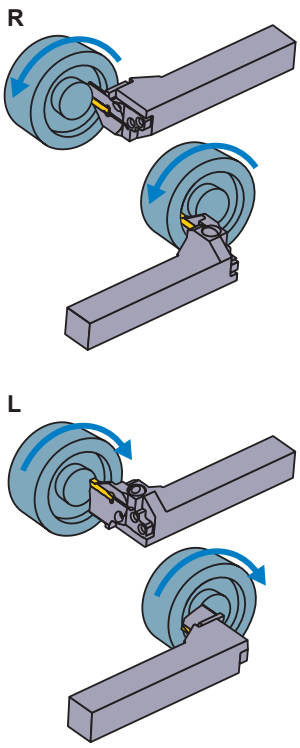
25	25	150	38	25	59	
25	25	150	38	25	59	



Insert selection

Seat Size	Geometry name
F	GY○○0300/0318/0324F○○○○−Breaker shown below

For grooving/cutting off breaker

Seat Size	Breaker / CW	GU (For gummy steel)	GS (Low)	GM (Medium)	GFGS (Hardened steel)
F	3.00mm	●	●	●	●
	3.18mm	●	●	●	●

For multifunctional grooving breaker

Seat Size	Breaker / CW	MF (Finish)	MS (Low)	MM (Medium)	BM (Copying) Ball shape
F	3.00mm				●
	RE 0.2	●	●	●	
	RE 0.4	●	●	●	
	RE 0.8			●	
	3.18mm				●
	RE 0.2	●			
	RE 0.4	●			
	3.24mm	●			

● : Standard insert with dimensions

GY

CW(Cutting width) 4.00, 4.24

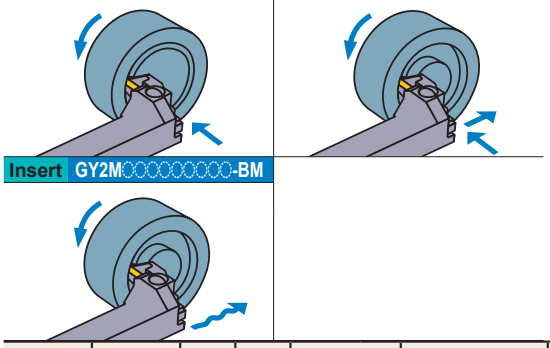
FACE GROOVING

Product Information

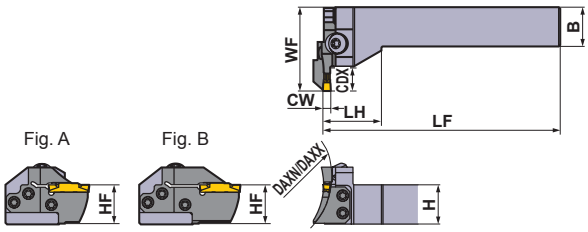
Recommended Cutting Condition >> 548
INSERTS >> 462
Technical Info >> 1971
IDENTIFICATION >> 460
SPARE PARTS >> 1927
ISO13399 Property >> 1966

5 90° type holder

Insert	GY1M/2M○○○○○○○○○○-GM	Insert	GY2G○○○○○○○○○○-MF
Insert	GY2M○○○○○○○○○○-GS/-GU	Insert	GY2M○○○○○○○○○○-MS
Insert	GY1G○○○○○○○○○○-GF/GS	Insert	GY2M○○○○○○○○○○-MM
Insert	GY2M○○○○○○○○○○-BM		



(Note 1) Please order the modular blade and modular holder separately.
(Note 2) Please set the left hand modular blade at the right hand holder and the right hand modular blade at the left hand holder.



Right hand tool holder shown.

Seat Size	CW	DAXN	DAXX	CDX	Type	Hand (R/L)	Order Number Holder	Stock	Modular Blade	Stock	Fig.
G	4.00 4.24	40	50	14	Modular	R	GYHR2525M90-M25L	●	GYM25LD-G14-040	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-G14-040	●	A
		50	60	14	Modular	R	GYHR2525M90-M25L	●	GYM25LD-G14-050	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-G14-050	●	A
		60	85	14	Modular	R	GYHR2525M90-M25L	●	GYM25LD-G14-060	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-G14-060	●	A
				25 ∗2	Modular	R	GYHR2525M90-M25L	●	GYM25LD-G25-060	●	B
						L	GYHL2525M90-M25R	●	GYM25RD-G25-060	●	B
		85	125	14	Modular	R	GYHR2525M90-M25L	●	GYM25LD-G14-085	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-G14-085	●	A
				25 ∗2	Modular	R	GYHR2525M90-M25L	●	GYM25LD-G25-085	●	B
						L	GYHL2525M90-M25R	●	GYM25RD-G25-085	●	B
		125	200	14	Modular	R	GYHR2525M90-M25L	●	GYM25LD-G14-125	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-G14-125	●	A
				25 ∗2	Modular	R	GYHR2525M90-M25L	●	GYM25LD-G25-125	●	B
						L	GYHL2525M90-M25R	●	GYM25RD-G25-125	●	B
		180	280	14	Modular	R	GYHR2525M90-M25L	●	GYM25LD-G14-180	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-G14-180	●	A
				25 ∗2	Modular	R	GYHR2525M90-M25L	●	GYM25LD-G25-180	●	B
						L	GYHL2525M90-M25R	●	GYM25RD-G25-180	●	B
		250	999	14	Modular	R	GYHR2525M90-M25L	●	GYM25LD-G14-250	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-G14-250	●	A
				25 ∗2	Modular	R	GYHR2525M90-M25L	●	GYM25LD-G25-250	●	B
						L	GYHL2525M90-M25R	●	GYM25RD-G25-250	●	B

∗1 Dimensions shown are when gauge insert is used. If other insert geometries are used then **LF**, **LH** and **WF** values may vary.
∗2 The maximum groove depth varies according to the insert used.

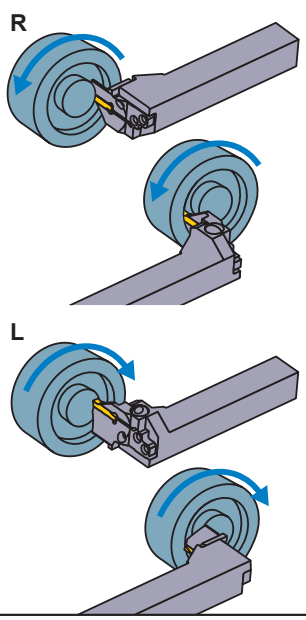
● : **Inventory maintained in Japan.**

* Wrench : ① : Clamp Screw, ② : Blade Screw

SPARE PARTS

Holder	Clamp Screw	Blade Screw (5 pcs.)	Wrench *
GYHR2525M90-M25L	GY06013M (Clamp Torque : 6.0N·m)	TS55 (Clamp Torque : 5.0N·m)	①TKY30R ②TKY25D
GYHL2525M90-M25R			

Dimensions (mm) *1						Cutting Mode
H	B	LF	LH	HF	WF	
25	25	150	38	25	53	R
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	64	
25	25	150	38	25	64	
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	64	
25	25	150	38	25	64	
25	25	150	38	25	53	L
25	25	150	38	25	53	
25	25	150	38	25	64	
25	25	150	38	25	64	
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	64	
25	25	150	38	25	64	
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	64	
25	25	150	38	25	64	



Insert selection

Seat Size	Geometry name
G	GY○○0400/0424G○○○○○−Breaker shown below

For grooving/cutting off breaker

Seat Size	Breaker / CW	GU (For gummy steel)	GS (Low)	GM (Medium)	GFGS (Hardened steel)
G	4.00mm	●	●	●	●

For multifunctional grooving breaker

Seat Size	Breaker / CW	MF (Finish)	MS (Low)	MM (Medium)	BM (Copying)
					Ball shape
G	4.00mm				●
	RE 0.2	●	●	●	
	RE 0.4	●	●	●	
	RE 0.8	●		●	
	4.24mm	●			

● : Standard insert with dimensions

GY

CW(Cutting width) 4.75, 5.00, 5.24

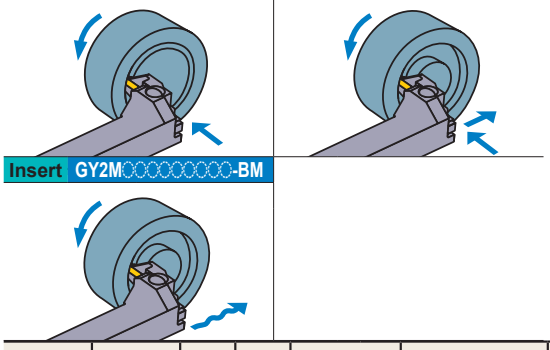
FACE GROOVING

Product Information

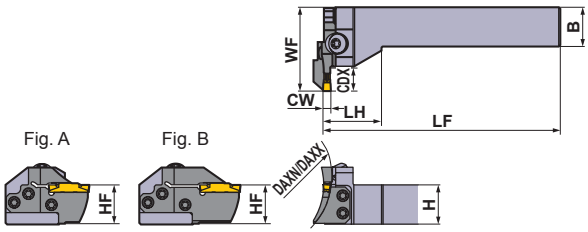
Recommended Cutting Condition >> 548
INSERTS >> 462
Technical Info >> 1971
IDENTIFICATION >> 460
SPARE PARTS >> 1927
ISO13399 Property >> 1966

5 90° type holder

Insert	GY1M/2M○○○○○○○○○○-GM	Insert	GY2G○○○○○○○○○○-MF
Insert	GY2M○○○○○○○○○○-GS/-GU	Insert	GY2M○○○○○○○○○○-MS
Insert	GY1G○○○○○○○○○○-GF/GS	Insert	GY2M○○○○○○○○○○-MM
Insert	GY2M○○○○○○○○○○-BM		



(Note 1) Please order the modular blade and modular holder separately.
(Note 2) Please set the left hand modular blade at the right hand holder and the right hand modular blade at the left hand holder.



Right hand tool holder shown.

Seat Size	CW	DAXN	DAXX	CDX	Type	Hand (R/L)	Order Number: Holder	Stock	Modular Blade	Stock	Fig.
H	4.75 5.00 5.24	50	60	14	Modular	R	GYHR2525M90-M25L	●	GYM25LD-H14-050	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-H14-050	●	A
		60	85	14	Modular	R	GYHR2525M90-M25L	●	GYM25LD-H14-060	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-H14-060	●	A
				25 ∗2	Modular	R	GYHR2525M90-M25L	●	GYM25LD-H25-060	●	B
						L	GYHL2525M90-M25R	●	GYM25RD-H25-060	●	B
		85	125	14	Modular	R	GYHR2525M90-M25L	●	GYM25LD-H14-085	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-H14-085	●	A
				25 ∗2	Modular	R	GYHR2525M90-M25L	●	GYM25LD-H25-085	●	B
						L	GYHL2525M90-M25R	●	GYM25RD-H25-085	●	B
		125	200	14	Modular	R	GYHR2525M90-M25L	●	GYM25LD-H14-125	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-H14-125	●	A
				25 ∗2	Modular	R	GYHR2525M90-M25L	●	GYM25LD-H25-125	●	B
						L	GYHL2525M90-M25R	●	GYM25RD-H25-125	●	B
		180	280	14	Modular	R	GYHR2525M90-M25L	●	GYM25LD-H14-180	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-H14-180	●	A
				25 ∗2	Modular	R	GYHR2525M90-M25L	●	GYM25LD-H25-180	●	B
						L	GYHL2525M90-M25R	●	GYM25RD-H25-180	●	B
		250	999	14	Modular	R	GYHR2525M90-M25L	●	GYM25LD-H14-250	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-H14-250	●	A
				25 ∗2	Modular	R	GYHR2525M90-M25L	●	GYM25LD-H25-250	●	B
						L	GYHL2525M90-M25R	●	GYM25RD-H25-250	●	B

∗1 Dimensions shown are when gauge insert is used. If other insert geometries are used then **LF**, **LH** and **WF** values may vary.
∗2 The maximum groove depth varies according to the insert used.

● : **Inventory maintained in Japan.**

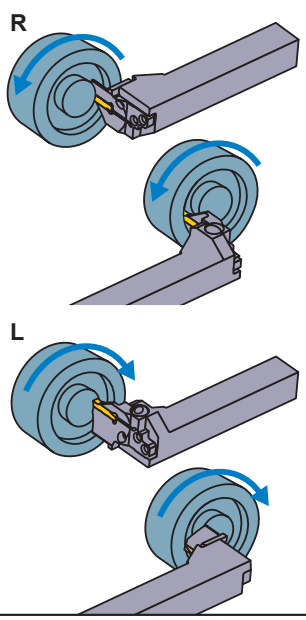
* Wrench : ① : Clamp Screw, ② : Blade Screw

SPARE PARTS

Holder	Clamp Screw	Blade Screw (5 pcs.)	Wrench *
GYHR2525M90-M25L	GY06013M (Clamp Torque : 6.0N·m)	TS55 (Clamp Torque : 5.0N·m)	①TKY30R ②TKY25D
GYHL2525M90-M25R			

Dimensions (mm) *1					
H	B	LF	LH	HF	WF
25	25	150	38	25	53
25	25	150	38	25	53
25	25	150	38	25	53
25	25	150	38	25	53
25	25	150	38	25	64
25	25	150	38	25	64
25	25	150	38	25	53
25	25	150	38	25	53
25	25	150	38	25	64
25	25	150	38	25	64
25	25	150	38	25	53
25	25	150	38	25	53
25	25	150	38	25	64
25	25	150	38	25	64
25	25	150	38	25	53
25	25	150	38	25	53
25	25	150	38	25	64
25	25	150	38	25	64
25	25	150	38	25	53
25	25	150	38	25	53
25	25	150	38	25	64
25	25	150	38	25	64

Cutting Mode



Insert selection

Seat Size	Geometry name
H	GY○○0475/0500/0524H○○○○–Breaker shown below

For grooving/cutting off breaker

Seat Size	Breaker / CW	GU (For gummy steel)	GS (Low)	GM (Medium)	GFGS (Hardened steel)
H	4.75mm	●	●	●	●
	5.00mm	●	●	●	●

For multifunctional grooving breaker

Seat Size	Breaker / CW	MF (Finish)	MS (Low)	MM (Medium)	BM (Copying) Ball shape
H	4.75mm				●
	RE 0.2	●			
	RE 0.4	●			
	RE 0.8	●			
	5.00mm				●
	RE 0.2	●			
	RE 0.4	●	●	●	
	RE 0.8	●	●	●	
	5.24mm	●			

● : Standard insert with dimensions

GY

CW(Cutting width) 6.00, 6.31, 6.35

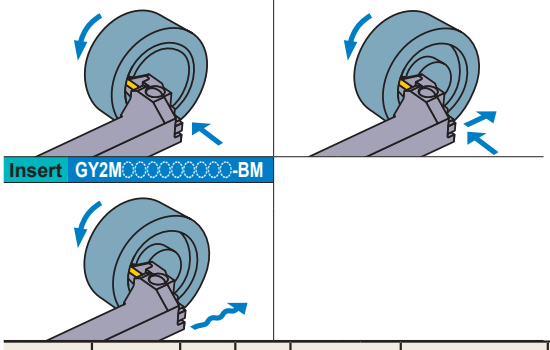
FACE GROOVING

Product Information

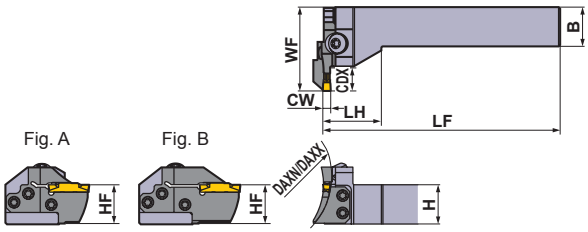
Recommended Cutting Condition >> 548
INSERTS >> 462
Technical Info >> 1971
IDENTIFICATION >> 460
SPARE PARTS >> 1927
ISO13399 Property >> 1966

5 90° type holder

Insert	GY2M○○○○○○○○○○-GS/GM	Insert	GY2G○○○○○○○○○○-MF
Insert	GY2M○○○○○○○○○○-GU	Insert	GY2M○○○○○○○○○○-MS
Insert	GY1G○○○○○○○○○○-GF/GS	Insert	GY2M○○○○○○○○○○-MM
Insert	GY2M○○○○○○○○○○-BM		



(Note 1) Please order the modular blade and modular holder separately.
(Note 2) Please set the left hand modular blade at the right hand holder and the right hand modular blade at the left hand holder.



Right hand tool holder shown.

Seat Size	CW	DAXN	DAXX	CDX	Type	Hand (R/L)	Order Number Holder	Stock	Modular Blade	Stock	Fig.
J	6.00 6.31 6.35	50	70	14	Modular	R	GYHR2525M90-M25L	●	GYM25LD-J14-050	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-J14-050	●	A
		70	110	14	Modular	R	GYHR2525M90-M25L	●	GYM25LD-J14-070	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-J14-070	●	A
				25 ∗2	Modular	R	GYHR2525M90-M25L	●	GYM25LD-J25-070	●	B
						L	GYHL2525M90-M25R	●	GYM25RD-J25-070	●	B
		110	200	14	Modular	R	GYHR2525M90-M25L	●	GYM25LD-J14-110	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-J14-110	●	A
				25 ∗2	Modular	R	GYHR2525M90-M25L	●	GYM25LD-J25-110	●	B
						L	GYHL2525M90-M25R	●	GYM25RD-J25-110	●	B
		170	280	14	Modular	R	GYHR2525M90-M25L	●	GYM25LD-J14-170	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-J14-170	●	A
				25 ∗2	Modular	R	GYHR2525M90-M25L	●	GYM25LD-J25-170	●	B
						L	GYHL2525M90-M25R	●	GYM25RD-J25-170	●	B
		250	999	14	Modular	R	GYHR2525M90-M25L	●	GYM25LD-J14-250	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-J14-250	●	A
				25 ∗2	Modular	R	GYHR2525M90-M25L	●	GYM25LD-J25-250	●	B
						L	GYHL2525M90-M25R	●	GYM25RD-J25-250	●	B

∗1 Dimensions shown are when gauge insert is used. If other insert geometries are used then **LF**, **LH** and **WF** values may vary.
∗2 The maximum groove depth varies according to the insert used.

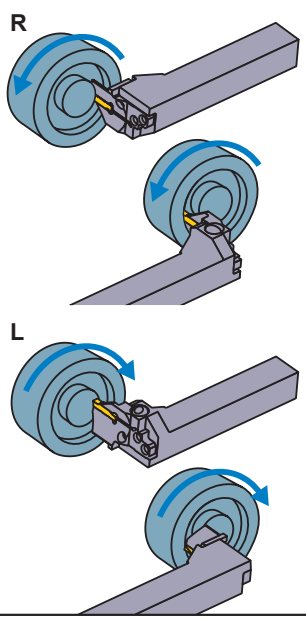
● : **Inventory maintained in Japan.**

* Wrench : ① : Clamp Screw, ② : Blade Screw

SPARE PARTS

Holder	Clamp Screw	Blade Screw (5 pcs.)	Wrench *
GYHR2525M90-M25L	GY06013M (Clamp Torque : 6.0N·m)	TS55 (Clamp Torque : 5.0N·m)	①TKY30R ②TKY25D
GYHL2525M90-M25R			

Dimensions (mm) *1						Cutting Mode
H	B	LF	LH	HF	WF	
25	25	150	38	25	53	R
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	64	
25	25	150	38	25	64	
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	64	
25	25	150	38	25	64	
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	64	
25	25	150	38	25	64	L
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	64	
25	25	150	38	25	64	



Insert selection

Seat Size	Geometry name
J	GY○○0600/0631/0635J○○○○–Breaker shown below

For grooving/cutting off breaker

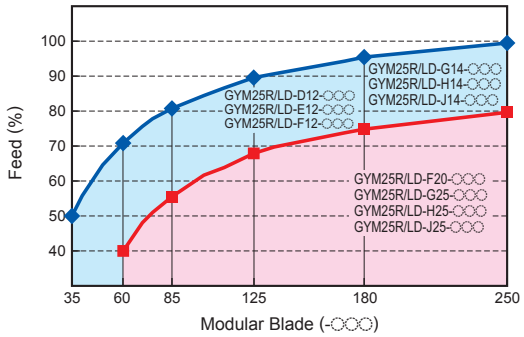
Seat Size	Breaker / CW	GU (For gummy steel)	GS (Low)	GM (Medium)	GFGS (Hardened steel)
J	6.00mm	●	●	●	●
	6.35mm	●	●	●	

For multifunctional grooving breaker

Seat Size	Breaker / CW	MF (Finish)	MS (Low)	MM (Medium)	BM (Copying)
					Ball shape
J	6.00mm				●
	RE 0.2	●			
	RE 0.4	●	●	●	
	RE 0.8	●	●	●	
	6.31mm	●			
	6.35mm				●
	RE 0.2	●			
	RE 0.4	●			
	RE 0.8	●			

● : Standard insert with dimensions

RELATIONSHIP BETWEEN THE MODULAR BLADE AND FEED PER ROTATION [For Face Grooving]



(Note) Adjust the feed per rotation in the cutting conditions to the percentage shown in the table above.

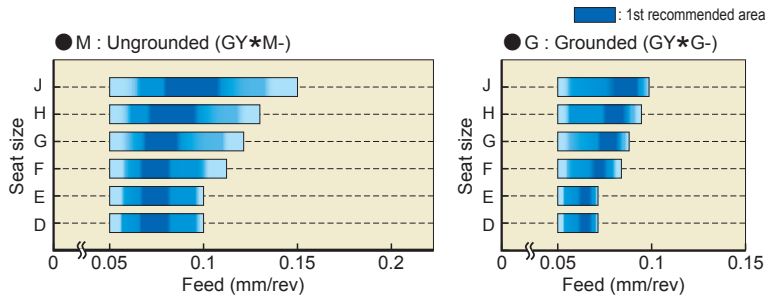
RECOMMENDED CUTTING SPEED (m/min) [For Face Grooving]

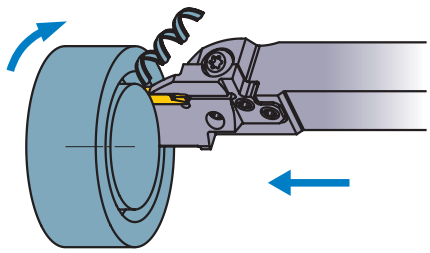
	Work Material	Hardness	Grade	Cutting Speed (m/min)
P	Mild Steel	≤160HB	VP20RT	80–180
			VP10RT	90–190
			NX2525	70–170
	Carbon Steel Alloy Steel	160–280HB	VP20RT	60–140
			VP10RT	70–150
			MY5015	90–210
			NX2525	55–135
		280HB≤	VP20RT	50–110
			VP10RT	60–120
			MY5015	80–160
			NX2525	45–105
M	Stainless Steel	≤270HB	VP20RT	50–110
			VP10RT	60–120
K	Gray Cast Iron	Tensile Strength ≤300MPa	VP20RT	60–140
			VP10RT	70–150
			MY5015	90–210
	Ductile Cast Iron	Tensile Strength ≤800MPa	VP20RT	50–110
			VP10RT	60–120
			MY5015	80–160
S	Heat Resistant Alloy Titanium Alloy	–	VP20RT	30–60
			VP10RT	40–70
			RT9010	40–70
H	Hardened steel	50HRC≤	BC8110	60–100
			MB8025	60–100

(Note 1) VP20RT is the first recommended grade for materials other than hardened steel.
(Note 2) For VP10RT, VP20RT and MY5015, wet cutting is recommended.

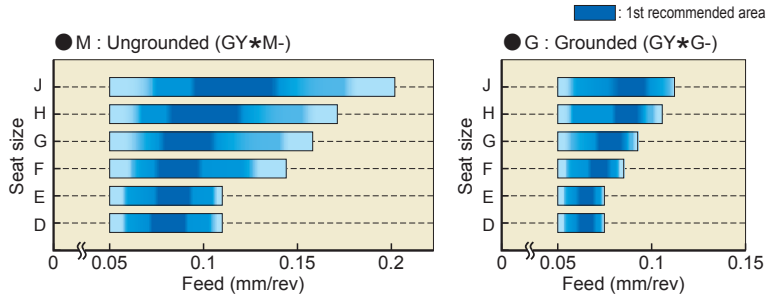
RECOMMENDED CUTTING CONDITIONS [For Face Grooving]

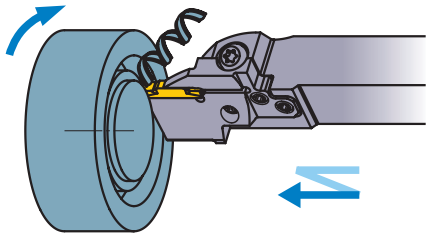
GROOVING





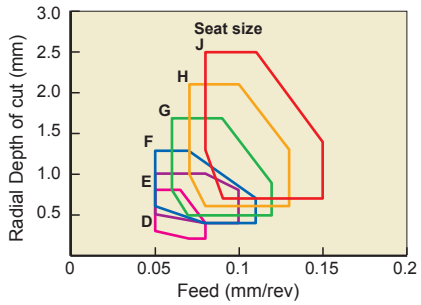
PLUNGING





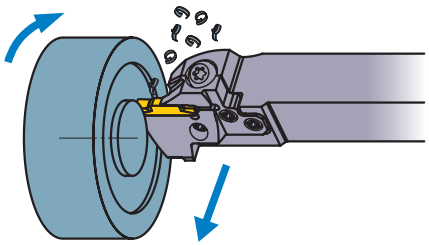
* After the 1st plunge, the width of cut should be set narrower than insert with CW.

TRAVERSE MACHINING (MF BREAKER)

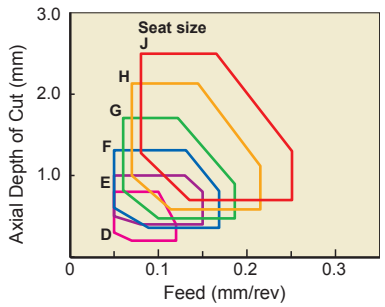


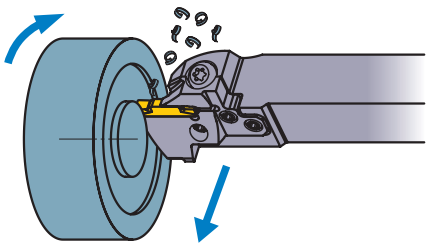
Seat Size	Insert Width (mm)
D	2.00 2.24
E	2.39 2.50 2.74
F	3.00 3.18 3.24

Seat Size	Insert Width (mm)
G	4.00 4.24
H	4.75 5.00 5.24
J	6.00 6.31 6.35

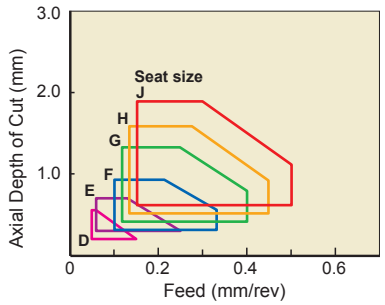


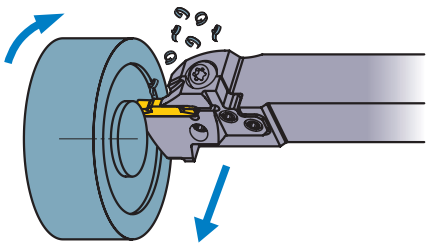
TRAVERSE MACHINING (MM/MS BREAKER)





TRAVERSE MACHINING (BM BREAKER)

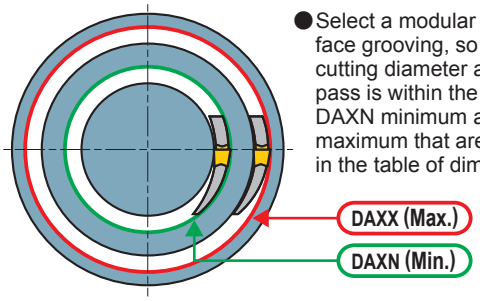




TOOL SELECTION

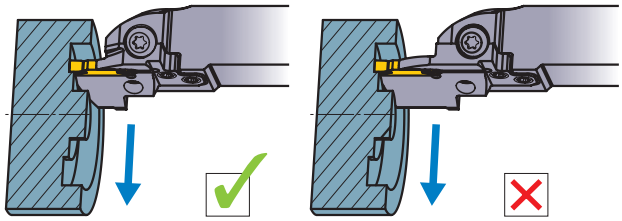
Notes when selecting the tool body

Modular blade (1)



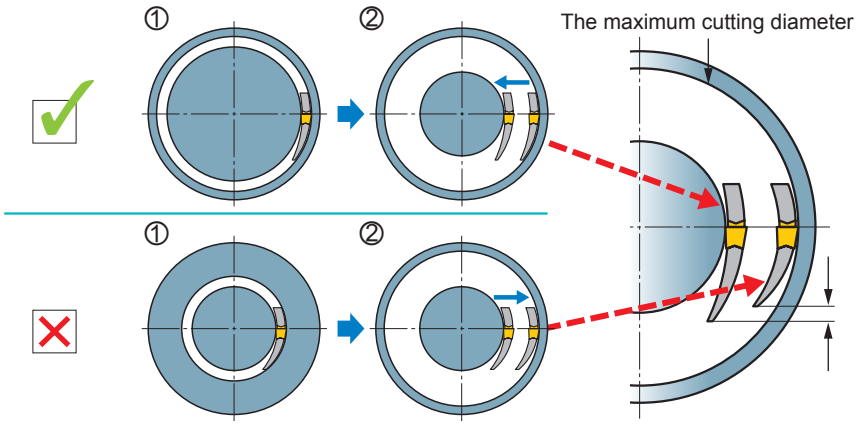
- Select a modular blade for face grooving, so that the cutting diameter at the first pass is within the range of DAXN minimum and DAXX maximum that are described in the table of dimensions.

Modular blade (2)



- Select the shortest possible blade suitable for the application.

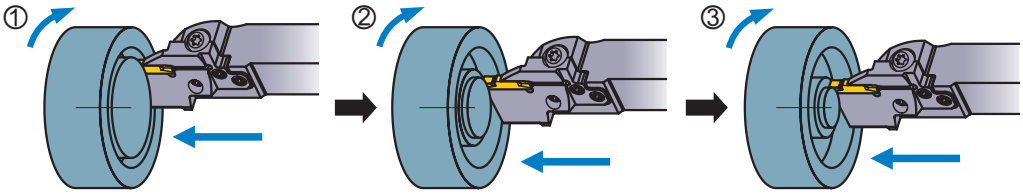
Modular blade (3)



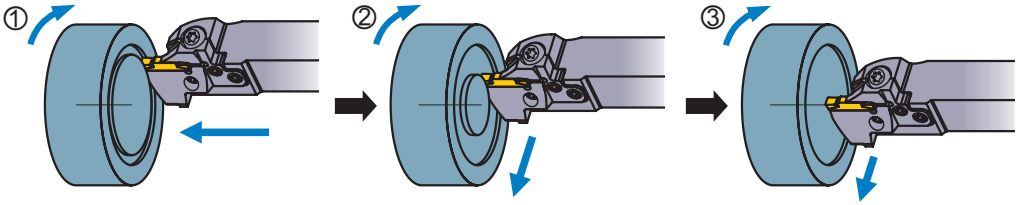
- Select the largest size blade within the maximum cutting diameter of the workpiece.
- Machine from the outer diameter towards the centre.
- Increased machining stability and rigidity is possible if a modular blade with the largest possible back metal is used.

- At first machine the maximum cutting diameter, there is no restriction in the cutting diameter on the remaining process.

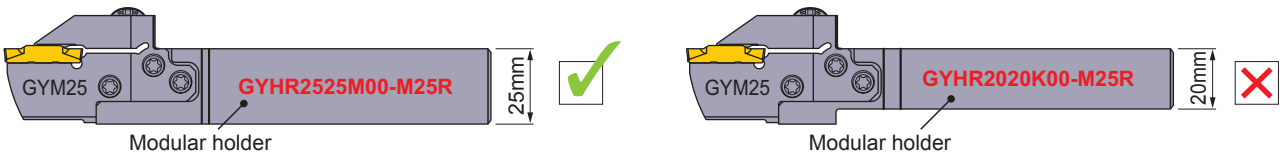
- When plunging in several passes.



- When combining plunging and infeed machining.



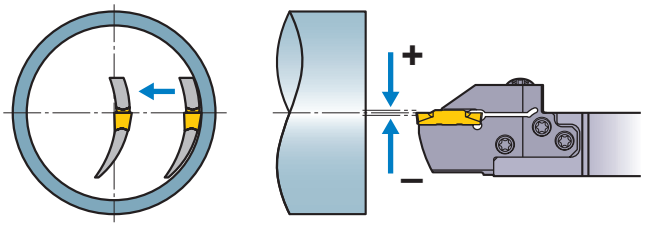
Precautions when selecting a modular holder.



- Select a modular holder with the largest possible shank size to maintain mounting rigidity.

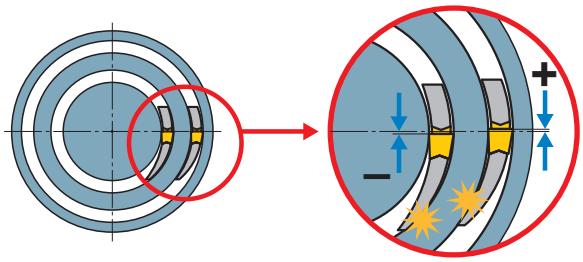
Notes when setting the tool

Setting the cutting edge height



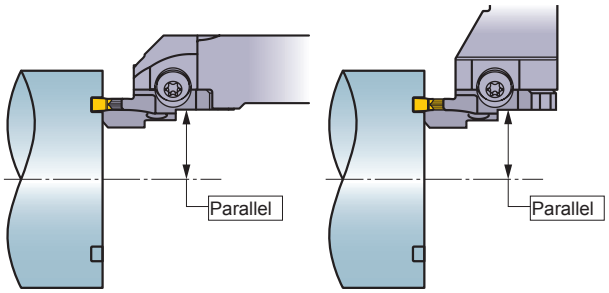
●Set the cutting edge height to ±0.1mm parallel to the central axis.
●Cutting edge centre height check should be done by traverse machining towards the centre with a very small depth of cut and ensure that an even surface and no material remains at the centre point afterwards.

When intertering the wall of groove and the Modular blade



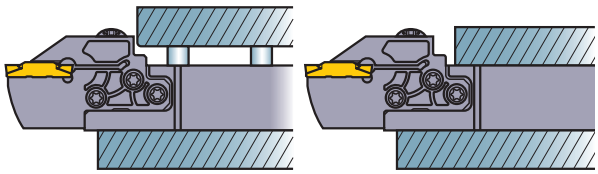
●If interference occurs even when the correct blade is used, the cutting edge height could be incorrect.
When interference occurs on the inner side of the blade, the cutting edge height is set too high.
When interference occurs on the outer side of the blade, the cutting edge height is set too low.

Setting the tool



●Set the insert parallel to the central axis.

Tool overhang



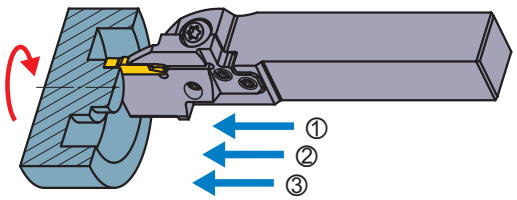
●When setting the tool, ensure that the overhang is as short as possible and avoid the step difference part as above figure shows.

MACHINING RECOMMENDATIONS

Notes when face grooving

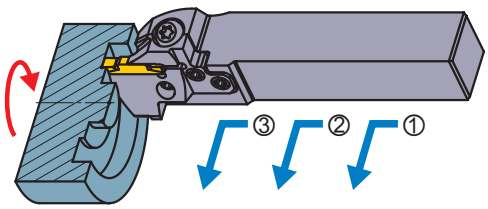
●**Always machine from the outer diameter towards the centre.**

Machining narrow grooves



●Plunging in several passes is recommended.

Machining wide grooves

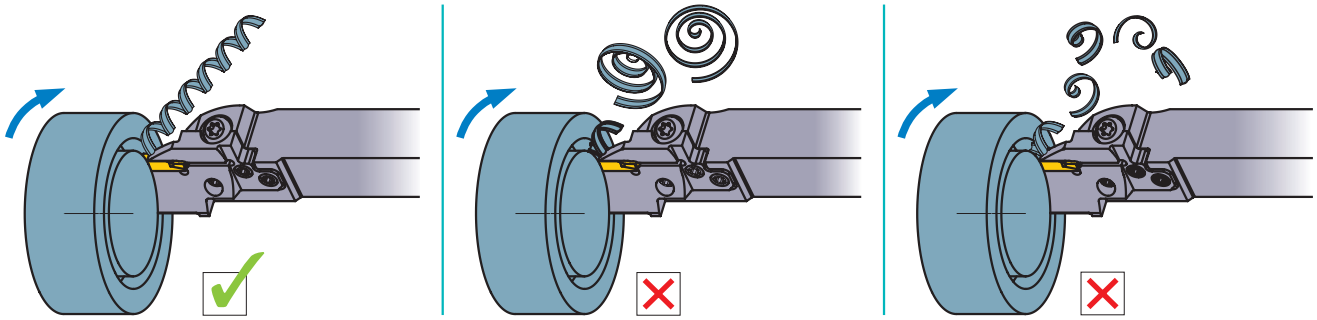


●Cross feed machining is recommended.

MACHINING RECOMMENDATIONS

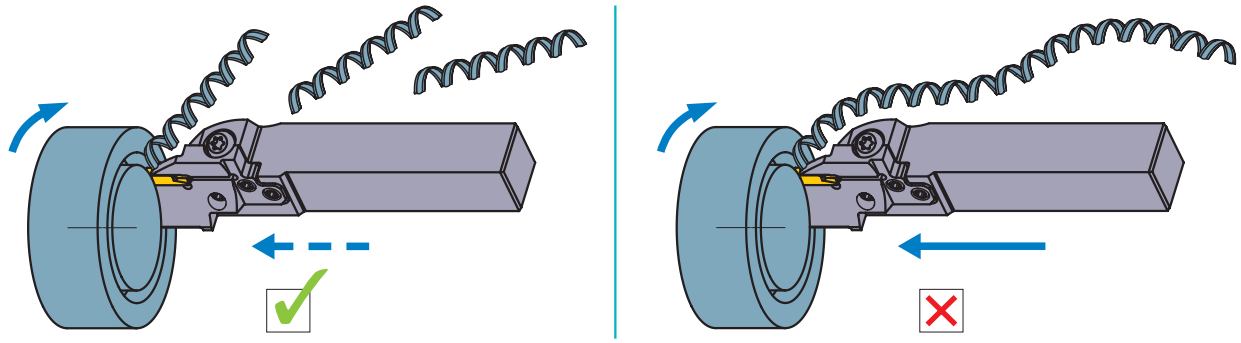
Notes when face grooving (2)

Notes on the first pass (1)



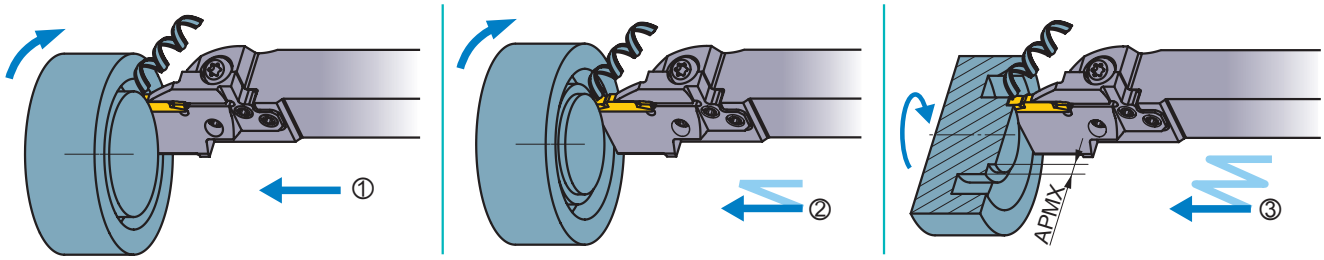
●During the first face grooving pass it is difficult to disperse broken chips and can lead to problems such as a chipped insert. Maintain longer chips that disperse easily by decreasing the feed per rotation.

Notes on the first pass (2)



●When chips become too long, use peck feed to break them into a suitable length.

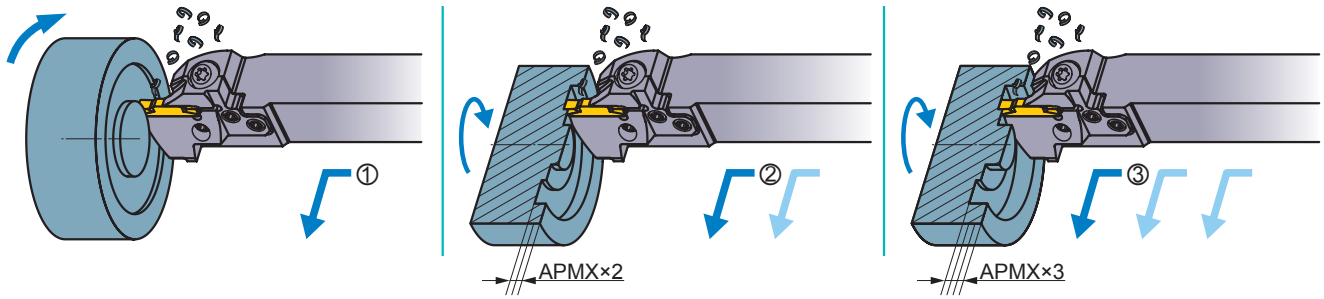
Notes when wide face grooving by plunging in several passes



●When machining a face groove in several passes, machine from the outer diameter towards the centre so that space for discharging chips is created to prevent insert damage caused by chip jamming.

●Plunging width of cut is recommended to be set at 60 - 80% of the insert width. This enhances the effect of the chipbreaker by enlarging the width of the groove to improve chip dispersal.

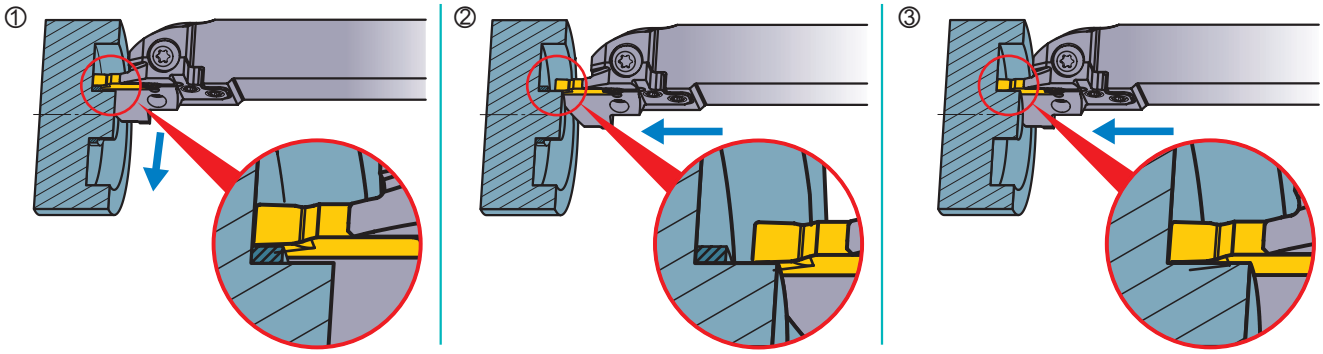
Notes when wide face grooving by combination of plunging and traverse machining (1)



●When face groove machining by using plunge feed and traverse machining, always machine from the outer diameter towards the centre to disperse chips outward to avoid chip jamming problems.

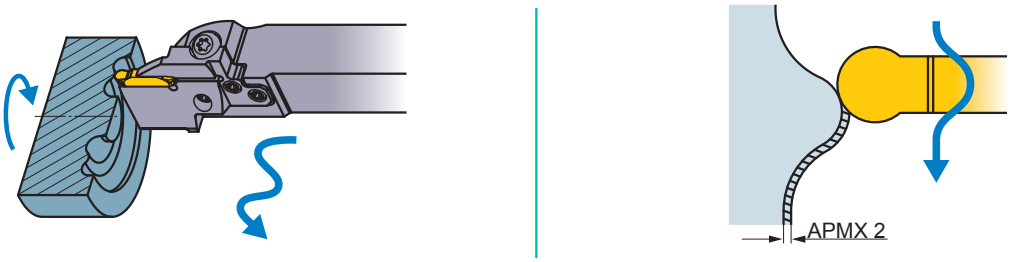
●Set the depth of cut within 40% of the insert width.

Notes when wide face grooving by combination of plunging and traverse machining (2)



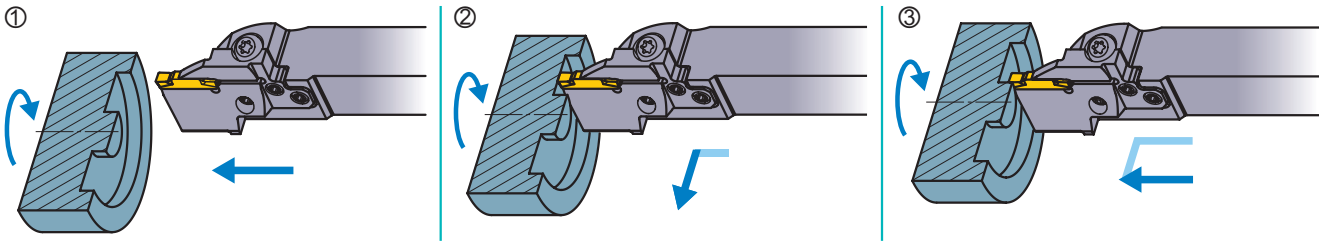
●When infeed machining at the bottom of a deep groove, chips may interfere on the cutting edge near the centre wall.
In such cases, stop infeed machining just before the centre wall (at a point less than the insert width) then remove the remaining material by plunging.

Notes when copying (BM Breaker)



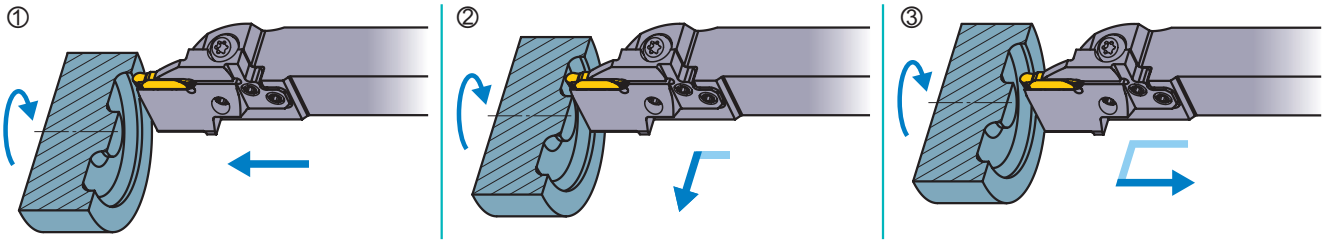
●With the BM breaker insert, 3 dimensional copying is possible. Set the depth of cut (APMX 2) to 30% less than the insert width.

Finishing (1)

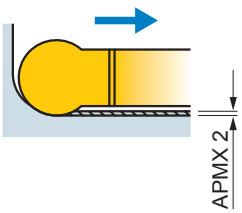


●When finish cutting, machine continuously from the outer wall to the bottom of the groove, then finally plunge cut the centre wall.

Finishing (2) (BM Breaker)



●Carry out finishing in one process.
For the depth of cut (APMX 2) when back turning, refer to the table on the right.

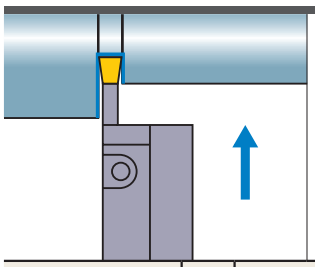


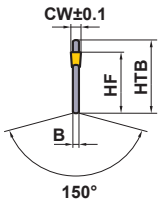
Insert	APMX 2 (mm)
GY2M0200D100N-BM	0.10
GY2M0250E125N-BM	
GY2M0300F150N-BM	
GY2M0318F159N-BM	
GY2M0400G200N-BM	0.15
GY2M0475H238N-BM	0.20
GY2M0500H250N-BM	
GY2M0600J300N-BM	0.25
GY2M0635J318N-BM	

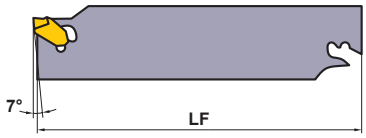
UGH

Product Information

Spare Parts >> 1927
ISO13399 Property >> 1966
Technical Info >> 1971



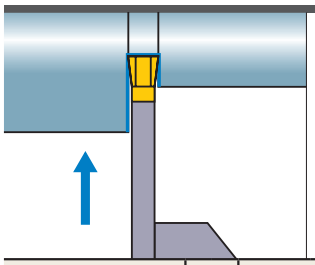


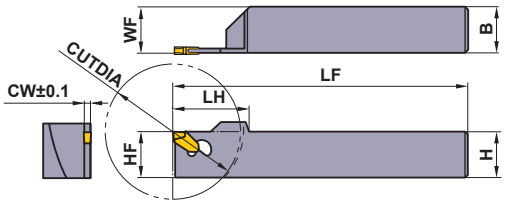


Order Number	Stock	Insert Number		Dimensions(mm)							Wrench	Tool Block
				CW	CUTDIA*1	CDX *2	B	HF	HTB	LF		
UGHN262	●	KGT	2	2.2	50	20	1.60	21.4	26	110	UGS1	KGBN26-20 KGBN26-25
UGHN263	●		3	3.1	75	32.5	2.35	21.4	26	110	UGS1	
UGHN264	●		4	4.1	80	35	3.20	21.4	26	110	UGS1	
UGHN265	●		5	5.1	80	35	4.00	21.4	26	110	UGS1	
UGHN322	●		2	2.2	50	20	1.60	25.0	32	150	UGS1	KGBN32-20 KGBN32-25
UGHN323	●		3	3.1	100	45	2.35	25.0	32	150	UGS1	
UGHN324	●		4	4.1	100	45	3.20	25.0	32	150	UGS1	
UGHN325	●		5	5.1	120	55	4.00	25.0	32	150	UGS1	

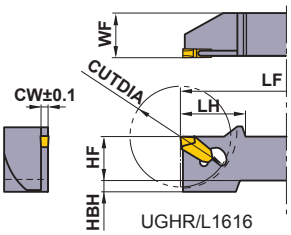
*1 CUTDIA : Max. Cut off Diameter
*2 CDX : Max. Groove Depth

● : **Inventory maintained in Japan.**





Right hand tool holder shown.



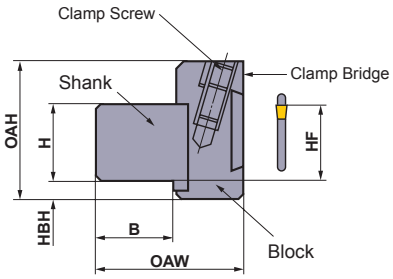
UGHR/L1616

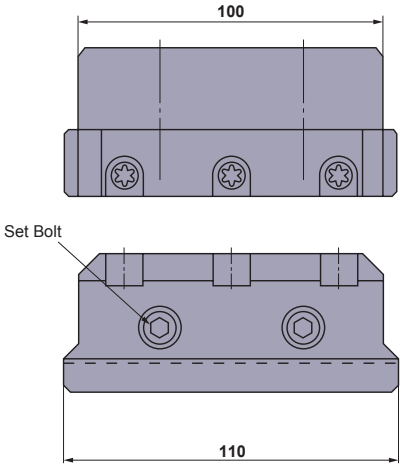
Order Number	Stock		Insert Number		Dimensions(mm)										Wrench
	R	L			CW	CUTDIA	CDX *	B	HF	LF	LH	H	WF	HBH	
UGHR/L1616H2	●	●	KGT	2	2.2	32	—	16	16	100	24	16	16.3	4	UGS1
UGHR/L1616H3	●	●		3	3.1	36	—	16	16	100	24	16	16.4	4	UGS1
UGHR/L2020K2A	●	●		2	2.2	32	—	20	20	125	24	20	20.3	—	UGS1
UGHR/L2020K2	●	●		2	2.2	42	8	20	20	125	25	20	20.3	—	UGS1
UGHR/L2020K3A	●	●		3	3.1	36	—	20	20	125	24	20	20.4	—	UGS1
UGHR/L2020K3	●	●		3	3.1	58	21	20	20	125	32	20	20.4	—	UGS1
UGHR/L2525M3	●	●		3	3.1	76	29	25	25	150	42	25	25.4	—	UGS1
UGHR/L2525M4	●	●		4	4.1	76	29	25	25	150	42	25	25.5	—	UGS1

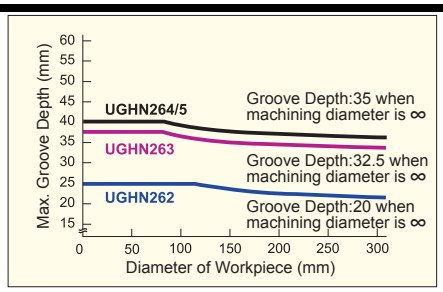
* CDX : Max. Groove Depth

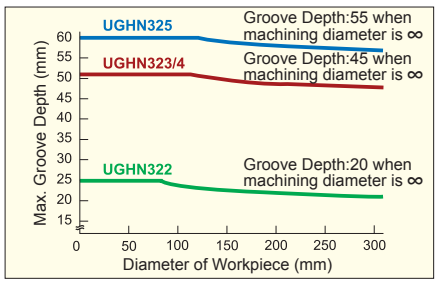
● : **Inventory maintained in Japan.**

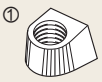
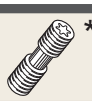
TOOL BLOCK





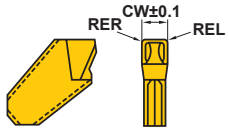
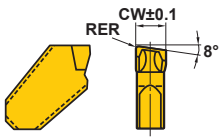




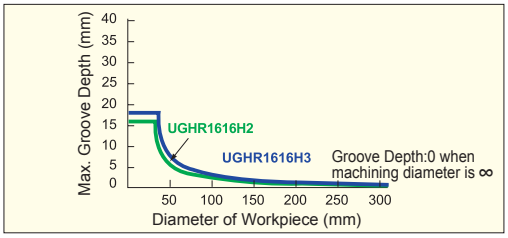
Order Number	Stock	Dimensions(mm)						① 	①  *	①	② *	②
		H	HF	HBH	OAH	B	OAW	Clamp Bridge	Clamp Screw	Wrench	Set Bolt	Wrench
KGBN26-20	●	20	20	11	45	20	43	KGC1	LS15T	TKY25R	HSC08016	HKY60R
KGBN26-25	●	25	25	6	45	25	48	KGC1	LS15T	TKY25R	HSC08016	HKY60R
KGBN32-20	●	20	20	15.6	52	20	43	KGC1	LS15T	TKY25R	HSC08016	HKY60R
KGBN32-25	●	25	25	10.6	52	25	48	KGC1	LS15T	TKY25R	HSC08016	HKY60R

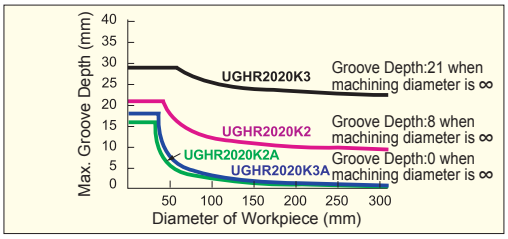
* Clamp Torque (N • m) : LS15T=8.5, HSC08016=24.0

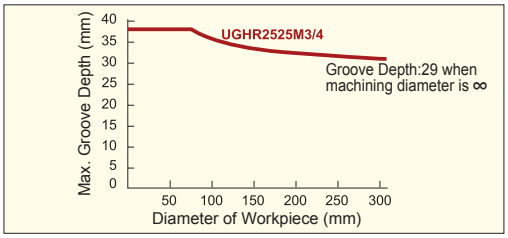
INSERTS

Order Number	Stock: Coated UE6020	Coated US735	Cermet NX2525		Carbide UTi20T		Dimensions(mm) CW	RER/L	Geometry
KGT2N	▲		●		●		2.2	0.2	
KGT3N	▲	●	●		●		3.1	0.2	
KGT4N	▲	●	●		●		4.1	0.2	
KGT5N	▲	●	●		●		5.1	0.2	
KGT2R	▲		●		●		2.2	0.2	
KGT2L	▲		●		●		2.2	0.2	
KGT3R	▲		●		●		3.1	0.2	
KGT3L	▲		●		●		3.1	0.2	
KGT4R	▲		●		●		4.1	0.2	
KGT4L	▲		●		●		4.1	0.2	
KGT5R	▲		●		●		5.1	0.2	
KGT5L	▲		●		●		5.1	0.2	Left hand tool holder shown.

(Note) The above insert is not compatible with other manufacturer's holders.







RECOMMENDED CUTTING CONDITIONS

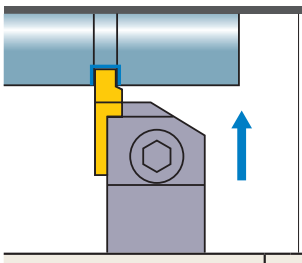
	Work Material	Hardness	Grade	Cutting Speed (m/min)	Feed (mm/rev) Groove Width 2.2mm	Groove Width 3.1mm	Groove Width 4.1mm	Groove Width 5.1mm
P	Mild Steel	≤180HB	UE6020 • NX2525 UTi20T	120 (100−140)	0.08 (0.06−0.1)	0.1 (0.08−0.12)	0.12 (0.1−0.14)	0.12 (0.1−0.14)
P	Carbon Steel Alloy Steel	180−280HB	UE6020 • NX2525 UTi20T	100 (80−120)	0.05 (0.04−0.06)	0.08 (0.06−0.1)	0.1 (0.08−0.12)	0.1 (0.08−0.12)
P	Carbon Steel Alloy Steel	280−350HB	UTi20T	80 (60−100)	0.05 (0.04−0.06)	0.08 (0.06−0.1)	0.1 (0.08−0.12)	0.1 (0.08−0.12)
M	Stainless Steel	≤200HB	US735	80 (60−100)	0.05 (0.04−0.06)	0.08 (0.06−0.1)	0.1 (0.08−0.12)	0.1 (0.08−0.12)

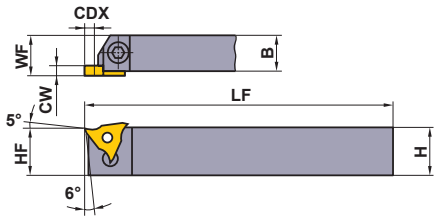
(Note) Please set the cutting edge height 0.1−0.2mm higher than center.

MG

Product Information

Spare Parts >> 1927
ISO13399 Property >> 1966
Technical Info >> 1971





Right hand tool holder shown.

Order Number	Stock R	Stock L	Insert Number		Dimensions(mm) CW	CDX	H	B	LF	HF	WF
MGHR/L2020K3315	●	●	MGTR/L	33125 | 33400	1.25	1.2	20	20	125	20	20.2
					1.45	1.5					
					1.5≤CW≤2.3	3.0					
MGHR/L2020K3323	●	●			2.3＜CW≤3.3	3.0	20	20	125	20	20.2
MGHR/L2525M3315	●	●			1.25	1.2	25	25	150	25	25.2
					1.45	1.5					
					1.5≤CW≤2.3	3.0					
MGHR/L2525M3323	●	●			2.3＜CW≤3.3	3.0	25	25	150	25	25.2
MGHR/L2525M3333	●	●			3.3＜CW≤4.7	3.0	25	25	150	25	25.2
MGHR/L2020K4315	●	●	MGTR/L	43125 | 43470	1.25	1.2 (2.0)*	20	20	125	20	20.2
					1.45	1.5					
					1.5≤CW≤2.3	3.0 (3.5)*					
MGHR/L2020K4323	●	●			2.3＜CW≤3.3	4.5 (4.0)*	20	20	125	20	20.2
MGHR/L2020K4333	●	●			3.3＜CW≤4.7(4.0)*	4.5 (5.0)*	20	20	125	20	20.2
MGHR/L2525M4315	●	●			1.25	1.2 (2.0)*	25	25	150	25	25.2
					1.45	1.5					
					1.5≤CW≤2.3	3.0 (3.5)*					
MGHR/L2525M4323	●	●			2.3＜CW≤3.3	4.5 (4.0)*	25	25	150	25	25.2
MGHR/L2525M4333	●	●			3.3＜CW≤4.7(4.0)*	4.5 (5.0)*	25	25	150	25	25.2
MGHR/L2525M4447	●	●	MGTR/L	44500 | 44600	4.7＜CW≤6.3	4.5	25	25	150	25	25.2

* Dimensions when installing the CBN insert.

● : **Inventory maintained in Japan.**

SPARE PARTS

Order Number	Clamp Bridge	* Clamp Screw	Spring	Wrench
MGHR/L2020K3315 – MGHR/L2525M4447	MTK1R/L	HBH06020	MES3	HKY40R

* Clamp Torque (N • m) : HBH06020=7.0

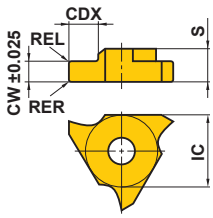
RECOMMENDED CUTTING CONDITIONS

	Work Material	Hardness	Grade	Cutting Speed (m/min)	Feed (mm/rev)
P	Carbon Steel Alloy Steel	180−280HB	**VP20MF**	120 (100−140)	0.14 (0.03−0.25)
			NX2525	130 (100−160)	0.12 (0.03−0.2)
M	Stainless Steel	≤200HB	**VP20MF**	120 (100−140)	0.12 (0.03−0.18)
K	Gray Cast Iron	Tensile Strength ≤350MPa	**VP20MF**	120 (100−140)	0.12 (0.03−0.18)

(Note) For machining a narrow groove, apply a lower feed within the recommended range.

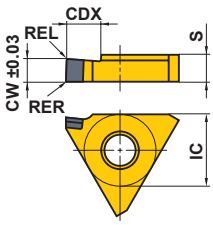
INSERTS

Order Number	Stock							Dimensions(mm)					Geometry
	Coated		Cermet		Carbide		CBN						
	VP20MF		NX2525		UTi20T		MB8025	CW	CDX	IC	S	RER/L	
	R	L	R	L	R	L	R						
MGTR/L33125	●	●	●		●	●		1.25	1.2	9.525	4.76	0.2	MGTR/L...
MGTR/L33145	●	●	●		●	●		1.45	1.5	9.525	4.76	0.2	
MGTR/L33150	●	●	●	●	●	●		1.5	3	9.525	4.76	0.2	
MGTR/L33175	●	●	●	●	●	●		1.75	3	9.525	4.76	0.2	
MGTR/L33200	●	●	●	●	●	●		2	3	9.525	4.76	0.2	
MGTR/L33230	●	●			●	●		2.3	3	9.525	4.76	0.2	
MGTR/L33250	●	●	●	●	●	●		2.5	3	9.525	4.76	0.3	
MGTR/L33270	●	●			●	●		2.7	3	9.525	4.76	0.3	
MGTR/L33280	●	●			●	●		2.8	3	9.525	4.76	0.3	
MGTR/L33300	●	●	●	●	●	●		3	3	9.525	4.76	0.3	
MGTR/L33320	●	●			●			3.2	3	9.525	4.76	0.3	
MGTR/L33330		●			●	●		3.3	3	9.525	4.76	0.3	
MGTR/L33350	●	●	●		●	●		3.5	3	9.525	4.76	0.3	
MGTR/L33400	●	●	●	●	●	●		4	3	9.525	4.76	0.3	
MGTR/L43125	●	●	●	●	●	●	●	1.25	1.2	12.7	4.76	0.2	
MGTR/L43145	●	●		●	●	●		1.45	1.5	12.7	4.76	0.2	
MGTR/L43150	●	●	●	●	●	●	●	1.5	3	12.7	4.76	0.2	
MGTR/L43175	●	●	●	●	●	●		1.75	3	12.7	4.76	0.2	
MGTR/L43200	●	●	●	●	●	●	●	2	3.5	12.7	4.76	0.2	
MGTR/L43230	●	●	●	●	●	●		2.3	3	12.7	4.76	0.2	
MGTR/L43250	●	●	●	●	●	●	●	2.5	4.5	12.7	4.76	0.3	
MGTR/L43260	●	●	●		●	●		2.6	4.5	12.7	4.76	0.3	
MGTR/L43270	●	●			●	●		2.7	4.5	12.7	4.76	0.3	
MGTR/L43280		●		●	●	●		2.8	4.5	12.7	4.76	0.3	
MGTR/L43300	●	●	●	●	●	●	●	3	4.5	12.7	4.76	0.3	
MGTR/L43320	●				●	●		3.2	4.5	12.7	4.76	0.3	
MGTR/L43330		●		●	●	●		3.3	4.5	12.7	4.76	0.3	
MGTR/L43350	●	●	●	●	●	●	●	3.5	4.5	12.7	4.76	0.3	
MGTR/L43400	●	●	●		●	●	●	4	4.5	12.7	4.76	0.3	
MGTR/L43420	●	●	●		●	●		4.2	4.5	12.7	4.76	0.4	
MGTR/L43430	●	●	●		●	●		4.3	4.5	12.7	4.76	0.4	
MGTR/L43450	●	●	●	●	●	●		4.5	4.5	12.7	4.76	0.4	
MGTR/L43470	●	●	●	●	●	●		4.7	4.5	12.7	4.76	0.4	
MGTR/L44500	●	●			●	●		5	4.5	12.7	6.35	0.4	
MGTR/L44550	●				●			5.5	4.5	12.7	6.35	0.4	
MGTR/L44600	●				●	●		6	4.5	12.7	6.35	0.4	



Right hand insert shown.

CBN Insert



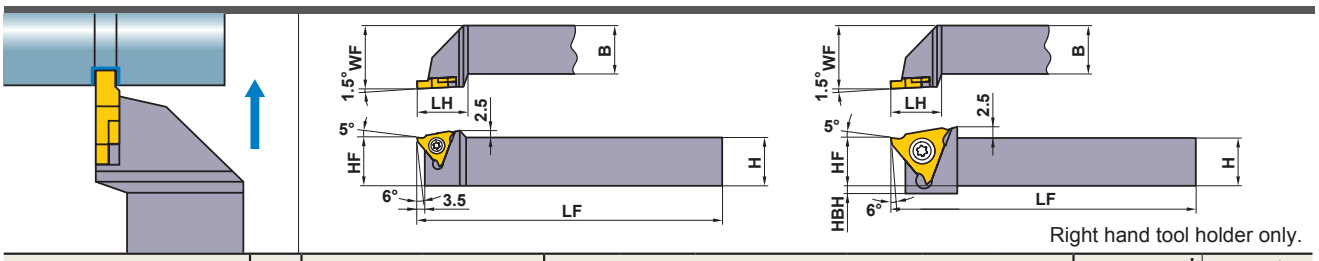
Right hand tool only.

SMG

EXTERNAL GROOVING

Product Information

Spare Parts >> 1927
ISO13399 Property >> 1966
Technical Info >> 1971



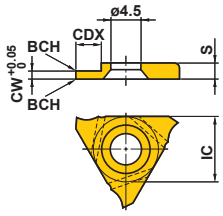
Right hand tool holder only.

Order Number	Stock	Insert Number		Dimensions(mm)							*	
	R	Grooving	Threading	H	B	LF	LH	HF	WF	HBH	Clamp Screw	Wrench
SMGHR1010E16	●	SMGTR 16×2□□□ 16×2□□□C	SMTTR 160360□□	10	10	70	16.5	10	12	4	FC400890T	TKY10F
SMGHR1212F16	●			12	12	80	16.5	12	16	2	FC400890T	TKY10F
SMGHR1616H16	●			16	16	100	20	16	20	—	FC400890T	TKY10F
SMGHR2020K16	●			20	20	125	20	20	25	—	FC400890T	TKY10F
SMGHR2525M16	●			25	25	150	20	25	32	—	FC400890T	TKY10F

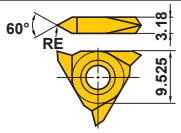
* Clamp Torque (N • m) : FC400890T=2.5

● : **Inventory maintained in Japan.**

SMG INSERTS (GROOVING)

Order Number	Stock: Cermet NX2525		Stock: Carbide UTi20T	Stock: Carbide HTi10	Dimensions(mm) CW	CDX	IC	S	BCH (45°)	Geometry
SMGTR16X2050				●	0.5	1.5	9.525	2	—	
SMGTR16X2060	●		●	●	0.6	1.5	9.525	2	—	
SMGTR16X2050C	●		●	●	0.5	1.5	9.525	2	0.05	
SMGTR16X2060C	●		●	●	0.6	1.5	9.525	2	0.05	
SMGTR16X2070C	●		●	●	0.7	2	9.525	2	0.05	
SMGTR16X2075C	●		●	●	0.75	2	9.525	2	0.05	
SMGTR16X2080C	●		●	●	0.8	2	9.525	2	0.1	
SMGTR16X2090C	●		●	●	0.9	2	9.525	2	0.1	
SMGTR16X2095C	●		●	●	0.95	2	9.525	2	0.1	
SMGTR16X2100C	●		●	●	1	2.5	9.525	2	0.1	
SMGTR16X2110C	●		●	●	1.1	2.5	9.525	2	0.1	
SMGTR16X2120C	●		●	●	1.2	2.5	9.525	2	0.1	
SMGTR16X2130C	●		●	●	1.3	2.5	9.525	2	0.1	

SMT INSERTS (THREADING)

Order Number	Stock: Carbide UTi20T	Dimensions(mm) RE	Thread Pitch (mm)	Geometry
SMTTR16036001	●	0.1	1.0–1.5	
SMTTR16036002	●	0.2	1.75–2.0	

Note: When installing the threading insert to the tool body, a difference occurs.

RECOMMENDED CUTTING CONDITIONS

	Work Material	Hardness	Grade	Cutting Speed (m/min)	Feed (mm/rev)
P	Carbon Steel Alloy Steel	180–280HB	UTi20T	100 (80–120)	0.07 (0.03–0.1)
			NX2525	130 (100–160)	0.07 (0.03–0.1)
M	Stainless Steel	≤200HB	UTi20T	130 (100–160)	0.1 (0.05–0.15)
K	Gray Cast Iron	Tensile Strength ≤350MPa	UTi20T HTi10	100 (80–120)	0.1 (0.05–0.15)
N	Aluminium Alloy	–	HTi10	350 (300–400)	0.1 (0.05–0.15)
	Brass	–	HTi10	250 (200–300)	0.1 (0.03–0.15)
	Acrylic	–	HTi10	250 (200–300)	0.1 (0.03–0.15)

● : Inventory maintained in Japan. (10 inserts in one case)

GY

CW(Cutting width) 2.00, 2.24

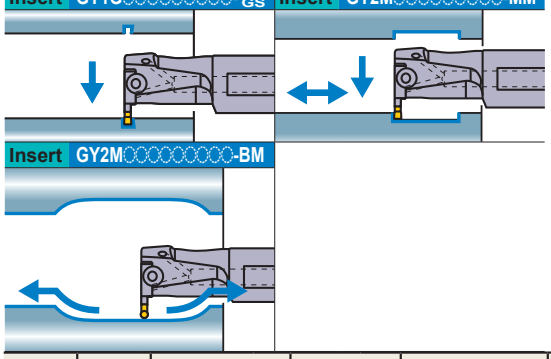
INTERNAL GROOVING

Product Information

Recommended Cutting Condition >> 574
INSERTS >> 462
Technical Info >> 1971
IDENTIFICATION >> 460
SPARE PARTS >> 1927
ISO13399 Property >> 1966

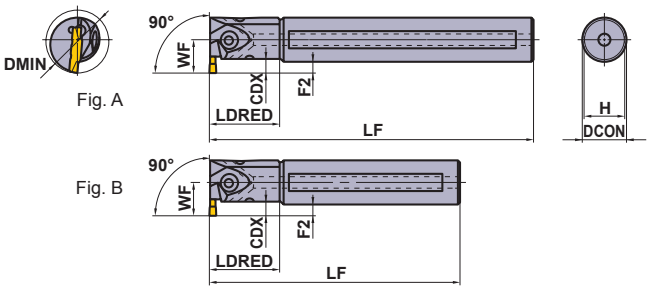
6 90° type holder

Insert GY1M/2M○○○○○○○○○○-GM
Insert GY2M○○○○○○○○○○-GS/-GU
Insert GY1G○○○○○○○○○○-GF/GS
Insert GY2G○○○○○○○○○○-MF
Insert GY2M○○○○○○○○○○-MS
Insert GY2M○○○○○○○○○○-MM
Insert GY2M○○○○○○○○○○-BM



(Note 1) Please order the modular blade and modular holder separately.
(Note 2) Please set the left hand modular blade at the right hand holder and the right hand modular blade at the left hand holder.

●Mono block type (Air / coolant through)



Right hand tool holder shown.

Seat Size	CW	CDX *3	DMIN	Type	Hand (R/L)	Order Number Holder	Stock	Modular Blade	Stock	Fig.
D	2.00 2.24	6	25	Mono Block	R	GYAR20K90A-D06	●	—	—	B
					L	GYAL20K90A-D06	●	—	—	B
				Mono Block	R	GYAR20Q90A-D06	●	—	—	A
					L	GYAL20Q90A-D06	●	—	—	A
			32	Mono Block	R	GYAR25K90B-D06	●	—	—	B
					L	GYAL25K90B-D06	●	—	—	B
				Mono Block	R	GYAR25R90B-D06	●	—	—	A
					L	GYAL25R90B-D06	●	—	—	A
		4—9.5 *1	40	Modular	R	GYDR32L90C-M20L	●	GYM20LA-D10	●	D
					L	GYDL32L90C-M20R	●	GYM20RA-D10	●	D
				Modular	R	GYDR32S90C-M20L	●	GYM20LA-D10	●	C
					L	GYDL32S90C-M20R	●	GYM20RA-D10	●	C
		5.5—9.5 *1	50	Modular	R	GYDR40M90D-M20L	●	GYM20LA-D10	●	D
					L	GYDL40M90D-M20R	●	GYM20RA-D10	●	D
				Modular	R	GYDR40T90D-M20L	●	GYM20LA-D10	●	C
					L	GYDL40T90D-M20R	●	GYM20RA-D10	●	C
		7—11.5 *1	60	Modular	R	GYDR40M90D-M25L	●	GYM25LA-D12	●	D
					L	GYDL40M90D-M25R	●	GYM25RA-D12	●	D
				Modular	R	GYDR40T90D-M25L	●	GYM25LA-D12	●	C
					L	GYDL40T90D-M25R	●	GYM25RA-D12	●	C
			70	Modular	R	GYDR50P90F-M25L	●	GYM25LA-D12	●	D
					L	GYDL50P90F-M25R	●	GYM25RA-D12	●	D
				Modular	R	GYDR50T90F-M25L	●	GYM25LA-D12	●	C
					L	GYDL50T90F-M25R	●	GYM25RA-D12	●	C

*1 The maximum groove depth varies according to the cutting diameter **DMIN**.
*2 Dimensions shown are when the gauge insert is used. If other insert geometries are used then **LF, LDRED, WF** and **F2** values may vary.
*3 The maximum groove depth (**CDX**) is a value within the dimension **LDRED**.

● : **Inventory maintained in Japan.**

●Modular blade type (Air / coolant through)

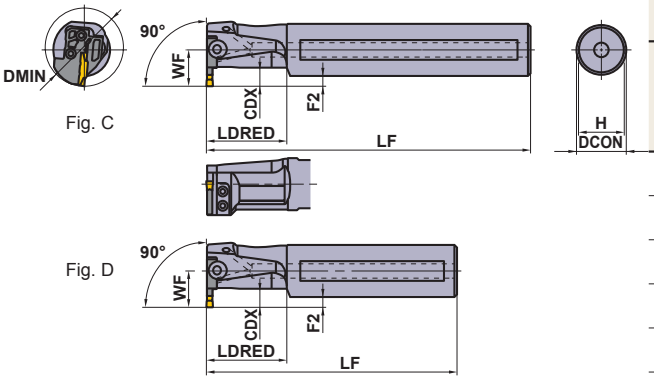


Fig. C

Fig. D

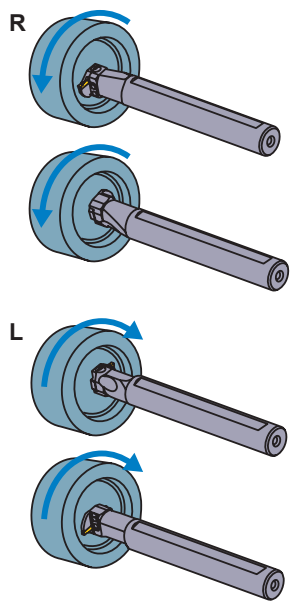
Right hand tool holder shown.

* Wrench : ① : Clamp Screw, ② : Blade Screw

SPARE PARTS

Holder	① ② Clamp Screw	4 pcs. Blade Screw	① ② Wrench *
GYAR/L20○90A-○06	①GY05016S (Clamp Torque : 5.0N·m)	–	①TKY20R
GYAR/L25○90B-○06			
GYDR/L32○90C-M20L/R	②GY06013M (Clamp Torque : 6.0N·m)	TS407 (Clamp Torque : 3.5N·m)	①TKY30R ②TKY15D
GYDR/L40○90D-M20L/R			
GYDR/L40○90D-M25L/R	②GY06013M (Clamp Torque : 6.0N·m)	TS55 (Clamp Torque : 5.0N·m)	①TKY30R ②TKY25D
GYDR/L50○90F-M25L/R			

Dimensions (mm) *2						Cutting Mode
DCON	LF	LDRED	WF	F2	H	
20	125	30	14.5	4.5	18	R
20	125	30	14.5	4.5	18	
20	180	30	14.5	4.5	18	
20	180	30	14.5	4.5	18	
25	125	40	19	6.5	23	
25	125	40	19	6.5	23	
25	200	40	19	6.5	23	
25	200	40	19	6.5	23	
32	140	50	22	6	30	
32	140	50	22	6	30	
32	250	50	22	6	30	
32	250	50	22	6	30	
40	150	60	28	8	37	L
40	150	60	28	8	37	
40	300	60	28	8	37	
40	300	60	28	8	37	
40	150	60	28	8	37	
40	150	60	28	8	37	
40	300	60	28	8	37	
40	300	60	28	8	37	
50	170	80	34	9	47	
50	170	80	34	9	47	
50	300	80	34	9	47	
50	300	80	34	9	47	



Insert selection

Seat Size	Geometry name
D	GY○○0200/0224D○○○○−Breaker shown below

For grooving/cutting off breaker

Seat Size	Breaker / CW	GU (For gummy steel)	GS (Low)	GM (Medium)	GFGS (Hardened steel)
D	2.00mm	●	●	●	●

For multifunctional grooving breaker

Seat Size	Breaker / CW	MF (Finish)	MS (Low)	MM (Medium)	BM (Copying)
					Ball nose
D	2.00mm	●	●	●	●
	2.24mm	●			

● : Standard insert with dimensions

GY

CW(Cutting width) 2.39, 2.50, 2.74

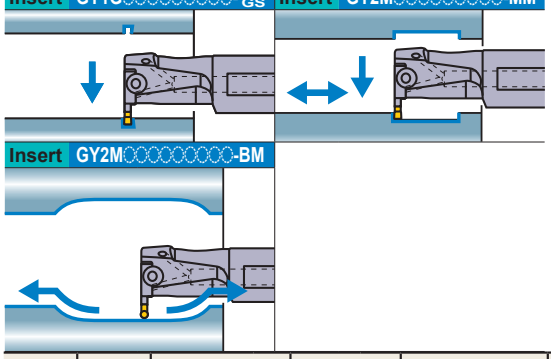
INTERNAL GROOVING

Product Information

Recommended Cutting Condition >> 574
INSERTS >> 462
Technical Info >> 1971
IDENTIFICATION >> 460
SPARE PARTS >> 1927
ISO13399 Property >> 1966

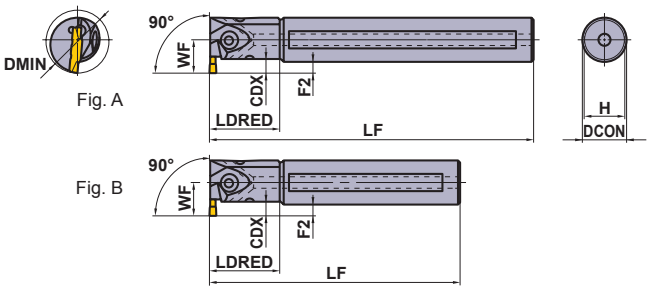
6 90° type holder

Insert	GY1M/2M○○○○○○○○○○-GM	Insert	GY2G○○○○○○○○○○-MF
Insert	GY2M○○○○○○○○○○-GS/-GU	Insert	GY2M○○○○○○○○○○-MS
Insert	GY1G○○○○○○○○○○-GF/GS	Insert	GY2M○○○○○○○○○○-MM
Insert	GY2M○○○○○○○○○○-BM		



(Note 1) Please order the modular blade and modular holder separately.
(Note 2) Please set the left hand modular blade at the right hand holder and the right hand modular blade at the left hand holder.

●Mono block type (Air / coolant through)



Right hand tool holder shown.

Seat Size	CW	CDX *3	DMIN	Type	Hand (R/L)	Order Number Holder	Stock	Modular Blade	Stock	Fig.
E	2.39 2.50 2.74	6	25	Mono Block	R	GYAR20K90A-E06	●	—	—	B
					L	GYAL20K90A-E06	●	—	—	B
				Mono Block	R	GYAR20Q90A-E06	●	—	—	A
					L	GYAL20Q90A-E06	●	—	—	A
			32	Mono Block	R	GYAR25K90B-E06	●	—	—	B
					L	GYAL25K90B-E06	●	—	—	B
				Mono Block	R	GYAR25R90B-E06	●	—	—	A
					L	GYAL25R90B-E06	●	—	—	A
		4—9.5 *1	40	Modular	R	GYDR32L90C-M20L	●	GYM20LA-E10	●	D
					L	GYDL32L90C-M20R	●	GYM20RA-E10	●	D
				Modular	R	GYDR32S90C-M20L	●	GYM20LA-E10	●	C
					L	GYDL32S90C-M20R	●	GYM20RA-E10	●	C
		5.5—9.5 *1	50	Modular	R	GYDR40M90D-M20L	●	GYM20LA-E10	●	D
					L	GYDL40M90D-M20R	●	GYM20RA-E10	●	D
				Modular	R	GYDR40T90D-M20L	●	GYM20LA-E10	●	C
					L	GYDL40T90D-M20R	●	GYM20RA-E10	●	C
		7—11.5 *1	60	Modular	R	GYDR40M90D-M25L	●	GYM25LA-E12	●	D
					L	GYDL40M90D-M25R	●	GYM25RA-E12	●	D
				Modular	R	GYDR40T90D-M25L	●	GYM25LA-E12	●	C
					L	GYDL40T90D-M25R	●	GYM25RA-E12	●	C
			70	Modular	R	GYDR50P90F-M25L	●	GYM25LA-E12	●	D
					L	GYDL50P90F-M25R	●	GYM25RA-E12	●	D
				Modular	R	GYDR50T90F-M25L	●	GYM25LA-E12	●	C
					L	GYDL50T90F-M25R	●	GYM25RA-E12	●	C

*1 The maximum groove depth varies according to the cutting diameter **DMIN**.
*2 Dimensions shown are when the gauge insert is used. If other insert geometries are used then **LF, LDRED, WF** and **F2** values may vary.
*3 The maximum groove depth (**CDX**) is a value within the dimension **LDRED**.

● : **Inventory maintained in Japan.**

●Modular blade type (Air / coolant through)

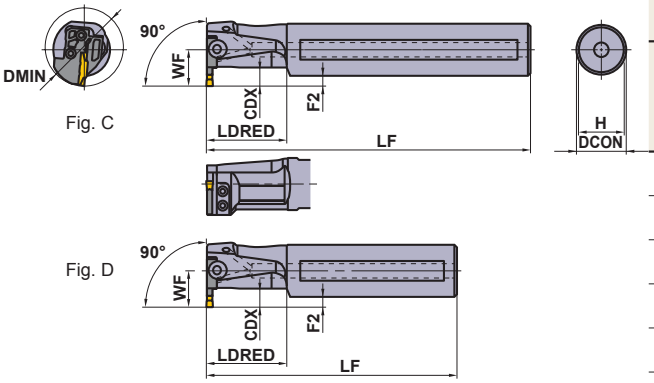


Fig. C

Fig. D

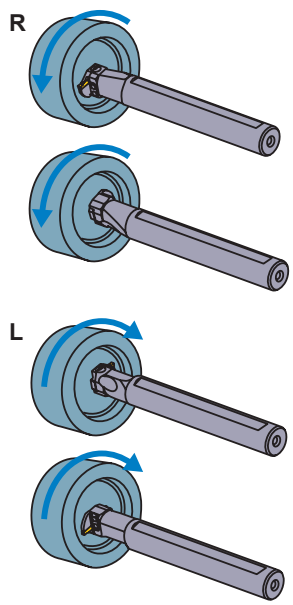
Right hand tool holder shown.

* Wrench : ① : Clamp Screw, ② : Blade Screw

SPARE PARTS

Holder	① ② Clamp Screw	4 pcs. Blade Screw	① ② Wrench *
GYAR/L20◌90A-◌06	①GY05016S (Clamp Torque : 5.0N·m)	–	①TKY20R
GYAR/L25◌90B-◌06			
GYDR/L32◌90C-M20L/R	②GY06013M (Clamp Torque : 6.0N·m)	TS407 (Clamp Torque : 3.5N·m)	①TKY30R ②TKY15D
GYDR/L40◌90D-M20L/R			
GYDR/L40◌90D-M25L/R	②GY06013M (Clamp Torque : 6.0N·m)	TS55 (Clamp Torque : 5.0N·m)	①TKY30R ②TKY25D
GYDR/L50◌90F-M25L/R			

Dimensions (mm) *2						Cutting Mode
DCON	LF	LDRED	WF	F2	H	
20	125	30	14.5	4.5	18	R
20	125	30	14.5	4.5	18	
20	180	30	14.5	4.5	18	
20	180	30	14.5	4.5	18	
25	125	40	19	6.5	23	
25	125	40	19	6.5	23	
25	200	40	19	6.5	23	
25	200	40	19	6.5	23	
32	140	50	22	6	30	
32	140	50	22	6	30	
32	250	50	22	6	30	
32	250	50	22	6	30	
40	150	60	28	8	37	L
40	150	60	28	8	37	
40	300	60	28	8	37	
40	300	60	28	8	37	
40	150	60	28	8	37	
40	150	60	28	8	37	
40	300	60	28	8	37	
40	300	60	28	8	37	
50	170	80	34	9	47	
50	170	80	34	9	47	
50	300	80	34	9	47	
50	300	80	34	9	47	



Insert selection

Seat Size	Geometry name
E	GY◌◌0239/0250/0274E◌◌◌◌–Breaker shown below

For grooving/cutting off breaker

Seat Size	CW \ Breaker	GU (For gummy steel)	GS (Low)	GM (Medium)	GFGS (Hardened steel)
E	2.39mm	●	●	●	●
	2.50mm	●	●	●	●

For multifunctional grooving breaker

Seat Size	CW \ Breaker	MF (Finish)	MS (Low)	MM (Medium)	BM (Copying)
					Ball nose
E	2.39mm	●			
	2.50mm	●	●	●	●
	2.74mm	●			

● : Standard insert with dimensions

GY

CW(Cutting width) 3.00, 3.18, 3.24

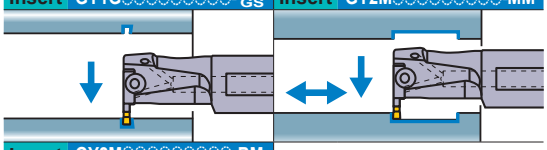
INTERNAL GROOVING

Product Information

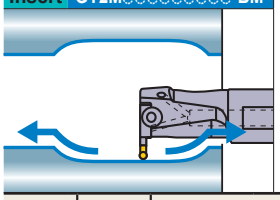
Recommended Cutting Condition >> 574
INSERTS >> 462
Technical Info >> 1971
IDENTIFICATION >> 460
SPARE PARTS >> 1927
ISO13399 Property >> 1966

6 90° type holder

Insert GY1M/2M○○○○○○○○○○-GM
Insert GY2M○○○○○○○○○○-GS/-GU
Insert GY1G○○○○○○○○○○-GF/GS
Insert GY2G○○○○○○○○○○-MF
Insert GY2M○○○○○○○○○○-MS
Insert GY2M○○○○○○○○○○-MM

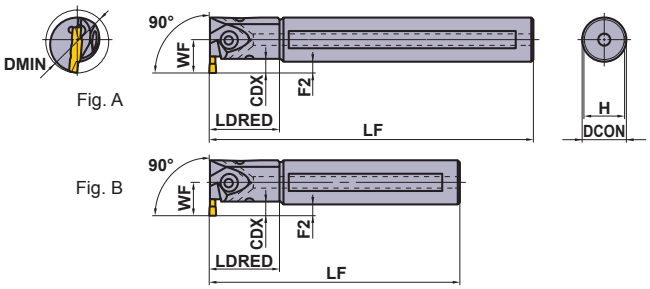


Insert GY2M○○○○○○○○○○-BM



(Note 1) Please order the modular blade and modular holder separately.
(Note 2) Please set the left hand modular blade at the right hand holder and the right hand modular blade at the left hand holder.

●Mono block type (Air / coolant through)



Right hand tool holder shown.

Seat Size	CW	CDX *3	DMIN	Type	Hand (R/L)	Order Number Holder	Stock	Modular Blade	Stock	Fig.
F	3.00 3.18 3.24	6	25	Mono Block	R	GYAR20K90A-F06	●	—	—	B
					L	GYAL20K90A-F06	●	—	—	B
				Mono Block	R	GYAR20Q90A-F06	●	—	—	A
					L	GYAL20Q90A-F06	●	—	—	A
			32	Mono Block	R	GYAR25K90B-F06	●	—	—	B
					L	GYAL25K90B-F06	●	—	—	B
				Mono Block	R	GYAR25R90B-F06	●	—	—	A
					L	GYAL25R90B-F06	●	—	—	A
		4—9.5 *1	40	Modular	R	GYDR32L90C-M20L	●	GYM20LA-F10	●	D
					L	GYDL32L90C-M20R	●	GYM20RA-F10	●	D
				Modular	R	GYDR32S90C-M20L	●	GYM20LA-F10	●	C
					L	GYDL32S90C-M20R	●	GYM20RA-F10	●	C
		5.5—9.5 *1	50	Modular	R	GYDR40M90D-M20L	●	GYM20LA-F10	●	D
					L	GYDL40M90D-M20R	●	GYM20RA-F10	●	D
				Modular	R	GYDR40T90D-M20L	●	GYM20LA-F10	●	C
					L	GYDL40T90D-M20R	●	GYM20RA-F10	●	C
		7—11.5 *1	60	Modular	R	GYDR40M90D-M25L	●	GYM25LA-F12	●	D
					L	GYDL40M90D-M25R	●	GYM25RA-F12	●	D
				Modular	R	GYDR40T90D-M25L	●	GYM25LA-F12	●	C
					L	GYDL40T90D-M25R	●	GYM25RA-F12	●	C
			70	Modular	R	GYDR50P90F-M25L	●	GYM25LA-F12	●	D
					L	GYDL50P90F-M25R	●	GYM25RA-F12	●	D
				Modular	R	GYDR50T90F-M25L	●	GYM25LA-F12	●	C
					L	GYDL50T90F-M25R	●	GYM25RA-F12	●	C

*1 The maximum groove depth varies according to the cutting diameter **DMIN**.
*2 Dimensions shown are when the gauge insert is used. If other insert geometries are used then **LF, LDRED, WF** and **F2** values may vary.
*3 The maximum groove depth (**CDX**) is a value within the dimension **LDRED**.

● : **Inventory maintained in Japan.**

●Modular blade type (Air / coolant through)

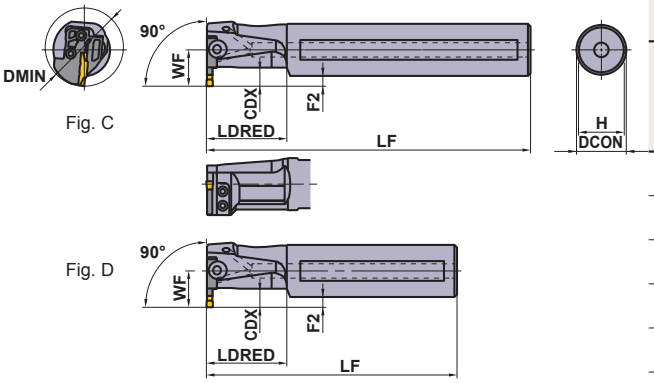


Fig. C

Fig. D

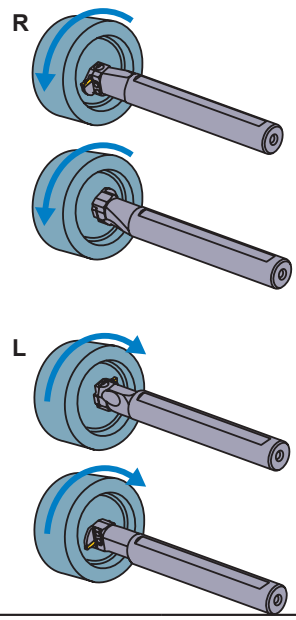
Right hand tool holder shown.

* Wrench : ① : Clamp Screw, ② : Blade Screw

SPARE PARTS

Holder	① ② Clamp Screw	4 pcs. Blade Screw	① ② Wrench *
GYAR/L20○90A-F06	①GY05016S (Clamp Torque : 5.0N·m)	–	①TKY20R
GYAR/L25○90B-○○○			
GYDR/L32○90C-M20L/R	②GY06013M (Clamp Torque : 6.0N·m)	TS407 (Clamp Torque : 3.5N·m)	①TKY30R ②TKY15D
GYDR/L40○90D-M20L/R			
GYDR/L40○90D-M25L/R	②GY06013M (Clamp Torque : 6.0N·m)	TS55 (Clamp Torque : 5.0N·m)	①TKY30R ②TKY25D
GYDR/L50○90F-M25L/R			

Dimensions (mm) *2						Cutting Mode
DCON	LF	LDRED	WF	F2	H	
20	125	30	14.5	4.5	18	R
20	125	30	14.5	4.5	18	
20	180	30	14.5	4.5	18	
20	180	30	14.5	4.5	18	
25	125	40	19	6.5	23	
25	125	40	19	6.5	23	
25	200	40	19	6.5	23	
25	200	40	19	6.5	23	
32	140	50	22	6	30	
32	140	50	22	6	30	
32	250	50	22	6	30	
32	250	50	22	6	30	
40	150	60	28	8	37	
40	150	60	28	8	37	L
40	300	60	28	8	37	
40	300	60	28	8	37	
40	150	60	28	8	37	
40	150	60	28	8	37	
40	300	60	28	8	37	
40	300	60	28	8	37	
50	170	80	34	9	47	
50	170	80	34	9	47	
50	300	80	34	9	47	
50	300	80	34	9	47	



Insert selection

Seat Size	Geometry name
F	GY○○0300/0318/0324F○○○○–Breaker shown below

For grooving/cutting off breaker

Seat Size	CW \ Breaker	GU (For gummy steel)	GS (Low)	GM (Medium)	GFGS (Hardened steel)
F	3.00mm	●	●	●	●
	3.18mm	●	●	●	●

For multifunctional grooving breaker

Seat Size	CW \ Breaker	MF (Finish)	MS (Low)	MM (Medium)	BM (Copying)
					Ball nose
F	3.00mm				●
	RE 0.2	●	●	●	
	RE 0.4	●	●	●	
	RE 0.8			●	
	3.18mm				●
	RE 0.2	●			
	RE 0.4	●			
	3.24mm	●			

● : Standard insert with dimensions

GY

CW(Cutting width) 4.00, 4.24

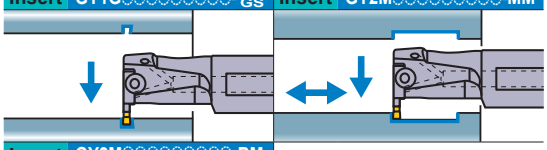
INTERNAL GROOVING

Product Information

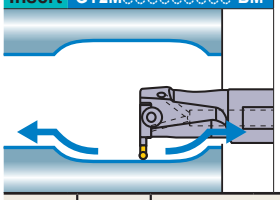
Recommended Cutting Condition >> 574
INSERTS >> 462
Technical Info >> 1971
IDENTIFICATION >> 460
SPARE PARTS >> 1927
ISO13399 Property >> 1966

6 90° type holder

Insert GY1M/2M○○○○○○○○○○-GM
Insert GY2M○○○○○○○○○○-GS/-GU
Insert GY1G○○○○○○○○○○-GF/GS
Insert GY2G○○○○○○○○○○-MF
Insert GY2M○○○○○○○○○○-MS
Insert GY2M○○○○○○○○○○-MM

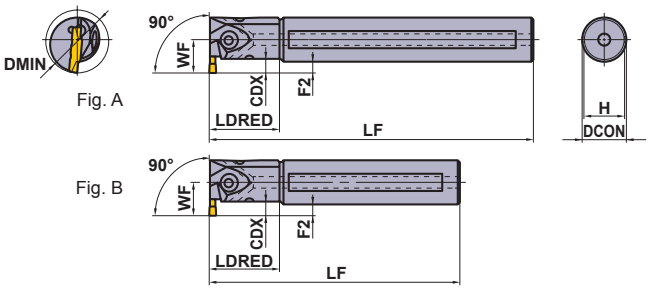


Insert GY2M○○○○○○○○○○-BM



(Note 1) Please order the modular blade and modular holder separately.
(Note 2) Please set the left hand modular blade at the right hand holder and the right hand modular blade at the left hand holder.

●Mono block type (Air / coolant through)



Right hand tool holder shown.

Seat Size	CW	CDX *3	DMIN	Type	Hand (R/L)	Order Number Holder	Stock	Modular Blade	Stock	Fig.
G	4.00 4.24	7	32	Mono Block	R	GYAR25K90B-G07	●	—	—	B
					L	GYAL25K90B-G07	●	—	—	B
				Mono Block	R	GYAR25R90B-G07	●	—	—	A
					L	GYAL25R90B-G07	●	—	—	A
		4.5—11.5 *1	40	Modular	R	GYDR32L90C-M20L	●	GYM20LA-G12	●	D
					L	GYDL32L90C-M20R	●	GYM20RA-G12	●	D
				Modular	R	GYDR32S90C-M20L	●	GYM20LA-G12	●	C
					L	GYDL32S90C-M20R	●	GYM20RA-G12	●	C
		6—11.5 *1	50	Modular	R	GYDR40M90D-M20L	●	GYM20LA-G12	●	D
					L	GYDL40M90D-M20R	●	GYM20RA-G12	●	D
				Modular	R	GYDR40T90D-M20L	●	GYM20LA-G12	●	C
					L	GYDL40T90D-M20R	●	GYM20RA-G12	●	C
		7.5—13 *1	60	Modular	R	GYDR40M90D-M25L	●	GYM25LA-G14	●	D
					L	GYDL40M90D-M25R	●	GYM25RA-G14	●	D
				Modular	R	GYDR40T90D-M25L	●	GYM25LA-G14	●	C
					L	GYDL40T90D-M25R	●	GYM25RA-G14	●	C
			70	Modular	R	GYDR50P90F-M25L	●	GYM25LA-G14	●	D
					L	GYDL50P90F-M25R	●	GYM25RA-G14	●	D
				Modular	R	GYDR50T90F-M25L	●	GYM25LA-G14	●	C
					L	GYDL50T90F-M25R	●	GYM25RA-G14	●	C

*1 The maximum groove depth varies according to the cutting diameter **DMIN**.
*2 Dimensions shown are when the gauge insert is used. If other insert geometries are used then **LF, LDRED, WF** and **F2** values may vary.
*3 The maximum groove depth (**CDX**) is a value within the dimension **LDRED**.

● : **Inventory maintained in Japan.**

●Modular blade type (Air / coolant through)

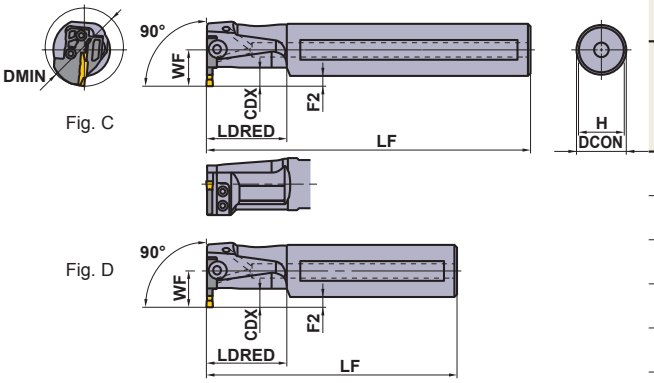


Fig. C

Fig. D

Right hand tool holder shown.

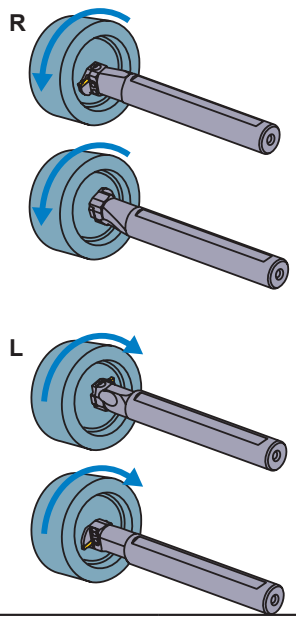
* Wrench : ① : Clamp Screw, ② : Blade Screw

SPARE PARTS

Holder	① ② Clamp Screw	4 pcs. Blade Screw	① ② Wrench *
GYAR/L20○90A-F06	①GY05016S (Clamp Torque : 5.0N·m)	–	①TKY20R
GYAR/L25○90B-○○○			
GYDR/L32○90C-M20L/R	②GY06013M (Clamp Torque : 6.0N·m)	TS407 (Clamp Torque : 3.5N·m)	①TKY30R ②TKY15D
GYDR/L40○90D-M20L/R			
GYDR/L40○90D-M25L/R	②GY06013M (Clamp Torque : 6.0N·m)	TS55 (Clamp Torque : 5.0N·m)	①TKY30R ②TKY25D
GYDR/L50○90F-M25L/R			

Dimensions (mm)					
DCON	LF	LDRED	WF	F2	H
25	125	40	19	6.5	23
25	125	40	19	6.5	23
25	200	40	19	6.5	23
25	200	40	19	6.5	23
32	140	50	22	6	30
32	140	50	22	6	30
32	250	50	22	6	30
32	250	50	22	6	30
40	150	60	28	8	37
40	150	60	28	8	37
40	300	60	28	8	37
40	300	60	28	8	37
40	150	60	28	8	37
40	150	60	28	8	37
40	300	60	28	8	37
40	300	60	28	8	37
50	170	80	34	9	47
50	170	80	34	9	47
50	300	80	34	9	47
50	300	80	34	9	47

Cutting Mode



Insert selection

Seat Size	Geometry name
G	GY○○0400/0424G○○○○−Breaker shown below

For grooving/cutting off breaker

Seat Size	CW \ Breaker	GU (For gummy steel)	GS (Low)	GM (Medium)	GFGS (Hardened steel)
G	4.00mm	●	●	●	●

For multifunctional grooving breaker

Seat Size	CW \ Breaker	MF (Finish)	MS (Low)	MM (Medium)	BM (Copying)
					Ball nose
G	4.00mm				●
	RE 0.2	●	●	●	
	RE 0.4	●	●	●	
	RE 0.8	●		●	
	4.24mm	●			

● : Standard insert with dimensions

GY

CW(Cutting width) 4.75, 5.00, 5.24

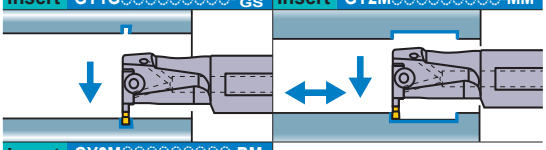
INTERNAL GROOVING

Product Information

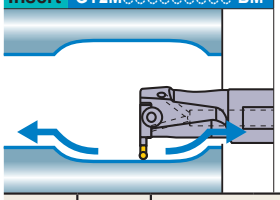
Recommended Cutting Condition >> 574
INSERTS >> 462
Technical Info >> 1971
IDENTIFICATION >> 460
SPARE PARTS >> 1927
ISO13399 Property >> 1966

6 90° type holder

Insert	GY1M/2M○○○○○○○○○○-GM	Insert	GY2G○○○○○○○○○○-MF
Insert	GY2M○○○○○○○○○○-GS/-GU	Insert	GY2M○○○○○○○○○○-MS
Insert	GY1G○○○○○○○○○○-GF/GS	Insert	GY2M○○○○○○○○○○-MM

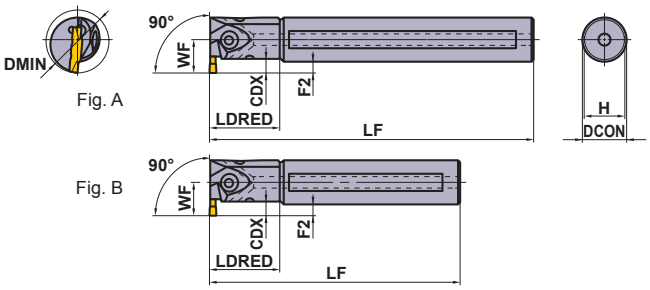


Insert GY2M○○○○○○○○○○-BM



(Note 1) Please order the modular blade and modular holder separately.
(Note 2) Please set the left hand modular blade at the right hand holder and the right hand modular blade at the left hand holder.

●Mono block type (Air / coolant through)



Right hand tool holder shown.

Seat Size	CW	CDX *3	DMIN	Type	Hand (R/L)	Order Number Holder	Stock	Modular Blade	Stock	Fig.
H	4.75 5.00 5.24	7	32	Mono Block	R	GYAR25K90B-H07	●	—	—	B
					L	GYAL25K90B-H07	●	—	—	B
				Mono Block	R	GYAR25R90B-H07	●	—	—	A
					L	GYAL25R90B-H07	●	—	—	A
		4.5—11.5 *1	40	Modular	R	GYDR32L90C-M20L	●	GYM20LA-H12	●	D
					L	GYDL32L90C-M20R	●	GYM20RA-H12	●	D
				Modular	R	GYDR32S90C-M20L	●	GYM20LA-H12	●	C
					L	GYDL32S90C-M20R	●	GYM20RA-H12	●	C
		6—11.5 *1	50	Modular	R	GYDR40M90D-M20L	●	GYM20LA-H12	●	D
					L	GYDL40M90D-M20R	●	GYM20RA-H12	●	D
				Modular	R	GYDR40T90D-M20L	●	GYM20LA-H12	●	C
					L	GYDL40T90D-M20R	●	GYM20RA-H12	●	C
		7.5—13 *1	60	Modular	R	GYDR40M90D-M25L	●	GYM25LA-H14	●	D
					L	GYDL40M90D-M25R	●	GYM25RA-H14	●	D
				Modular	R	GYDR40T90D-M25L	●	GYM25LA-H14	●	C
					L	GYDL40T90D-M25R	●	GYM25RA-H14	●	C
			70	Modular	R	GYDR50P90F-M25L	●	GYM25LA-H14	●	D
					L	GYDL50P90F-M25R	●	GYM25RA-H14	●	D
				Modular	R	GYDR50T90F-M25L	●	GYM25LA-H14	●	C
					L	GYDL50T90F-M25R	●	GYM25RA-H14	●	C

*1 The maximum groove depth varies according to the cutting diameter **DMIN**.
*2 Dimensions shown are when the gauge insert is used. If other insert geometries are used then **LF, LDRED, WF** and **F2** values may vary.
*3 The maximum groove depth (**CDX**) is a value within the dimension **LDRED**.

● : **Inventory maintained in Japan.**

●Modular blade type (Air / coolant through)

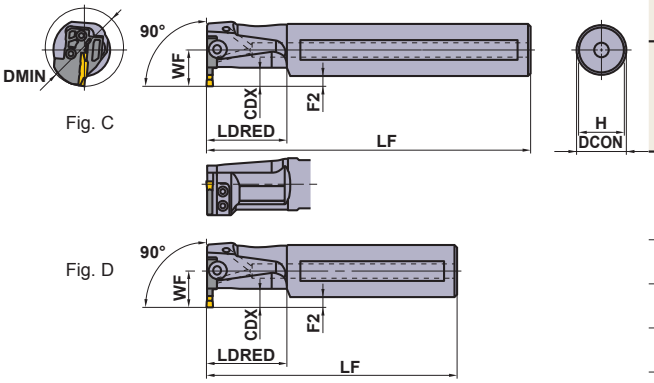
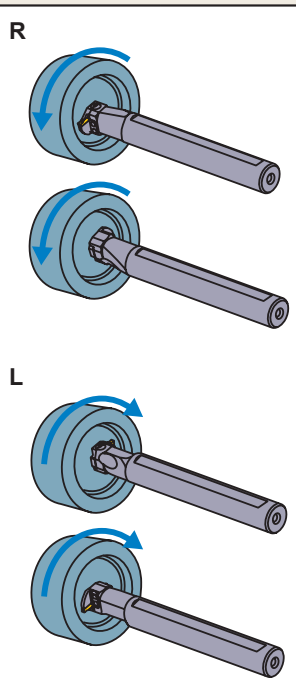


Fig. C

Fig. D

Right hand tool holder shown.

Dimensions (mm) *2						Cutting Mode
DCON	LF	LDRED	WF	F2	H	
25	125	40	19	6.5	23	R
25	125	40	19	6.5	23	
25	200	40	19	6.5	23	
25	200	40	19	6.5	23	
32	140	50	22	6	30	
32	140	50	22	6	30	
32	250	50	22	6	30	
32	250	50	22	6	30	
40	150	60	28	8	37	
40	150	60	28	8	37	
40	300	60	28	8	37	
40	300	60	28	8	37	
40	150	60	28	8	37	
40	150	60	28	8	37	
40	300	60	28	8	37	L
40	300	60	28	8	37	
50	170	80	34	9	47	
50	170	80	34	9	47	
50	300	80	34	9	47	
50	300	80	34	9	47	



* Wrench : ① : Clamp Screw, ② : Blade Screw

SPARE PARTS

Holder	① ② Clamp Screw	4 pcs. Blade Screw	① ② Wrench *
GYAR/L25◌90B-◌07	①GY05016S (Clamp Torque : 5.0N·m)	–	①TKY20R
GYDR/L32◌90C-M20L/R	②GY06013M (Clamp Torque : 6.0N·m)	TS407 (Clamp Torque : 3.5N·m)	①TKY30R ②TKY15D
GYDR/L40◌90D-M20L/R			
GYDR/L40◌90D-M25L/R	②GY06013M (Clamp Torque : 6.0N·m)	TS55 (Clamp Torque : 5.0N·m)	①TKY30R ②TKY25D
GYDR/L50◌90F-M25L/R			

Insert selection

Seat Size	Geometry name
H	GY◌◌0475/0500/0524H◌◌◌◌–Breaker shown below

For grooving/cutting off breaker

Seat Size	Breaker / CW	GU (For gummy steel)	GS (Low)	GM (Medium)	GFGS (Hardened steel)
H	4.75mm	●	●	●	●
	5.00mm	●	●	●	●

For multifunctional grooving breaker

Seat Size	Breaker / CW	MF (Finish)	MS (Low)	MM (Medium)	BM (Copying)
					Ball nose
H	4.75mm				●
	RE 0.2	●			
	RE 0.4	●			
	RE 0.8	●			
	5.00mm				●
	RE 0.2	●			
	RE 0.4	●	●	●	
	RE 0.8	●	●	●	
	5.24mm	●			

● : Standard insert with dimensions

GY

CW(Cutting width) 6.00, 6.31, 6.35

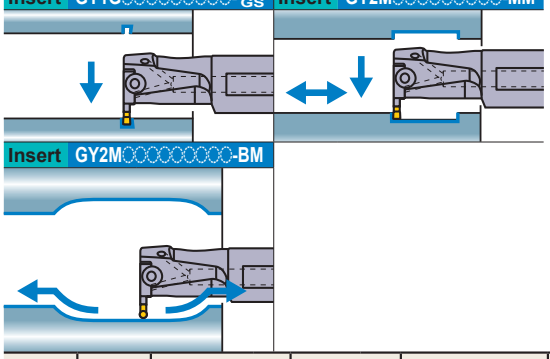
INTERNAL GROOVING

Product Information

Recommended Cutting Condition >> 574
INSERTS >> 462
Technical Info >> 1971
IDENTIFICATION >> 460
SPARE PARTS >> 1927
ISO13399 Property >> 1966

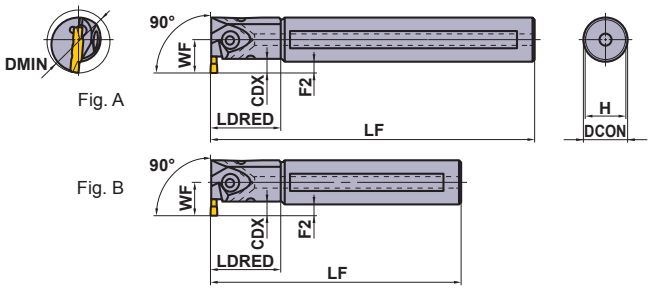
6 90° type holder

Insert GY1M/2M○○○○○○○○○○-GM
Insert GY2M○○○○○○○○○○-GS/-GU
Insert GY1G○○○○○○○○○○-GF/GS
Insert GY2G○○○○○○○○○○-MF
Insert GY2M○○○○○○○○○○-MS
Insert GY2M○○○○○○○○○○-MM
Insert GY2M○○○○○○○○○○-BM



(Note 1) Please order the modular blade and modular holder separately.
(Note 2) Please set the left hand modular blade at the right hand holder and the right hand modular blade at the left hand holder.

●Mono block type (Air / coolant through)



Right hand tool holder shown.

Seat Size	CW	CDX *3	DMIN	Type	Hand (R/L)	Order Number Holder	Stock	Modular Blade	Stock	Fig.
J	6.00 6.31 6.35	7.5—13 *1	60	Modular	R	GYDR40M90D-M25L	●	GYM25LA-J14	●	D
					L	GYDL40M90D-M25R	●	GYM25RA-J14	●	D
				Modular	R	GYDR40T90D-M25L	●	GYM25LA-J14	●	C
					L	GYDL40T90D-M25R	●	GYM25RA-J14	●	C
			70	Modular	R	GYDR50P90F-M25L	●	GYM25LA-J14	●	D
					L	GYDL50P90F-M25R	●	GYM25RA-J14	●	D
				Modular	R	GYDR50T90F-M25L	●	GYM25LA-J14	●	C
					L	GYDL50T90F-M25R	●	GYM25RA-J14	●	C

*1 The maximum groove depth varies according to the cutting diameter **DMIN**.
*2 Dimensions shown are when the gauge insert is used. If other insert geometries are used then **LF, LDRED, WF** and **F2** values may vary.
*3 The maximum groove depth (**CDX**) is a value within the dimension **LDRED**.

●Modular blade type (Air / coolant through)

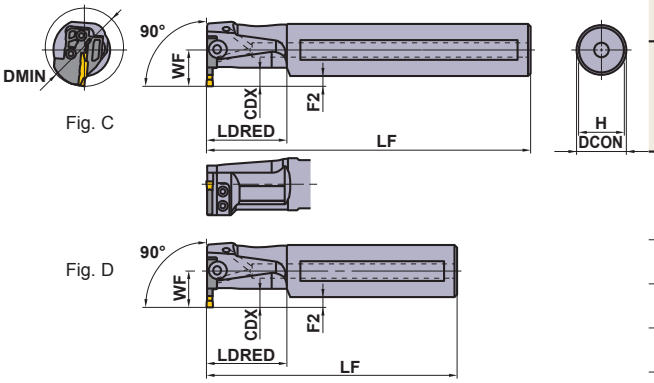


Fig. C

Fig. D

Right hand tool holder shown.

* Wrench : ① : Clamp Screw, ② : Blade Screw

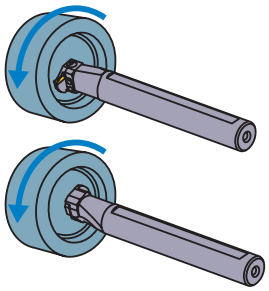
SPARE PARTS

Holder	① ② Clamp Screw	4 pcs. Blade Screw	① ② Wrench *
GYAR/L25○90B-○07	①GY05016S (Clamp Torque : 5.0N·m)	–	①TKY20R
GYDR/L32○90C-M20L/R	②GY06013M (Clamp Torque : 6.0N·m)	TS407 (Clamp Torque : 3.5N·m)	①TKY30R ②TKY15D
GYDR/L40○90D-M20L/R			
GYDR/L40○90D-M25L/R	②GY06013M (Clamp Torque : 6.0N·m)	TS55 (Clamp Torque : 5.0N·m)	①TKY30R ②TKY25D
GYDR/L50○90F-M25L/R			

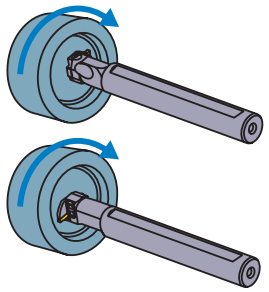
Dimensions (mm)					
DCON	LF	LDRED	WF	F2	H
40	150	60	28	8	37
40	150	60	28	8	37
40	300	60	28	8	37
40	300	60	28	8	37
50	170	80	34	9	47
50	170	80	34	9	47
50	300	80	34	9	47
50	300	80	34	9	47

Cutting Mode

R



L



Insert selection

Seat Size	Geometry name
J	GY○○0600/0631/0635J○○○○–Breaker shown below

For grooving/cutting off breaker

Seat Size	CW \ Breaker	GU (For gummy steel)	GS (Low)	GM (Medium)	GFGS (Hardened steel)
J	6.00mm	●	●	●	●
	6.35mm	●	●	●	

For multifunctional grooving breaker

Seat Size	CW \ Breaker	MF (Finish)	MS (Low)	MM (Medium)	BM (Copying)
					Ball nose
J	6.00mm				●
	RE 0.2	●			
	RE 0.4	●	●	●	
	RE 0.8	●	●	●	
	6.31mm	●			
	6.35mm				●
	RE 0.2	●			
	RE 0.4	●			
	RE 0.8	●			

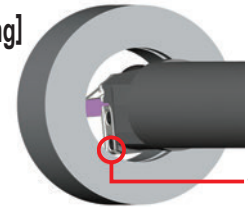
● : Standard insert with dimensions

RECOMMENDED CUTTING SPEED (m/min) [For Internal Grooving]

	Work Material	Hardness	Grade	Cutting Speed (m/min) 50–300
P	Mild Steel	≤160HB	VP20RT	80–180
			VP10RT	90–190
			NX2525	70–170
	Carbon Steel Alloy Steel	160–280HB	VP20RT	60–140
			VP10RT	70–150
			MY5015	90–210
			NX2525	55–135
		280HB≤	VP20RT	50–110
			VP10RT	60–120
			MY5015	80–160
			NX2525	45–105
M	Stainless Steel	≤270HB	VP20RT	50–110
			VP10RT	60–120
K	Gray Cast Iron	Tensile Strength ≤300MPa	VP20RT	60–140
			VP10RT	70–150
			MY5015	90–210
	Ductile Cast Iron	Tensile Strength ≤800MPa	VP20RT	50–110
			VP10RT	60–120
			MY5015	80–160
S	Heat Resistant Alloy Titanium Alloy	–	VP20RT	30–60
			VP10RT	40–70
			RT9010	40–70
H	Hardened steel	50HRC≤	BC8110	60–100
			MB8025	60–100

(Note 1) VP20RT is the first recommended grade for materials other than hardened steel.
(Note 2) For VP10RT, VP20RT and MY5015, wet cutting is recommended.

LIMITATION OF THE MAXIMUM GROOVE DEPTH [For Internal Grooving]



Due to interference of this part, the maximum groove depth is limited by the cutting diameter.

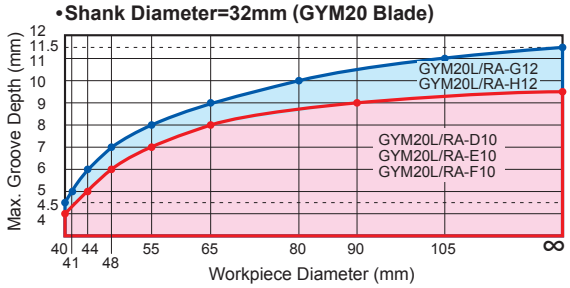
•When using the mono block type

The maximum groove depth is not limited by the cutting diameter.

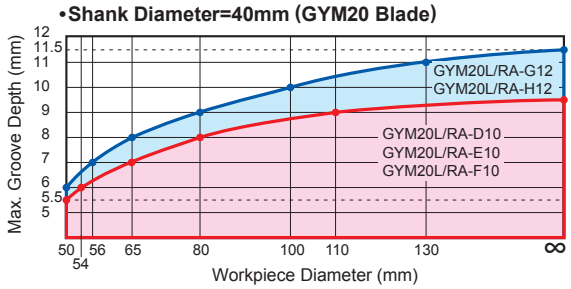
•When using the modular blade type

The maximum groove depth is limited by the cutting diameter.

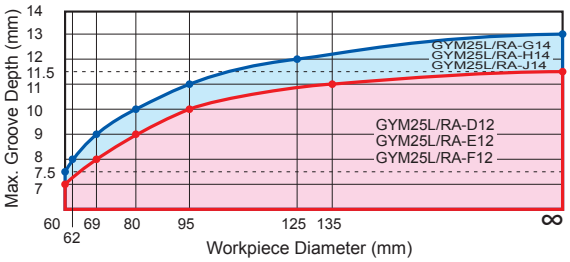
•Shank Diameter=32mm (GYM20 Blade)



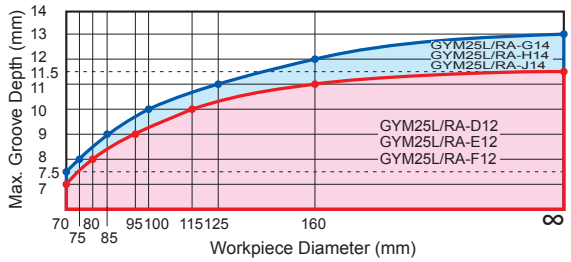
•Shank Diameter=40mm (GYM20 Blade)



•Shank Diameter=40mm (GYM25 Blade)

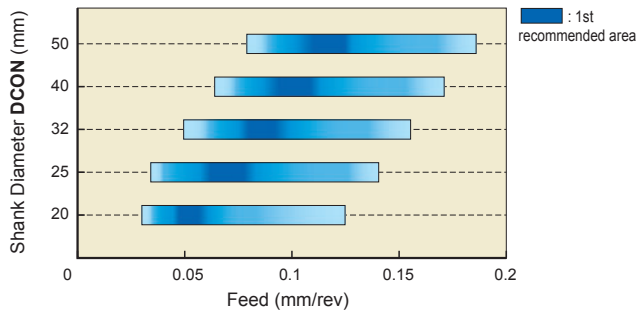


•Shank Diameter=50mm (GYM25 Blade)

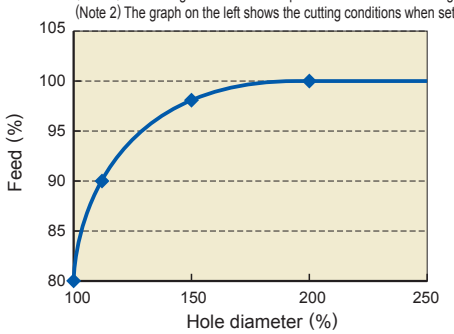


RECOMMENDED CUTTING CONDITIONS [For Internal Grooving]

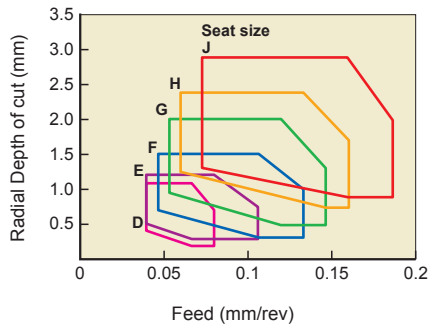
GROOVING



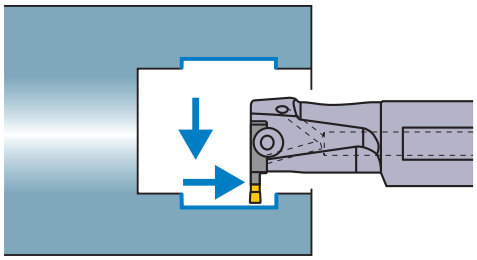
(Note 1) The cutting diameter 100% represents the minimum cutting diameter (DMIN).
(Note 2) The graph on the left shows the cutting conditions when setting the feed to 100%.



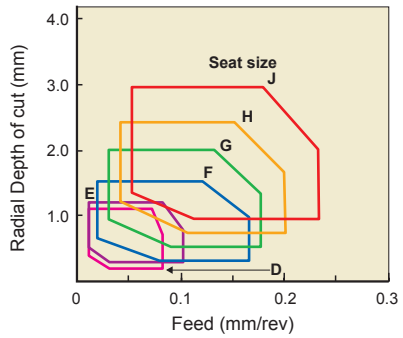
TRAVERSE MACHINING (MF BREAKER)



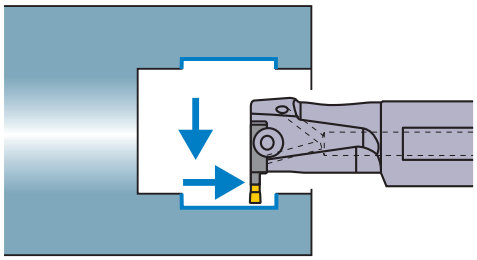
●When traverse machining a blind hole, it is recommended to carry out back turning considering chip disposal.



TRAVERSE MACHINING (MM/MS BREAKER)

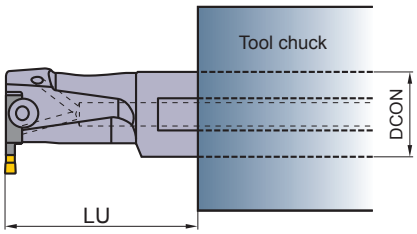


●When traverse machining a blind hole, it is recommended to carry out back turning considering chip disposal.



(Note) The above cutting conditions are for when using the tool overhang (LU) 1.6-2.0 times larger than the shank diameter (DCON). (L/D=1.6-2.0)
When using L/D larger than 2.0, reduce the cutting conditions.

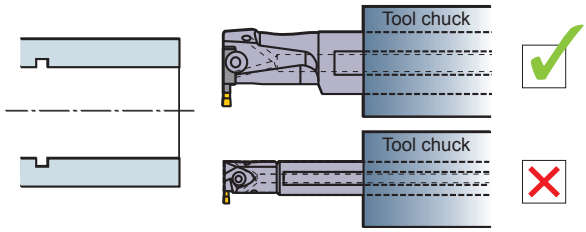
	Seat Size Insert Width (mm)
D	2.00 2.24
E	2.39 2.50 2.74
F	3.00 3.18 3.24
G	4.00 4.24
H	4.75 5.00 5.24
J	6.00 6.31 6.35



TOOL SELECTION

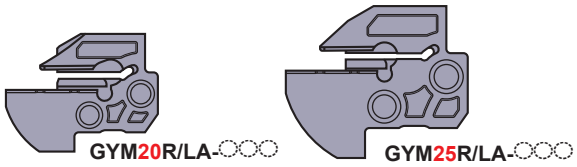
Notes when selecting the tool body

Holder



●When the overhang is the same, select a holder with the largest possible shank size to ensure sufficient clamping rigidity.

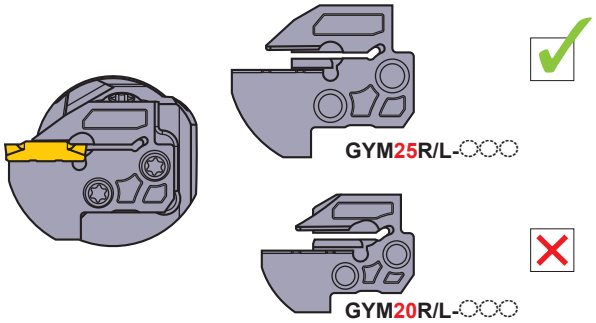
Modular blade (1)



GYM20R/LA-D10	GYM25R/LA-D12
GYM20R/LA-E10	GYM25R/LA-E12
GYM20R/LA-F10	GYM25R/LA-F12
GYM20R/LA-G12	GYM25R/LA-G14
GYM20R/LA-H12	GYM25R/LA-H14
	GYM25R/LA-J14

●For a ø40 shank holder, if there is no restriction for use, select a holder suitable for GYM25 blade.

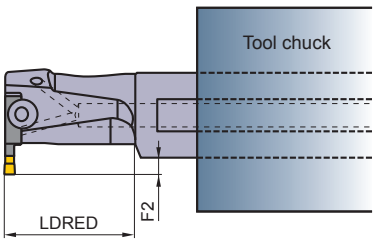
Modular blade (2)



●For an internal holder, select a modular blade listed above.

Notes when setting the tool

Overhang



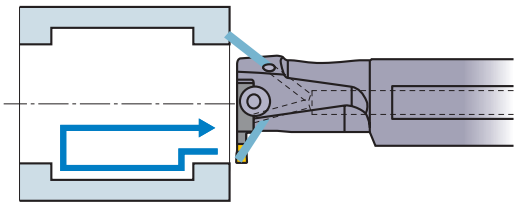
●The maximum groove depth is limited to the dimension LDRED. When machining with longer overhangs, refer to the dimension F2 of the tool used.

MACHINING RECOMMENDATIONS

Notes on multi-function machining (MF, MS, MM and BM breakers)

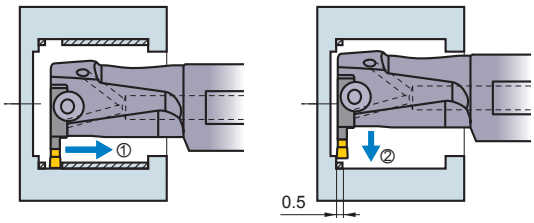
For internal grooving, the machining methods for external grooving can be used, but please note the following precautions.

Coolant



●Supply large amounts of coolant for effective chip disposal during cutting. Maintain supply until the tool has been retracted completely for improved chip disposal.

Machining blind holes

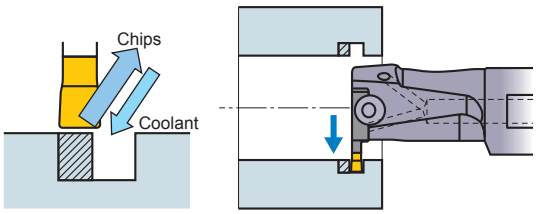


●As continuous chips tend to elongate at the back of the bore, the above operation is recommended.
The recommended width of cut for ② is 0.5mm.

Machining Wide Grooves

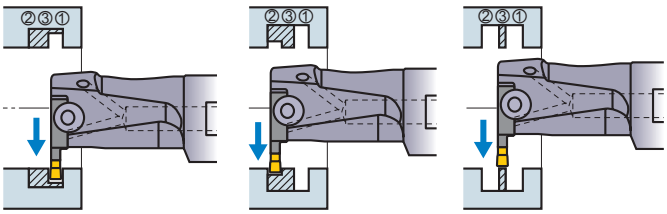
Grooving

●When the cutting edge width is x 2 ≥ groove width



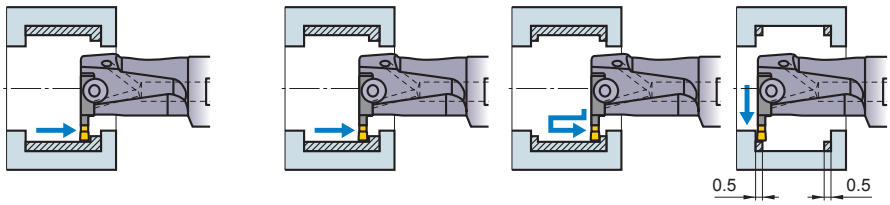
●When the depth of cut is shallower than the cutting edge width, continuous chips are usually produced. When plunging in several passes, it is recommended to carry out machining in the steps above. This ensures that coolant reaches the cutting edge and chips are easily discharged.

●When the cutting edge width is x 2 < groove width



●When the groove depth is larger than the cutting edge width, carry out plunging in the steps above to break up chips efficiently.

Turning

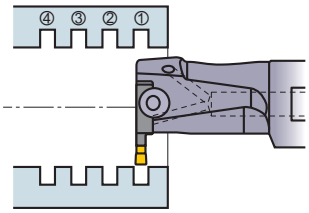


●When chip breaking and disposal are especially important, cross-feed machining is recommended.

●Wide face grooving when the corner R of the work piece is equal to the corner R of the insert, machine as shown above. (When corner R of the work piece is larger than corner R of the insert, refer to the description of external wide grooving.)

●If the groove depth exceeds a given level, chips may elongate at the wall. In such a case, increase the feed and carry out machining as shown above.

Machining instruction



●It is recommended to carry out grooving from the front end of the workpiece.
This reduces workpiece deflection.

C-F/HR

MICRO-MINI BORING BARS

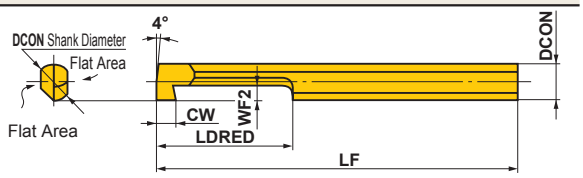
INTERNAL GROOVING

Product Information

Spare Parts >> 1927
ISO13399 Property >> 1966
Technical Info >> 1971

MICRO-MINI STANDARD (SOLID CARBIDE BORING BAR)

Order Number	Stock Micro Grain Carbide TF15	Dimensions(mm) CW	DCON	LF	LDRED	DMIN*	WF2	Geometry
C03FR-BLS	●	2.0	3	80	15	3.2	1.0	
C04FR-BLS	●	2.5	4	80	20	4.2	1.5	
C05HR-BLS	●	3.0	5	100	25	5.2	2.0	



Right hand tool only.

* DMIN : Min. Cutting Diameter

● : **Inventory maintained in Japan. (MICRO MINI is available in 1 piece in one pack.)**

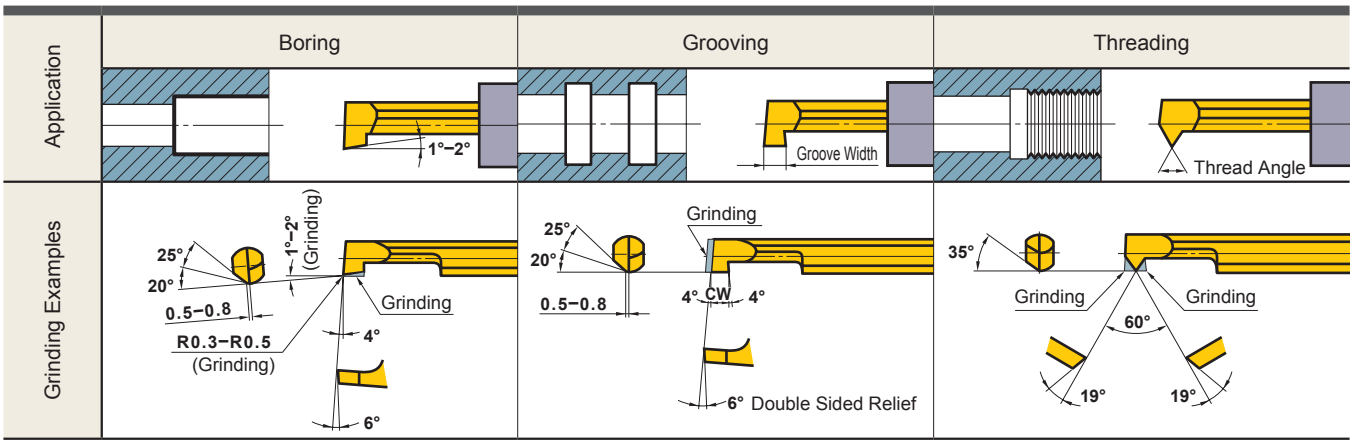
RECOMMENDED CUTTING CONDITIONS

	Work Material	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)	Excrescence Quantity (l /d)	Edge Condition Corner Radius or BCH *	Edge Condition Honing *
P	Carbon Steel · Alloy Steel 180—280HB	40 (30—50)	0.05 (—0.1)	0.2 (0.1—0.3)	5	0.1—0.5	0.01—0.05
M	Stainless Steel ≤200HB	40 (30—50)	0.05 (—0.1)	0.2 (0.1—0.3)	5	≤0.4	0—0.03
K	Gray Cast Iron ≤350MPa	40 (30—50)	0.05 (—0.05)	0.2 (0.1—0.3)	5	0.1—0.5	0.01—0.05
N	Non-ferrous Metal	80 (60—100)	0.05 (—0.1)	0.3 (0.1—0.5)	5	0.1—0.5	0—0.03

*Cutting edge is not honed. Please hone according to the application before machining.

GRINDING THE CUTTING EDGE OF MICRO-MINI

●MICRO-MINI can be applied to boring and grooving as supplied. But, it can also be reground as shown below.
●For shaping and regrinding, use a diamond whetstone approximately #250—#400. Please grind according to the application using the figure below as a reference.



CG-RS

MICRO-MINI TWIN

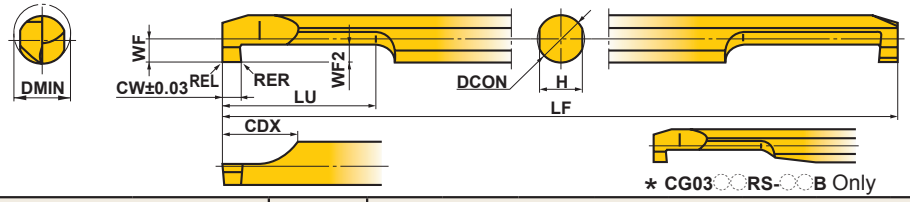
INTERNAL GROOVING

Product Information

SPARE PARTS >> 1927
ISO13399 Property >> 1966
Technical Info >> 1971

·CG

CG TYPE (Internal Grooving)



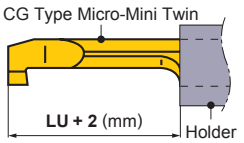
Order Number	Stock		Breaker	Dimensions (mm)									
	Micro Grain Carbide	Coated											
	TF15	VP15TF		DMIN	CW	WF2	RER/L	DCON	LF	LU	CDX	WF	H
CG0305RS-10	●	●	Without	3	1	1	0.05	3	50	5	6	1.3	2.7
CG0305RS-10B	●	●	With	3	1	1	0.05	3	50	5	6	1.3	2.7
CG0306RS-20	●	●	Without	3	2	1	0.1	3	50	6	6	1.3	2.7
CG0306RS-20B	●	●	With	3	2	1	0.1	3	50	6	6	1.3	2.7
CG03RS-10	●	●	Without	3	1	1	0.05	3	50	10	6	1.3	2.7
CG03RS-10B	●	●	With	3	1	1	0.05	3	50	10	6	1.3	2.7
CG03RS-20	●	●	Without	3	2	1	0.1	3	50	11	6	1.3	2.7
CG03RS-20B	●	●	With	3	2	1	0.1	3	50	11	6	1.3	2.7
CG0407RS-10	●	●	Without	4	1	1.5	0.05	4	60	7	7	1.8	3.6
CG0407RS-10B	●	●	With	4	1	1.5	0.05	4	60	7	7	1.8	3.6
CG0408RS-20	●	●	Without	4	2	1.5	0.1	4	60	8	7	1.8	3.6
CG0408RS-20B	●	●	With	4	2	1.5	0.1	4	60	8	7	1.8	3.6
CG04RS-10	●	●	Without	4	1	1.5	0.05	4	60	15	7	1.8	3.6
CG04RS-10B	●	●	With	4	1	1.5	0.05	4	60	15	7	1.8	3.6
CG04RS-20	●	●	Without	4	2	1.5	0.1	4	60	16	7	1.8	3.6
CG04RS-20B	●	●	With	4	2	1.5	0.1	4	60	16	7	1.8	3.6
CG0510RS-10	●	●	Without	5	1	2	0.05	5	70	10	8	2.3	4.5
CG0510RS-10B	●	●	With	5	1	2	0.05	5	70	10	8	2.3	4.5
CG0511RS-20	●	●	Without	5	2	2	0.1	5	70	11	8	2.3	4.5
CG0511RS-20B	●	●	With	5	2	2	0.1	5	70	11	8	2.3	4.5
CG05RS-10	●	●	Without	5	1	2	0.05	5	70	20	8	2.3	4.5
CG05RS-10B	●	●	With	5	1	2	0.05	5	70	20	8	2.3	4.5
CG05RS-20	●	●	Without	5	2	2	0.1	5	70	21	8	2.3	4.5
CG05RS-20B	●	●	With	5	2	2	0.1	5	70	21	8	2.3	4.5
CG0610RS-10	●	●	Without	6	1	2	0.05	6	75	10	8	2.8	5.4
CG0610RS-10B	●	●	With	6	1	2	0.05	6	75	10	8	2.8	5.4
CG0611RS-20	●	●	Without	6	2	2	0.1	6	75	11	8	2.8	5.4
CG0611RS-20B	●	●	With	6	2	2	0.1	6	75	11	8	2.8	5.4
CG06RS-10	●	●	Without	6	1	2	0.05	6	75	20	8	2.8	5.4
CG06RS-10B	●	●	With	6	1	2	0.05	6	75	20	8	2.8	5.4
CG06RS-20	●	●	Without	6	2	2	0.1	6	75	21	8	2.8	5.4
CG06RS-20B	●	●	With	6	2	2	0.1	6	75	21	8	2.8	5.4

● : Inventory maintained in Japan. (MICRO-MINI TWIN is available in 1 piece in one pack.)

Order Number	Stock		Breaker	Dimensions (mm)									
	Micro Grain Carbide	Coated											
	TF15	VP15TF		DMIN	CW	WF2	RER/L	DCON	LF	LU	CDX	WF	H
CG0712RS-10	●	●	Without	7	1	2	0.05	7	85	12	8	3.3	6.4
CG0712RS-10B	●	●	With	7	1	2	0.05	7	85	12	8	3.3	6.4
CG0713RS-20	●	●	Without	7	2	2	0.1	7	85	13	8	3.3	6.4
CG0713RS-20B	●	●	With	7	2	2	0.1	7	85	13	8	3.3	6.4
CG07RS-10	●	●	Without	7	1	2	0.05	7	85	25	8	3.3	6.4
CG07RS-10B	●	●	With	7	1	2	0.05	7	85	25	8	3.3	6.4
CG07RS-20	●	●	Without	7	2	2	0.1	7	85	26	8	3.3	6.4
CG07RS-20B	●	●	With	7	2	2	0.1	7	85	26	8	3.3	6.4

RECOMMENDED CUTTING CONDITIONS

	Work Material	Hardness	Cutting Speed (m/min)	Feed (mm/rev)		Recommended Tool Overhang (mm)
				CG03RS/CG04RS	CG05RS/CG06RS/CG07RS	
P	Carbon Steel · Alloy Steel	180−280HB	80 (40−120)	0.02 (0.01−0.03)	0.03 (0.01−0.05)	CG Type Micro-Mini Twin
M	Stainless Steel	≤200HB	80 (40−120)	0.02 (0.01−0.03)	0.03 (0.01−0.05)	
K	Gray Cast Iron	Tensile Strength ≤350MPa	80 (40−120)	0.03 (0.01−0.05)	0.03 (0.01−0.05)	
N	Non-ferrous Metal	–	120 (80−160)	0.03 (0.01−0.05)	0.05 (0.01−0.08)	



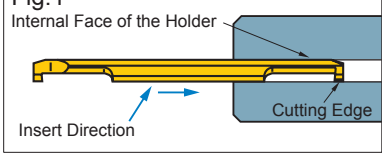
(Note) Wet cutting is recommended.

PRECAUTIONS WHEN USING THE MICRO-MINI TWIN

●When using a holder for general purpose / small automatic lathe:

1 To avoid chipping of the 2nd cutting edge take care when inserting the boring bar into the holder. Refer to fig.1. If the 2nd edge contacts the internal face of the holder there is a possibility that it may chip.

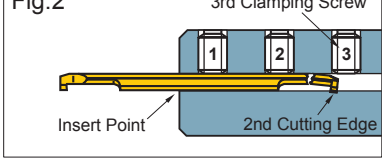
Fig.1



2 When using this type of holder, there is a possibility that damage to the shank and the 2nd cutting edge can occur. Make sure that the clamping screws are tightened to the set torque value. Additionally make sure that there is no clamping screw near the 2nd cutting edge as this can break the boring bar.

◎When using Mitsubishi holders
When using holders with a tool overhang of recommended quantity, ensure that the 3rd clamping screw is removed prior to machining. The set torque value for clamping screw is 2.0 N•m.

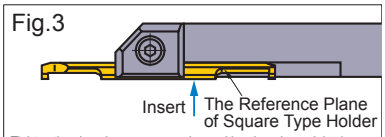
Fig.2



●When using a square type holder:

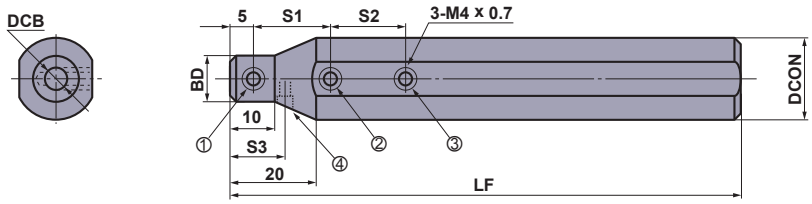
1 When installing the boring bar into the holder, tighten the clamp screws after ensuring the flats on the tool holder are parallel to the reference flats on the micro-mini bar. Refer to fig.3.
2 Make sure that the clamping screws are tightened to the recommended values.
3 Do not tighten the clamp screw without a bar in place, otherwise the bridge will be deformed.

Fig.3

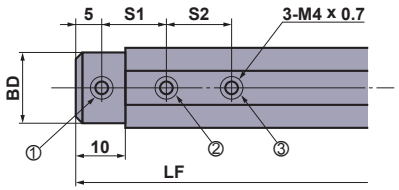


Tighten the clamping screw ensuring making the micro-mini twin boring bars in contact with the reference plane of square type holder.

ROUND TYPE HOLDER



RBH22◌◌N has a temporary set screw for different machine specifications.
(Represented by number 4)



RBH158◌◌N, RBH16◌◌N,
RBH190◌◌N

Order Number	Stock	Dimensions (mm)							MICRO-MINI C	MICRO-MINI TWIN CG	*1 Clamp Screw				Wrench	Torque (N • m)
		DCON	DCB	BD	LF	S1	S2	S3			①	②	③	④		
RBH15830N	●	15.875	3	15	100	10	10	—	03FR-BLS	03RS-◌◌(B)	A	A	A	—	HKY20F	2.0
RBH15840N	●	15.875	4	15	100	15	15	—	04FR-BLS	04RS-◌◌(B)	A	A	A	—	HKY20F	2.0
RBH15850N	●	15.875	5	15	100	15	15	—	05HR-BLS	05RS-◌◌(B)	A	A	A	—	HKY20F	2.0
RBH15860N	●	15.875	6	15	100	15	15	—	—	06RS-◌◌(B)	A	A	A	—	HKY20F	2.0
RBH15870N	●	15.875	7	15	100	20	20	—	—	07RS-◌◌(B)	A	A	A	—	HKY20F	2.0
RBH1630N	●	16	3	15	100	10	10	—	03FR-BLS	03RS-◌◌(B)	A	A	A	—	HKY20F	2.0
RBH1640N	●	16	4	15	100	15	15	—	04FR-BLS	04RS-◌◌(B)	A	A	A	—	HKY20F	2.0
RBH1650N	●	16	5	15	100	15	15	—	05HR-BLS	05RS-◌◌(B)	A	A	A	—	HKY20F	2.0
RBH1660N	●	16	6	15	100	15	15	—	—	06RS-◌◌(B)	A	A	A	—	HKY20F	2.0
RBH1670N	●	16	7	15	100	20	20	—	—	07RS-◌◌(B)	A	A	A	—	HKY20F	2.0
*2 RBH19030N	●	19.05	3	18	125	10	10	—	03FR-BLS	03RS-◌◌(B)	B	B	B	—	HKY20F	2.0
*2 RBH19040N	●	19.05	4	18	125	15	15	—	04FR-BLS	04RS-◌◌(B)	B	B	B	—	HKY20F	2.0
*2 RBH19050N	●	19.05	5	18	125	15	15	—	05HR-BLS	05RS-◌◌(B)	B	B	B	—	HKY20F	2.0
*2 RBH19060N	●	19.05	6	18	125	15	15	—	—	06RS-◌◌(B)	B	B	B	—	HKY20F	2.0
*2 RBH19070N	●	19.05	7	18	125	20	20	—	—	07RS-◌◌(B)	B	B	B	—	HKY20F	2.0
RBH2030N	●	20	3	12	125	10	10	—	03FR-BLS	03RS-◌◌(B)	A	A	B	—	HKY20F	2.0
RBH2040N	●	20	4	13	125	15	15	—	04FR-BLS	04RS-◌◌(B)	A	B	B	—	HKY20F	2.0
RBH2050N	●	20	5	14	125	15	15	—	05HR-BLS	05RS-◌◌(B)	A	B	B	—	HKY20F	2.0
RBH2060N	●	20	6	15	125	15	15	—	—	06RS-◌◌(B)	A	B	B	—	HKY20F	2.0
RBH2070N	●	20	7	16	125	20	20	—	—	07RS-◌◌(B)	A	B	B	—	HKY20F	2.0
RBH2230N	●	22	3	12	125	10	10	10	03FR-BLS	03RS-◌◌(B)	A	B	C	A	HKY20F	2.0
RBH2240N	●	22	4	13	125	15	15	12.5	04FR-BLS	04RS-◌◌(B)	A	B	B	A	HKY20F	2.0
RBH2250N	●	22	5	14	125	15	15	12.5	05HR-BLS	05RS-◌◌(B)	A	B	B	A	HKY20F	2.0
RBH2260N	●	22	6	15	125	15	15	15	—	06RS-◌◌(B)	A	B	B	A	HKY20F	2.0
RBH2270N	●	22	7	16	125	20	20	15	—	07RS-◌◌(B)	A	B	B	A	HKY20F	2.0
RBH2530N	●	25	3	12	150	10	10	—	03FR-BLS	03RS-◌◌(B)	A	B	C	—	HKY20F	2.0
RBH2540N	●	25	4	13	150	15	15	—	04FR-BLS	04RS-◌◌(B)	A	C	C	—	HKY20F	2.0
RBH2550N	●	25	5	14	150	15	15	—	05HR-BLS	05RS-◌◌(B)	A	C	C	—	HKY20F	2.0
RBH2560N	●	25	6	15	150	15	15	—	—	06RS-◌◌(B)	A	C	C	—	HKY20F	2.0
RBH2570N	●	25	7	16	150	20	20	—	—	07RS-◌◌(B)	A	C	C	—	HKY20F	2.0

● : Inventory maintained in Japan.

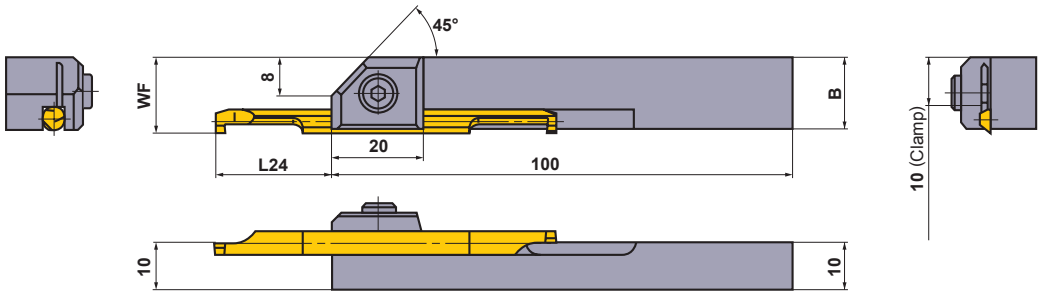
Order Number	Stock	Dimensions (mm)							MICRO-MINI C	MICRO-MINI TWIN CG	*1 Clamp Screw				Wrench	Torque (N • m)
		DCON	DCB	BD	LF	S1	S2	S3			①	②	③	④		
RBH25430N	●	25.4	3	12	150	10	10	—	03FR-BLS	03RS-○○(B)	A	B	C	—	HKY20F	2.0
RBH25440N	●	25.4	4	13	150	15	15	—	04FR-BLS	04RS-○○(B)	A	C	C	—	HKY20F	2.0
RBH25450N	●	25.4	5	14	150	15	15	—	05HR-BLS	05RS-○○(B)	A	C	C	—	HKY20F	2.0
RBH25460N	●	25.4	6	15	150	15	15	—	—	06RS-○○(B)	A	C	C	—	HKY20F	2.0
RBH25470N	●	25.4	7	16	150	20	20	—	—	07RS-○○(B)	A	C	C	—	HKY20F	2.0

*1 Order number of clamp screw A=HSS04004, B=HSS04006, C=HSS04008
*2 Revised order number.

● : **Inventory maintained in Japan.**

Conventional Order Number	Revised Order Number
RBH1930N	**RBH19030N**
RBH1940N	**RBH19040N**
RBH1950N	**RBH19050N**
RBH1960N	**RBH19060N**
RBH1970N	**RBH19070N**

SQUARE TYPE HOLDER



Order Number	Stock	Dimensions (mm)				MICRO-MINI TWIN CG	Clamp Screw	Wrench	Torque (N • m)
		MICRO-MINI TWIN CG							
		B	WF	L24 *					
				Width of Cutting Edge 1mm	Width of Cutting Edge 2mm				
SBH1030R	●	13.8	13.8	13—17.5 (14)	14—16.5 (15)	03RS-10(B),03RS-20(B)	HSC05012	HKY40R	9.5
SBH1040R	●	14.7	14.8	18—22.5 (19)	19—21.5 (20)	04RS-10(B),04RS-20(B)	HSC05012	HKY40R	9.5
SBH1050R	●	15.6	15.8	23—27.5 (24)	24—26.5 (25)	05RS-10(B),05RS-20(B)	HSC05012	HKY40R	9.5
SBH1060R	●	16.5	16.8	23—32.5 (24)	24—31.5 (25)	06RS-10(B),06RS-20(B)	HSC05012	HKY40R	9.5
SBH1070R	●	17.4	17.8	28—38 (29)	29—37 (30)	07RS-10(B),07RS-20(B)	HSC05012	HKY40R	9.5

* L24 is the length of overhang for sufficient clamping, and ( ) is the recommended length for machining of carbon and alloy steel.

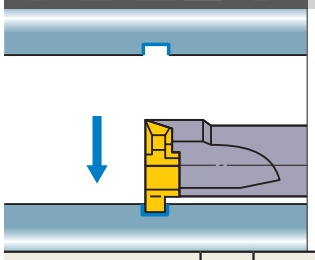
● : **Inventory maintained in Japan.**

FSL51/52

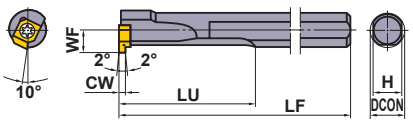
Product Information

Spare Parts >> 1927
ISO13399 Property >> 1966
Technical Info >> 1971

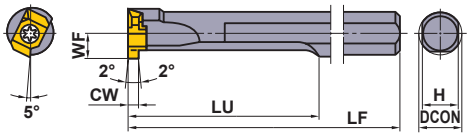
FSL51 Internal grooving, Threading



1 Corner type (FSL5108R,5110R)



2 Corner type (FSL5112R,5114R,5116R)

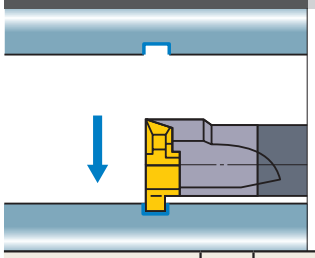


Right hand tool holder only.

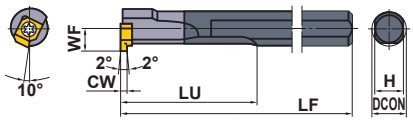
Order Number	Stock	Insert Number		Dimensions(mm)							Max. Groove Depth (mm)	*2 Clamp Screw	Wrench
	R	Grooving	Threading	DCON	LF	LU	WF	H	CW	DMIN *1			
FSL5108R	●	MLG10○○L	MLT1001L	8	125	30	4.8	7	1.2 1.5 2.0	**10**	1.0	TS25	TKY08F
FSL5110R	●	MLG10○○L	MLT1001L	10	150	40	5.8	9		**12**	1.0	TS25	TKY08F
FSL5112R	●	MLG14○○L	MLT1401L	12	180	50	6.8	10.8	1.5 2.0 3.0	**14**	2.0	TS32	TKY08F
FSL5114R	●	MLG14○○L	MLT1401L	14	180	60	7.8	12.4		**16**	2.0	TS32	TKY08F
FSL5116R	●	MLG20○○L	MLT2001L	16	200	70	9.7	14	2.0 3.0 4.0	**20**	3.0	TS43	TKY15F

*1 DMIN : Min. Cutting Diameter
*2 Clamp Torque (N • m) : TS25=1.0, TS32=1.0, TS43=3.5

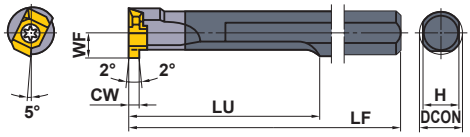
FSL52 (Carbide shank) Internal grooving, Threading



1 Corner type (FSL5208R,5210R)



2 Corner type (FSL5212R,5214R,5216R)



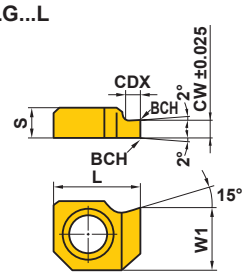
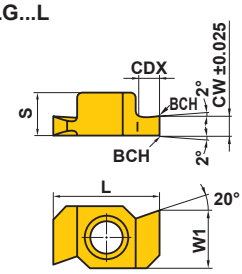
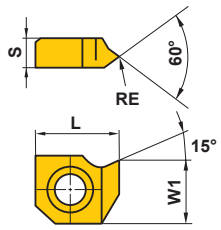
Right hand tool holder only.

Order Number	Stock	Insert Number		Dimensions(mm)							Max. Groove Depth (mm)	*2 Clamp Screw	Wrench
	R	Grooving	Threading	DCON	LF	LU	WF	H	CW	DMIN *1			
FSL5208R	●	MLG10○○L	MLT1001L	8	125	60	4.8	7	1.2 1.5 2.0	**10**	1.0	TS25	TKY08F
FSL5210R	●	MLG10○○L	MLT1001L	10	150	70	5.8	9		**12**	1.0	TS25	TKY08F
FSL5212R	●	MLG14○○L	MLT1401L	12	180	80	6.8	10.8	1.5 2.0 3.0	**14**	2.0	TS32	TKY08F
FSL5214R	●	MLG14○○L	MLT1401L	14	180	85	7.8	12.4		**16**	2.0	TS32	TKY08F
FSL5216R	●	MLG20○○L	MLT2001L	16	200	115	9.7	14	2.0 3.0 4.0	**20**	3.0	TS43	TKY15F

*1 DMIN : Min. Cutting Diameter
*2 Clamp Torque (N • m) : TS25=1.0, TS32=1.0, TS43=3.5

● : **Inventory maintained in Japan.**

INSERTS

Application	CW and pitch (mm)	Order Number	Coated UP20M	Carbide UTi20T	Dimensions(mm) L	W1	CDX	S	RE	BCH	Geometry
Grooving	1.2	**MLG1012L**		●	7	5	1	2.38	—	0.1	MLG...L 
	1.5	**MLG1015L**		●	7	5	1	2.38	—	0.1	
	2	**MLG1020L**		●	7	5	1	2.38	—	0.1	
	1.5	**MLG1415L**		●	11.8	6.5	2	4.76	—	0.1	MLG...L 
	2	**MLG1420L**		●	11.8	6.5	2	4.76	—	0.1	
	3	**MLG1430L**		●	11.8	6.5	2	4.76	—	0.1	
	2	**MLG2020L**		●	16.8	9.03	3	6.35	—	0.1	
	3	**MLG2030L**		●	16.8	9.03	3	6.35	—	0.1	
	4	**MLG2040L**		●	16.8	9.03	3	6.35	—	0.1	
Threading	Pitch 1.5—2.0	**MLT1001L**	●	●	7	5	—	2.38	0.1	—	MLT 
	Pitch 1.5—2.5	**MLT1401L**	●	●	11.8	6.5	—	4.76	0.1	—	
	Pitch 1.5—3.5	**MLT2001L**	●	●	16.8	9.03	—	6.35	0.1	—	

● : Inventory maintained in Japan.
(10 inserts in one case)

RECOMMENDED CUTTING CONDITIONS

Work Material		Hardness	Grade	Cutting Speed (m/min)	Feed (mm/rev) 1.2, 1.5mm	2.0mm	3.0mm	4.0mm
P	Carbon Steel Alloy Steel	180—280HB	**UP20M • UTi20T**	90 (60—120)	0.05 (0.02—0.08)	0.05 (0.02—0.08)	0.05 (0.02—0.08)	0.05 (0.02—0.08)
		280—350HB	**UP20M • UTi20T**	80 (50—100)	0.03 (0.02—0.04)	0.03 (0.02—0.04)	0.03 (0.02—0.04)	0.03 (0.02—0.04)

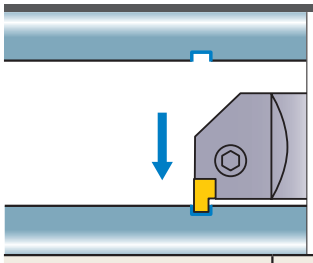
DPT

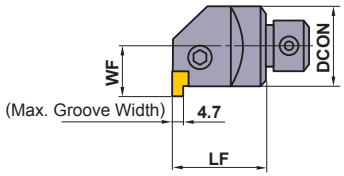
D TYPE BORING HEAD

INTERNAL GROOVING

Product Information

SPARE PARTS >> 1927
ISO13399 Property >> 1966
Technical Info >> 1971





Right hand tool holder only.

Order Number	Stock	Insert Number	Dimensions(mm)				Lock Pin	Lock Screw *2	Stop Ring	Wrench
	R		DCON	LF	WF	DMIN *1				
DPT4132R	●	MGTL43○○○	32	40	20	40	P21S	HSP08014	E01	HKY40R
DPT4140R	●		40	50	25	50	P21S	HSP08014	E01	HKY40R

(Note) Please use left hand insert.
*1 DMIN : Min. Cutting Diameter
*2 Clamp Torque (N • m) : HSP08014=7.0

● : **Inventory maintained in Japan.**

STANDARD ARBOR FOR D TYPE BORING HEAD

① **B** ② **1** ③ **32** ④ **32**

①Designation

②Arbor Length (mm)

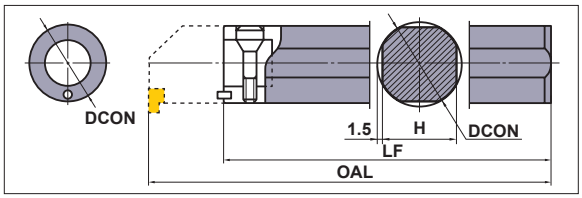
Symbol	DCON	LF	OAL
1	32	260	300
	40	310	360

③Arbor Diameter (mm)

Symbol	Diameter(DCON)
32	32
40	40

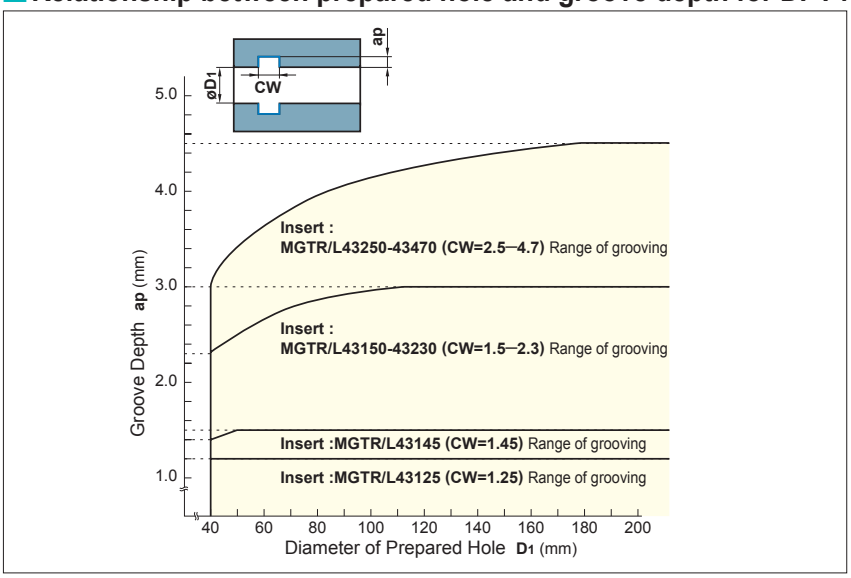
④Head Diameter (mm)

Symbol	Diameter(BD)
32	32
40	40



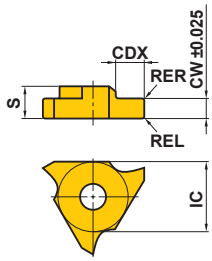
Order Number	Stock	Dimensions (mm)				Set Bolt	Wrench	Head Order Number
		DCON	LF	H	OAL			
B13232	●	32	260	29	300	SD32	HKY60R	DPT4132R
B14040	●	40	310	37	360	SD40	HKY60R	DPT4140R

Relationship between prepared hole and groove depth for DPT4 type



INSERTS

Order Number	Stock			Dimensions(mm)					Geometry
	Coated	Cermet	Carbide						
	VP20MF	NX2525	UTi20T	CW	CDX	IC	S	RER/L	
MGTL43125	●	●	●	1.25	1.2	12.7	4.76	0.2	MGTL...
MGTL43145	●	●	●	1.45	1.5	12.7	4.76	0.2	
MGTL43150	●	●	●	1.5	3.0	12.7	4.76	0.2	
MGTL43175	●	●	●	1.75	3.0	12.7	4.76	0.2	
MGTL43200	●	●	●	2	3.0	12.7	4.76	0.2	
MGTL43230	●	●	●	2.3	3.0	12.7	4.76	0.2	
MGTL43250	●	●	●	2.5	4.5	12.7	4.76	0.3	
MGTL43260	●		●	2.6	4.5	12.7	4.76	0.3	
MGTL43270	●		●	2.7	4.5	12.7	4.76	0.3	
MGTL43280	●	●	●	2.8	4.5	12.7	4.76	0.3	
MGTL43300	●	●	●	3	4.5	12.7	4.76	0.3	
MGTL43320			●	3.2	4.5	12.7	4.76	0.3	
MGTL43330	●	●	●	3.3	4.5	12.7	4.76	0.3	
MGTL43350	●	●	●	3.5	4.5	12.7	4.76	0.3	
MGTL43400	●		●	4	4.5	12.7	4.76	0.3	
MGTL43420	●		●	4.2	4.5	12.7	4.76	0.4	
MGTL43430	●		●	4.3	4.5	12.7	4.76	0.4	
MGTL43450	●	●	●	4.5	4.5	12.7	4.76	0.4	
MGTL43470	●	●	●	4.7	4.5	12.7	4.76	0.4	

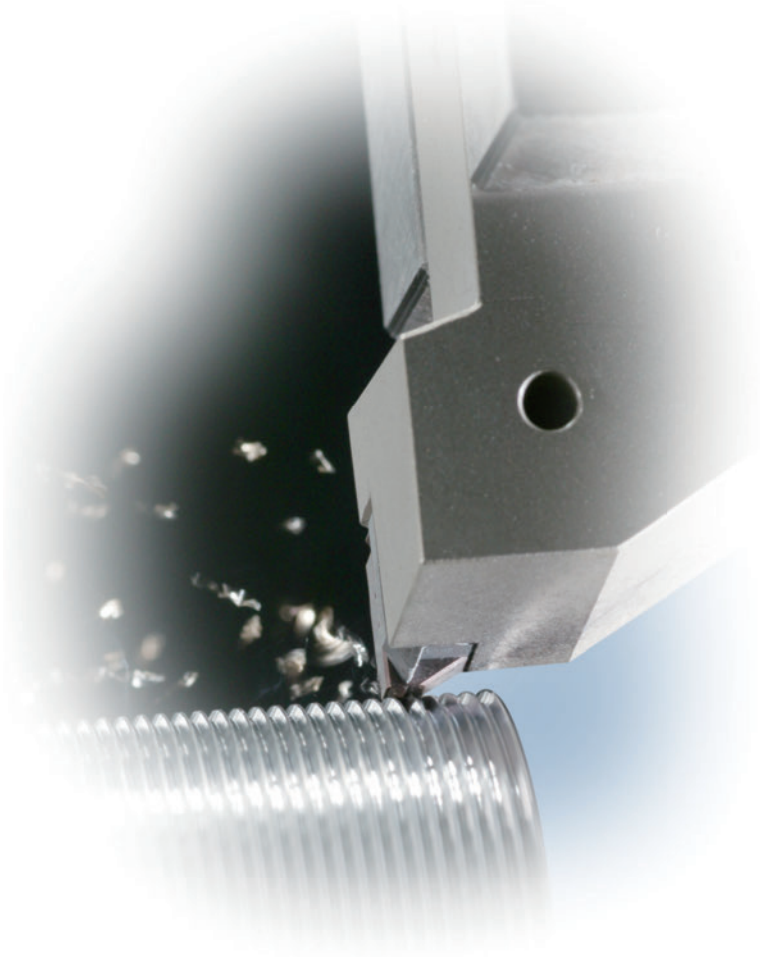


● : Inventory maintained in Japan.
(10 inserts in one case)

RECOMMENDED CUTTING CONDITIONS

	Work Material	Hardness	Grade	Cutting Speed (m/min)	Feed (mm/rev)
P	Carbon Steel Alloy Steel	180−280HB	VP20MF	120 (100−140)	0.14 (0.03−0.25)
			NX2525	130 (100−160)	0.12 (0.03−0.2)
M	Stainless Steel	≤200HB	VP20MF	120 (100−140)	0.12 (0.03−0.18)
K	Gray Cast Iron	Tensile Strength ≤350MPa	VP20MF	120 (100−140)	0.12 (0.03−0.18)

(Note) For machining a narrow groove, apply a lower feed within the recommended range.



TURNING TOOLS
THREADING

CROSS REFERENCE THREAD PITCH (EXTERNAL) 590
CROSS REFERENCE THREAD PITCH (INTERNAL) 592
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EXTERNAL THREADING 604
MMT 604
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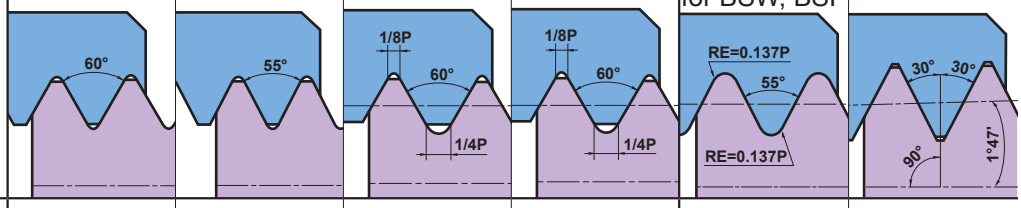
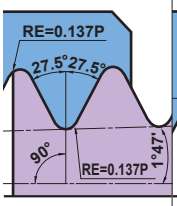
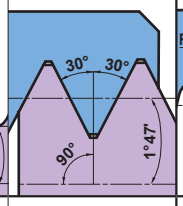
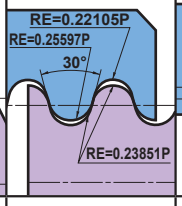
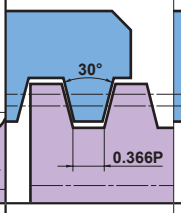
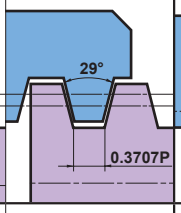
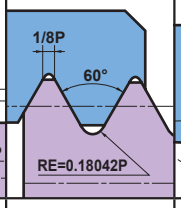
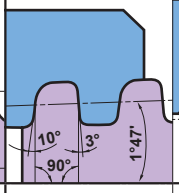
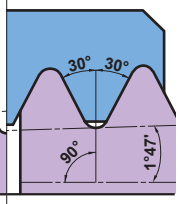
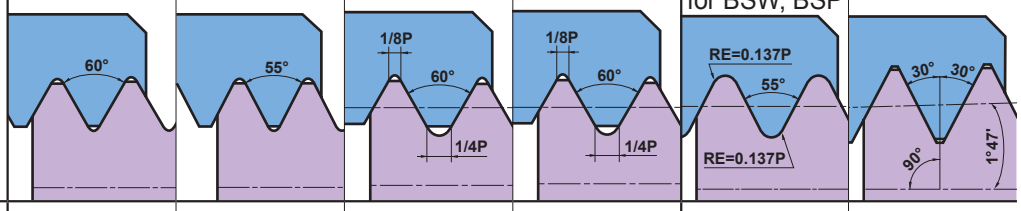
MT 609
MTH/MT1 609
SMG 611
SMG 611
INTERNAL THREADING 614
MMT 614
MMTI 614
CT-RS 619
CT-RS 619
FSL51/52 623
FSL51/52 623
DPT2 626
DPT2 626

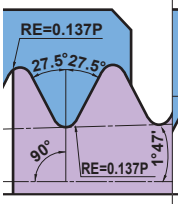
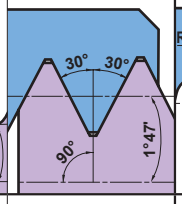
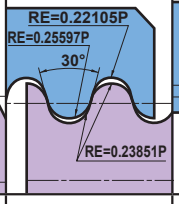
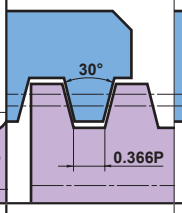
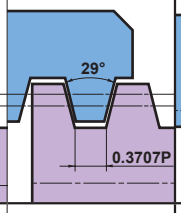
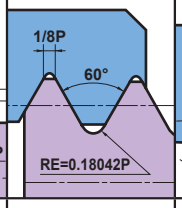
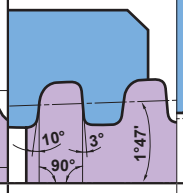
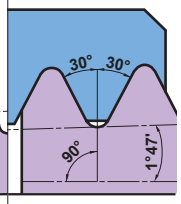
★Arranged by Alphabetical order

CT-RS 619
DPT2 626
FSL51/52 623
MMTE 604
MMTI 614
MTH/MT1 609
SMG 611

Application		General machining				Pipe fittings and couplings for gas and water	
Type		Partial Profile 60°	Partial Profile 55°	ISO Metric	American UN	Parallel Pipe Thread Whitworth for BSW, BSP	American NPT
							
Symbol		M UNC UNF	W	M	UNC UNF	G(PF) Rp(PS) W	NPT
Holder	Pitch	mm (thread/inch)	thread/inch	mm	thread/inch	thread/inch	thread/inch
MMT Holder 604	Full form	–	–	0.5–5.0	32–5	28–5	27, 18, 14 11.5, 8
	Partial form	0.5–5.0 (48–5)	48–5	0.5–5.0	48–5	–	–
MT Holder 609	Partial form	0.25–4.5 (64–6)	20–9	0.25–4.5	64–6	–	–
SMG Holder 611	Partial form	0.25–2.0 (48–13)	–	0.25–2.0	48–13	–	–

Steam, gas and water line pipes		Pipe couplings for food and fire fighting industries	Motion transmissions		Aircraft and aerospace	Oil and gas	
Taper Pipe Thread BSPT	American NPTF	Round DIN 405	ISO Trapezoidal 30°	American ACME	UNJ	API Buttress Casing	API Round Casing&Tubing
							
R(PT) Rc(PT) Rp	NPTF	Rd	Tr (TM)	ACME (Tw)	UNJ	BCSG	CSG LCSG
thread/inch	thread/inch	thread/inch	mm	thread/inch	thread/inch	thread/inch	thread/inch
28, 19 14, 11	27, 18, 14 11.5, 8	10, 8 6, 4	1.5, 2 3, 4, 5	12, 10 8, 6, 5	32—8	5	10, 8
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—

Application		General machining				Pipe fittings and couplings for gas and water	
Type		Partial Profile 60°	Partial Profile 55°	ISO Metric	American UN	Parallel Pipe Thread Whitworth for BSW, BSP	American NPT
							
Symbol		M UNC UNF	W	M	UNC UNF	G(PF) Rp(PS) W	NPT
Holder	Pitch	mm (thread/inch)	thread/inch	mm	thread/inch	thread/inch	thread/inch
MMT **Boring Bars** 614	Full form	–	–	0.5–5.0	32–5	28–5	27, 18, 14 11.5, 8
	Partial form	0.5–5.0 (48–5)	48–5	0.5–5.0	48–5	–	–
FSL5 **Boring Bars** 623	Partial form	1.5–3.5 (16–8)	–	1.5–3.5	16–8	–	–
DPT2 **Boring Head** 626	Partial form	0.25–4.5 (64–6)	–	0.25–4.5	64–6	–	–
MICRO-MINI TWIN 619	Partial form	0.5–1.75 (36–16)	–	0.5–1.75	36–16	–	–

Steam, gas and water line pipes		Pipe couplings for food and fire fighting industries	Motion transmissions		Aircraft and aerospace	Oil and gas	
Taper Pipe Thread BSPT	American NPTF	Round DIN 405	ISO Trapezoidal 30°	American ACME	UNJ	API Buttress Casing	API Round Casing&Tubing
							
R(PT) Rc(PT) Rp	NPTF	Rd	Tr (TM)	ACME (Tw)	UNJ	BCSG	CSG LCSG
thread/inch	thread/inch	thread/inch	mm	thread/inch	thread/inch	thread/inch	thread/inch
19, 14, 11	14, 11.5, 8	10, 8 6, 4	1.5, 2 3, 4, 5	12, 10 8, 6, 5	–	5	10, 8
–	–	–	–	–	* –	–	–
–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–

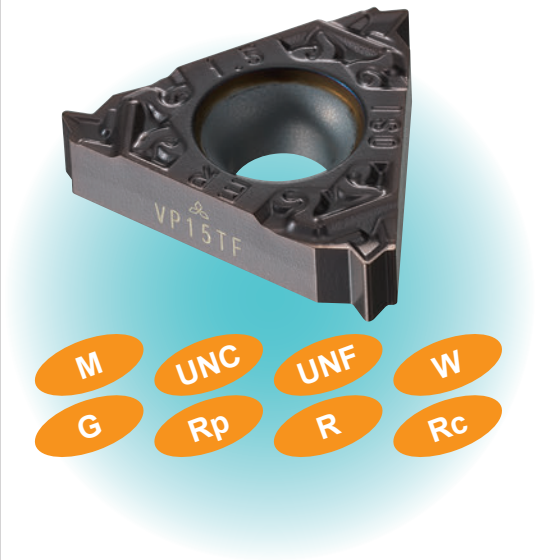
* When machining an internal UNJ thread, cut an internal hole with the appropriate diameter. Then machine with 60° American UN. In this case, a full form type insert cannot be used.

FEATURES OF MMT SERIES

A WIDE VARIETY OF PRODUCTS

Mitsubishi Miracle Threading (MMT) series. 283 inserts and 26 holders.

M-CLASS INSERTS WITH 3-D CHIP BREAKERS



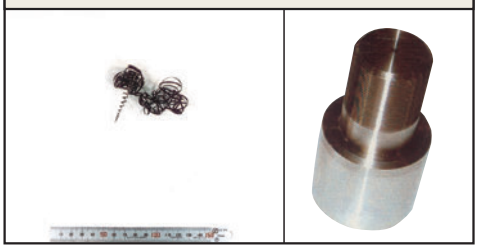
G-CLASS GROUND INSERTS

IDEAL CHIP CONTROL EVEN IN THE LATTER HALF OF PASSES WHEN CONTINUOUS CHIPS ARE USUALLY PRODUCED. (M-CLASS INSERTS WITH 3-D CHIP BREAKERS)

ISO metric external thread pitch 1.5mm Final pass (6th pass)

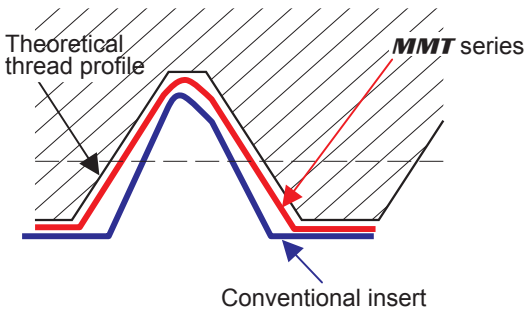
Competitor

MMT



<Cutting Conditions>
Workpiece : JIS SCM440
Insert : MMT16ER150ISO-S
Grade : VP15TF
Cutting speed : 120m/min
Cutting method : Radial Infeed
Depth of cut : Fixed cut area
Pass : 6 times
Coolant : Wet

A HIGHER LEVEL OF PRECISION THAN CONVENTIONAL INSERTS (G-CLASS GROUND INSERTS)

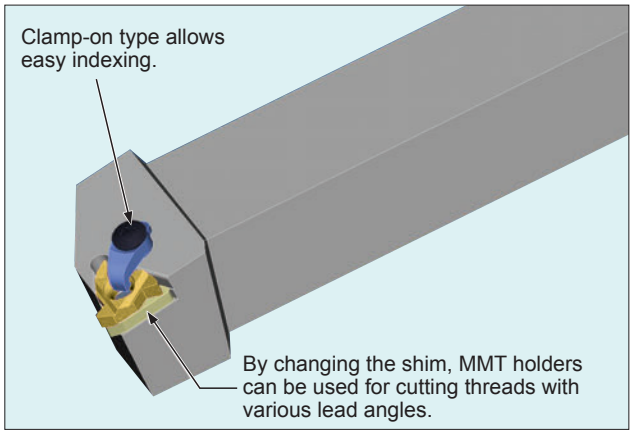


High precision threading can be achieved by using MMT inserts that feature a ground rake face and peripheral cutting edge.

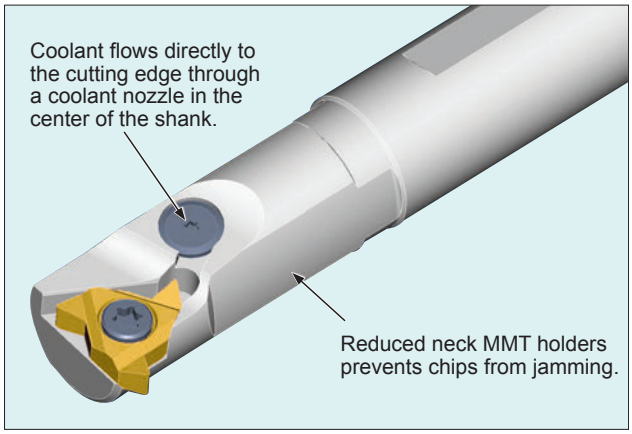
Thread Type	Threading Tolerance
ISO Metric	6g / 6H
American UN	2A / 2B
Whitworth for BSW, BSP	Medium Class A
BSPT	Standard BSPT
Round DIN 405	7h / 7H
ISO Trapezoidal 30°	7e / 7H
American ACME	3G
UNJ	3A
API Buttress Casing	Standard API
API Rounded Casing & Tubing	Standard API RD
American NPT	Standard NPT
American NPTF	Class2

HOLDER (Use of special surface treatment)

External

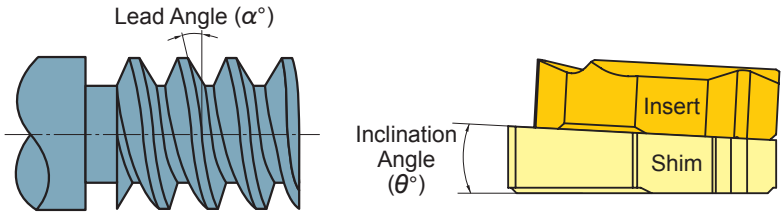


Internal



* Order number of coolant guide screw: TFS03006 (Except MMTIR1316/MMTIR1516)

SUITABLE FOR THREADING WITH A LARGE LEAD ANGLE



By changing only the shim, MMT holders can be used for turning of threads with various lead angles as well as the turning of left hand threads.

Lead Angle (α°)	Inclination Angle (θ°)
−1.5°	−3°
−0.5°	−2°
0.5°	−1°
1.5°	0°
2.5°	1°
3.5°	2°
4.5°	3°

Standard shim delivered with the holder.

GRADE

VP10MF (G-class ground insert only)

● Superior wear and plastic deformation resistance

- High wear and plastic deformation resistance for threading when maintaining the thread form is important. Suitable for continuous high precision machining with extensive tool life.
- Effective in combination with G-class inserts for high precision threading.

VP15TF (G-class ground insert, M-class insert with 3-D chip breakers)

● Wide versatility

- High fracture resistance during low rigidity applications such as bar feed machining. Able to withstand harsh conditions for long periods where conventional inserts would be liable to breakage.
- Effective combination of high cost performance M-class inserts with 3-D chip breakers.

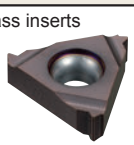
VP20RT (M-class insert with 3-D chip breakers)

● Excellent fracture resistance

- Suitable for stainless steel boring and unstable machining where inserts are vulnerable to fracturing.
- Effective combination of high cost performance M-class inserts with 3-D chip breakers.

CHOOSING M-CLASS INSERTS WITH 3-D CHIP BREAKERS OR G-CLASS INSERTS

Insert	Chip control	Precision of thread
M-class inserts with 3-D chip breakers	◎	○

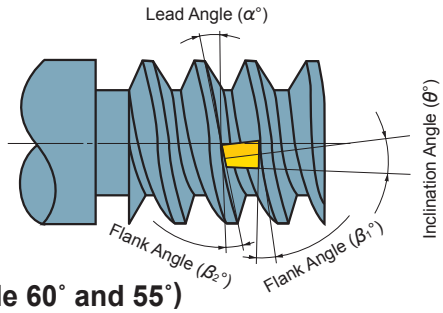
Insert	Chip control	Precision of thread
G-class inserts 	○	◎

- For ideal chip control and a high cost performance ratio, M-class inserts with 3-D chip breakers are recommended.
- G-class inserts are recommended where higher precision is required.

SELECTING A SHIM FOR THE MMT SERIES

FLANK ANGLE AND LEAD ANGLE

Lead angle (α) depends on a combination of thread diameter and pitch. Select a shim so that the lead angle of the thread can coincide with the flank angles of the thread and insert (β_1, β_2). No need to change a shim for general threading with an MMT holder. When threading with a small diameter or large pitch, change the shim depending on the lead angle, referring to the table and graph below. When threading left hand threads, change to a shim with a negative inclination angle.



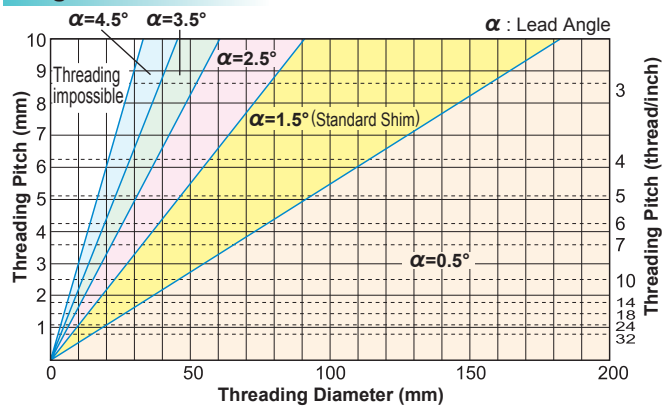
SHIM REFERENCE TABLE (THREADING DIAMETER) (Thread angle 60˚ and 55˚)

Pitch (mm) \ Lead Angle	Right Hand Thread (mm)						Left Hand Thread (mm)		
	Threading impossible	4.5°	3.5°	2.5°	1.5°	0.5°	Threading impossible	−1.5°	−0.5°
0.5	≤ϕ1.7	ϕ1.7 − ϕ2.3	ϕ2.3 − ϕ3.0	ϕ3.0 − ϕ4.6	ϕ4.6 − ϕ9.1	≥ϕ9.1	≤ϕ3.6	ϕ3.6 − ϕ9.1	≥ϕ9.1
0.75	≤ϕ2.5	ϕ2.5 − ϕ3.4	ϕ3.4 − ϕ4.6	ϕ4.6 − ϕ6.8	ϕ6.8 − ϕ13.7	≥ϕ13.7	≤ϕ5.5	ϕ5.5 − ϕ13.7	≥ϕ13.7
1	≤ϕ3.3	ϕ3.3 − ϕ4.6	ϕ4.6 − ϕ6.1	ϕ6.1 − ϕ9.1	ϕ9.1 − ϕ18.2	≥ϕ18.2	≤ϕ7.3	ϕ7.3 − ϕ18.2	≥ϕ18.2
1.25	≤ϕ4.1	ϕ4.1 − ϕ5.7	ϕ5.7 − ϕ7.6	ϕ7.6 − ϕ11.4	ϕ11.4 − ϕ22.8	≥ϕ22.8	≤ϕ9.1	ϕ9.1 − ϕ22.8	≥ϕ22.8
1.5	≤ϕ5.0	ϕ5.0 − ϕ6.8	ϕ6.8 − ϕ9.1	ϕ9.1 − ϕ13.7	ϕ13.7 − ϕ27.4	≥ϕ27.4	≤ϕ10.9	ϕ10.9 − ϕ27.4	≥ϕ27.4
1.75	≤ϕ5.8	ϕ5.8 − ϕ8.0	ϕ8.0 − ϕ10.6	ϕ10.6 − ϕ16.0	ϕ16.0 − ϕ31.9	≥ϕ31.9	≤ϕ12.8	ϕ12.8 − ϕ31.9	≥ϕ31.9
2	≤ϕ6.6	ϕ6.6 − ϕ9.1	ϕ9.1 − ϕ12.1	ϕ12.1 − ϕ18.2	ϕ18.2 − ϕ36.5	≥ϕ36.5	≤ϕ14.6	ϕ14.6 − ϕ36.5	≥ϕ36.5
2.5	≤ϕ8.3	ϕ8.3 − ϕ11.4	ϕ11.4 − ϕ15.2	ϕ15.2 − ϕ22.8	ϕ22.8 − ϕ45.6	≥ϕ45.6	≤ϕ18.2	ϕ18.2 − ϕ45.6	≥ϕ45.6
3	≤ϕ9.9	ϕ9.9 − ϕ13.7	ϕ13.7 − ϕ18.2	ϕ18.2 − ϕ27.3	ϕ27.3 − ϕ54.7	≥ϕ54.7	≤ϕ21.9	ϕ21.9 − ϕ54.7	≥ϕ54.7
3.5	≤ϕ11.6	ϕ11.6 − ϕ15.9	ϕ15.9 − ϕ21.3	ϕ21.3 − ϕ31.9	ϕ31.9 − ϕ63.8	≥ϕ63.8	≤ϕ25.5	ϕ25.5 − ϕ63.8	≥ϕ63.8
4	≤ϕ13.2	ϕ13.2 − ϕ18.2	ϕ18.2 − ϕ24.3	ϕ24.3 − ϕ36.5	ϕ36.5 − ϕ72.9	≥ϕ72.9	≤ϕ29.2	ϕ29.2 − ϕ72.9	≥ϕ72.9
4.5	≤ϕ14.9	ϕ14.9 − ϕ20.5	ϕ20.5 − ϕ27.3	ϕ27.3 − ϕ41.0	ϕ41.0 − ϕ82.1	≥ϕ82.1	≤ϕ32.8	ϕ32.8 − ϕ82.1	≥ϕ82.1
5	≤ϕ16.5	ϕ16.5 − ϕ22.8	ϕ22.8 − ϕ30.4	ϕ30.4 − ϕ45.6	ϕ45.6 − ϕ91.2	≥ϕ91.2	≤ϕ36.5	ϕ36.5 − ϕ91.2	≥ϕ91.2

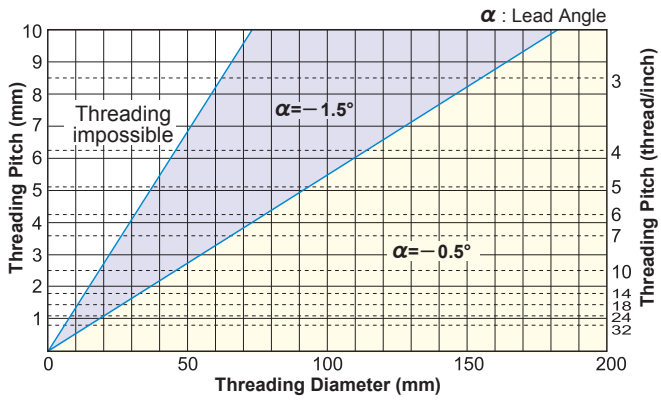
(Note) Back turning in the case of left hand threads.

SHIM REFERENCE GRAPH (Thread angle 60˚ and 55˚)

Right Hand Thread



Left Hand Thread



(Note) When a thread lead angle ≤ the tool flank angle, change the shim to prevent side interference with the insert.
(Refer to the table below for the calculation of thread lead angle and tool flank angle.)

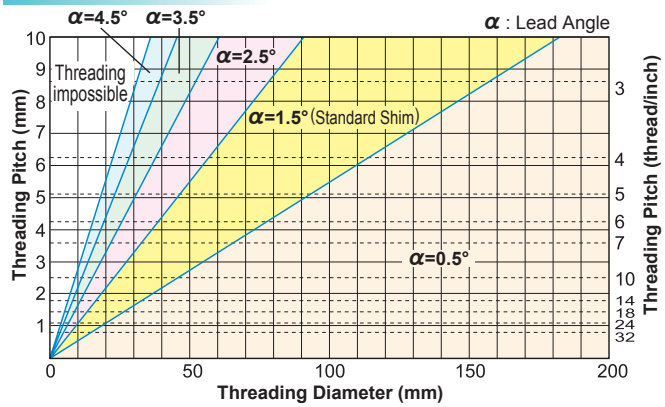
SHIM REFERENCE TABLE (THREADING DIAMETER) (Thread angle 30˚ and 29˚)

Pitch (mm) \ Lead Angle	Right Hand Thread (mm)						Left Hand Thread (mm)		
	Threading impossible	4.5°	3.5°	2.5°	1.5°	0.5°	Threading impossible	−1.5°	−0.5°
0.5	≤ϕ1.8	ϕ1.8 − ϕ2.3	ϕ2.3 − ϕ3.0	ϕ3.0 − ϕ4.6	ϕ4.6 − ϕ9.1	≥ϕ9.1	≤ϕ4.6	ϕ4.6 − ϕ9.1	≥ϕ9.1
0.75	≤ϕ2.7	ϕ2.7 − ϕ3.4	ϕ3.4 − ϕ4.6	ϕ4.6 − ϕ6.8	ϕ6.8 − ϕ13.7	≥ϕ13.7	≤ϕ6.8	ϕ6.8 − ϕ13.7	≥ϕ13.7
1	≤ϕ3.6	ϕ3.6 − ϕ4.6	ϕ4.6 − ϕ6.1	ϕ6.1 − ϕ9.1	ϕ9.1 − ϕ18.2	≥ϕ18.2	≤ϕ9.1	ϕ9.1 − ϕ18.2	≥ϕ18.2
1.25	≤ϕ4.5	ϕ4.5 − ϕ5.7	ϕ5.7 − ϕ7.6	ϕ7.6 − ϕ11.4	ϕ11.4 − ϕ22.8	≥ϕ22.8	≤ϕ11.4	ϕ11.4 − ϕ22.8	≥ϕ22.8
1.5	≤ϕ5.5	ϕ5.5 − ϕ6.8	ϕ6.8 − ϕ9.1	ϕ9.1 − ϕ13.7	ϕ13.7 − ϕ27.4	≥ϕ27.4	≤ϕ13.7	ϕ13.7 − ϕ27.4	≥ϕ27.4
1.75	≤ϕ6.4	ϕ6.4 − ϕ8.0	ϕ8.0 − ϕ10.6	ϕ10.6 − ϕ16.0	ϕ16.0 − ϕ31.9	≥ϕ31.9	≤ϕ16.0	ϕ16.0 − ϕ31.9	≥ϕ31.9
2	≤ϕ7.3	ϕ7.3 − ϕ9.1	ϕ9.1 − ϕ12.1	ϕ12.1 − ϕ18.2	ϕ18.2 − ϕ36.5	≥ϕ36.5	≤ϕ18.2	ϕ18.2 − ϕ36.5	≥ϕ36.5
2.5	≤ϕ9.1	ϕ9.1 − ϕ11.4	ϕ11.4 − ϕ15.2	ϕ15.2 − ϕ22.8	ϕ22.8 − ϕ45.6	≥ϕ45.6	≤ϕ22.8	ϕ22.8 − ϕ45.6	≥ϕ45.6
3	≤ϕ10.9	ϕ10.9 − ϕ13.7	ϕ13.7 − ϕ18.2	ϕ18.2 − ϕ27.3	ϕ27.3 − ϕ54.7	≥ϕ54.7	≤ϕ27.3	ϕ27.3 − ϕ54.7	≥ϕ54.7
3.5	≤ϕ12.7	ϕ12.7 − ϕ15.9	ϕ15.9 − ϕ21.3	ϕ21.3 − ϕ31.9	ϕ31.9 − ϕ63.8	≥ϕ63.8	≤ϕ31.9	ϕ31.9 − ϕ63.8	≥ϕ63.8
4	≤ϕ14.6	ϕ14.6 − ϕ18.2	ϕ18.2 − ϕ24.3	ϕ24.3 − ϕ36.5	ϕ36.5 − ϕ72.9	≥ϕ72.9	≤ϕ36.5	ϕ36.5 − ϕ72.9	≥ϕ72.9
4.5	≤ϕ16.4	ϕ16.4 − ϕ20.5	ϕ20.5 − ϕ27.3	ϕ27.3 − ϕ41.0	ϕ41.0 − ϕ82.1	≥ϕ82.1	≤ϕ41.0	ϕ41.0 − ϕ82.1	≥ϕ82.1
5	≤ϕ18.2	ϕ18.2 − ϕ22.8	ϕ22.8 − ϕ30.4	ϕ30.4 − ϕ45.6	ϕ45.6 − ϕ91.2	≥ϕ91.2	≤ϕ45.6	ϕ45.6 − ϕ91.2	≥ϕ91.2

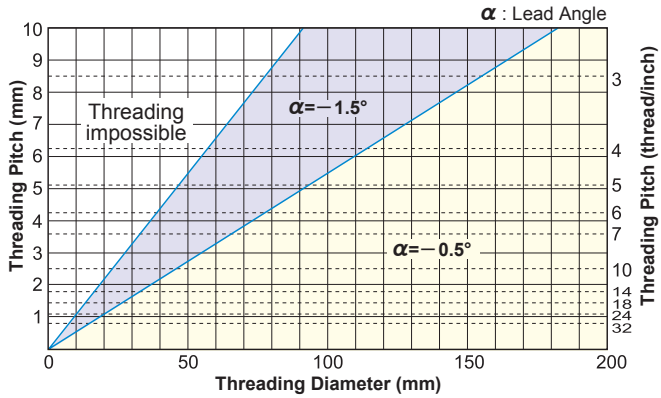
(Note) Back turning in the case of left hand threads.

SHIM REFERENCE GRAPH (Thread angle 30˚ and 29˚)

Right Hand Thread



Left Hand Thread



(Note) When a thread lead angle ≤ the tool flank angle, change the shim to prevent side interference with the insert.
(Refer to the table below for the calculation of thread lead angle and tool flank angle.)

Selection table

Lead Angle	Opening angle 60°/55° Right Hand Thread		Opening angle 60°/55° Left Hand Thread		Opening angle 30°/29° Right Hand Thread		Opening angle 30°/29° Left Hand Thread	
0	P05	P05	N05	N05	P05	P05	N05	N05
0.5	P05	P05	N05	N05	P05	P05	N05	N05
1	P15	P15	N15	N15	P15	P15	N15	N15
1.5	P15	P15	N15	N15	P15	P15	N15	N15
2	P25	P25	N15	N15	P25	P25	Compatible	Compatible
2.5	P25	P25	Compatible	Compatible	P25	P25	Compatible	Compatible
3	P35	P35	Compatible	Compatible	P35	P35	Compatible	Compatible
3.5	P35	P35	Compatible	Compatible	P35	P35	Compatible	Compatible
4	P45	P45	Compatible	Compatible	P45	P45	Compatible	Compatible
4.5	P45	P45	Compatible	Compatible	P45	P45	Compatible	Compatible
5	P45	P45	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible
5.5	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible

(Note) Back turning in the case of left hand threads.

When replacing a shim, check if the difference between the thread lead angle and shim inclination angle is within:
2.5°−0.5° where thread helix angle is 60° (55°)
2°−1° where thread helix angle is 30° (29°)
∗ Inclination angle of a standard shim is 0°.
∗ The holder has a 1.5° lead angle.

CALCULATION OF THREAD LEAD ANGLE

$$\tan\alpha = \frac{l}{\pi d} = \frac{nP}{\pi d}$$

α: Lead angle
l : Lead
n : Number of threads
P : Pitch
d : Effective diameter of thread

EXAMPLE OF SELECTING A SHIM

- When the thread lead angle is 2.2°
  ①In the case when the thread helix angle is 60°
  (2.2° lead angle) − (2.5−0.5°) = -0.3°−1.7° shim inclination angle is appropriate. Although cutting is possible even with a standard sheet (sheet inclination angle of 0°), it is recommended to replace it with a sheet from the Sheet Specification Table having an inclination angle of 1°.
  ②In the case when the thread helix angle is 30°
  (2.2° lead angle) − (2−1°) = -0.2°−1.2° shim inclination angle is appropriate. Replace with a sheet from the Sheet Specification Table having an inclination angle of 1°.

∗ Refer to the web catalogue.
http://www.carbide.mht.co.th/technical_information/tec_turning_tools/tec_threading

RELIEF ANGLE OF AN INSERT SET ON A HOLDER

Thread Helix Angle	Internal Relief Angle	External Relief Angle
60°	8.8°	5.8°
55°	7.9°	5.2°
30°	4.1°	2.7°
29°	4°	2.6°

- Relief angles (β_2, β_1) of an insert become small when the thread helix angle of a trapezoidal, round, or other thread is small. Take care when selecting a shim.

STANDARD OF DEPTH OF CUT EXTERNAL (RADIAL INFEED)

ISO Metric

Pitch (mm)	Total Cutting Depth	Number of Passes														Insert Type	
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	G-class ground inserts	M-class inserts with 3-D chip breakers
0.5	0.31	0.10	0.08	0.07	0.06											MMT16ER050ISO	—
0.75	0.46	0.16	0.14	0.10	0.06											MMT16ER075ISO	—
1.0	0.61	0.18	0.15	0.12	0.10	0.06										MMT16ER100ISO	MMT16ER100ISO-S
1.25	0.77	0.19	0.17	0.14	0.11	0.10	0.06									MMT16ER125ISO	MMT16ER125ISO-S
1.5	0.92	0.22	0.21	0.17	0.14	0.12	0.06									MMT16ER150ISO	MMT16ER150ISO-S
1.75	1.07	0.22	0.21	0.16	0.13	0.11	0.09	0.09	0.06							MMT16ER175ISO	MMT16ER175ISO-S
2.0	1.23	0.24	0.23	0.17	0.16	0.14	0.12	0.11	0.06							MMT16ER200ISO	MMT16ER200ISO-S
2.5	1.53	0.26	0.23	0.19	0.17	0.15	0.13	0.12	0.11	0.11	0.06					MMT16ER250ISO	MMT16ER250ISO-S
3.0	1.84	0.27	0.25	0.20	0.18	0.16	0.14	0.13	0.12	0.12	0.11	0.10	0.06			MMT16ER300ISO	MMT16ER300ISO-S
3.5	2.15	0.33	0.30	0.24	0.21	0.18	0.17	0.15	0.14	0.14	0.12	0.11	0.06			MMT22ER350ISO	—
4.0	2.45	0.34	0.31	0.24	0.22	0.19	0.17	0.16	0.14	0.14	0.13	0.12	0.12	0.11	0.06	MMT22ER400ISO	—
4.5	2.76	0.38	0.34	0.28	0.24	0.22	0.20	0.18	0.16	0.16	0.15	0.14	0.13	0.12	0.06	MMT22ER450ISO	—
5.0	3.07	0.42	0.38	0.32	0.27	0.24	0.22	0.20	0.18	0.18	0.17	0.16	0.15	0.12	0.06	MMT22ER500ISO	—

American UN

Pitch (thread/inch)	Total Cutting Depth	Number of Passes														Insert Type	
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	G-class ground inserts	M-class inserts with 3-D chip breakers
32	0.49	0.17	0.15	0.11	0.06											MMT16ER320UN	—
28	0.56	0.17	0.14	0.10	0.09	0.06										MMT16ER280UN	—
24	0.65	0.18	0.16	0.14	0.11	0.06										MMT16ER240UN	—
20	0.78	0.20	0.18	0.13	0.11	0.10	0.06									MMT16ER200UN	—
18	0.87	0.22	0.20	0.15	0.13	0.11	0.06									MMT16ER180UN	—
16	0.97	0.22	0.20	0.15	0.12	0.11	0.11	0.06								MMT16ER160UN	MMT16ER160UN-S
14	1.11	0.23	0.21	0.16	0.13	0.11	0.11	0.10	0.06							MMT16ER140UN	MMT16ER140UN-S
13	1.20	0.25	0.22	0.17	0.14	0.13	0.12	0.11	0.06							MMT16ER130UN	—
12	1.30	0.28	0.23	0.18	0.16	0.14	0.13	0.12	0.06							MMT16ER120UN	MMT16ER120UN-S
11	1.42	0.28	0.23	0.19	0.16	0.14	0.13	0.12	0.11	0.06						MMT16ER110UN	—
10	1.56	0.28	0.24	0.19	0.16	0.14	0.13	0.13	0.12	0.11	0.06					MMT16ER100UN	—
9	1.73	0.34	0.29	0.22	0.17	0.15	0.14	0.13	0.12	0.11	0.06					MMT16ER090UN	—
8	1.95	0.35	0.30	0.24	0.19	0.16	0.15	0.14	0.13	0.12	0.11	0.06				MMT16ER080UN	—
7	2.22	0.37	0.33	0.28	0.24	0.20	0.17	0.16	0.15	0.14	0.12	0.06				MMT22ER070UN	—
6	2.60	0.42	0.35	0.29	0.25	0.21	0.18	0.17	0.16	0.15	0.13	0.12	0.11	0.06		MMT22ER060UN	—
5	3.12	0.43	0.39	0.31	0.27	0.24	0.22	0.20	0.19	0.19	0.18	0.17	0.15	0.12	0.06	MMT22ER050UN	—

Whitworth for BSW, BSP

Pitch (thread/inch)	Total Cutting Depth	Number of Passes														Insert Type	
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	G-class ground inserts	M-class inserts with 3-D chip breakers
28	0.58	0.17	0.14	0.11	0.10	0.06										MMT16ER280W	—
26	0.63	0.18	0.15	0.13	0.11	0.06										MMT16ER260W	—
20	0.81	0.20	0.18	0.14	0.12	0.11	0.06									MMT16ER200W	—
19	0.86	0.21	0.19	0.15	0.13	0.12	0.06									MMT16ER190W	MMT16ER190W-S
18	0.90	0.25	0.19	0.15	0.13	0.12	0.06									MMT16ER180W	—
16	1.02	0.21	0.18	0.15	0.13	0.11	0.09	0.09	0.06							MMT16ER160W	—
14	1.16	0.23	0.21	0.17	0.14	0.12	0.12	0.11	0.06							MMT16ER140W	MMT16ER140W-S
12	1.36	0.27	0.25	0.20	0.16	0.15	0.14	0.13	0.06							MMT16ER120W	—
11	1.48	0.27	0.24	0.20	0.17	0.15	0.14	0.13	0.12	0.06						MMT16ER110W	MMT16ER110W-S
10	1.63	0.27	0.25	0.20	0.17	0.15	0.15	0.13	0.13	0.12	0.06					MMT16ER100W	—
9	1.81	0.28	0.26	0.21	0.18	0.16	0.15	0.14	0.13	0.12	0.12	0.06				MMT16ER090W	—
8	2.03	0.30	0.27	0.22	0.19	0.17	0.16	0.15	0.14	0.13	0.12	0.12	0.06			MMT16ER080W	—
7	2.32	0.34	0.32	0.26	0.22	0.20	0.18	0.17	0.16	0.15	0.14	0.12	0.06			MMT22ER070W	—
6	2.71	0.35	0.33	0.27	0.23	0.21	0.20	0.19	0.17	0.16	0.15	0.14	0.13	0.12	0.06	MMT22ER060W	—
5	3.25	0.42	0.40	0.35	0.29	0.26	0.24	0.22	0.20	0.19	0.18	0.17	0.15	0.12	0.06	MMT22ER050W	—

BSPT

Pitch (thread/inch)	Total Cutting Depth	Number of Passes														Insert Type	
		1	2	3	4	5	6	7	8	9						G-class ground inserts	M-class inserts with 3-D chip breakers
28	0.58	0.17	0.14	0.11	0.10	0.06										MMT16ER280BSPT	—
19	0.86	0.22	0.19	0.15	0.12	0.12	0.06									MMT16ER190BSPT	MMT16ER190BSPT-S
14	1.16	0.24	0.20	0.17	0.14	0.12	0.12	0.11	0.06							MMT16ER140BSPT	MMT16ER140BSPT-S
11	1.48	0.25	0.23	0.21	0.18	0.16	0.14	0.13	0.12	0.06						MMT16ER110BSPT	MMT16ER110BSPT-S

(Note)
- Set the finishing allowance on a diameter at approx. 0.1mm when using a full form insert.
- Please note the cutting depth and the number of passes when a corner radius of a partial form insert or of an internal threading insert is small to prevent damage to the insert corner.
- Please set the cutting depth sufficiently deep enough on materials such as hardened steel or austenitic stainless steel to help prevent premature wear and chipping caused by the outer layer of the material.

STANDARD OF DEPTH OF CUT EXTERNAL (RADIAL INFEED)

Round DIN 405

Pitch (thread/inch)	Total Cutting Depth	Number of Passes 1	2	3	4	5	6	7	8	9	10	11	12	13	14		Insert Type
10	1.27	0.23	0.21	0.20	0.19	0.16	0.12	0.10	0.06								MMT16ER100RD
8	1.59	0.23	0.21	0.20	0.19	0.18	0.16	0.14	0.12	0.10	0.06						MMT16ER080RD
6	2.12	0.26	0.25	0.24	0.22	0.21	0.19	0.17	0.16	0.14	0.12	0.10	0.06				MMT16ER060RD
4	3.18	0.34	0.33	0.32	0.30	0.28	0.26	0.24	0.22	0.20	0.19	0.17	0.15	0.12	0.06		MMT22ER040RD

ISO Trapezoidal 30°

Pitch (mm)	Total Cutting Depth	Number of Passes 1	2	3	4	5	6	7	8	9	10	11	12	13	14		Insert Type
1.5	0.90	0.23	0.21	0.16	0.13	0.11	0.06										MMT16ER150TR
2.0	1.25	0.29	0.26	0.21	0.17	0.14	0.12	0.06									MMT16ER200TR
3.0	1.75	0.32	0.31	0.24	0.19	0.18	0.17	0.15	0.13	0.06							MMT16ER300TR
4.0	2.25	0.33	0.32	0.24	0.22	0.21	0.17	0.16	0.15	0.14	0.13	0.12	0.06				MMT22ER400TR
5.0	2.75	0.35	0.32	0.26	0.24	0.22	0.21	0.19	0.19	0.17	0.15	0.14	0.13	0.12	0.06		MMT22ER500TR

American ACME

Pitch (thread/inch)	Total Cutting Depth	Number of Passes 1	2	3	4	5	6	7	8	9	10	11	12	13	14		Insert Type
12	1.19	0.27	0.23	0.20	0.17	0.14	0.12	0.06									MMT16ER120ACME
10	1.52	0.29	0.25	0.21	0.18	0.16	0.14	0.12	0.11	0.06							MMT16ER100ACME
8	1.84	0.30	0.26	0.22	0.19	0.16	0.15	0.14	0.13	0.12	0.11	0.06					MMT16ER080ACME
6	2.37	0.34	0.30	0.27	0.24	0.21	0.19	0.16	0.14	0.12	0.12	0.11	0.11	0.06			MMT22ER060ACME
5	2.79	0.36	0.33	0.30	0.26	0.23	0.20	0.18	0.17	0.16	0.15	0.14	0.13	0.12	0.06		MMT22ER050ACME

UNJ

Pitch (thread/inch)	Total Cutting Depth	Number of Passes 1	2	3	4	5	6	7	8	9	10	11					Insert Type
32	0.46	0.16	0.14	0.10	0.06												MMT16ER320UNJ
28	0.52	0.16	0.12	0.09	0.09	0.06											MMT16ER280UNJ
24	0.61	0.17	0.14	0.14	0.10	0.06											MMT16ER240UNJ
20	0.73	0.19	0.16	0.13	0.10	0.09	0.06										MMT16ER200UNJ
18	0.81	0.23	0.18	0.14	0.10	0.10	0.06										MMT16ER180UNJ
16	0.92	0.26	0.21	0.14	0.12	0.10	0.09										MMT16ER160UNJ
14	1.05	0.26	0.23	0.17	0.12	0.11	0.10	0.06									MMT16ER140UNJ
12	1.22	0.28	0.27	0.20	0.17	0.13	0.11	0.06									MMT16ER120UNJ
10	1.47	0.30	0.29	0.21	0.15	0.13	0.12	0.11	0.10	0.06							MMT16ER100UNJ
8	1.83	0.31	0.30	0.23	0.18	0.15	0.14	0.13	0.12	0.11	0.10	0.06					MMT16ER080UNJ

API Buttress Casing

Pitch (thread/inch)	Total Cutting Depth	Number of Passes 1	2	3	4	5	6	7	8	9	10	11					Insert Type
5	1.55	0.25	0.23	0.17	0.15	0.13	0.12	0.12	0.11	0.11	0.10	0.06					MMT22ER050APBU

API Round Casing&Tubing

Pitch (thread/inch)	Total Cutting Depth	Number of Passes 1	2	3	4	5	6	7	8	9	10	11	12				Insert Type
10	1.41	0.25	0.23	0.16	0.14	0.12	0.12	0.12	0.11	0.10	0.06						MMT16ER100APRD
8	1.81	0.25	0.24	0.19	0.16	0.14	0.14	0.13	0.13	0.13	0.13	0.11	0.06				MMT16ER080APRD

American NPT

Pitch (thread/inch)	Total Cutting Depth	Number of Passes 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Insert Type
27	0.66	0.15	0.13	0.12	0.11	0.09	0.06										MMT16ER270NPT
18	1.01	0.20	0.16	0.14	0.13	0.12	0.11	0.09	0.06								MMT16ER180NPT
14	1.33	0.23	0.19	0.16	0.14	0.13	0.12	0.11	0.10	0.09	0.06						MMT16ER140NPT
11.5	1.64	0.24	0.19	0.17	0.15	0.15	0.13	0.13	0.12	0.11	0.10	0.09	0.06				MMT16ER115NPT
8	2.42	0.33	0.28	0.23	0.20	0.18	0.16	0.15	0.14	0.13	0.12	0.12	0.11	0.11	0.10	0.06	MMT16ER080NPT

American NPTF

Pitch (thread/inch)	Total Cutting Depth	Number of Passes 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Insert Type
27	0.64	0.16	0.14	0.11	0.09	0.08	0.06										MMT16ER270NPTF
18	1.00	0.19	0.16	0.14	0.13	0.12	0.11	0.09	0.06								MMT16ER180NPTF
14	1.35	0.23	0.21	0.16	0.14	0.13	0.12	0.11	0.10	0.09	0.06						MMT16ER140NPTF
11.5	1.63	0.24	0.23	0.19	0.15	0.13	0.11	0.11	0.11	0.10	0.10	0.10	0.06				MMT16ER115NPTF
8	2.38	0.32	0.27	0.23	0.19	0.17	0.16	0.15	0.14	0.13	0.12	0.12	0.11	0.11	0.10	0.06	MMT16ER080NPTF

(Note)
- Set the finishing allowance on a diameter at approx. 0.1mm when using a full form insert.
- Please note the cutting depth and the number of passes when a corner radius of a partial form insert or of an internal threading insert is small to prevent damage to the insert corner.
- Please set the cutting depth sufficiently deep enough on materials such as hardened steel or austenitic stainless steel to help prevent premature wear and chipping caused by the outer layer of the material.

STANDARD OF DEPTH OF CUT INTERNAL (RADIAL INFEED)

ISO Metric

Pitch (mm)	Total Cutting Depth	Number of Passes														Insert Type			
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	G-class ground inserts		M-class inserts with 3-D chip breakers	
0.5	0.29	0.09	0.07	0.07	0.06											MMT11IR050ISO	MMT16IR050ISO	—	—
0.75	0.43	0.15	0.13	0.09	0.06											MMT11IR075ISO	MMT16IR075ISO	—	—
1.0	0.58	0.17	0.15	0.11	0.09	0.06										MMT11IR100ISO	MMT16IR100ISO	MMT11IR100ISO-S	MMT16IR100ISO-S
1.25	0.72	0.18	0.16	0.12	0.11	0.09	0.06									MMT11IR125ISO	MMT16IR125ISO	MMT11IR125ISO-S	MMT16IR125ISO-S
1.5	0.87	0.21	0.20	0.16	0.13	0.11	0.06									MMT11IR150ISO	MMT16IR150ISO	MMT11IR150ISO-S	MMT16IR150ISO-S
1.75	1.01	0.21	0.20	0.15	0.12	0.10	0.09	0.08	0.06							MMT11IR175ISO	MMT16IR175ISO	—	MMT16IR175ISO-S
2.0	1.15	0.24	0.22	0.18	0.14	0.12	0.10	0.09	0.06							MMT11IR200ISO	MMT16IR200ISO	—	MMT16IR200ISO-S
2.5	1.44	0.25	0.24	0.21	0.15	0.13	0.12	0.10	0.09	0.09	0.06					—	MMT16IR250ISO	—	MMT16IR250ISO-S
3.0	1.73	0.26	0.25	0.22	0.17	0.14	0.13	0.12	0.11	0.10	0.09	0.08	0.06			—	MMT16IR300ISO	—	MMT16IR300ISO-S
3.5	2.02	0.32	0.30	0.23	0.19	0.17	0.15	0.14	0.13	0.12	0.11	0.10	0.06			—	MMT22IR350ISO	—	—
4.0	2.31	0.33	0.31	0.24	0.22	0.18	0.15	0.14	0.13	0.12	0.12	0.11	0.10	0.10	0.06	—	MMT22IR400ISO	—	—
4.5	2.60	0.36	0.33	0.28	0.24	0.21	0.19	0.16	0.15	0.14	0.13	0.12	0.12	0.11	0.06	—	MMT22IR450ISO	—	—
5.0	2.89	0.41	0.38	0.32	0.27	0.24	0.21	0.18	0.16	0.15	0.14	0.13	0.12	0.12	0.06	—	MMT22IR500ISO	—	—

American UN

Pitch (thread/inch)	Total Cutting Depth	Number of Passes														Insert Type		
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	G-class ground inserts		M-class inserts with 3-D chip breakers
32	0.46	0.16	0.14	0.10	0.06											MMT11IR320UN	MMT16IR320UN	—
28	0.52	0.16	0.13	0.09	0.08	0.06										MMT11IR280UN	MMT16IR280UN	—
24	0.61	0.17	0.15	0.13	0.10	0.06										MMT11IR240UN	MMT16IR240UN	—
20	0.73	0.18	0.15	0.13	0.11	0.10	0.06									MMT11IR200UN	MMT16IR200UN	—
18	0.81	0.20	0.18	0.14	0.12	0.11	0.06									MMT11IR180UN	MMT16IR180UN	—
16	0.92	0.20	0.18	0.15	0.12	0.11	0.10	0.06								MMT11IR160UN	MMT16IR160UN	MMT16IR160UN-S
14	1.05	0.21	0.18	0.15	0.13	0.11	0.11	0.10	0.06							MMT11IR140UN	MMT16IR140UN	MMT16IR140UN-S
13	1.13	0.22	0.19	0.16	0.14	0.13	0.12	0.11	0.06							—	MMT16IR130UN	—
12	1.22	0.24	0.22	0.18	0.16	0.13	0.12	0.11	0.06							—	MMT16IR120UN	MMT16IR120UN-S
11	1.33	0.24	0.22	0.20	0.15	0.12	0.12	0.11	0.11	0.06						—	MMT16IR110UN	—
10	1.47	0.25	0.22	0.21	0.14	0.13	0.12	0.12	0.11	0.11	0.06					—	MMT16IR100UN	—
9	1.63	0.31	0.23	0.21	0.17	0.15	0.14	0.13	0.12	0.11	0.06					—	MMT16IR090UN	—
8	1.83	0.31	0.26	0.21	0.18	0.16	0.15	0.14	0.13	0.12	0.11	0.06				—	MMT16IR080UN	—
7	2.09	0.36	0.30	0.24	0.21	0.18	0.17	0.16	0.15	0.14	0.12	0.06				—	MMT22IR070UN	—
6	2.44	0.40	0.33	0.25	0.23	0.19	0.17	0.16	0.15	0.14	0.13	0.12	0.11	0.06		—	MMT22IR060UN	—
5	2.93	0.41	0.35	0.31	0.26	0.23	0.21	0.20	0.19	0.17	0.15	0.14	0.13	0.12	0.06	—	MMT22IR050UN	—

Whitworth for BSW, BSP

Pitch (thread/inch)	Total Cutting Depth	Number of Passes														Insert Type		
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	G-class ground inserts		M-class inserts with 3-D chip breakers
28	0.58	0.17	0.14	0.11	0.10	0.06										—	MMT16IR280W	—
26	0.63	0.18	0.15	0.13	0.11	0.06										—	MMT16IR260W	—
20	0.81	0.20	0.18	0.14	0.12	0.11	0.06									—	MMT16IR200W	—
19	0.86	0.21	0.19	0.15	0.13	0.12	0.06									MMT11IR190W	MMT16IR190W	MMT16IR190W-S
18	0.90	0.25	0.19	0.15	0.13	0.12	0.06									—	MMT16IR180W	—
16	1.02	0.21	0.18	0.15	0.13	0.11	0.09	0.09	0.06							—	MMT16IR160W	—
14	1.16	0.23	0.21	0.17	0.14	0.12	0.12	0.11	0.06							MMT11IR140W	MMT16IR140W	MMT16IR140W-S
12	1.36	0.27	0.25	0.20	0.16	0.15	0.14	0.13	0.06							—	MMT16IR120W	MMT16IR120W-S
11	1.48	0.27	0.24	0.20	0.17	0.15	0.14	0.13	0.12	0.06						—	MMT16IR110W	—
10	1.63	0.27	0.25	0.20	0.17	0.15	0.15	0.13	0.13	0.12	0.06					—	MMT16IR100W	—
9	1.81	0.28	0.26	0.21	0.18	0.16	0.15	0.14	0.13	0.12	0.12	0.06				—	MMT16IR090W	—
8	2.03	0.30	0.27	0.22	0.19	0.17	0.16	0.15	0.14	0.13	0.12	0.12	0.06			—	MMT16IR080W	—
7	2.32	0.34	0.32	0.26	0.22	0.20	0.18	0.17	0.16	0.15	0.14	0.12	0.06			—	MMT22IR070W	—
6	2.71	0.35	0.33	0.27	0.23	0.21	0.20	0.19	0.17	0.16	0.15	0.14	0.13	0.12	0.06	—	MMT22IR060W	—
5	3.25	0.42	0.40	0.35	0.29	0.26	0.24	0.22	0.20	0.19	0.18	0.17	0.15	0.12	0.06	—	MMT22IR050W	—

(Note)
- Set the finishing allowance on a diameter at approx. 0.1mm when using a full form insert.
- Please note the cutting depth and the number of passes when a corner radius of a partial form insert or of an internal threading insert is small to prevent damage to the insert corner.
- Please set the cutting depth sufficiently deep enough on materials such as hardened steel or austenitic stainless steel to help prevent premature wear and chipping caused by the outer layer of the material.

STANDARD OF DEPTH OF CUT INTERNAL (RADIAL INFEED)

BSPT

Pitch (thread/inch)	Total Cutting Depth	Number of Passes 1	2	3	4	5	6	7	8	9							Insert Type: G-class ground inserts		M-class inserts with 3-D chip breakers
19	0.86	0.22	0.19	0.15	0.12	0.12	0.06										MMT11IR190BSPT	MMT16IR190BSPT	MMT16IR190BSPT-S
14	1.16	0.24	0.20	0.17	0.14	0.12	0.12	0.11	0.06								MMT11IR140BSPT	MMT16IR140BSPT	MMT16IR140BSPT-S
11	1.48	0.25	0.23	0.21	0.18	0.16	0.14	0.13	0.12	0.06							—	MMT16IR110BSPT	MMT16IR110BSPT-S

Round DIN 405

Pitch (thread/inch)	Total Cutting Depth	Number of Passes 1	2	3	4	5	6	7	8	9	10	11	12	13	14		Insert Type
10	1.27	0.23	0.21	0.20	0.19	0.16	0.12	0.10	0.06								MMT16IR100RD
8	1.59	0.23	0.21	0.20	0.19	0.18	0.16	0.14	0.12	0.10	0.06						MMT16IR080RD
6	2.12	0.26	0.25	0.24	0.22	0.21	0.19	0.17	0.16	0.14	0.12	0.10	0.06				MMT16IR060RD
4	3.18	0.34	0.33	0.32	0.30	0.28	0.26	0.24	0.22	0.20	0.19	0.17	0.15	0.12	0.06		MMT22IR040RD

ISO Trapezoidal 30°

Pitch (mm)	Total Cutting Depth	Number of Passes 1	2	3	4	5	6	7	8	9	10	11	12	13	14		Insert Type
1.5	0.90	0.23	0.21	0.16	0.13	0.11	0.06										MMT16IR150TR
2	1.25	0.29	0.26	0.21	0.17	0.14	0.12	0.06									MMT16IR200TR
3	1.75	0.32	0.31	0.24	0.19	0.18	0.17	0.15	0.13	0.06							MMT16IR300TR
4	2.25	0.33	0.32	0.24	0.22	0.21	0.17	0.16	0.15	0.14	0.13	0.12	0.06				MMT22IR400TR
5	2.75	0.35	0.32	0.26	0.24	0.22	0.21	0.19	0.19	0.17	0.15	0.14	0.13	0.12	0.06		MMT22IR500TR

American ACME

Pitch (thread/inch)	Total Cutting Depth	Number of Passes 1	2	3	4	5	6	7	8	9	10	11	12	13	14		Insert Type
12	1.19	0.27	0.23	0.20	0.17	0.14	0.12	0.06									MMT16IR120ACME
10	1.52	0.29	0.25	0.21	0.18	0.16	0.14	0.12	0.11	0.06							MMT16IR100ACME
8	1.84	0.30	0.26	0.22	0.19	0.16	0.15	0.14	0.13	0.12	0.11	0.06					MMT16IR080ACME
6	2.37	0.34	0.30	0.27	0.24	0.21	0.19	0.16	0.14	0.12	0.12	0.11	0.11	0.06			MMT22IR060ACME
5	2.79	0.36	0.33	0.30	0.26	0.23	0.20	0.18	0.17	0.16	0.15	0.14	0.13	0.12	0.06		MMT22IR050ACME

API Buttress Casing

Pitch (thread/inch)	Total Cutting Depth	Number of Passes 1	2	3	4	5	6	7	8	9	10	11					Insert Type
5	1.55	0.25	0.23	0.17	0.15	0.13	0.12	0.12	0.11	0.11	0.10	0.06					MMT22IR050APBU

API Round Casing&Tubing

Pitch (thread/inch)	Total Cutting Depth	Number of Passes 1	2	3	4	5	6	7	8	9	10	11	12				Insert Type
10	1.41	0.25	0.23	0.16	0.14	0.12	0.12	0.12	0.11	0.10	0.06						MMT16IR100APRD
8	1.81	0.25	0.24	0.19	0.16	0.14	0.14	0.13	0.13	0.13	0.13	0.11	0.06				MMT16IR080APRD

American NPT

Pitch (thread/inch)	Total Cutting Depth	Number of Passes 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Insert Type
27	0.66	0.15	0.13	0.12	0.11	0.09	0.06										MMT16IR270NPT
18	1.01	0.20	0.16	0.14	0.13	0.12	0.11	0.09	0.06								MMT16IR180NPT
14	1.33	0.23	0.19	0.16	0.14	0.13	0.12	0.11	0.10	0.09	0.06						MMT16IR140NPT
11.5	1.64	0.24	0.19	0.17	0.15	0.15	0.13	0.13	0.12	0.11	0.10	0.09	0.06				MMT16IR115NPT
8	2.42	0.33	0.28	0.23	0.20	0.18	0.16	0.15	0.14	0.13	0.12	0.12	0.11	0.11	0.10	0.06	MMT16IR080NPT

American NPTF

Pitch (thread/inch)	Total Cutting Depth	Number of Passes 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Insert Type
14	1.35	0.23	0.21	0.16	0.14	0.13	0.12	0.11	0.10	0.09	0.06						MMT16IR140NPTF
11.5	1.63	0.24	0.23	0.19	0.15	0.13	0.11	0.11	0.11	0.10	0.10	0.10	0.06				MMT16IR115NPTF
8	2.38	0.32	0.27	0.23	0.19	0.17	0.16	0.15	0.14	0.13	0.12	0.12	0.11	0.11	0.10	0.06	MMT16IR080NPTF

(Note)
- Set the finishing allowance on a diameter at approx. 0.1mm when using a full form insert.
- Please note the cutting depth and the number of passes when a corner radius of a partial form insert or of an internal threading insert is small to prevent damage to the insert corner.
- Please set the cutting depth sufficiently deep enough on materials such as hardened steel or austenitic stainless steel to help prevent premature wear and chipping caused by the outer layer of the material.

IDENTIFICATION

MMT E R 12 12 H 16 – C

Designation

Application

E	External

Hand of Tool

R	Right

Tool Size (mm) (Height and Width)

12	12
16	16
20	20
25	25
32	32

Tool Length (mm)

H	100
K	125
M	150
P	170

Insert Size (mm)

16	9.525
22	12.7

Method of Holding

C	Clamp-on

MMT I R 13 16 A K 11 – S P15

Designation

Application

I	Internal

Hand of Tool

R	Right

Min.Cutting Diameter (mm)

Shank Diameter (mm)

Shank Material

A	Steel Shank with Coolant Hole

Tool Length (mm)

K	125	R	200
M	150	S	250
Q	180	T	300

Insert Size (mm)

11	6.35
16	9.525
22	12.7

Method of Holding

S	Screw-on
C	Clamp-on

Lead Angle

P15	1.5°
P25	2.5°
P35	3.5°

IDENTIFICATION

MMT 16 E R 100 ISO – S

Designation

Diameter of Inscribed Circle (mm)

11	6.35
16	9.525

Application

E	External
I	Internal

Hand of Tool

R	Right

Pitch

100	1.0mm	A	0.5—1.5mm or 48—16 thread/inch
125	1.25mm		
150	1.5mm	G	1.75—3.0mm or 14—8 thread/inch
175	1.75mm		
200	2.0mm		
250	2.5mm		
300	3.0mm		

Threading Type

60	Partial Profile 60°
55	Partial Profile 55°
ISO	ISO Metric
W	Whitworth for BSW, BSP
BSPT	BSPT
UN	American UN

S	M-class inserts with 3-D chip breakers

MMT 16 E R 050 ISO

Designation

Diameter of Inscribed Circle (mm)

11	6.35
16	9.525
22	12.7

Application

E	External
I	Internal

Hand of Tool

R	Right

Pitch

050	0.5mm	A	0.5—1.5mm or 48—16 thread/inch
075	0.75mm		
100	1.0mm		
125	1.25mm	G	1.75—3.0mm or 14—8 thread/inch
150	1.5mm		
175	1.75mm		
200	2.0mm	AG	0.5—3.0mm or 48—8 thread/inch
250	2.5mm		
300	3.0mm		
350	3.5mm		
400	4.0mm	N	3.5—5.0mm or 7—5 thread/inch
450	4.5mm		
500	5.0mm		

Threading Type

60	Partial Profile 60°
55	Partial Profile 55°
ISO	ISO Metric
W	Whitworth for BSW, BSP
BSPT	BSPT
UN	American UN
RD	Round DIN 405
TR	ISO Trapezoidal 30°
ACME	American ACME
UNJ	UNJ
APBU	API Buttress Casing
APRD	API Round Casing&Tubing
NPT	NPT
NPTF	NPTF

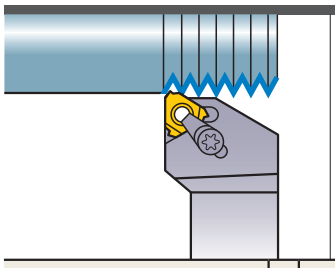
Memo

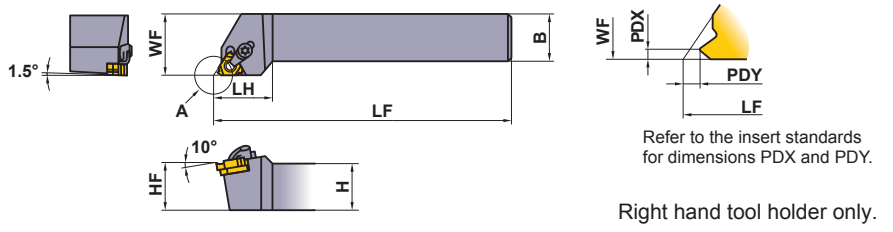
MMTE

External threading

Product Information

Cutting Condition >> 596
Technical Info >> 1981
Spare Parts >> 1927
ISO13399 Property >> 1966





Refer to the insert standards for dimensions PDX and PDY.

Right hand tool holder only.

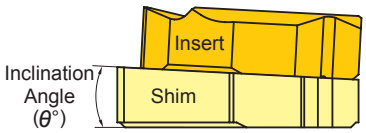
Order Number	Stock R	Insert Number	Dimensions (mm) H	B	LF	LH	HF	WF	Clamp Bridge	Clamp Screw *	Stop Ring	Shim Screw *	Shim	Wrench
MMTER1212H16-C	●	MMT16ER	12	12	100	25	12	16	SETK51	SETS51	CR4	HFC03008	CTE32TP15	①TKY15F ②HKY20R
MMTER1616H16-C	●		16	16	100	25	16	20	SETK51	SETS51	CR4	HFC03008	CTE32TP15	①TKY15F ②HKY20R
MMTER2020K16-C	●		20	20	125	26	20	25	SETK51	SETS51	CR4	HFC03008	CTE32TP15	①TKY15F ②HKY20R
MMTER2525M16-C	●		25	25	150	28	25	32	SETK51	SETS51	CR4	HFC03008	CTE32TP15	①TKY15F ②HKY20R
MMTER3232P16-C	●		32	32	170	32	32	40	SETK51	SETS51	CR4	HFC03008	CTE32TP15	①TKY15F ②HKY20R
MMTER2525M22-C	●	MMT22ER	25	25	150	32	25	32	SETK61	SETS61	CR5	HFC04010	CTE43TP15	①TKY20F ②HKY25R
MMTER3232P22-C	●		32	32	170	32	32	40	SETK61	SETS61	CR5	HFC04010	CTE43TP15	①TKY20F ②HKY25R

(Note) Select and use a shim as shown below (sold separately), dependant on the lead angle.
* Clamp Torque (N • m) : SETS51=3.5, SETS61=5.0, HFC03008=1.5, HFC04010=2.2

SHIM

Lead Angle (α°)	Order Number	Stock R	Inclination Angle (θ°)	Applicable Holder
−1.5°	**CTE32TN15**	●	−3°	MMTER 16-C
−0.5°	**CTE32TN05**	●	−2°	
0.5°	**CTE32TP05**	●	−1°	
1.5°	**CTE32TP15**	●	0°	
2.5°	**CTE32TP25**	●	1°	
3.5°	**CTE32TP35**	●	2°	
4.5°	**CTE32TP45**	●	3°	

Lead Angle (α°)	Order Number	Stock R	Inclination Angle (θ°)	Applicable Holder
−1.5°	**CTE43TN15**	●	−3°	MMTER 22-C
−0.5°	**CTE43TN05**	●	−2°	
0.5°	**CTE43TP05**	●	−1°	
1.5°	**CTE43TP15**	●	0°	
2.5°	**CTE43TP25**	●	1°	
3.5°	**CTE43TP35**	●	2°	
4.5°	**CTE43TP45**	●	3°	



Standard shim delivered with the holder.

● : **Inventory maintained in Japan.**

RECOMMENDED CUTTING CONDITIONS

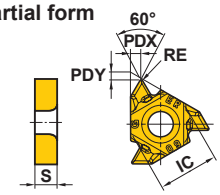
	Work Material	Hardness	Grade	Cutting Speed (m/min)
P	Mild Steel	≤180HB	**VP10MF**	150 (70—230)
			VP15TF	100 (60—140)
			VP20RT	80 (60—100)
	Carbon Steel Alloy Steel	180—280HB	**VP10MF**	140 (80—200)
			VP15TF	100 (60—140)
			VP20RT	80 (60—100)
M	Stainless Steel	≤200HB	**VP15TF**	80 (40—120)
			VP20RT	
K	Gray Cast Iron	Tensile Strength ≤350MPa	**VP10MF**	140 (80—200)
			VP15TF	90 (60—120)

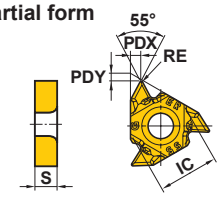
	Work Material	Hardness	Grade	Cutting Speed (m/min)
S	Heat-Resistant Alloy	—	**VP10MF**	45 (15—70)
			VP15TF	30 (20—40)
			VP20RT	
	Titanium Alloy	—	**VP10MF**	60 (40—80)
			VP15TF	45 (25—65)
			VP20RT	
H	Heat-Treated Alloy	45—55HRC	**VP10MF**	50 (30—70)
			VP15TF	40 (20—60)

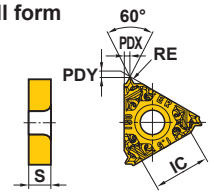
·INSERTS

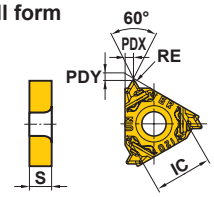
EXTERNAL THREADING INSERTS

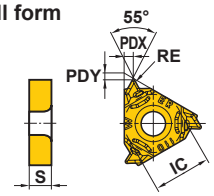
Type	Order Number	Coated VP15TF	Coated VP20RT	Pitch mm	Pitch thread/inch	Dimensions (mm) IC	S	PDY	PDX	RE	Total Cutting Depth (mm)	Geometry
Partial Profile 60°	MMT16ERA60-S	●		0.5—1.5	48—16	9.525	3.44	0.8	0.9	0.06	—	Partial form
	MMT16ERG60-S	●		1.75—3.0	14—8	9.525	3.44	1.2	1.7	0.23	—	
Partial Profile 55°	MMT16ERA55-S	●			48—16	9.525	3.44	0.8	0.9	0.07	—	Partial form
	MMT16ERG55-S	●			14—8	9.525	3.44	1.2	1.7	0.23	—	
ISO Metric	MMT16ER100ISO-S	●	●	1.0		9.525	3.44	0.7	0.7	0.13	0.61	Full form
	MMT16ER125ISO-S	●	●	1.25		9.525	3.44	0.8	0.9	0.16	0.77	
	MMT16ER150ISO-S	●	●	1.5		9.525	3.44	0.8	1.0	0.20	0.92	
	MMT16ER175ISO-S	●	●	1.75		9.525	3.44	0.9	1.2	0.22	1.07	
	MMT16ER200ISO-S	●	●	2.0		9.525	3.44	1.0	1.3	0.26	1.23	
	MMT16ER250ISO-S	●	●	2.5		9.525	3.44	1.1	1.5	0.33	1.53	
	MMT16ER300ISO-S	●	●	3.0		9.525	3.44	1.2	1.6	0.40	1.84	
American UN	MMT16ER160UN-S	●			16	9.525	3.44	0.9	1.1	0.23	0.97	Full form
	MMT16ER140UN-S	●			14	9.525	3.44	1.0	1.2	0.26	1.11	
	MMT16ER120UN-S	●			12	9.525	3.44	1.1	1.4	0.30	1.30	
Whitworth for BSW, BSP	MMT16ER190W-S	●			19	9.525	3.44	0.8	1.0	0.18	0.86	Full form
	MMT16ER140W-S	●			14	9.525	3.44	1.0	1.2	0.25	1.16	
	MMT16ER110W-S	●			11	9.525	3.44	1.1	1.5	0.32	1.48	
BSPT	MMT16ER190BSPT-S	●			19	9.525	3.44	0.8	0.9	0.18	0.86	Full form
	MMT16ER140BSPT-S	●			14	9.525	3.44	1.0	1.2	0.25	1.16	
	MMT16ER110BSPT-S	●			11	9.525	3.44	1.1	1.5	0.32	1.48	

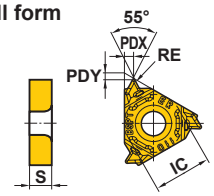






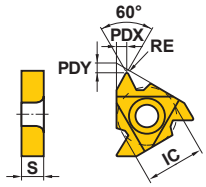
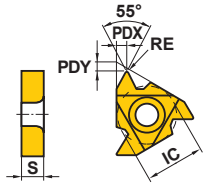
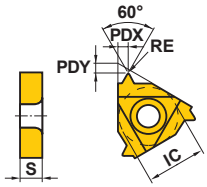






● : Inventory maintained in Japan. (5 inserts in one case)

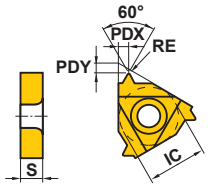
EXTERNAL THREADING INSERTS

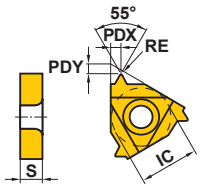
Type	Thread Tolerance	Order Number	Coated VP10MF	Coated VP15TF	Pitch mm	Pitch thread/inch	Dimensions (mm) IC	S	PDY	PDX	RE	Total Cutting Depth (mm)	Geometry
Partial Profile 60°	—	**MMT16ERA60**	●	●	0.5—1.5	48—16	9.525	3.44	0.8	0.9	0.05	—	**Partial form** 
		MMT16ERG60	●	●	1.75—3.0	14—8	9.525	3.44	1.2	1.7	0.27	—	
		MMT16ERAG60	●		0.5—3.0	48—8	9.525	3.44	1.2	1.7	0.08	—	
		MMT22ERN60	●		3.5—5.0	7—5	12.7	4.64	1.7	2.5	0.53	—	
Partial Profile 55°	—	**MMT16ERA55**	●	●		48—16	9.525	3.44	0.8	0.9	0.05	—	**Partial form** 
		MMT16ERG55	●	●		14—8	9.525	3.44	1.2	1.7	0.21	—	
		MMT16ERAG55	●			48—8	9.525	3.44	1.2	1.7	0.07	—	
		MMT22ERN55	●			7—5	12.7	4.64	1.7	2.5	0.44	—	
ISO Metric	6g	**MMT16ER050ISO**	●		0.5		9.525	3.44	0.6	0.4	0.06	0.31	**Full form** 
		MMT16ER075ISO	●		0.75		9.525	3.44	0.6	0.6	0.10	0.46	
		MMT16ER100ISO	●	●	1.0		9.525	3.44	0.7	0.7	0.16	0.61	
		MMT16ER125ISO	●	●	1.25		9.525	3.44	0.8	0.9	0.19	0.77	
		MMT16ER150ISO	●	●	1.5		9.525	3.44	0.8	1.0	0.23	0.92	
		MMT16ER175ISO	●	●	1.75		9.525	3.44	0.9	1.2	0.21	1.07	
		MMT16ER200ISO	●	●	2.0		9.525	3.44	1.0	1.3	0.31	1.23	
		MMT16ER250ISO	●	●	2.5		9.525	3.44	1.1	1.5	0.32	1.53	
		MMT16ER300ISO	●	●	3.0		9.525	3.44	1.2	1.6	0.46	1.84	
		MMT22ER350ISO	●		3.5		12.7	4.64	1.6	2.3	0.45	2.15	
		MMT22ER400ISO	●		4.0		12.7	4.64	1.6	2.3	0.52	2.45	
		MMT22ER450ISO	●		4.5		12.7	4.64	1.7	2.4	0.58	2.76	
		MMT22ER500ISO	●		5.0		12.7	4.64	1.7	2.5	0.63	3.07	

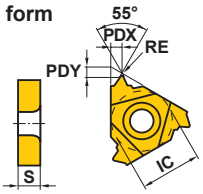
● : Inventory maintained in Japan. (5 inserts in one case)

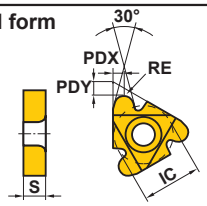
EXTERNAL THREADING INSERTS

Type	Thread Tolerance	Order Number	Coated VP10MF	Coated VP15TF	Pitch mm	Pitch thread/inch	Dimensions (mm) IC	S	PDY	PDX	RE	Total Cutting Depth (mm)	Geometry
American UN	2A	MMT16ER320UN	●			32	9.525	3.44	0.6	0.6	0.09	0.49	Full form
		MMT16ER280UN	●			28	9.525	3.44	0.6	0.7	0.10	0.56	
		MMT16ER240UN	●			24	9.525	3.44	0.7	0.8	0.16	0.65	
		MMT16ER200UN	●			20	9.525	3.44	0.8	0.9	0.19	0.78	
		MMT16ER180UN	●			18	9.525	3.44	0.8	1.0	0.21	0.87	
		MMT16ER160UN	●	●		16	9.525	3.44	0.9	1.1	0.24	0.97	
		MMT16ER140UN	●	●		14	9.525	3.44	1.0	1.2	0.22	1.11	
		MMT16ER130UN	●			13	9.525	3.44	1.0	1.3	0.24	1.20	
		MMT16ER120UN	●	●		12	9.525	3.44	1.1	1.4	0.32	1.30	
		MMT16ER110UN	●			11	9.525	3.44	1.1	1.5	0.29	1.42	
		MMT16ER100UN	●			10	9.525	3.44	1.1	1.5	0.32	1.56	
		MMT16ER090UN	●			9	9.525	3.44	1.2	1.7	0.35	1.73	
		MMT16ER080UN	●			8	9.525	3.44	1.2	1.6	0.48	1.95	
		MMT22ER070UN	●			7	12.7	4.64	1.6	2.3	0.47	2.22	
		MMT22ER060UN	●			6	12.7	4.64	1.6	2.3	0.53	2.60	
		MMT22ER050UN	●			5	12.7	4.64	1.7	2.5	0.64	3.12	
Whitworth for BSW, BSP	Medium Class A	MMT16ER280W	●			28	9.525	3.44	0.6	0.7	0.09	0.58	Full form
		MMT16ER260W	●			26	9.525	3.44	0.7	0.8	0.10	0.63	
		MMT16ER200W	●			20	9.525	3.44	0.8	0.9	0.18	0.81	
		MMT16ER190W	●	●		19	9.525	3.44	0.8	1.0	0.19	0.86	
		MMT16ER180W	●			18	9.525	3.44	0.8	1.0	0.20	0.90	
		MMT16ER160W	●			16	9.525	3.44	0.9	1.1	0.23	1.02	
		MMT16ER140W	●	●		14	9.525	3.44	1.0	1.2	0.26	1.16	
		MMT16ER120W	●			12	9.525	3.44	1.1	1.4	0.30	1.36	
		MMT16ER110W	●	●		11	9.525	3.44	1.1	1.5	0.33	1.48	
		MMT16ER100W	●			10	9.525	3.44	1.1	1.5	0.37	1.63	
		MMT16ER090W	●			9	9.525	3.44	1.2	1.7	0.34	1.81	
		MMT16ER080W	●			8	9.525	3.44	1.2	1.5	0.39	2.03	
		MMT22ER070W	●			7	12.7	4.64	1.6	2.3	0.46	2.32	
		MMT22ER060W	●			6	12.7	4.64	1.6	2.3	0.53	2.71	
		MMT22ER050W	●			5	12.7	4.64	1.7	2.4	0.66	3.25	
BSPT	Standard BSPT	MMT16ER280BSPT	●			28	9.525	3.44	0.6	0.6	0.09	0.58	Full form
		MMT16ER190BSPT	●	●		19	9.525	3.44	0.8	0.9	0.14	0.86	
		MMT16ER140BSPT	●	●		14	9.525	3.44	1.0	1.2	0.26	1.16	
		MMT16ER110BSPT	●	●		11	9.525	3.44	1.1	1.5	0.33	1.48	
Round DIN 405	7h	MMT16ER100RD	●			10	9.525	3.44	1.1	1.2	0.60	1.27	Full form
		MMT16ER080RD	●			8	9.525	3.44	1.4	1.3	0.75	1.59	
		MMT16ER060RD	●			6	9.525	3.44	1.5	1.7	1.00	2.12	
		MMT22ER040RD	●			4	9.525	3.44	2.2	2.3	1.51	3.18	





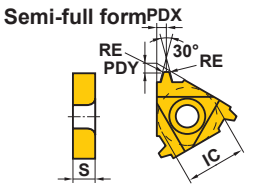


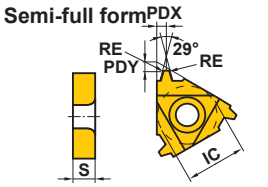


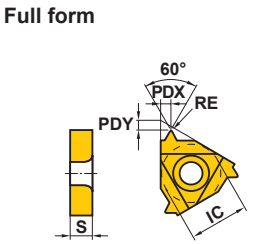
● : Inventory maintained in Japan. (5 inserts in one case)

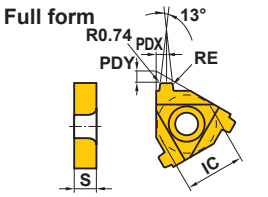
EXTERNAL THREADING INSERTS

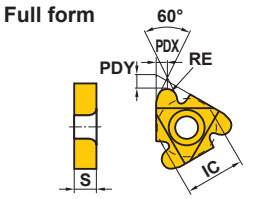
Type	Thread Tolerance	Order Number	Coated VP10MF	Pitch mm	Pitch thread/inch	Dimensions (mm) IC	S	PDY	PDX	RE	Total Cutting Depth (mm)	Geometry
ISO Trapezoidal 30°	7e	MMT16ER150TR	●	1.5		9.525	3.44	1.0	1.1	0.08	0.90	Semi-full form
		MMT16ER200TR	●	2.0		9.525	3.44	1.1	1.3	0.15	1.25	
		MMT16ER300TR	●	3.0		9.525	3.44	1.3	1.5	0.15	1.75	
		MMT22ER400TR	●	4.0		12.7	4.64	1.7	1.9	0.15	2.25	
		MMT22ER500TR	●	5.0		12.7	4.64	2.1	2.5	0.15	2.75	
American ACME	3G	MMT16ER120ACME	●		12	9.525	3.44	1.1	1.2	0.08	1.19	Semi-full form
		MMT16ER100ACME	●		10	9.525	3.44	1.3	1.4	0.08	1.52	
		MMT16ER080ACME	●		8	9.525	3.44	1.4	1.5	0.10	1.84	
		MMT22ER060ACME	●		6	12.7	4.64	1.8	2.1	0.10	2.37	
		MMT22ER050ACME	●		5	12.7	4.64	2.0	2.3	0.10	2.79	
UNJ	3A	MMT16ER320UNJ	●		32	9.525	3.44	0.6	0.7	0.13	0.46	Full form
		MMT16ER280UNJ	●		28	9.525	3.44	0.7	0.7	0.14	0.52	
		MMT16ER240UNJ	●		24	9.525	3.44	0.7	0.8	0.17	0.61	
		MMT16ER200UNJ	●		20	9.525	3.44	0.8	0.9	0.20	0.73	
		MMT16ER180UNJ	●		18	9.525	3.44	0.8	1.0	0.22	0.81	
		MMT16ER160UNJ	●		16	9.525	3.44	0.9	1.1	0.25	0.92	
		MMT16ER140UNJ	●		14	9.525	3.44	1.0	1.2	0.29	1.05	
		MMT16ER120UNJ	●		12	9.525	3.44	1.1	1.3	0.33	1.22	
		MMT16ER100UNJ	●		10	9.525	3.44	1.2	1.5	0.40	1.47	
		MMT16ER080UNJ	●		8	9.525	3.44	1.2	1.6	0.51	1.83	
API Buttress Casing	Standard API	MMT22ER050APBU	●		5	12.7	4.64	3.1	1.9	0.18	1.55	Full form
API Round Casing&Tubing	Standard API RD	MMT16ER100APRD	●		10	9.525	3.44	1.2	1.4	0.34	1.41	Full form
		MMT16ER080APRD	●		8	9.525	3.44	1.3	1.5	0.41	1.81	
American NPT	Standard NPT	MMT16ER270NPT	●		27	9.525	3.44	0.7	0.8	0.04	0.66	Full form
		MMT16ER180NPT	●		18	9.525	3.44	0.8	1.0	0.08	1.01	
		MMT16ER140NPT	●		14	9.525	3.44	0.9	1.2	0.09	1.33	
		MMT16ER115NPT	●		11.5	9.525	3.44	1.1	1.5	0.11	1.64	
		MMT16ER080NPT	●		8	9.525	3.44	1.3	1.8	0.14	2.42	
American NPTF	Class 2	MMT16ER270NPTF	●		27	9.525	3.44	0.7	0.8	0.04	0.64	Full form
		MMT16ER180NPTF	●		18	9.525	3.44	0.8	1.0	0.04	1.00	
		MMT16ER140NPTF	●		14	9.525	3.44	0.9	1.2	0.04	1.35	
		MMT16ER115NPTF	●		11.5	9.525	3.44	1.1	1.5	0.04	1.63	
		MMT16ER080NPTF	●		8	9.525	3.44	1.3	1.8	0.04	2.38	

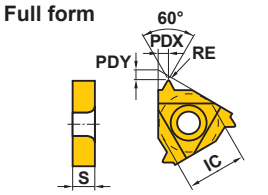


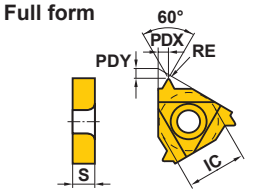












● : Inventory maintained in Japan. (5 inserts in one case)

MTH/MT1

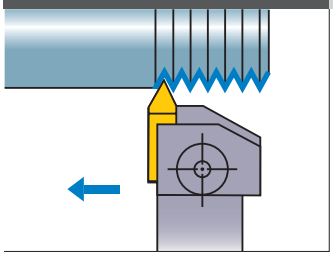
External threading

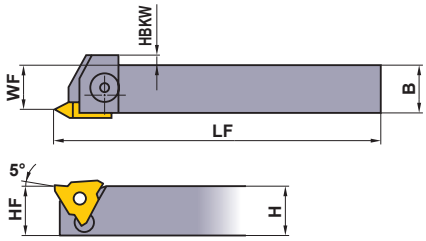
Product Information

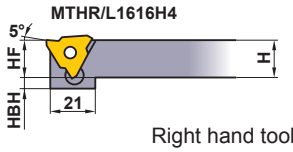
Spare Parts >> 1927
ISO13399 Property >> 1966
Technical Info >> 1981

MTH

External threading







(Note) Cutting in the opposite direction is not possible.

Right hand tool holder shown.

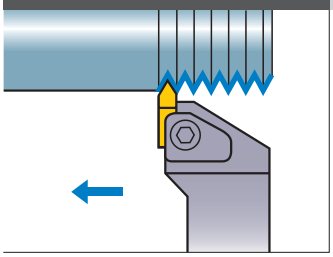
Order Number	Stock R	Stock L	Insert Number	Dimensions (mm) H	B	LF	HF	HBH	WF	HBKW	Clamp Bridge	Clamp Screw *	Spring	Wrench
MTHR/L1616H4	●	●	MTTR/L43○○○○	16	16	100	16	3	13.8	3	MTK1R/L	HBH06020	MES3	HKY40R
MTHR/L2020K4	●	●		20	20	125	20	—	17.8	—	MTK1R/L	HBH06020	MES3	HKY40R
MTHR/L2525M4	●	●		25	25	150	25	—	22.8	—	MTK1R/L	HBH06020	MES3	HKY40R

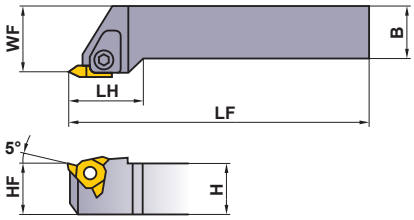
* Clamp Torque (N • m) : HBH06020=7.0

● : **Inventory maintained in Japan.**

MT1

External threading





(Note) Cutting in the opposite direction is not possible.

Right hand tool holder shown.

Order Number	Stock R	Stock L	Insert Number	Dimensions (mm) H	B	LF	LH	HF	WF	Clamp Bridge	Clamp Screw *	Spring	Wrench
MT1R/L2020K4	●	●	MTTR/L43○○○○	20	20	125	30	20	25	MTK1R/L	HBH06020	MES3	HKY40R
MT1R/L2525M4	●	●		25	25	150	30	25	32	MTK1R/L	HBH06020	MES3	HKY40R
MT1R/L3232P4	●	●		32	32	170	30	32	40	MTK1R/L	HBH06020	MES3	HKY40R

* Clamp Torque (N • m) : HBH06020=7.0

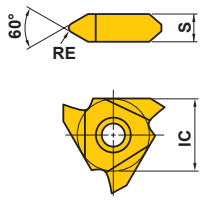
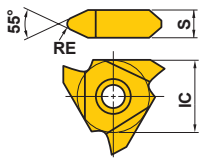
● : **Inventory maintained in Japan.**

RECOMMENDED CUTTING CONDITIONS

	Work Material	Hardness	Grade	Cutting Speed (m/min)
P	Mild Steel	≤180HB	**UP20M**	140 (100—180)
			NX2525	200 (150—250)
			UTi20T	120 (100—150)
	Carbon Steel Alloy Steel	180—280HB	**UP20M**	120 (100—150)
			NX2525	170 (150—200)
			UTi20T	100 (70—120)

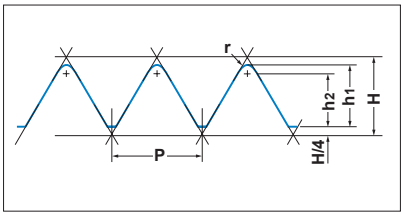
	Work Material	Hardness	Grade	Cutting Speed (m/min)
M	Stainless Steel	≤200HB	**UP20M**	120 (80—150)
			UTi20T	100 (70—130)
K	Gray Cast Iron	Tensile Strength ≤350MPa	**UP20M**	80 (60—100)
			UTi20T	80 (60—100)
			HTi10	100 (70—130)

INSERTS

Type	Order Number	Class	Coated UP20M	Cermet NX2525	Cermet	Carbide UTi20T	Carbide HTi10	ISO Pitch mm (thread/inch)	Dimensions (mm) IC	S	RE	Geometry
Partial Profile 60°	**MTTR436000**	G		●		●		−0.8	12.7	4.76	0	**MTTR/L(60°)**
	MTTR436001	G	●	●		●	●	1.0−1.75	12.7	4.76	0.1	
	MTTL436001	G	●			●	●	1.0−1.75	12.7	4.76	0.1	
	MTTR436002	G	●	●		●	●	2.0−2.5	12.7	4.76	0.2	
	MTTL436002	G		●		●		2.0−2.5	12.7	4.76	0.2	
	MTTR436003	G	□	●		●	●	3.0−3.5	12.7	4.76	0.3	
	MTTL436003	G		●		●		3.0−3.5	12.7	4.76	0.3	
	MTTR436004	G		●		●		4.0−4.5	12.7	4.76	0.4	Right hand insert shown.
Partial Profile 55°	**MTTR435501**	G		●		●		(28−10)	12.7	4.76	0.1	**MTTR(55°)**
	MTTR435502	G		●		●		(16−8)	12.7	4.76	0.2	
	MTTR435503	G		●		●		(11−8)	12.7	4.76	0.3	
												Right hand insert shown.

STANDARD OF DEPTH OF CUT

- The chart on the right shows the cutting depths when machining external ISO metric screw threads.
- When you use cermet grades or cut stainless steel, please increase the number of passes by 2−3 times.



METRIC SCREW THREAD

P (Pitch)		0.75	1.00	1.25	1.50	1.75	2.00	2.50	3.00	3.50	4.00	4.50
h_1		0.46	0.61	0.77	0.92	1.07	1.23	1.53	1.84	2.15	2.45	2.76
h_2		0.35	0.47	0.59	0.70	0.82	0.94	1.17	1.41	1.65	1.87	2.11
r (Corner Radius)		0.11	0.14	0.18	0.22	0.25	0.29	0.36	0.43	0.50	0.58	0.65
Number of Passes	1	0.18	0.20	0.20	0.25	0.25	0.25	0.30	0.30	0.35	0.35	0.40
	2	0.13	0.15	0.18	0.20	0.20	0.25	0.25	0.25	0.30	0.30	0.35
	3	0.10	0.10	0.12	0.15	0.20	0.20	0.20	0.25	0.25	0.25	0.30
	4	0.05	0.10	0.12	0.15	0.15	0.15	0.20	0.20	0.20	0.25	0.25
	5		0.06	0.10	0.10	0.12	0.15	0.15	0.20	0.20	0.25	0.25
	6			0.05	0.07	0.10	0.10	0.10	0.15	0.20	0.20	0.20
	7					0.05	0.08	0.10	0.15	0.15	0.20	0.20
	8						0.05	0.10	0.10	0.15	0.15	0.15
	9							0.08	0.10	0.10	0.15	0.15
	10							0.05	0.09	0.10	0.10	0.15
	11								0.05	0.10	0.10	0.10
	12									0.05	0.10	0.10
	13										0.05	0.10
	14											0.06

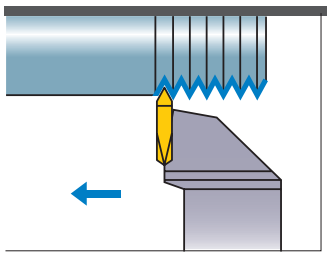
(Note) The first pass causes a high load on the cutting edge. In order to avoid damage, keep the depth of cut to 0.4−0.5mm maximum.

SMG

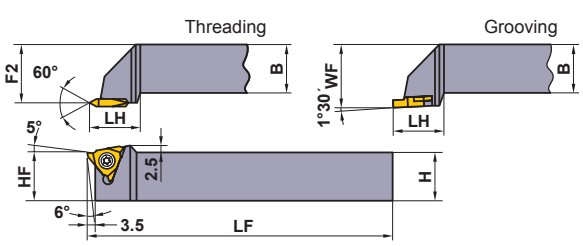
External threading, Grooving

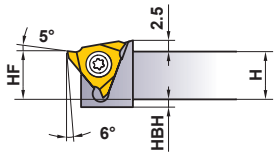
Product Information

Spare Parts >> 1927
ISO13399 Property >> 1966
Technical Info >> 1981



(Note) Cutting in the opposite direction is not possible.





SMGHR1010E16 : HBH=4
SMGHR1212F16 : HBH=2

Right hand tool holder only.

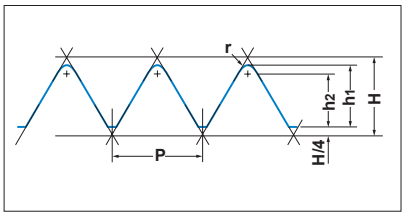
Order Number	Stock	Insert Number		Dimensions (mm)							*	
	R	Threading	Grooving	H	B	LF	LH	HF	WF	F2	Clamp Screw	Wrench
SMGHR1010E16	●	SMTTR160360○○	SMGTR16X2○○○ SMGTR16X2○○○C	10	10	70	16.5	10	12	11.7	FC400890T	TKY10F
SMGHR1212F16	●			12	12	80	16.5	12	16	15.7	FC400890T	TKY10F
SMGHR1616H16	●			16	16	100	20	16	20	19.7	FC400890T	TKY10F
SMGHR2020K16	●			20	20	125	20	20	25	24.7	FC400890T	TKY10F
SMGHR2525M16	●			25	25	150	20	25	32	31.7	FC400890T	TKY10F

* Clamp Torque (N • m) : FC400890T=2.5

● : **Inventory maintained in Japan.**

STANDARD OF DEPTH OF CUT

- The chart on the right shows the cutting depths when machining external ISO metric screw threads.
- When you use cermet grades or cut stainless steel, please increase the number of passes by 2—3 times.



METRIC SCREW THREAD

P (Pitch)		0.75	1.00	1.25	1.50	1.75	2.00
h_1		0.46	0.61	0.77	0.92	1.07	1.23
h_2		0.35	0.47	0.59	0.70	0.82	0.94
r (Corner Radius)		0.11	0.14	0.18	0.22	0.25	0.29
Number of Passes	1	0.18	0.20	0.20	0.25	0.25	0.25
	2	0.13	0.15	0.18	0.20	0.20	0.25
	3	0.10	0.10	0.12	0.15	0.20	0.20
	4	0.05	0.10	0.12	0.15	0.15	0.15
	5		0.06	0.10	0.10	0.12	0.15
	6			0.05	0.07	0.10	0.10
	7					0.05	0.08
	8						0.05
	9						

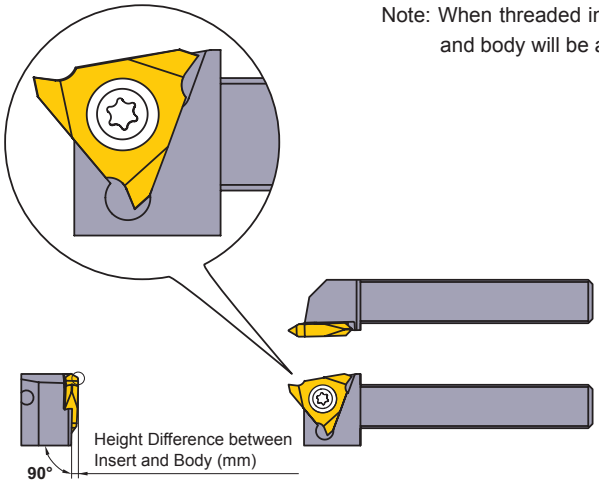
(Note) The first pass causes a high load on the cutting edge. In order to avoid damage, keep the depth of cut to 0.4—0.5mm maximum.

RECOMMENDED CUTTING CONDITIONS

	Work Material	Hardness	Grade	Cutting Speed (m/min)
P	Mild Steel	≤180HB	**NX2525**	200 (150—250)
			UTi20T	120 (100—150)
	Carbon Steel Alloy Steel	180—280HB	**NX2525**	170 (150—200)
			UTi20T	100 (70—120)

	Work Material	Hardness	Grade	Cutting Speed (m/min)
M	Stainless Steel	≤200HB	**UTi20T**	100 (70—130)
K	Gray Cast Iron	Tensile Strength ≤350MPa	**UTi20T**	80 (60—100)
			HTi10	100 (70—130)

Conditions when Inserts are Installed

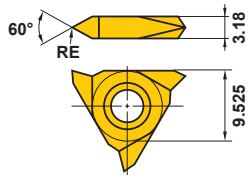


Note: When threaded inserts are installed on the body, the height difference between the insert and body will be as shown in the following table.

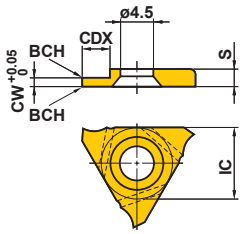
Height Difference between Insert and Body (mm)

Threading	Grooving
1.23	0.05

SMT INSERTS (Threading)

Order Number	Carbide	Thread Pitch (mm)	Dimensions (mm)	Geometry
	UTi20T		RE	
SMTTR16036001	●	1.0—1.5	0.1	
SMTTR16036002	●	1.75—2.0	0.2	

SMG INSERTS (Grooving)

Order Number	Cermet	Carbide		Dimensions (mm)					Geometry
	NX2525	UTi20T	HTi10	CW	CDX	IC	S	BCH	
SMGTR16X2050			●	0.5	1.5	9.525	2	—	
SMGTR16X2060	●	●	●	0.6	1.5	9.525	2	—	
SMGTR16X2050C	●	●	●	0.5	1.5	9.525	2	0.05	
SMGTR16X2060C	●	●	●	0.6	1.5	9.525	2	0.05	
SMGTR16X2070C	●	●	●	0.7	2	9.525	2	0.05	
SMGTR16X2075C	●	●	●	0.75	2	9.525	2	0.05	
SMGTR16X2080C	●	●	●	0.8	2	9.525	2	0.1	
SMGTR16X2090C	●	●	●	0.9	2	9.525	2	0.1	
SMGTR16X2095C	●	●	●	0.95	2	9.525	2	0.1	
SMGTR16X2100C	●	●	●	1	2.5	9.525	2	0.1	
SMGTR16X2110C	●	●	●	1.1	2.5	9.525	2	0.1	
SMGTR16X2120C	●	●	●	1.2	2.5	9.525	2	0.1	
SMGTR16X2130C	●	●	●	1.3	2.5	9.525	2	0.1	

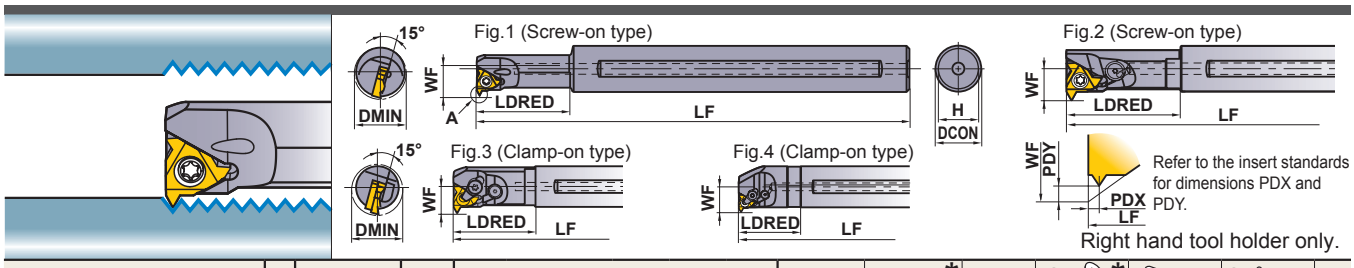
Memo

MMTI

Internal threading

Product Information

Cutting Condition >> 596
Technical Info >> 1981
Spare Parts >> 1927
ISO13399 Property >> 1966



Order Number	Stock R	Insert Number	Lead Angle	Dimensions (mm) DCON	LF	LDRED	WF	H	DMIN	Clamp Bridge	Clamp Screw *	Stop Ring	① Shim Screw ② Embedded Seat Screw *	Shim	① ② Wrench	Fig
MMTIR1316AK11-SP15	●	MMT11IR	1.5°	16	125	25	8.7	15	**13**	—	TS25	—	—	—	①TKY08F	1
MMTIR1316AK11-SP25	●		2.5°	16	125	25	8.7	15	**13**	—	TS25	—	—	—	①TKY08F	1
MMTIR1316AK11-SP35	●		3.5°	16	125	25	8.7	15	**13**	—	TS25	—	—	—	①TKY08F	1
MMTIR1516AM11-SP15	●		1.5°	16	150	32	9.7	15	**15**	—	TS25	—	—	—	①TKY08F	1
MMTIR1516AM11-SP25	●		2.5°	16	150	32	9.7	15	**15**	—	TS25	—	—	—	①TKY08F	1
MMTIR1516AM11-SP35	●		3.5°	16	150	32	9.7	15	**15**	—	TS25	—	—	—	①TKY08F	1
MMTIR1916AM16-SP15	●	MMT16IR	1.5°	16	150	40	12.2	15	**19**	—	CS350860T	—	—	—	①TKY15F	2
MMTIR1916AM16-SP25	●		2.5°	16	150	40	12.2	15	**19**	—	CS350860T	—	—	—	①TKY15F	2
MMTIR1916AM16-SP35	●		3.5°	16	150	40	12.2	15	**19**	—	CS350860T	—	—	—	①TKY15F	2
MMTIR2420AQ16-C	●		1.5°	20	180	40	14.2	19	**24**	SETK51	SETS51	CR4	①HFC03006 ②TFS03006	CTI32TP15	①TKY15F ②HKY20R	3
MMTIR2925AS16-C	●		1.5°	25	250	60	16.7	23.4	**29**	SETK51	SETS51	CR4	①HFC03006 ②TFS03006	CTI32TP15	①TKY15F ②HKY20R	3
MMTIR3732AS16-C	●		1.5°	32	250	48	20.5	30.4	**37**	SETK51	SETS51	CR4	①HFC03006 ②TFS03006	CTI32TP15	①TKY15F ②HKY20R	4
MMTIR2420AQ22-SP15	●	MMT22IR	1.5°	20	180	50	15.5	19	**24**	—	TS43	—	—	—	①TKY15F	2
MMTIR2420AQ22-SP25	●		2.5°	20	180	50	15.5	19	**24**	—	TS43	—	—	—	①TKY15F	2
MMTIR2420AQ22-SP35	●		3.5°	20	180	50	15.5	19	**24**	—	TS43	—	—	—	①TKY15F	2
MMTIR3025AR22-C	●		1.5°	25	200	38	17.8	23.4	**30**	SETK61	SETS61	CR5	①HFC04008 ②TFS03006	CTI43TP15	①TKY20F ②HKY25R	4
MMTIR3832AS22-C	●		1.5°	32	250	48	21.8	30.4	**38**	SETK61	SETS61	CR5	①HFC04008 ②TFS03006	CTI43TP15	①TKY20F ②HKY25R	4
MMTIR4640AT22-C	●		1.5°	40	300	60	26.2	38	**46**	SETK61	SETS61	CR5	①HFC04008 ②TFS03006	CTI43TP15	①TKY20F ②HKY25R	4

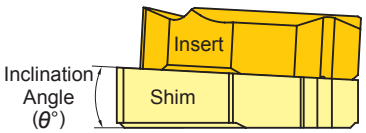
(Note) Select and use a shim as shown below (sold separately), dependant on the lead angle.
- A screw-on tool holder uses no shim. (The holder body has a lead angle.) Use a tool holder with the appropriate lead angle.
- Min. cutting diameter (DMIN) shows the internal hole diameter, not the thread diameter.

* Clamp Torque (N • m) : TS25=1.0, CS350860T=3.5, SETS51=3.5, TS43=3.5, SETS61=5.0, HFC03006=1.5, HFC04008=2.2

SHIM

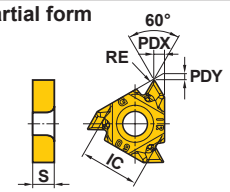
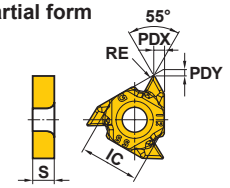
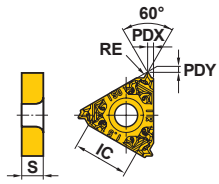
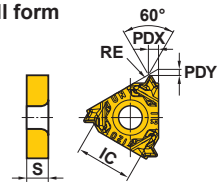
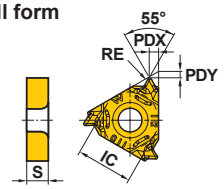
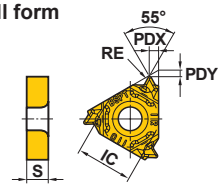
Lead Angle (α°)	Order Number	Stock R	Inclination Angle (θ°)	Applicable Holder
−1.5°	**CTI32TN15**	●	−3°	MMTIR ○○○○ ○○16-C
−0.5°	**CTI32TN05**	●	−2°	
0.5°	**CTI32TP05**	●	−1°	
1.5°	**CTI32TP15**	●	0°	
2.5°	**CTI32TP25**	●	1°	
3.5°	**CTI32TP35**	●	2°	
4.5°	**CTI32TP45**	●	3°	

Lead Angle (α°)	Order Number	Stock R	Inclination Angle (θ°)	Applicable Holder
−1.5°	**CTI43TN15**	●	−3°	MMTIR ○○○○ ○○22-C
−0.5°	**CTI43TN05**	●	−2°	
0.5°	**CTI43TP05**	●	−1°	
1.5°	**CTI43TP15**	●	0°	
2.5°	**CTI43TP25**	●	1°	
3.5°	**CTI43TP35**	●	2°	
4.5°	**CTI43TP45**	●	3°	



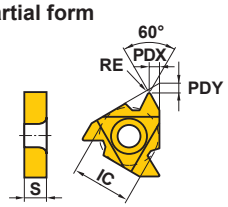
Standard shim delivered with the holder.

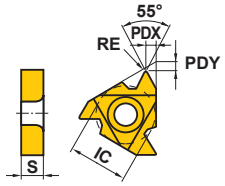
INTERNAL THREADING INSERTS

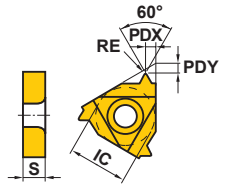
Type	Order Number	Coated VP15TF	Coated VP20RT	Pitch mm	Pitch thread/inch	Dimensions (mm) IC	S	PDY	PDX	RE	Total Cutting Depth (mm)	Geometry
Partial Profile 60°	MMT11IRA60-S	●		0.5—1.5	48—16	6.35	3.04	0.8	0.9	0.03	—	Partial form 
	MMT16IRA60-S	●		0.5—1.5	48—16	9.525	3.44	0.8	0.9	0.03	—	
	MMT16IRG60-S	●		1.75—3.0	14—8	9.525	3.44	1.2	1.7	0.11	—	
Partial Profile 55°	MMT11IRA55-S	●			48—16	6.35	3.04	0.8	0.9	0.07	—	Partial form 
	MMT16IRA55-S	●			48—16	9.525	3.44	0.8	0.9	0.07	—	
	MMT16IRG55-S	●			14—8	9.525	3.44	1.2	1.7	0.21	—	
ISO Metric	MMT11IR100ISO-S	●		1.0		6.35	3.04	0.6	0.7	0.06	0.58	Full form 
	MMT11IR125ISO-S	●		1.25		6.35	3.04	0.8	0.9	0.08	0.72	
	MMT11IR150ISO-S	●		1.5		6.35	3.04	0.8	1.0	0.10	0.87	
	MMT16IR100ISO-S	●	●	1.0		9.525	3.44	0.6	0.7	0.06	0.58	
	MMT16IR125ISO-S	●	●	1.25		9.525	3.44	0.8	0.9	0.08	0.72	
	MMT16IR150ISO-S	●	●	1.5		9.525	3.44	0.8	1.0	0.10	0.87	
	MMT16IR175ISO-S	●	●	1.75		9.525	3.44	0.9	1.2	0.11	1.01	
	MMT16IR200ISO-S	●	●	2.0		9.525	3.44	1.0	1.3	0.13	1.15	
	MMT16IR250ISO-S	●	●	2.5		9.525	3.44	1.1	1.5	0.17	1.44	
	MMT16IR300ISO-S	●	●	3.0		9.525	3.44	1.1	1.5	0.20	1.73	
American UN	MMT16IR160UN-S	●			16	9.525	3.44	0.9	1.1	0.11	0.92	Full form 
	MMT16IR140UN-S	●			14	9.525	3.44	0.9	1.2	0.12	1.05	
	MMT16IR120UN-S	●			12	9.525	3.44	1.1	1.4	0.14	1.22	
Whitworth for BSW, BSP	MMT16IR190W-S	●			19	9.525	3.44	0.8	1.0	0.18	0.86	Full form 
	MMT16IR140W-S	●			14	9.525	3.44	1.0	1.2	0.25	1.16	
	MMT16IR110W-S	●			11	9.525	3.44	1.1	1.5	0.32	1.48	
BSPT	MMT16IR190BSPT-S	●			19	9.525	3.44	0.8	0.9	0.18	0.86	Full form 
	MMT16IR140BSPT-S	●			14	9.525	3.44	1.0	1.2	0.25	1.16	
	MMT16IR110BSPT-S	●			11	9.525	3.44	1.1	1.5	0.32	1.48	

INTERNAL THREADING INSERTS

Type	Thread Tolerance	Order Number	Coated VP10MF	Coated VP15TF	Pitch mm	Pitch thread/inch	Dimensions (mm) IC	S	PDY	PDX	RE	Total Cutting Depth (mm)	Geometry
Partial Profile 60°	—	**MMT11IRA60**	●	●	0.5—1.5	48—16	6.35	3.04	0.8	0.9	0.05	—	Partial form
		MMT16IRA60	●	●	0.5—1.5	48—16	9.525	3.44	0.8	0.9	0.05	—	
		MMT16IRG60	●	●	1.75—3.0	14—8	9.525	3.44	1.2	1.7	0.16	—	
		MMT16IRAG60	●		0.5—3.0	48—8	9.525	3.44	1.2	1.7	0.05	—	
		MMT22IRN60	●		3.5—5.0	7—5	12.7	4.64	1.7	2.5	0.30	—	
Partial Profile 55°	—	**MMT11IRA55**	●	●		48—16	6.35	3.04	0.8	0.9	0.05	—	Partial form
		MMT16IRA55	●	●		48—16	9.525	3.44	0.8	0.9	0.05	—	
		MMT16IRG55	●	●		14—8	9.525	3.44	1.2	1.7	0.21	—	
		MMT16IRAG55	●			48—8	9.525	3.44	1.2	1.7	0.07	—	
		MMT22IRN55	●			7—5	12.7	4.64	1.7	2.5	0.44	—	
ISO Metric	6H	**MMT11IR050ISO**	●		0.5		6.35	3.04	0.6	0.4	0.03	0.29	Full form
		MMT11IR075ISO	●		0.75		6.35	3.04	0.6	0.6	0.04	0.43	
		MMT11IR100ISO	●	●	1.0		6.35	3.04	0.6	0.7	0.10	0.58	
		MMT11IR125ISO	●	●	1.25		6.35	3.04	0.8	0.9	0.12	0.72	
		MMT11IR150ISO	●	●	1.5		6.35	3.04	0.8	1.0	0.14	0.87	
		MMT11IR175ISO	●		1.75		6.35	3.04	0.9	1.1	0.10	1.01	
		MMT11IR200ISO	●		2.0		6.35	3.04	0.9	1.1	0.18	1.15	
		MMT16IR050ISO	●		0.5		9.525	3.44	0.6	0.4	0.03	0.29	
		MMT16IR075ISO	●		0.75		9.525	3.44	0.6	0.6	0.04	0.43	
		MMT16IR100ISO	●	●	1.0		9.525	3.44	0.6	0.7	0.10	0.58	
		MMT16IR125ISO	●	●	1.25		9.525	3.44	0.8	0.9	0.12	0.72	
		MMT16IR150ISO	●	●	1.5		9.525	3.44	0.8	1.0	0.14	0.87	
		MMT16IR175ISO	●	●	1.75		9.525	3.44	0.9	1.2	0.10	1.01	
		MMT16IR200ISO	●	●	2.0		9.525	3.44	1.0	1.3	0.18	1.15	
		MMT16IR250ISO	●	●	2.5		9.525	3.44	1.1	1.5	0.15	1.44	
		MMT16IR300ISO	●	●	3.0		9.525	3.44	1.1	1.5	0.26	1.73	
		MMT22IR350ISO	●		3.5		12.7	4.64	1.6	2.3	0.22	2.02	
		MMT22IR400ISO	●		4.0		12.7	4.64	1.6	2.3	0.25	2.31	
		MMT22IR450ISO	●		4.5		12.7	4.64	1.6	2.4	0.28	2.60	
		MMT22IR500ISO	●		5.0		12.7	4.64	1.6	2.3	0.32	2.89	

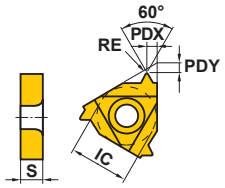


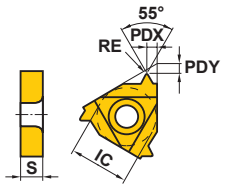


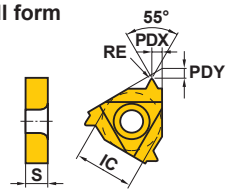


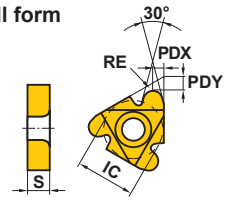
INTERNAL THREADING INSERTS

Type	Thread Tolerance	Order Number	Coated VP10MF	Coated VP15TF	Pitch mm	Pitch thread/inch	Dimensions (mm) IC	S	PDY	PDX	RE	Total Cutting Depth (mm)	Geometry
American UN	2B	MMT11IR320UN	●			32	6.35	3.04	0.6	0.6	0.04	0.46	Full form
		MMT11IR280UN	●			28	6.35	3.04	0.6	0.7	0.05	0.52	
		MMT11IR240UN	●			24	6.35	3.04	0.7	0.8	0.09	0.61	
		MMT11IR200UN	●			20	6.35	3.04	0.8	0.9	0.11	0.73	
		MMT11IR180UN	●			18	6.35	3.04	0.8	1.0	0.12	0.81	
		MMT11IR160UN	●			16	6.35	3.04	0.9	1.1	0.14	0.92	
		MMT11IR140UN	●			14	6.35	3.04	0.9	1.1	0.11	1.05	
		MMT16IR320UN	●			32	9.525	3.44	0.6	0.6	0.04	0.46	
		MMT16IR280UN	●			28	9.525	3.44	0.6	0.7	0.05	0.52	
		MMT16IR240UN	●			24	9.525	3.44	0.7	0.8	0.09	0.61	
		MMT16IR200UN	●			20	9.525	3.44	0.8	0.9	0.11	0.73	
		MMT16IR180UN	●			18	9.525	3.44	0.8	1.0	0.12	0.81	
		MMT16IR160UN	●	●		16	9.525	3.44	0.9	1.1	0.14	0.92	
		MMT16IR140UN	●	●		14	9.525	3.44	0.9	1.2	0.11	1.05	
		MMT16IR130UN	●			13	9.525	3.44	1.0	1.3	0.10	1.13	
		MMT16IR120UN	●	●		12	9.525	3.44	1.1	1.4	0.18	1.22	
		MMT16IR110UN	●			11	9.525	3.44	1.1	1.5	0.13	1.33	
		MMT16IR100UN	●			10	9.525	3.44	1.1	1.5	0.15	1.47	
		MMT16IR090UN	●			9	9.525	3.44	1.2	1.7	0.17	1.63	
		MMT16IR080UN	●			8	9.525	3.44	1.1	1.5	0.27	1.83	
		MMT22IR070UN	●			7	12.7	4.64	1.6	2.3	0.23	2.09	
		MMT22IR060UN	●			6	12.7	4.64	1.6	2.3	0.26	2.44	
		MMT22IR050UN	●			5	12.7	4.64	1.6	2.3	0.32	2.93	
Whitworth for BSW, BSP	Medium Class A	MMT11IR190W	●			19	6.35	3.04	0.8	1.0	0.19	0.86	Full form
		MMT11IR140W	●			14	6.35	3.04	0.9	1.1	0.26	1.16	
		MMT16IR280W	●			28	9.525	3.44	0.6	0.7	0.09	0.58	
		MMT16IR260W	●			26	9.525	3.44	0.7	0.8	0.10	0.63	
		MMT16IR200W	●			20	9.525	3.44	0.8	0.9	0.18	0.81	
		MMT16IR190W	●	●		19	9.525	3.44	0.8	1.0	0.19	0.86	
		MMT16IR180W	●			18	9.525	3.44	0.8	1.0	0.20	0.90	
		MMT16IR160W	●			16	9.525	3.44	0.9	1.1	0.23	1.02	
		MMT16IR140W	●	●		14	9.525	3.44	1.0	1.2	0.26	1.16	
		MMT16IR120W	●			12	9.525	3.44	1.1	1.4	0.30	1.36	
		MMT16IR110W	●	●		11	9.525	3.44	1.1	1.5	0.33	1.48	
		MMT16IR100W	●			10	9.525	3.44	1.1	1.5	0.37	1.63	
		MMT16IR090W	●			9	9.525	3.44	1.2	1.7	0.34	1.81	
		MMT16IR080W	●			8	9.525	3.44	1.2	1.5	0.39	2.03	
		MMT22IR070W	●			7	12.7	4.64	1.6	2.3	0.46	2.32	
		MMT22IR060W	●			6	12.7	4.64	1.6	2.3	0.53	2.71	
		MMT22IR050W	●			5	12.7	4.64	1.7	2.4	0.66	3.25	
BSPT	Standard BSPT	MMT11IR190BSPT	●			19	6.35	3.04	0.8	0.9	0.14	0.86	Full form
		MMT11IR140BSPT	●			14	6.35	3.04	0.9	1.0	0.26	1.16	
		MMT16IR190BSPT	●	●		19	9.525	3.44	0.8	0.9	0.14	0.86	
		MMT16IR140BSPT	●	●		14	9.525	3.44	1.0	1.2	0.26	1.16	
		MMT16IR110BSPT	●	●		11	9.525	3.44	1.1	1.5	0.33	1.48	
Round DIN 405	7H	MMT16IR100RD	●			10	9.525	3.44	1.1	1.2	0.55	1.27	Full form
		MMT16IR080RD	●			8	9.525	3.44	1.4	1.4	0.70	1.59	
		MMT16IR060RD	●			6	9.525	3.44	1.4	1.5	0.93	2.12	
		MMT22IR040RD	●			4	12.7	4.64	2.2	2.3	1.40	3.18	



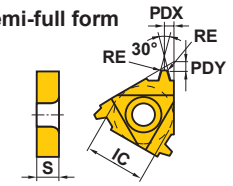


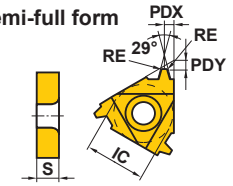


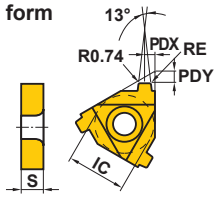


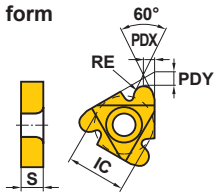
INTERNAL THREADING INSERTS

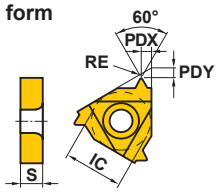
Type	Thread Tolerance	Order Number	Coated VP10MF	Pitch mm	Pitch thread/inch	Dimensions (mm) IC	S	PDY	PDX	RE	Total Cutting Depth (mm)	Geometry
ISO Trapezoidal 30°	7H	MMT16IR150TR	●	1.5		9.525	3.44	1.0	1.1	0.08	0.90	Semi-full form
		MMT16IR200TR	●	2.0		9.525	3.44	1.1	1.3	0.15	1.25	
		MMT16IR300TR	●	3.0		9.525	3.44	1.3	1.5	0.15	1.75	
		MMT22IR400TR	●	4.0		12.7	4.64	1.7	1.9	0.15	2.25	
		MMT22IR500TR	●	5.0		12.7	4.64	2.1	2.5	0.15	2.75	
American ACME	3G	MMT16IR120ACME	●		12	9.525	3.44	1.2	1.3	0.05	1.19	Semi-full form
		MMT16IR100ACME	●		10	9.525	3.44	1.2	1.3	0.08	1.52	
		MMT16IR080ACME	●		8	9.525	3.44	1.4	1.5	0.10	1.84	
		MMT22IR060ACME	●		6	12.7	4.64	1.8	2.1	0.10	2.37	
		MMT22IR050ACME	●		5	12.7	4.64	2.0	2.3	0.10	2.79	
UNJ		When machining an internal UNJ thread, cut an internal hole with the appropriate diameter. Then machine with 60° American UN. In this case, a full form type insert cannot be used.										
API Buttress Casing	Standard API	MMT22IR050APBU	●		5	12.7	4.64	2.8	1.9	0.18	1.55	Full form
API Round Casing&Tubing	Standard API RD	MMT16IR100APRD	●		10	9.525	3.44	1.2	1.4	0.34	1.41	Full form
		MMT16IR080APRD	●		8	9.525	3.44	1.3	1.5	0.41	1.81	
American NPT	Standard NPT	MMT16IR270NPT	●		27	9.525	3.44	0.7	0.8	0.04	0.66	Full form
		MMT16IR180NPT	●		18	9.525	3.44	0.8	1.0	0.08	1.01	
		MMT16IR140NPT	●		14	9.525	3.44	0.9	1.2	0.09	1.33	
		MMT16IR115NPT	●		11.5	9.525	3.44	1.1	1.5	0.11	1.64	
		MMT16IR080NPT	●		8	9.525	3.44	1.3	1.8	0.14	2.42	
American NPTF	Class 2	MMT16IR140NPTF	●		14	9.525	3.44	0.9	1.2	0.04	1.35	Full form
		MMT16IR115NPTF	●		11.5	9.525	3.44	1.1	1.5	0.04	1.63	
		MMT16IR080NPTF	●		8	9.525	3.44	1.3	1.8	0.04	2.38	

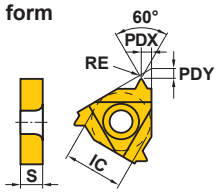












CT-RS

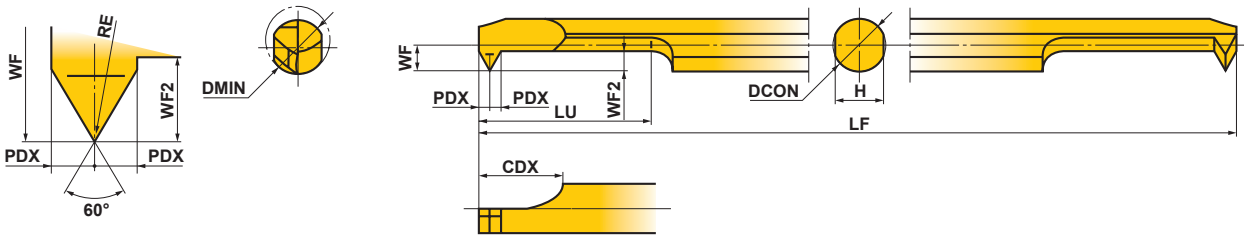
MICRO-MINI TWIN BORING BARS

Internal threading for small dia.

Product Information

Spare Parts >> 1927
ISO13399 Property >> 1966
Technical Info >> 1981

CT STANDARD

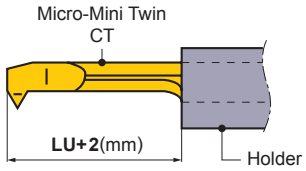


Order Number	Stock		Breaker	Threads				Dimensions (mm)									
	Micro Grain Carbide	Coated		Metric Screw		Unified Coarse Screw											
	TF15	VP15TF		Thread	Pitch (mm)	Thread	Pitch (thread/inch)	DMIN	RE	DCON	LF	LU	CDX	WF	PDX	WF2	H
CT0305RS-M4	●	●	Without	≥M4	0.5−1.0	≥NO.8-32UNC	36−24	**3**	0.03	3	50	5.2	6	1.3	0.6	1.2	2.7
CT03RS-M4	●	●	Without	≥M4	0.5−1.0	≥NO.8-36UNF	36−24	**3**	0.03	3	50	10.2	6	1.3	0.6	1.2	2.7
CT03RS-M4B	●	●	With	≥M4	0.5−1.0		36−24	**3**	0.03	3	50	10.2	6	1.3	0.6	1.2	2.7
CT0407RS-M6	●	●	Without	≥M6	0.75−1.25	≥1/4-20UNC	28−20	**4.5**	0.05	4	60	7.6	7	1.8	0.8	1.7	3.6
CT04RS-M6	●	●	Without	≥M6	0.75−1.25	≥1/4-28UNF	28−20	**4.5**	0.05	4	60	15.6	7	1.8	0.8	1.7	3.6
CT04RS-M6B	●	●	With	≥M6	0.75−1.25		28−20	**4.5**	0.05	4	60	15.6	7	1.8	0.8	1.7	3.6
CT0511RS-M8	●	●	Without	≥M8	0.75−1.5	≥5/16-18UNC	24−18	**6**	0.05	5	70	11	8	2.3	1	2.2	4.5
CT05RS-M8	●	●	Without	≥M8	0.75−1.5	≥5/16-24UNF	24−18	**6**	0.05	5	70	21	8	2.3	1	2.2	4.5
CT05RS-M8B	●	●	With	≥M8	0.75−1.5		24−18	**6**	0.05	5	70	21	8	2.3	1	2.2	4.5
CT0611RS-M10	●	●	Without	≥M10	0.75−1.75	≥3/8-16UNC	24−16	**7**	0.05	6	75	11	8	2.8	1	2.2	5.4
CT06RS-M10	●	●	Without	≥M10	0.75−1.75	≥3/8-24UNF	24−16	**7**	0.05	6	75	21	8	2.8	1	2.2	5.4
CT06RS-M10B	●	●	With	≥M10	0.75−1.75		24−16	**7**	0.05	6	75	21	8	2.8	1	2.2	5.4

● : Inventory maintained in Japan. (MICRO-MINI TWIN is available in 1 piece in one pack.)

RECOMMENDED CUTTING CONDITIONS

	Work Material	Cutting Speed (m/min)	Recommended Tool Overhang (mm)
P	Carbon Steel Alloy Steel	50 (30－80)	
M	Stainless Steel	50 (30－80)	
K	Cast Iron	50 (30－80)	
N	Non-Ferrous Metal	80 (50－100)	



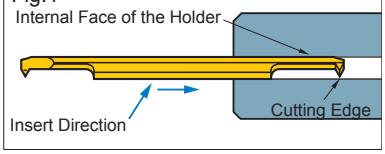
(Note 1) Wet cutting is recommended.
(Note 2) Pay special attention to machining of small diameters at high revolutions as the feed rate cannot keep up with the speed.

PRECAUTIONS WHEN USING THE MICRO-MINI TWIN

●When using a holder for general purpose / small automatic lathe:

1 To avoid chipping of the 2nd cutting edge take care when inserting the boring bar into the holder. Refer to fig.1. If the 2nd edge contacts the internal face of the holder there is a possibility that it may chip.

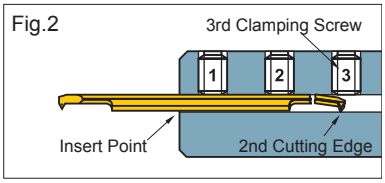
Fig.1



2 When using this type of holder, there is a possibility that damage to the shank and the 2nd cutting edge can occur. Make sure that the clamping screws are tightened to the set torque value. Additionally make sure that there is no clamping screw near the 2nd cutting edge as this can break the boring bar.

◎When using Mitsubishi holders
When using holders with a tool overhang of recommended quantity, ensure that the 3rd clamping screw is removed prior to machining. The set torque value for clamping screw is 2.0 N • m.

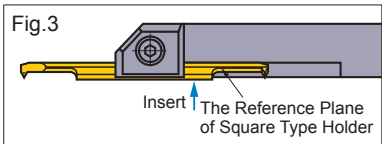
Fig.2



●When using a square type holder:

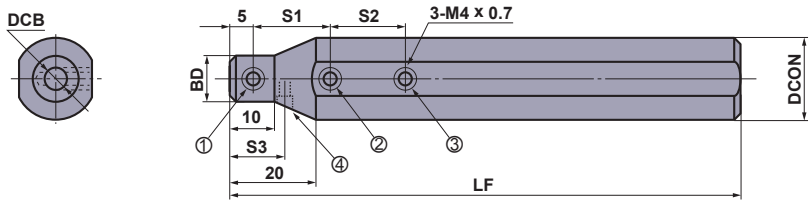
1 When installing the boring bar into the holder, tighten the clamp screws after ensuring the flats on the tool holder are parallel to the reference flats on the micro-mini bar. Refer to fig.3.
2 Make sure that the clamping screws are tightened to the recommended values.
3 Do not tighten the clamp screw without a bar in place, otherwise the bridge will be deformed.

Fig.3

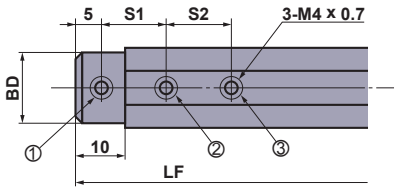


Tighten the clamping screw ensuring making the micro-mini twin boring bars in contact with the reference plane of square type holder.

ROUND TYPE HOLDER



RBH22□□N has a temporary set screw for different machine specifications.
(Represented by number 4)



RBH158□□N, RBH16□□N,
RBH190□□N

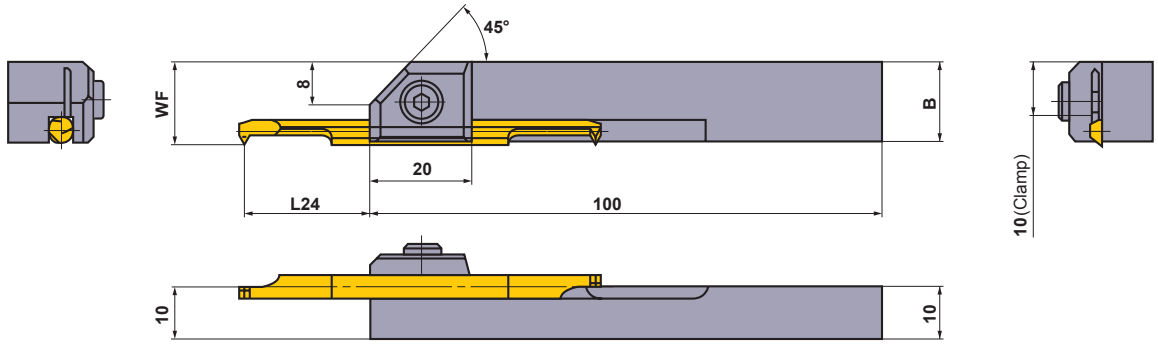
Order Number	Stock	Dimensions (mm)							Micro-Mini Twin CT	*1 Clamp Screw				Wrench	Torque (N•m)
		DCON	DCB	BD	LF	S1	S2	S3		①	②	③	④		
RBH15830N	●	15.875	3	15	100	10	10	—	0305RS-M4, 03RS-M4(B)	A	A	A	—	HKY20F	2.0
RBH15840N	●	15.875	4	15	100	15	15	—	0407RS-M6, 04RS-M6(B)	A	A	A	—	HKY20F	2.0
RBH15850N	●	15.875	5	15	100	15	15	—	0511RS-M8, 05RS-M8(B)	A	A	A	—	HKY20F	2.0
RBH15860N	●	15.875	6	15	100	15	15	—	0611RS-M10, 06RS-M10(B)	A	A	A	—	HKY20F	2.0
RBH1630N	●	16	3	15	100	10	10	—	0305RS-M4, 03RS-M4(B)	A	A	A	—	HKY20F	2.0
RBH1640N	●	16	4	15	100	15	15	—	0407RS-M6, 04RS-M6(B)	A	A	A	—	HKY20F	2.0
RBH1650N	●	16	5	15	100	15	15	—	0511RS-M8, 05RS-M8(B)	A	A	A	—	HKY20F	2.0
RBH1660N	●	16	6	15	100	15	15	—	0611RS-M10, 06RS-M10(B)	A	A	A	—	HKY20F	2.0
*2 RBH19030N	●	19.05	3	18	125	10	10	—	0305RS-M4, 03RS-M4(B)	B	B	B	—	HKY20F	2.0
*2 RBH19040N	●	19.05	4	18	125	15	15	—	0407RS-M6, 04RS-M6(B)	B	B	B	—	HKY20F	2.0
*2 RBH19050N	●	19.05	5	18	125	15	15	—	0511RS-M8, 05RS-M8(B)	B	B	B	—	HKY20F	2.0
*2 RBH19060N	●	19.05	6	18	125	15	15	—	0611RS-M10, 06RS-M10(B)	B	B	B	—	HKY20F	2.0
RBH2030N	●	20	3	12	125	10	10	—	0305RS-M4, 03RS-M4(B)	A	A	B	—	HKY20F	2.0
RBH2040N	●	20	4	13	125	15	15	—	0407RS-M6, 04RS-M6(B)	A	B	B	—	HKY20F	2.0
RBH2050N	●	20	5	14	125	15	15	—	0511RS-M8, 05RS-M8(B)	A	B	B	—	HKY20F	2.0
RBH2060N	●	20	6	15	125	15	15	—	0611RS-M10, 06RS-M10(B)	A	B	B	—	HKY20F	2.0
RBH2230N	●	22	3	12	125	10	10	10	0305RS-M4, 03RS-M4(B)	A	B	C	A	HKY20F	2.0
RBH2240N	●	22	4	13	125	15	15	12.5	0407RS-M6, 04RS-M6(B)	A	B	B	A	HKY20F	2.0
RBH2250N	●	22	5	14	125	15	15	12.5	0511RS-M8, 05RS-M8(B)	A	B	B	A	HKY20F	2.0
RBH2260N	●	22	6	15	125	15	15	15	0611RS-M10, 06RS-M10(B)	A	B	B	A	HKY20F	2.0
RBH2530N	●	25	3	12	150	10	10	—	0305RS-M4, 03RS-M4(B)	A	B	C	—	HKY20F	2.0
RBH2540N	●	25	4	13	150	15	15	—	0407RS-M6, 04RS-M6(B)	A	C	C	—	HKY20F	2.0
RBH2550N	●	25	5	14	150	15	15	—	0511RS-M8, 05RS-M8(B)	A	C	C	—	HKY20F	2.0
RBH2560N	●	25	6	15	150	15	15	—	0611RS-M10, 06RS-M10(B)	A	C	C	—	HKY20F	2.0
RBH25430N	●	25.4	3	12	150	10	10	—	0305RS-M4, 03RS-M4(B)	A	B	C	—	HKY20F	2.0
RBH25440N	●	25.4	4	13	150	15	15	—	0407RS-M6, 04RS-M6(B)	A	C	C	—	HKY20F	2.0
RBH25450N	●	25.4	5	14	150	15	15	—	0511RS-M8, 05RS-M8(B)	A	C	C	—	HKY20F	2.0
RBH25460N	●	25.4	6	15	150	15	15	—	0611RS-M10, 06RS-M10(B)	A	C	C	—	HKY20F	2.0

*1 Order number of clamp screw A=HSS04004, B=HSS04006, C=HSS04008
*2 Revised order number.

Conventional Order Number	Revised Order Number
RBH1930N	RBH19030N
RBH1940N	RBH19040N
RBH1950N	RBH19050N
RBH1960N	RBH19060N

● : Inventory maintained in Japan.

SQUARE TYPE HOLDER



Order Number	Stock	Dimensions (mm) Micro-Mini Twin **CT**			Micro-Mini Twin **CT**	Clamp Screw	Wrench	Torque (N•m)
		B	**WF**	*** L24**				
SBH1030R	●	13.8	13.8	13—17.5(14)	0305RS-M4, 03RS-M4(B)	HSC05012	HKY40R	9.5
SBH1040R	●	14.7	14.8	18.5—22(19.5)	0407RS-M6, 04RS-M6(B)	HSC05012	HKY40R	9.5
SBH1050R	●	15.6	15.8	24—26.5(25)	0511RS-M8, 05RS-M8(B)	HSC05012	HKY40R	9.5
SBH1060R	●	16.5	16.8	24—31.5(25)	0611RS-M10, 06RS-M10(B)	HSC05012	HKY40R	9.5

* L24 is the length of overhang for sufficient clamping, and ( ) is the recommended length for machining of carbon and alloy steel.

FSL51/52

F TYPE BORING BARS

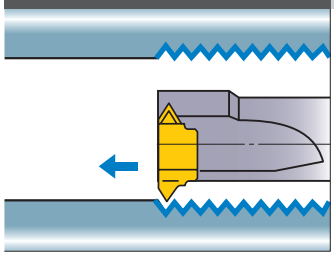
Internal threading, Grooving

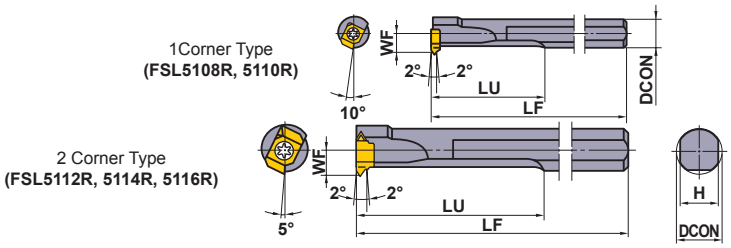
Product Information

Spare Parts >> 1927
ISO13399 Property >> 1966
Technical Info >> 1981

FSL51

Internal threading, Grooving





(Note) Cutting in the opposite direction is not possible.

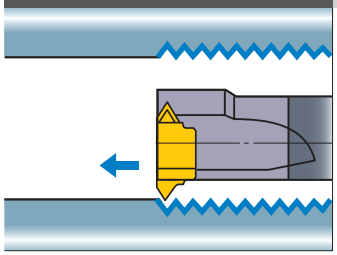
Right hand tool holder only.

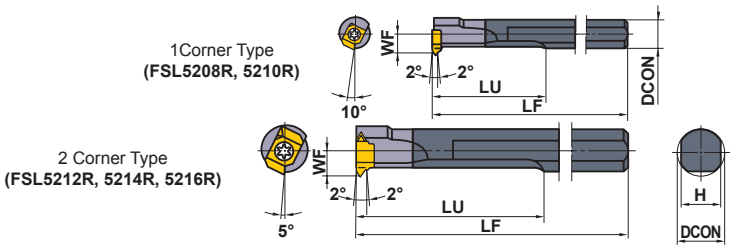
Order Number	Stock	Insert Number		Dimensions (mm)						*2	
	R	Threading	Grooving	DCON	LF	LU	WF	H	DMIN*1	Clamp Screw	Wrench
FSL5108R	●	MLT1001L	MLG10◌◌L	8	125	30	4.8	7	**10**	TS25	TKY08F
FSL5110R	●	MLT1001L	MLG10◌◌L	10	150	40	5.8	9	**12**	TS25	TKY08F
FSL5112R	●	MLT1401L	MLG14◌◌L	12	180	50	6.8	10.8	**14**	TS32	TKY08F
FSL5114R	●	MLT1401L	MLG14◌◌L	14	180	60	7.8	12.4	**16**	TS32	TKY08F
FSL5116R	●	MLT2001L	MLG20◌◌L	16	200	70	9.7	14	**20**	TS43	TKY15F

*1 DMIN : Min.Cutting Diameter
*2 Clamp Torque (N • m) : TS25=1.0, TS32=1.0, TS43=3.5

FSL52

(Carbide shank) Internal threading, Grooving





(Note) Cutting in the opposite direction is not possible.

Right hand tool holder only.

Order Number	Stock	Insert Number		Dimensions (mm)						*2	
	R	Threading	Grooving	DCON	LF	LU	WF	H	DMIN*1	Clamp Screw	Wrench
FSL5208R	●	MLT1001L	MLG10◌◌L	8	125	60	4.8	7	**10**	TS25	TKY08F
FSL5210R	●	MLT1001L	MLG10◌◌L	10	150	70	5.8	9	**12**	TS25	TKY08F
FSL5212R	●	MLT1401L	MLG14◌◌L	12	180	80	6.8	11	**14**	TS32	TKY08F
FSL5214R	●	MLT1401L	MLG14◌◌L	14	180	85	7.8	12	**16**	TS32	TKY08F
FSL5216R	●	MLT2001L	MLG20◌◌L	16	200	115	9.7	14	**20**	TS43	TKY15F

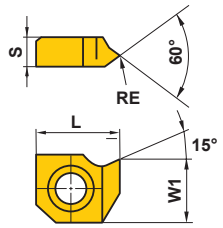
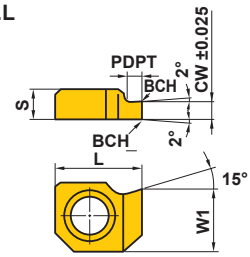
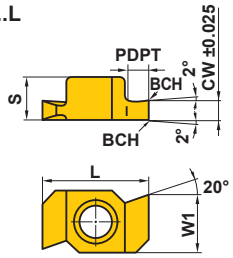
*1 DMIN : Min.Cutting Diameter
*2 Clamp Torque (N • m) : TS25=1.0, TS32=1.0, TS43=3.5

RECOMMENDED CUTTING CONDITIONS

	Work Material	Hardness	Grade	Cutting Speed (m/min)
P	Mild Steel	≤180HB	**UP20M**	140 (100—180)
			UTi20T	120 (100—150)
	Carbon Steel Alloy Steel	180—280HB	**UP20M**	120 (100—150)
			UTi20T	100 (70—120)

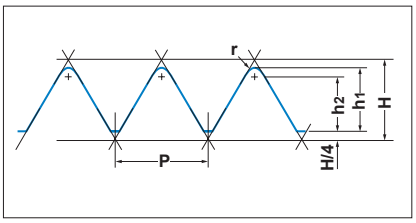
	Work Material	Hardness	Grade	Cutting Speed (m/min)
M	Stainless Steel	≤200HB	**UP20M**	120 (80—150)
			UTi20T	100 (70—130)
K	Gray Cast Iron	Tensile Strength ≤350MPa	**UP20M**	80 (60—100)
			UTi20T	80 (60—100)

INSERTS

Type	Order Number	Coated UP20M	Carbide UTi20T	Pitch and CW (mm)	Dimensions (mm) L	W1	PDPT	S	BCH	RE	Geometry
Threading	MLT1001L	●	●	Pitch 1.5—2.0	7	5	—	2.38	—	0.1	MLT 
	MLT1401L	●	●	Pitch 1.5—2.5	11.8	6.5	—	4.76	—	0.1	
	MLT2001L	●	●	Pitch 1.5—3.5	16.8	9.03	—	6.35	—	0.1	
Grooving	MLG1012L		●	1.2	7	5	1.0	2.38	0.1	—	MLG...L 
	MLG1015L		●	1.5	7	5	1.0	2.38	0.1	—	
	MLG1020L		●	2	7	5	1.0	2.38	0.1	—	
	MLG1415L		●	1.5	11.8	6.5	2.0	4.76	0.1	—	MLG...L 
	MLG1420L		●	2	11.8	6.5	2.0	4.76	0.1	—	
	MLG1430L		●	3	11.8	6.5	2.0	4.76	0.1	—	
	MLG2020L		●	2	16.8	9.03	3.0	6.35	0.1	—	
	MLG2030L		●	3	16.8	9.03	3.0	6.35	0.1	—	
	MLG2040L		●	4	16.8	9.03	3.0	6.35	0.1	—	

STANDARD OF DEPTH OF CUT

- The chart on the right shows the cutting depths when machining external ISO metric screw threads.
- When you use cermet grades or cut stainless steel, please increase the number of passes by 2—3 times.



METRIC SCREW THREAD

P (Pitch)		0.75	1.00	1.25	1.50	1.75	2.00	2.50	3.00	3.50
h_1		0.43	0.58	0.72	0.87	1.01	1.15	1.44	1.73	2.02
h_2		0.38	0.51	0.63	0.76	0.88	1.01	1.21	1.51	1.77
r (Corner Radius)		0.05	0.07	0.09	0.11	0.13	0.14	0.18	0.22	0.25
Number of Passes	1	0.10	0.15	0.18	0.20	0.23	0.25	0.25	0.25	0.30
	2	0.10	0.13	0.15	0.20	0.20	0.20	0.22	0.25	0.25
	3	0.10	0.10	0.12	0.15	0.20	0.15	0.20	0.22	0.22
	4	0.08	0.10	0.12	0.15	0.15	0.15	0.20	0.20	0.20
	5	0.05	0.05	0.10	0.10	0.10	0.15	0.15	0.20	0.20
	6		0.05	0.05	0.07	0.08	0.10	0.10	0.15	0.20
	7					0.05	0.10	0.10	0.12	0.15
	8						0.05	0.10	0.10	0.15
	9							0.07	0.10	0.10
	10							0.05	0.09	0.10
	11								0.05	0.10
	12									0.05

(Note) The first pass causes a high load on the cutting edge. In order to avoid damage, keep the depth of cut to 0.4—0.5mm maximum.

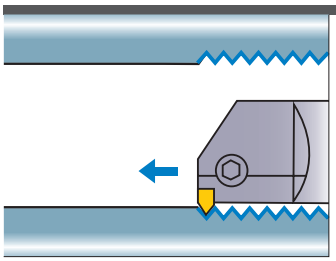
DPT2

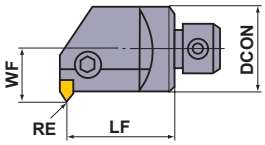
D TYPE BORING HEAD

Internal threading

Product Information

Spare Parts >> 1927
ISO13399 Property >> 1966
Technical Info >> 1981





Right hand tool holder only.

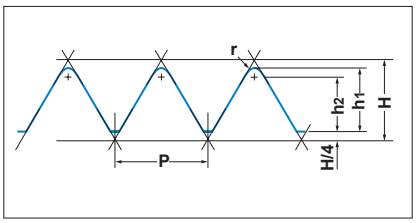
Order Number	Stock	Insert Number	Dimensions (mm)								
	R		DCON	LF	WF	DMIN*2	RE	Lock Pin	Lock Screw *1	Stop Ring	Wrench
DPT2132R	●	MTTL4355◯◯	32	40	20	**40**	0.1	P21S	HSP08014	E01	HKY40R
DPT2140R	●	MTTL4360◯◯	40	50	25	**50**	0.1	P21S	HSP08014	E01	HKY40R

*1 Clamp Torque (N • m) : HSP08014=7.0
*2 DMIN : Min.Cutting Diameter

● : **Inventory maintained in Japan.**

STANDARD OF DEPTH OF CUT

- The chart on the right shows the cutting depths when machining external ISO metric screw threads.
- When you use cermet grades or cut stainless steel, please increase the number of passes by 2—3 times.



METRIC SCREW THREAD

P (Pitch)		0.75	1.00	1.25	1.50	1.75	2.00	2.50	3.00	3.50	4.00	4.50
h_1		0.43	0.58	0.72	0.87	1.01	1.15	1.44	1.73	2.02	2.31	2.60
h_2		0.38	0.51	0.63	0.76	0.88	1.01	1.21	1.51	1.77	2.02	2.28
r (Corner Radius)		0.05	0.07	0.09	0.11	0.13	0.14	0.18	0.22	0.25	0.29	0.32
Number of Passes	1	0.10	0.15	0.18	0.20	0.23	0.25	0.25	0.25	0.30	0.30	0.35
	2	0.10	0.13	0.15	0.20	0.20	0.20	0.22	0.25	0.25	0.25	0.30
	3	0.10	0.10	0.12	0.15	0.20	0.15	0.20	0.22	0.22	0.25	0.25
	4	0.08	0.10	0.12	0.15	0.15	0.15	0.20	0.20	0.20	0.25	0.25
	5	0.05	0.05	0.10	0.10	0.10	0.15	0.15	0.20	0.20	0.23	0.25
	6		0.05	0.05	0.07	0.08	0.10	0.10	0.15	0.20	0.20	0.20
	7					0.05	0.10	0.10	0.12	0.15	0.20	0.20
	8						0.05	0.10	0.10	0.15	0.15	0.15
	9							0.07	0.10	0.10	0.15	0.15
	10							0.05	0.09	0.10	0.10	0.15
	11								0.05	0.10	0.10	0.10
	12									0.05	0.08	0.10
	13										0.05	0.10
	14											0.05

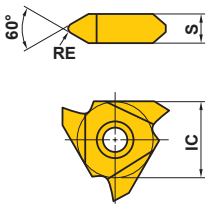
(Note) The first pass causes a high load on the cutting edge. In order to avoid damage, keep the depth of cut to 0.4—0.5mm maximum.

RECOMMENDED CUTTING CONDITIONS

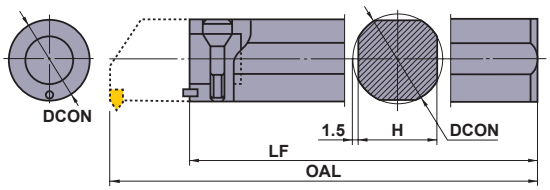
	Work Material	Hardness	Grade	Cutting Speed (m/min)
P	Mild Steel	≤180HB	**UP20M**	140 (100—180)
			NX2525	200 (150—250)
			UTi20T	120 (100—150)
	Carbon Steel Alloy Steel	180—280HB	**UP20M**	120 (100—150)
			NX2525	170 (150—200)
			UTi20T	100 (70—120)

	Work Material	Hardness	Grade	Cutting Speed (m/min)
M	Stainless Steel	≤200HB	**UP20M**	120 (80—150)
			UTi20T	100 (70—130)
K	Gray Cast Iron	Tensile Strength ≤350MPa	**UP20M**	80 (60—100)
			UTi20T	80 (60—100)
			HTi10	100 (70—130)

INSERTS

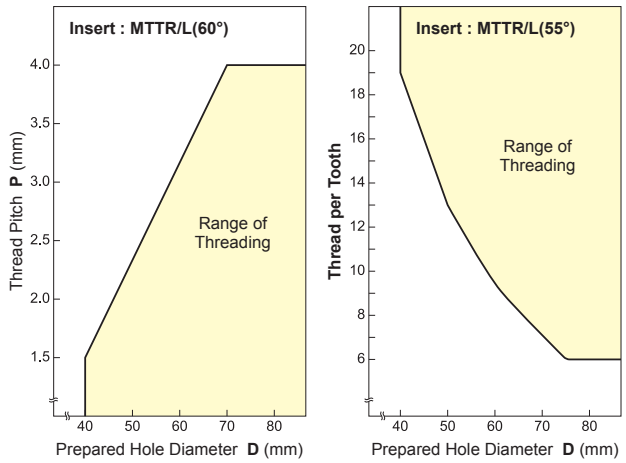
Type	Order Number	Class	Coated	Cermet		Carbide		ISO Pitch mm (thread/inch)	Dimensions (mm)			Geometry
			UP20M	NX2525		UTi20T	HTi10		IC	S	RE	
Partial Profile 60°	**MTTL436001**	G	●			●	●	1.0—1.75	12.7	4.76	0.1	**MTTL(60°)** 
	MTTL436002	G		●		●		2.0—2.5	12.7	4.76	0.2	
	MTTL436003	G		●		●		3.0—3.5	12.7	4.76	0.3	

STANDARD ARBOR FOR D TYPE BORING HEAD



Order Number	Stock	Dimensions (mm)				Set Bolt	Wrench	Head
		DCON	LF	H	OAL			
B13232	●	32	260	29	300	SD32	HKY60R	DPT2132R
B14040	●	40	310	37	360	SD40	HKY60R	DPT2140R

RANGE OF MACHINING



HSK-T TOOLS

OUTLINE OF HSK-T TOOLS..... 630
HSK-T TOOL STANDARDS..... 632

★Arranged by Alphabetical order

DCLN	637	MMTE/MMTEN	644	PDJN/DDJN	634
DDJN	639	MT	646	PDNN/DDNN	638
H-TH	648	PCLN/DCLN	635	PRGC/PRDC	640
MG	642	PCMN/DCMN	636	SVPB/SVVB	641

OUTLINE OF HSK-T TOOLS

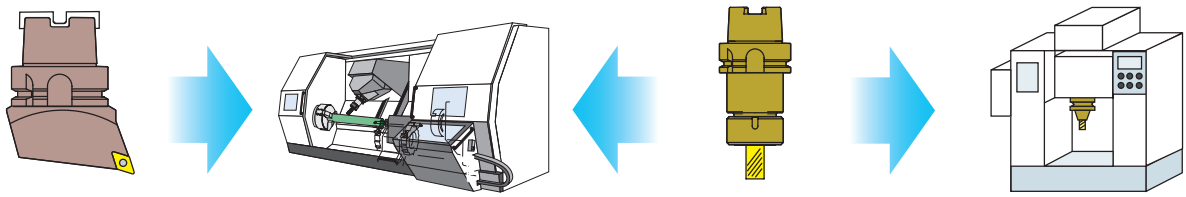
HSK-T System

HSK-T is a new HSK system designed for turning on multi-task machines that are compatible with HSK-A type (ISO standard: ISO12164-1:2001).
The HSK system was developed by a consortium of 17 Japanese manufacturers and registered in ISO standard (ISO12164-3:2008) under the name HSK-T type in 2008 and JIS standard (JIS B6064-3) in 2013.

High accuracy cutting edge positioning

The HSK-T type has a closer tolerance between the spindle key and tool holder keyway than the HSK-A type. This results in higher cutting edge positional accuracies. For milling, the conventional HSK-A type tools can be still used.

Compatible with both multi-task machines and machining centres



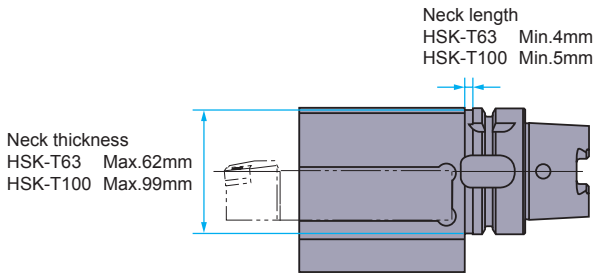
HSK-T
Turning tool holder

HSK-T spindle
Multi-task machines

HSK-A
Rotating tool holder

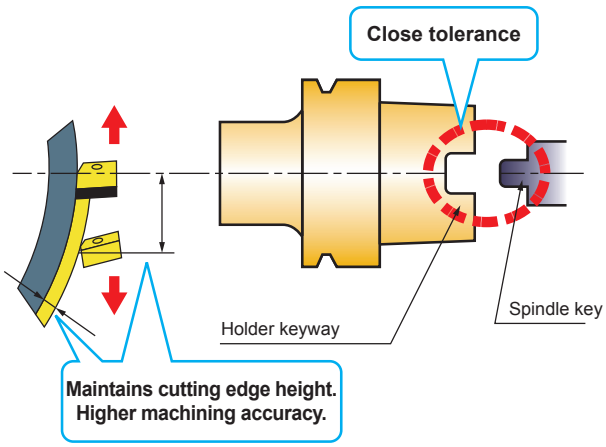
HSK-A spindle
Machining centre

*Note
Short neck length from the flange with thick body of the HSK-T turning tool as shown in the figure at the left.
Because there are machines which cannot be mounted depending on the ATC specifications of the multi-task machine(HSK-A type), please check beforehand.
Also be careful of interference of the magazine with adjacent tools.

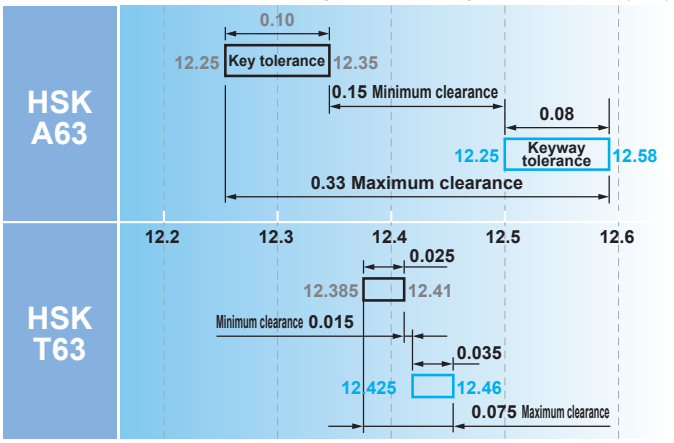


HSK-T turning tool standard (Example)

Improved keyway tolerance



Tolerance comparison (Example) (mm)

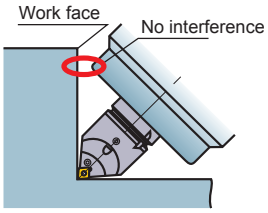


High accuracy and rigidity HSK-T type tooling system developed for use on multi-task machines.

Straight type tools suitable for use on multi-task machines

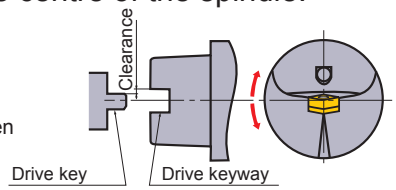
Avoid workpiece interference with improved tool accessibility.

By tilting the machines B spindle (main axis of the tool) at 45 deg, interference between the spindle, holder, workpiece and chuck can be avoided.



Improve centreline height by positioning the cutting edge at the centre of the spindle.

Increased stability and accuracy can be achieved because the cutting edge centreline height is not affected by the gap between the spindle and the key.



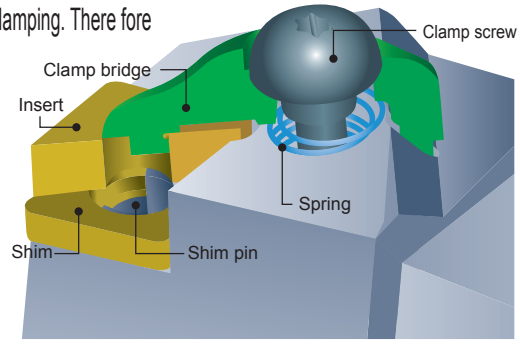
New one-action type double clamp series

The double clamp mechanism offers high rigidity, accuracy and reliability that ensures secure insert clamping. There fore making it suitable turning of difficult to machine materials such as stainless and heat resistant alloys.

Handed type for turning and facing

Straight type for turning and facing

For turning, facing and boring



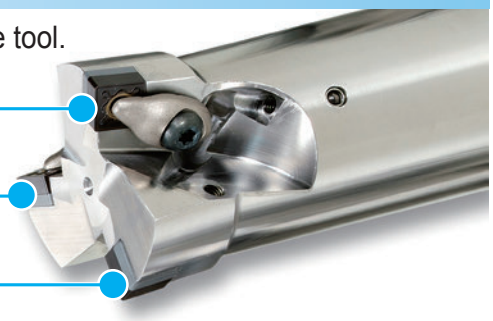
3 on 1 tool for process and tool consolidation

3 turning inserts of the same geometry can be installed on a single tool.

The same type of inserts can be installed for quick change with spare tools.

Different types of inserts can be installed for different applications (roughing, semi finishing and finishing)

Inserts in different grade types can be installed to cover various kinds of workpieces.



New HSK-T100 size for large workpieces

Larger tool holder sizes for high efficiency machining.

Square shank holder type

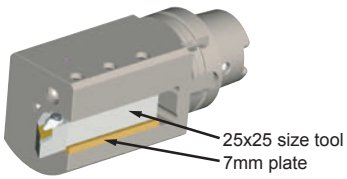
Boring bar / Drill type

Sleeve

A single tool can be used with different sized tool holders.

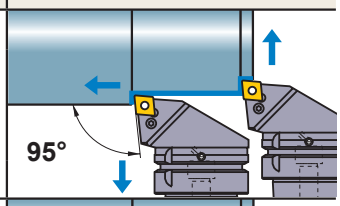
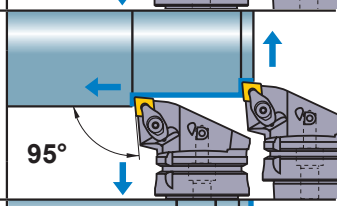
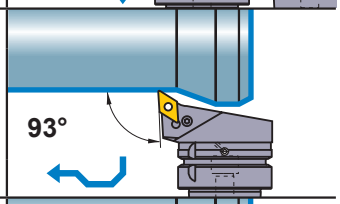
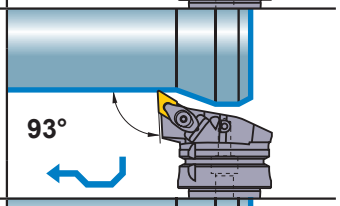
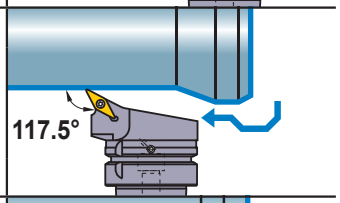
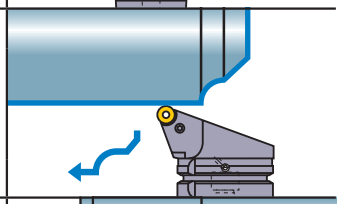
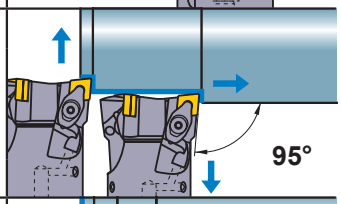
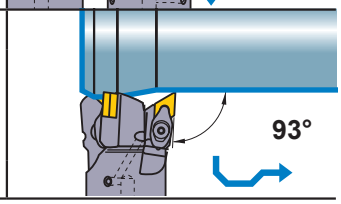
- Available for use with JIS B4126 (ISO 5610) 32x32 and 32x25 tools.
- Possible to fit a 25x25 tool by using a 7mm plate.

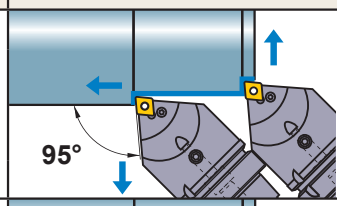
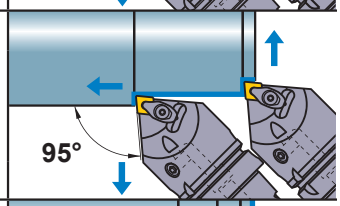
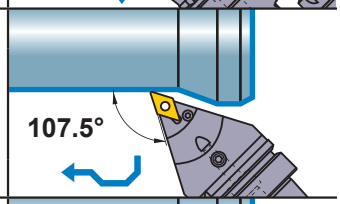
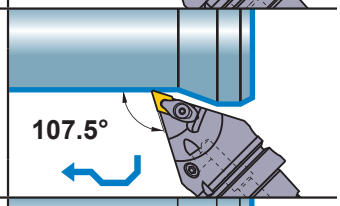
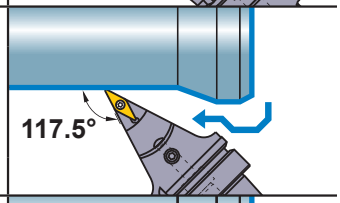
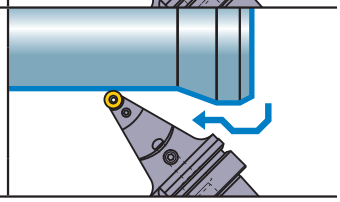
*Please prepare a plate on your own.



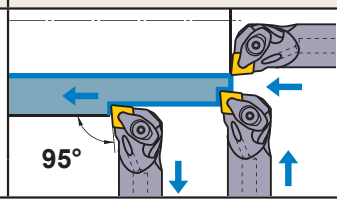
CLASSIFICATION OF HSK-T TOOLS

EXTERNAL TURNING • FACING • COPYING

Order Number	Cutting Mode
H63TH-PCLNR/L-DX12 635	
H63TH-DCLNR/L-DX12 635	
H63TH-PDJNR/L-DX15 634	
H63TH-DDJNR/L-DX15 634	
H63TH-SVPBR/L-DX16 641	
H63TH-PRGCR/L-DX12 640	
H63TH-DCLNL-L12-3 637	
H63TH-DDJNL-L15-3 639	

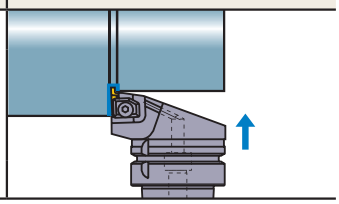
Order Number	Cutting Mode
H63TH-PCMNN-H/L12 636	
H63TH-DCMNN-H/L12 636	
H63TH-PDNNN-H/L15 638	
H63TH-DDNNN-H/L15 638	
H63TH-SVVBN-H/L16 641	
H63TH-PRDCN-H/L12 640	

EXTERNAL TURNING • FACING• BORING

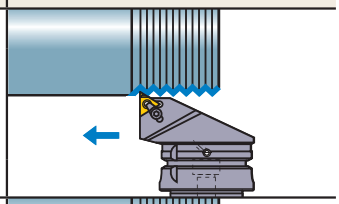
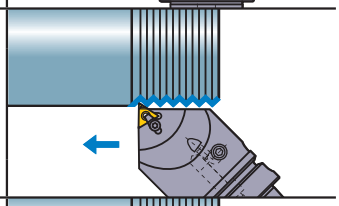
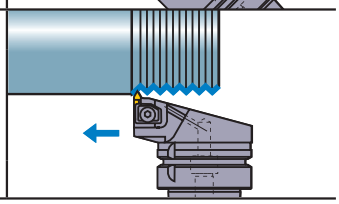
Order Number	Cutting Mode
H63TH-A25KDCLNR/L12 H63TH-A32LDCLNR/L12 637	

CLASSIFICATION OF HSK-T TOOLS

GROOVING

Order Number	Cutting Mode
H63TH-MGHR/L-DX43○○ 642	

THREADING

Order Number	Cutting Mode
H63TH-MMTER-DX16 644	
H63TH-MMTENR-H/L16 644	
H63TH-MTHR/L-DX43 646	

EXTERNAL TURNING TOOL HOLDERS

Order Number	Holder
H63TH-EV2525R/L-112 648	
H100TH-EV3232R/L-180 649	
H63TH-EN2525R/L-115 *1 650	
H100TH-EN3232R/L-130 *1 650	
H63TH-EV2020R/L-105-3 651	

BORING BAR HOLDERS

Order Number	Holder
H63TH-B○○-○○ 651	
H100TH-B○○-○○○ 652	
SL32○○-90 (Sleeve) *2 652	

*1 Mitsubishi Materials is licensed for production and distribution of these tools from MORI SEIKI CO., LTD under Patent No.3720202.
*2 The SL32○○-90 sleeve is only for use with H100TH-B32-135.

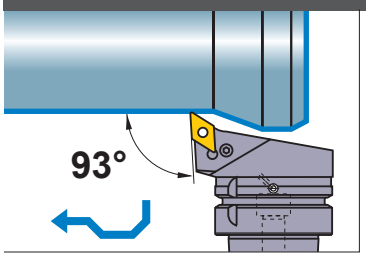
PDJN/DDJN

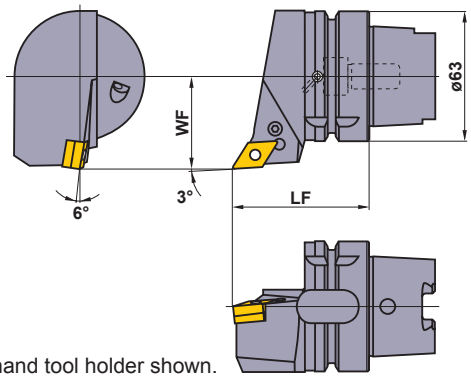
Product Information

Spare Parts >> 1927
ISO13399 Property >> 1966
Technical Info >> 1971

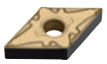
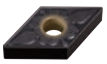
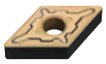
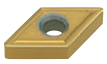
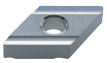
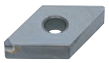
PDJN

External turning • Copying





Right hand tool holder shown.

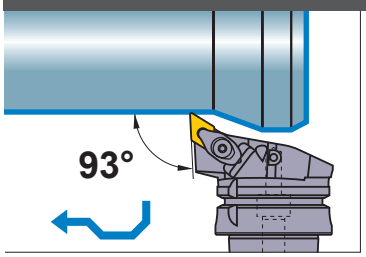
Finish	Light	Medium
FP	LP	MP
		
(15)	(15)	(15)
Medium	**Medium – Rough**	**Stainless**
MK	RP	MS
		
(15)	(15)	(15)
G Class	**CBN**	
R/L		
		
(15)	(15)	

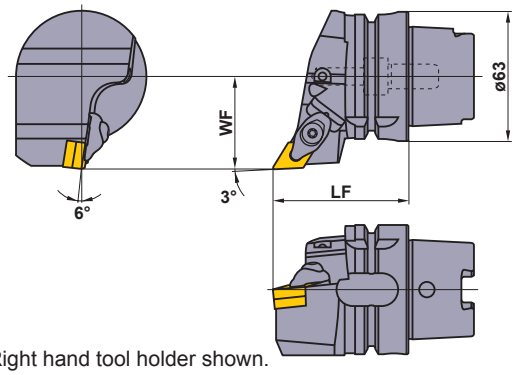
Order Number	Stock R	Stock L	Insert Number		Dimensions (mm) LF	Dimensions (mm) WF	*3 WT (kg)	*2 Shim	Shim Pin	Clamp Lever	*1 Clamp Screw	Wrench
H63TH-PDJNR/L-DX15	●	●	DNM○ DNG○ NP-DN○A	1504○○	65	45	1.2	LLSDN43 (LLSDN42)	LLP14	LLCL24	LLCS108	HKY30R

*1 Clamp Torque (N • m) : LLCS108=3.3
*2 Please use shim no. LLSDN42 with 6.35mm thick inserts. When using 6.35mm thick inserts, the shim should be ordered separately.
*3 WT : Tool Weight

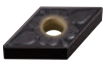
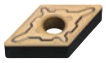
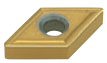
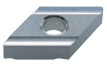
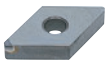
DDJN

External turning • Copying ***DOUBLE CLAMP type***





Right hand tool holder shown.

Finish	Light	Medium
FP	LP	MP
(15)	(15)	(15)
Medium	**Medium – Rough**	**Stainless**
MK	RP	MS
		
(15)	(15)	(15)
G Class	**CBN**	
R/L		
		
(15)	(15)	

Order Number	Stock R	Stock L	Insert Number		Dimensions (mm) LF	Dimensions (mm) WF	*3 WT (kg)	*2 Shim	Shim Pin	Clamp Bridge	Spring	*1 Clamp Screw	Wrench
H63TH-DDJNR/L-DX15	●	●	DNM○ DNG○ NP-DN○A	1504○○	65	45	1.2	LLSDN43 (LLSDN42)	LLP24	DCK2613	DCS1	DC0621T	TKY20F

*1 Clamp Torque (N • m) : DC0621T=5.0
*2 Please use shim no. LLSDN42 with 6.35mm thick inserts. When using 6.35mm thick inserts, the shim should be ordered separately.
*3 WT : Tool Weight

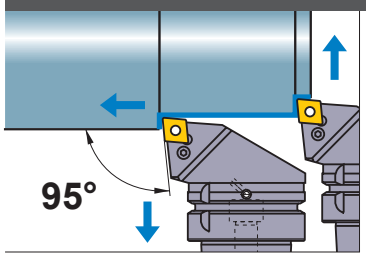
PCLN/DCLN

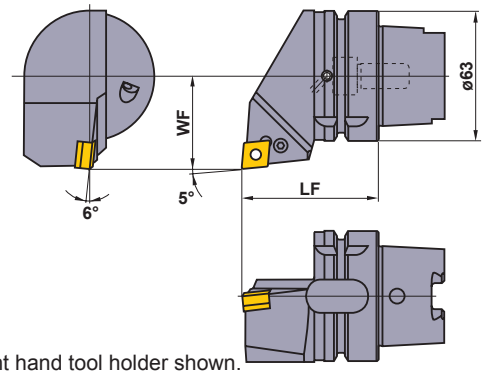
Product Information

Spare Parts >> 1927
ISO13399 Property >> 1966
Technical Info >> 1971

PCLN

External turning • Facing





Right hand tool holder shown.

Finish	Light	Medium
FP	LP	MP
(12)	(12)	(12)
Medium	Medium	Medium – Rough
MK	Standard	RP
(12)	(12)	(12)
Stainless	CBN	
MS		
(12)	(12)	

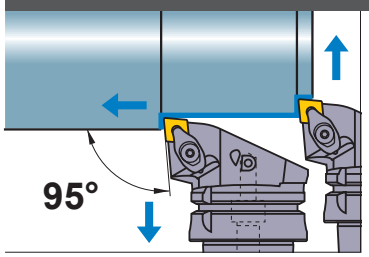
Order Number	Stock R	Stock L	Insert Number		Dimensions (mm) LF	Dimensions (mm) WF	*2 WT (kg)	Shim	Shim Pin	Clamp Lever	*1 Clamp Screw	Wrench
H63TH-PCLNR/L-DX12	●	●	CNM○ CNG○ NP-CN○A	1204○○	65	45	1.3	LLSCN42	LLP14	LLCL14	LLCS108	HKY30R

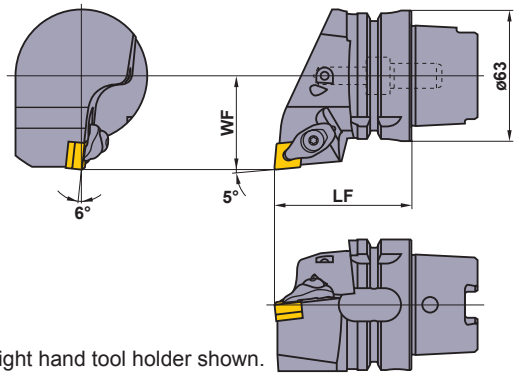
*1 Clamp Torque (N • m) : LLCS108=3.3
*2 WT : Tool Weight

● : **Inventory maintained in Japan.**

DCLN

External turning • Facing ***DOUBLE CLAMP type***





Right hand tool holder shown.

Finish	Light	Medium
FP	LP	MP
(12)	(12)	(12)
Medium	Medium	Medium – Rough
MK	Standard	RP
(12)	(12)	(12)
Stainless	CBN	
MS		
(12)	(12)	

Order Number	Stock R	Stock L	Insert Number		Dimensions (mm) LF	Dimensions (mm) WF	*2 WT (kg)	Shim	Shim Pin	Clamp Bridge	Spring	*1 Clamp Screw	Wrench
H63TH-DCLNR/L-DX12	●	●	CNM○ CNG○ NP-CN○A	1204○○	65	45	1.3	LLSCN42	LLP14	DCK2613	DCS1	DC0621T	TKY20F

*1 Clamp Torque (N • m) : DC0621T=5.0
*2 WT : Tool Weight

● : **Inventory maintained in Japan.**

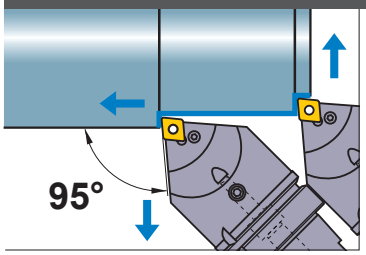
PCMN/DCMN

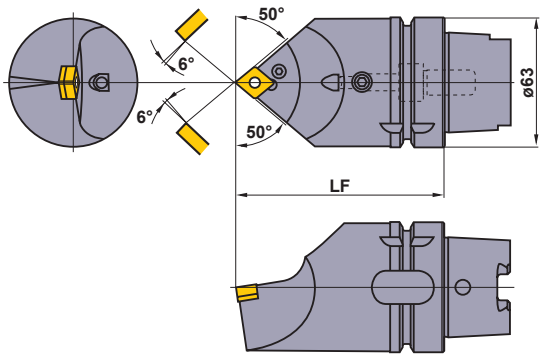
Product Information

Spare Parts >> 1927
ISO13399 Property >> 1966
Technical Info >> 1971

PCMN

External turning • Facing





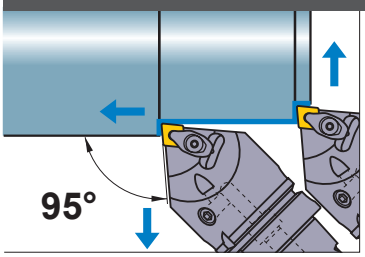
Finish	Light	Medium
FP (12)	LP (12)	MP (12)
Medium	**Medium**	**Medium – Rough**
MK (12)	Standard (12)	RP (12)
Stainless	**CBN**	
MS (12)	(12)	

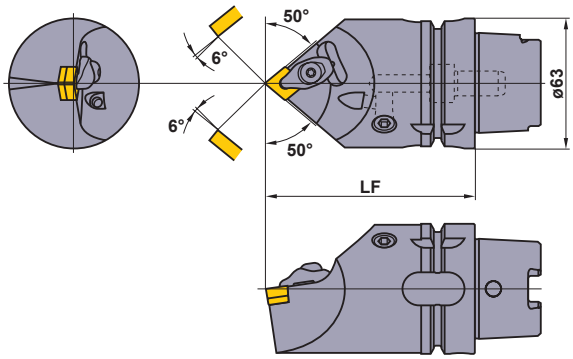
Order Number	Stock	Insert Number		Dimensions (mm) LF	*2 WT (kg)	Shim	Shim Pin	Clamp Lever	Clamp Screw *1	Plug	Wrench
H63TH-PCMNN-H12	●	CNM○ CNG○ NP-CN○A	1204○○	100	1.7	LLSCN42	LLP14	LLCL14	LLCS108	HGM-PT1/8	HKY30R
H63TH-PCMNN-L12	●			140	2.7	LLSCN42	LLP14	LLCL14	LLCS108	HGM-PT1/8	HKY30R

*1 Clamp Torque (N • m) : LLCS108=3.3
*2 WT : Tool Weight

DCMN

External turning • Facing ***DOUBLE CLAMP type***





Finish	Light	Medium
FP (12)	LP (12)	MP (12)
Medium	**Medium**	**Medium – Rough**
MK (12)	Standard (12)	RP (12)
Stainless	**CBN**	
MS (12)	(12)	

Order Number	Stock	Insert Number		Dimensions (mm) LF	*2 WT (kg)	Shim	Shim Pin	Clamp Bridge	Spring	Clamp Screw *1	Wrench
H63TH-DCMNN-H12	●	CNM○ CNG○ NP-CN○A	1204○○	100	1.7	LLSCN42	LLP14	DCK2613	DCS1	DC0621T	TKY20F
H63TH-DCMNN-L12	●			140	2.7	LLSCN42	LLP14	DCK2613	DCS1	DC0621T	TKY20F

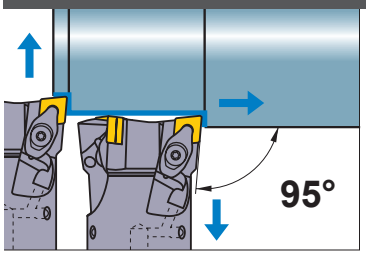
*1 Clamp Torque (N • m) : DC0621T=5.0
*2 WT : Tool Weight

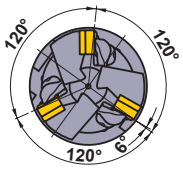
DCLN

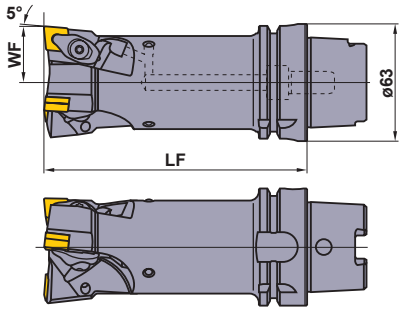
Product Information

Spare Parts >> 1927
ISO13399 Property >> 1966
Technical Info >> 1971

DCLN — External turning • Facing — DOUBLE CLAMP type







Left hand tool holder only.

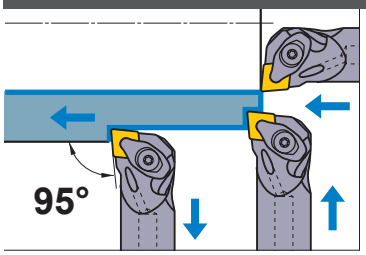
Finish	Light	Medium
FP (12)	LP (12)	MP (12)
Medium	**Medium**	**Medium – Rough**
MK (12)	Standard (12)	RP (12)
Stainless	**CBN**	
MS (12)	(12)	

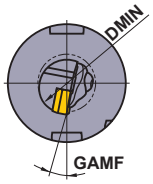
Order Number	Stock L	Insert Number		Dimensions (mm) LF	WF	*2 WT (kg)	Shim	Shim Pin	Clamp Bridge	Spring	Clamp Screw *1	Wrench
H63TH-DCLNL-L12-3	●	CNM○ CNG○ NP-CN○A	1204○○	140	30	2.2	LLSCN42	LLP14	DCK2613	DCS1	DC0621T	TKY20F

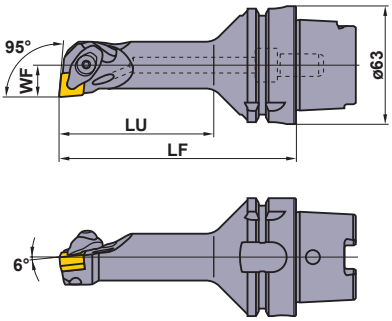
*1 Clamp Torque (N • m) : DC0621T=5.0
*2 WT : Tool Weight

● : **Inventory maintained in Japan.**

DCLN — External turning • Facing • Boring — DOUBLE CLAMP type







Right hand tool holder shown.

Finish	Light	Medium
FP (12)	LP (12)	MP (12)
Medium	**Medium**	**Medium – Rough**
MK (12)	Standard (12)	RP (12)
Stainless	**CBN**	
MS (12)	(12)	

Order Number	Stock R	Stock L	Insert Number		Dimensions (mm) LF	LU	WF	GAMF	DMIN (mm)	*2 WT (kg)	Shim	Shim Pin	Clamp Bridge	Spring	Clamp Screw *1	Wrench
H63TH-A25KDCLNR/L12	●	●	CNM○ CNG○ NP-CN○A	1204○○	125	82	17	11°	32	1.1	LLSCP42	LLP14	DCK2613	DCS1	DC0621T	TKY20F
H63TH-A32LDCLNR/L12	●	●			140	100	22	13°	40	1.4	LLSCN42	LLP14	DCK2613	DCS1	DC0621T	TKY20F

*1 Clamp Torque (N • m) : DC0621T=5.0
*2 WT : Tool Weight

● : **Inventory maintained in Japan.**

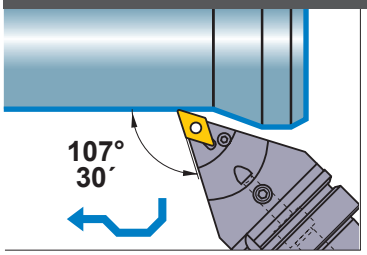
PDNN/DDNN

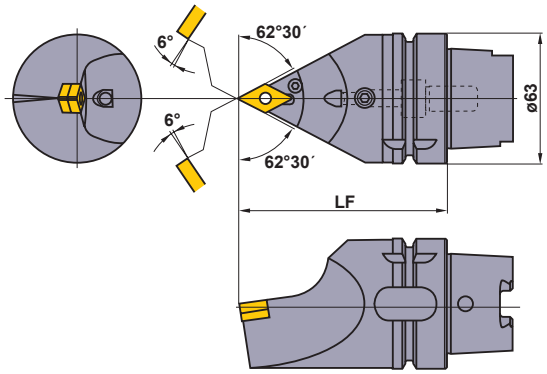
Product Information

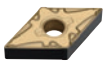
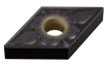
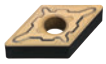
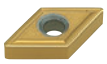
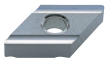
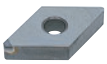
Spare Parts >> 1927
ISO13399 Property >> 1966
Technical Info >> 1971

PDNN

External turning • Copying





Finish	Light	Medium
FP  (15)	LP (15)	MP (15)
Medium	**Medium–Rough**	**Stainless**
MK  (15)	RP  (15)	MS  (15)
G Class	**CBN**	
R/L  (15)	 (15)	

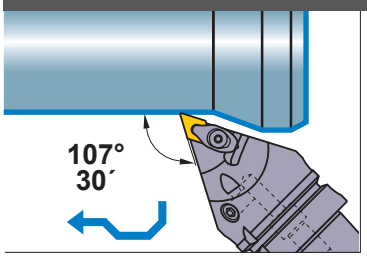
Order Number	Stock	Insert Number		Dimensions (mm) LF	*3 WT (kg)	*2 Shim	Shim Pin	Clamp Lever	*1 Clamp Screw	Plug	Wrench
H63TH-PDNNN-H15	●	DNM○ DNG○ NP-DN○A	1504○○	100	1.6	LLSDN43 (LLSDN42)	LLP14	LLCL24	LLCS108	HGM-PT1/8	HKY30R
H63TH-PDNNN-L15	●			140	2.5	LLSDN43 (LLSDN42)	LLP14	LLCL24	LLCS108	HGM-PT1/8	HKY30R

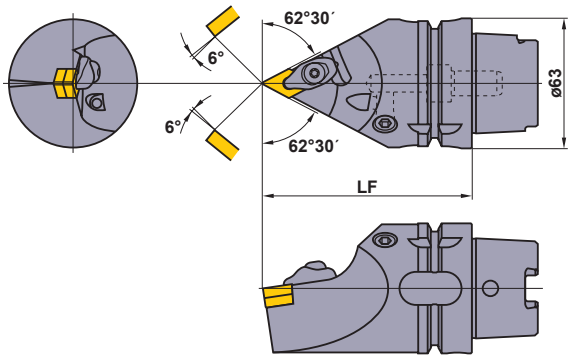
*1 Clamp Torque (N • m) : LLCS108=3.3
*2 Please use shim no. LLSDN42 with 6.35mm thick inserts. When using 6.35mm thick inserts, the shim should be ordered separately.
*3 WT : Tool Weight

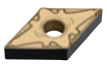
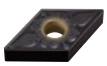
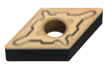
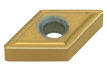
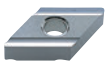
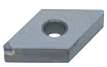
● : **Inventory maintained in Japan.**

DDNN

External turning • Copying ***DOUBLE CLAMP type***





Finish	Light	Medium
FP  (15)	LP (15)	MP (15)
Medium	**Medium–Rough**	**Stainless**
MK  (15)	RP  (15)	MS  (15)
G Class	**CBN**	
R/L  (15)	 (15)	

Order Number	Stock	Insert Number		Dimensions (mm) LF	*3 WT (kg)	*2 Shim	Shim Pin	Clamp Bridge	Spring	*1 Clamp Screw	Wrench
H63TH-DDNNN-H15	●	DNM○ DNG○ NP-DN○A	1504○○	100	1.6	LLSDN43 (LLSDN42)	LLP24	DCK2613	DCS1	DC0621T	TKY20F
H63TH-DDNNN-L15	●			140	2.5	LLSDN43 (LLSDN42)	LLP24	DCK2613	DCS1	DC0621T	TKY20F

*1 Clamp Torque (N • m) : DC0621T=5.0
*2 Please use shim no. LLSDN42 with 6.35mm thick inserts. When using 6.35mm thick inserts, the shim should be ordered separately.
*3 WT : Tool Weight

● : **Inventory maintained in Japan.**

DDJN

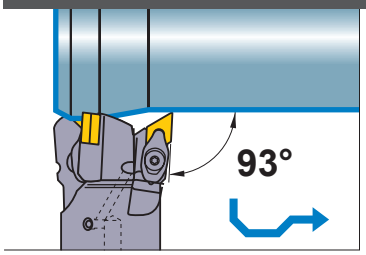
Product Information

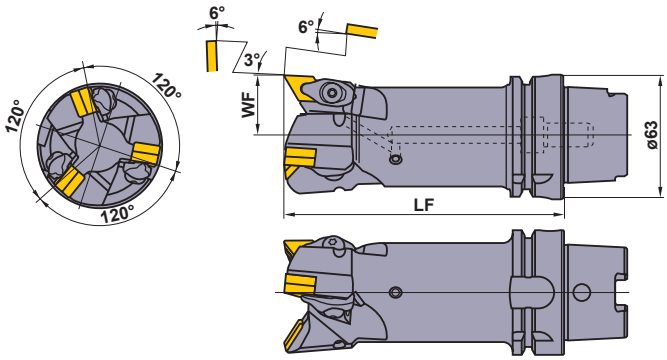
Spare Parts >> 1927
ISO13399 Property >> 1966
Technical Info >> 1971

DDJN

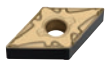
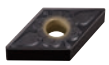
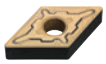
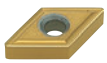
DOUBLE CLAMP type

External turning • Facing





Left hand tool holder only.

Finish	Light
FP	LP
	
(15)	(15)
Medium	**Medium**
MP	MK
	
(15)	(15)
Medium−Rough	**Stainless**
RP	MS
	
(15)	(15)

Order Number	Stock	Insert Number		Dimensions (mm)		*3 WT (kg)	*2 Shim	Shim Pin	Clamp Bridge	Spring	*1 Clamp Screw	Wrench
	L			LF	WF							
H63TH-DDJNL-L15-3	●	DNM○ DNG○ NP-DN○A	1504○○	140	30	2.2	LLSDN43 (LLSDN42)	LLP24	DCK2613	DCS1	DC0621T	TKY20F

*1 Clamp Torque (N • m) : DC0621T=5.0
*2 Please use shim no. LLSDN42 with 6.35mm thick inserts. When using 6.35mm thick inserts, the shim should be ordered separately.
*3 WT : Tool Weight

PRGC/PRDC

Product Information

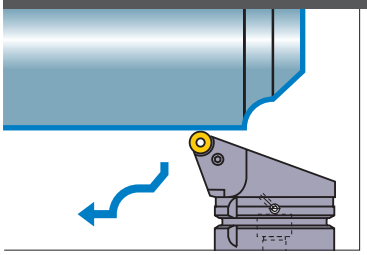
Spare Parts >> 1927
ISO13399 Property >> 1966
Technical Info >> 1971

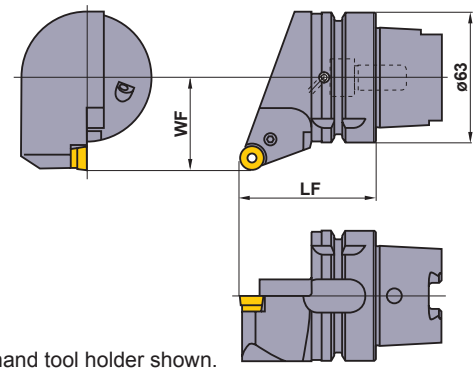
PRGC

External turning • Facing • Copying

Medium

(12)





Right hand tool holder shown.

Order Number	Stock R	Stock L	Insert Number		Dimensions (mm) LF	Dimensions (mm) WF	*2 WT (kg)	Shim	Shim Pin	Clamp Lever	*1 Clamp Screw	Wrench
H63TH-PRGCR/L-DX12	●	●	RCMX	1204M0	65	45	1.2	LLSRN123	LLP13	LLCL112	LLCS106	HKY25R

*1 Clamp Torque (N • m) : LLCS106=2.2
*2 WT : Tool Weight

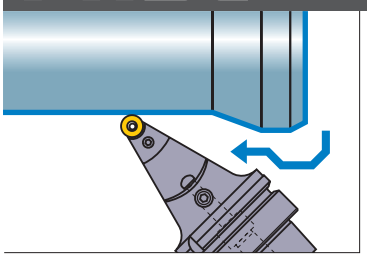
● : **Inventory maintained in Japan.**

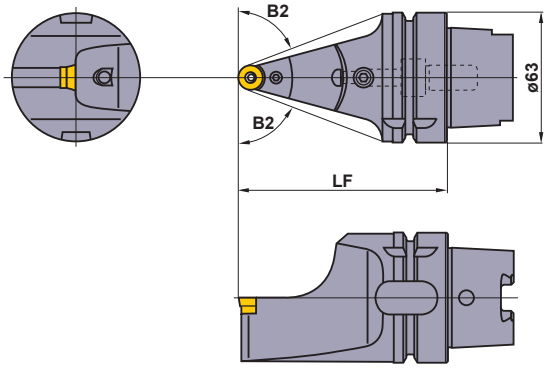
PRDC

External turning • Facing • Copying

Medium

(12)





Order Number	Stock	Insert Number		Dimensions (mm) LF	Dimensions (mm) B2	*2 WT (kg)	Shim	Shim Pin	Clamp Lever	*1 Clamp Screw	Plug	Wrench
H63TH-PRDCN-H12	●	RCMX	1204M0	100	69°	1.4	LLSRN123	LLP13	LLCL112	LLCS106	HGM-PT1/8	HKY25R
H63TH-PRDCN-L12	●			140	75°	2.3	LLSRN123	LLP13	LLCL112	LLCS106	HGM-PT1/8	HKY25R

*1 Clamp Torque (N • m) : LLCS106=2.2
*2 WT : Tool Weight

● : **Inventory maintained in Japan.**

RECOMMENDED CUTTING CONDITIONS

	Work Material	Hardness	Cutting Mode	Breaker	Grade	Cutting Speed (m/min)
P	Mild Steel	≤180HB	Medium Cutting	**Standard**	**UE6110**	205—350
	Carbon Steel • Alloy Steel	180HB—350HB	Medium Cutting	**Standard**	**UE6110**	150—260
M	Stainless Steel	≤200HB	Medium Cutting	**Standard**	**US735**	70—130

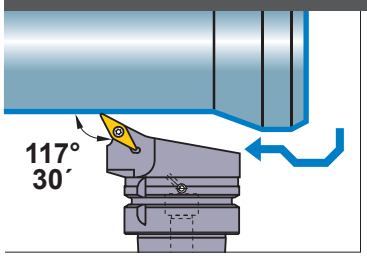
SVPB/SVVB

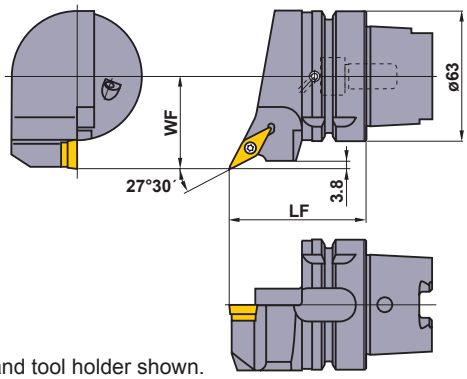
Product Information

Spare Parts >> 1927
ISO13399 Property >> 1966
Technical Info >> 1971

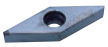
SVPB

Facing • Copying





Right hand tool holder shown.

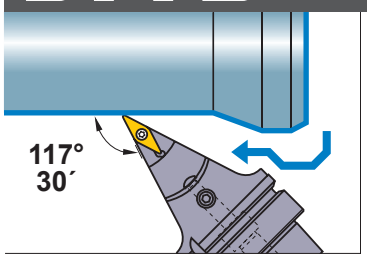
Finish	Light
R/L-F (16)	SV (16)
Medium	Medium
MV (16)	MP (16)
CBN	
 (16)	

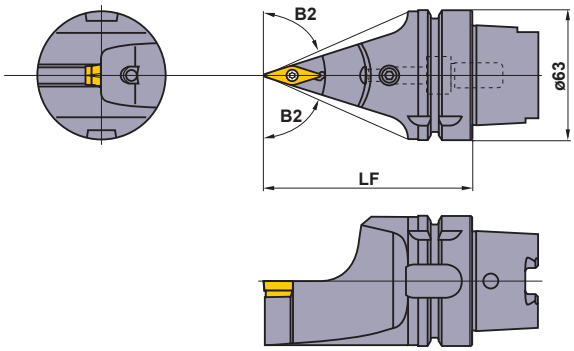
Order Number	Stock R	Stock L	Insert Number		Dimensions (mm) LF	Dimensions (mm) WF	*2 WT (kg)	Shim	Shim Pin	*1 Clamp Screw	Wrench
H63TH-SVPBR/L-DX16	●	●	VBMT VBGT	1604○○	65	45	1.1	SPSVN32	BCP141	TS35D	TKY15F

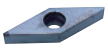
*1 Clamp Torque (N • m) : TS35D=3.5
*2 WT : Tool Weight

SVVB

Facing • Copying





Finish	Light
R/L-F (16)	SV (16)
Medium	Medium
MV (16)	MP (16)
CBN	
 (16)	

Order Number	Stock	Insert Number		Dimensions (mm) LF	Dimensions (mm) B2	*2 WT (kg)	Shim	Shim Pin	*1 Clamp Screw	Plug	Wrench
H63TH-SVVBN-H16	●	VBMT VBGT	1604○○	100	66°30'	1.3	SPSVN32	BCP141	TS35D	HGM-PT1/8	TKY15F
H63TH-SVVBN-L16	●			140	72°30'	2.2	SPSVN32	BCP141	TS35D	HGM-PT1/8	TKY15F

*1 Clamp Torque (N • m) : TS35D=3.5
*2 WT : Tool Weight

RECOMMENDED CUTTING CONDITIONS

	Work Material	Hardness	Cutting Mode	Breaker	Grade	Cutting Speed (m/min)
P	Mild Steel	≤180HB	Finish Cutting	**F**	**AP25N**	250 (150—300)
			Medium Cutting	**MV**	**UE6020**	200 (150—250)
	Carbon Steel Alloy Steel	180HB—350HB	Finish Cutting	**F**	**AP25N**	210 (150—260)
			Medium Cutting	**MV**	**UE6020**	170 (120—210)
M	Stainless Steel	≤200HB	Medium Cutting	**MV**	**US735**	100 (70—120)
K	Gray Cast Iron	Tensile Strength≤350MPa	Medium Cutting	**MV**	**UE6020**	170 (140—200)

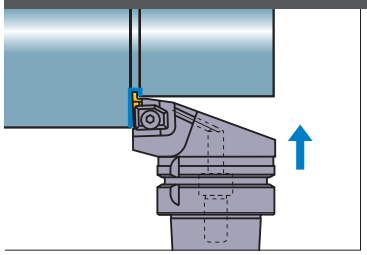
MG

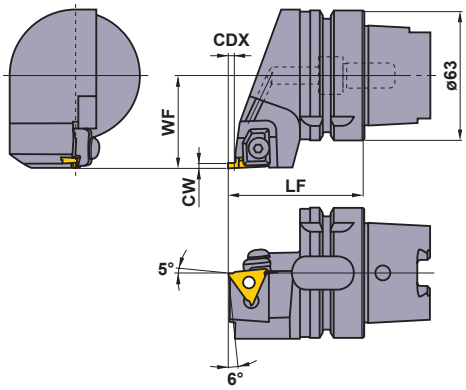
Product Information

Spare Parts >> 1927
ISO13399 Property >> 1966
Technical Info >> 1971

MG

Grooving





Right hand tool holder shown.

Order Number	Stock R	Stock L	Insert Number		Dimensions (mm) CW	CDX	LF	WF	*2 WT (kg)	Clamp Bridge	*1 Clamp Screw	Spring	Wrench
H63TH-MGHR/L-DX4315	●	●	MGTR/L	43125 I 43470	1.25	1.2	65	45	1.2	MTK1R/L	HBH06020	MES3	HKY40R
					1.45	1.5							
					1.5≤CW≤2.3	3							
H63TH-MGHR/L-DX4323	●	●			2.3<CW≤3.3	4.5							
H63TH-MGHR/L-DX4333	●	●			3.3<CW≤4.7	4.5							

*1 Clamp Torque (N • m) : HBH06020=7.0
*2 WT : Tool Weight

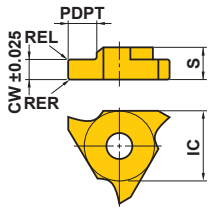
● : **Inventory maintained in Japan.**

RECOMMENDED CUTTING CONDITIONS

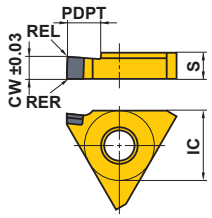
	Work Material	Hardness	Grade	Cutting Speed (m/min)	Feed (mm/rev)
P	Carbon Steel Alloy Steel	180—350HB	**VP20MF**	120 (100—140)	0.10 (0.03—0.18)
			NX2525	130 (100—160)	0.12 (0.03—0.2)
M	Stainless Steel	≤200HB	**VP20MF**	120 (100—140)	0.10 (0.03—0.18)
K	Gray Cast Iron	Tensile Strength≤350MPa	**VP20MF**	120 (100—140)	0.10 (0.03—0.18)

INSERTS FOR MG TYPE

Order Number	Stock							Dimensions (mm)					Geometry
	Coated		Cermet		Carbide		CBN						
	VP20MF		NX2525		UTi20T		MB8025	CW	PDPT	IC	S	RER/L	
	R	L	R	L	R	L	R						
MGTR/L43125	●	●	●	□	●	●	●	1.25	1.2	12.7	4.76	0.2	MGTR/L...
MGTR/L43145	●	□		□	●	□		1.45	1.5	12.7	4.76	0.2	
MGTR/L43150	●	●	●	●	●	●	●	1.5	3	12.7	4.76	0.2	
MGTR/L43175	●	●	●	□	●	●		1.75	3	12.7	4.76	0.2	
MGTR/L43200	●	●	●	●	●	●	●	2	3	12.7	4.76	0.2	
MGTR/L43230	●	●	●	●		●		2.3	3	12.7	4.76	0.2	
MGTR/L43250	●	●	●	●	●	●	●	2.5	4.5	12.7	4.76	0.3	
MGTR/L43260	●	□	□		●	●		2.6	4.5	12.7	4.76	0.3	
MGTR/L43270	●	□			●	□		2.7	4.5	12.7	4.76	0.3	
MGTR/L43280		●		□	●	●		2.8	4.5	12.7	4.76	0.3	
MGTR/L43300	●	●	●	●	●	●	●	3	4.5	12.7	4.76	0.3	
MGTR/L43320	●				●	●		3.2	4.5	12.7	4.76	0.3	
MGTR/L43330		●		□	●	●		3.3	4.5	12.7	4.76	0.3	
MGTR/L43350	●	□	●	□	●	●	●	3.5	4.5	12.7	4.76	0.3	
MGTR/L43400	●	●	●		●	●	●	4	4.5	12.7	4.76	0.3	
MGTR/L43420	●	□	□		●	□		4.2	4.5	12.7	4.76	0.4	
MGTR/L43430	●	□	□		●	●		4.3	4.5	12.7	4.76	0.4	
MGTR/L43450	●	●	●	●	●	●		4.5	4.5	12.7	4.76	0.4	
MGTR/L43470	●	□	□	□	●	□		4.7	4.5	12.7	4.76	0.4	



CBN Insert



Right hand insert shown.

● : Inventory maintained in Japan. □ : Non stock, produced to order only.
(10 inserts in one case) (CBN inserts are available in 1 piece in one case.)

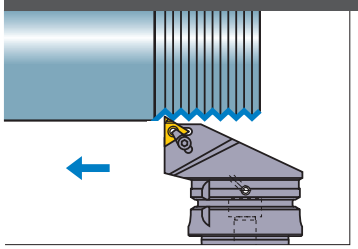
MMTE/MMTEN

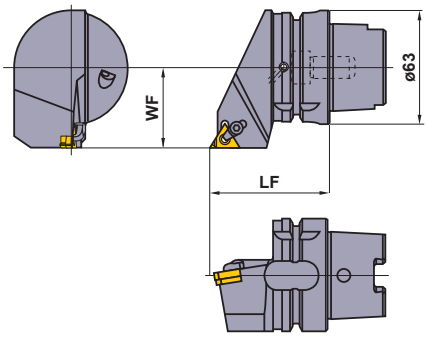
Product Information

Spare Parts >> 1927
ISO13399 Property >> 1966
Technical Info >> 1971

MMTE

Threading





Right hand tool holder only.

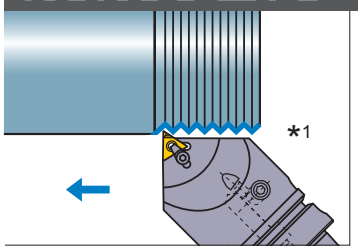
Order Number	Stock	Insert Number		Dimensions (mm)		*2 WT (kg)	Clamp Bridge	Clamp Screw *1	Stop Ring	Shim	Shim Screw *1	Wrench
	R			LF	WF							
H63TH-MMTER-DX16	●	MMT16ER	○○○○○	65	45	1.2	SETK51	SETS51	CR4	CTE32TP15	HFC03008	①TKY15F ②HKY20R

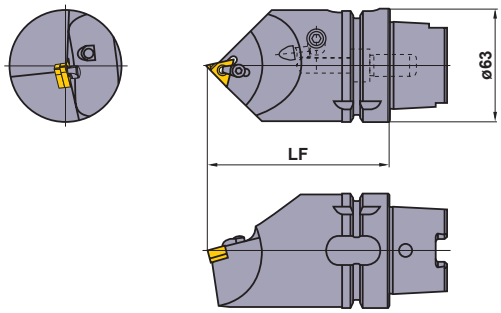
*1 Clamp Torque (N • m) : SETS51=3.5, HFC03008=1.5
*2 WT : Tool Weight

● : **Inventory maintained in Japan.**

MMTEN

Threading





Tool holder for right hand insert only.

Order Number	Stock	Insert Number		Dimensions (mm)	*3 WT (kg)	Clamp Bridge	Clamp Screw *2	Stop Ring	Shim	Shim Screw *2	Plug	Wrench
				LF								
H63TH-MMTENR-H16	●	MMT16ER	○○○○○	100	1.7	SETK51	SETS51	CR4	CTE32TP15	HFC03008	HGM-PT1/8	①TKY15F ②HKY20R
H63TH-MMTENR-L16	●			140	2.7	SETK51	SETS51	CR4	CTE32TP15	HFC03008	HGM-PT1/8	①TKY15F ②HKY20R

*1 For use with B axis tilted at 45 degrees.
*2 Clamp Torque (N • m) : SETS51=3.5, HFC03008=1.5
*3 WT : Tool Weight

● : **Inventory maintained in Japan.**

RECOMMENDED CUTTING CONDITIONS

	Work Material	Hardness	Grade	Cutting Speed (m/min)
P	Mild Steel	≤180HB	**VP10MF**	150 (70—230)
			VP15TF	100 (60—140)
	Carbon Steel Alloy Steel	180—350HB	**VP10MF**	140 (80—200)
			VP15TF	100 (60—140)
M	Stainless Steel	≤200HB	**VP10MF**	130 (80—180)
			VP15TF	80 (40—120)
K	Gray Cast Iron	Tensile Strength≤350MPa	**VP10MF**	140 (80—200)
			VP15TF	90 (60—120)

MT

Product Information

Spare Parts >> 1927
ISO13399 Property >> 1966
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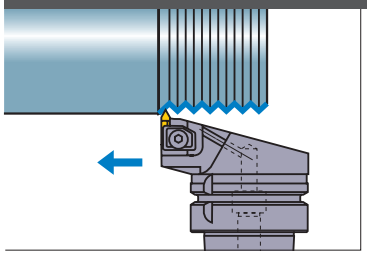
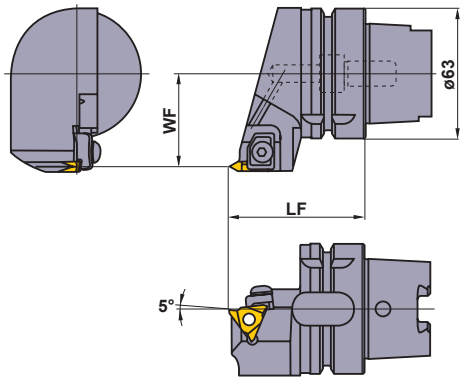
MT Threading





Right hand tool holder shown.

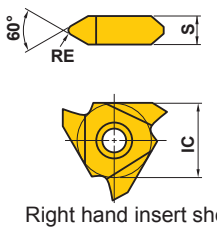
Order Number	Stock R	Stock L	Insert Number		Dimensions (mm) LF	Dimensions (mm) WF	*2 WT (kg)	Clamp Bridge	Clamp Screw *1	Spring	Wrench
H63TH-MTHR/L-DX43	●	●	MTTR/L	43○○○○	65	45	1.2	MTK1R/L	HBH06020	MES3	HKY40R

*1 Clamp Torque (N • m) : HBH06020=7.0
*2 WT : Tool Weight

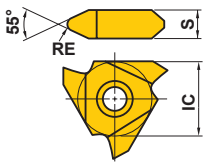
● : Inventory maintained in Japan.

INSERTS FOR MT TYPE

Type	Order Number	Class	Coated UP20M	Cermet NX2525		Carbide UTi20T	Carbide HTi10	ISO Pitch mm (thread/inch)	Dimensions (mm) IC	S	RE	Geometry
General • 60°	**MTTR436000**	G		●		●		–0.8	12.7	4.76	0	**MTTR/L(60°)** (G Class)
	MTTR436001	G	●	●		●	●	1.0–1.75	12.7	4.76	0.1	
	MTTL436001	G	●			●	●	1.0–1.75	12.7	4.76	0.1	
	MTTR436002	G	●	●		●	●	2.0–2.5	12.7	4.76	0.2	
	MTTL436002	G		●		●		2.0–2.5	12.7	4.76	0.2	
	MTTR436003	G	□	●		●	●	3.0–3.5	12.7	4.76	0.3	
	MTTL436003	G		●		●		3.0–3.5	12.7	4.76	0.3	
	MTTR436004	G		●		●		4.0–4.5	12.7	4.76	0.4	
General • 55°	**MTTR435501**	G		●		●		(28–10)	12.7	4.76	0.1	**MTTR/L(55°)** (G Class)
	MTTR435502	G		●		●		(16–8)	12.7	4.76	0.2	
	MTTR435503	G		●		●		(11–8)	12.7	4.76	0.3	



Right hand insert shown.

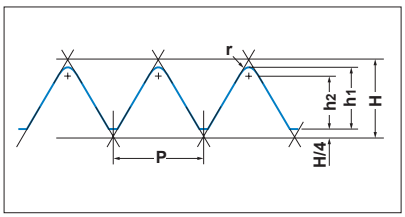


Right hand insert shown.

● : Inventory maintained in Japan. □ : Non stock, produced to order only.
(10 inserts in one case)

STANDARD DEPTH OF CUT

●The chart on the right shows the cutting depths when machining external ISO metric screw threads.
●When you use cermet grades or cut stainless steel, please increase the number of passes by 2—3 times.



●METRIC THREAD

Unit : mm

P (Pitch)		0.75	1.00	1.25	1.50	1.75	2.00	2.50	3.00	3.50	4.00	4.50
h_1		0.46	0.61	0.77	0.92	1.07	1.23	1.53	1.84	2.15	2.45	2.76
h_2		0.35	0.47	0.59	0.70	0.82	0.94	1.17	1.41	1.65	1.87	2.11
r (Corner Radius)		0.11	0.14	0.18	0.22	0.25	0.29	0.36	0.43	0.50	0.58	0.65
Number of Passes	1	0.18	0.20	0.20	0.25	0.25	0.25	0.30	0.30	0.35	0.35	0.40
	2	0.13	0.15	0.18	0.20	0.20	0.25	0.25	0.25	0.30	0.30	0.35
	3	0.10	0.10	0.12	0.15	0.20	0.20	0.20	0.25	0.25	0.25	0.30
	4	0.05	0.10	0.12	0.15	0.15	0.15	0.20	0.20	0.20	0.25	0.25
	5		0.06	0.10	0.10	0.12	0.15	0.15	0.20	0.20	0.25	0.25
	6			0.05	0.07	0.10	0.10	0.10	0.15	0.20	0.20	0.20
	7					0.05	0.08	0.10	0.15	0.15	0.20	0.20
	8						0.05	0.10	0.10	0.15	0.15	0.15
	9							0.08	0.10	0.10	0.15	0.15
	10							0.05	0.09	0.10	0.10	0.15
	11								0.05	0.10	0.10	0.10
	12									0.05	0.10	0.10
	13										0.05	0.10
	14											0.06

(Note) The first pass causes a high load on the cutting edge.
In order to avoid damage, keep the depth of cut to 0.4—0.5mm maximum.

RECOMMENDED CUTTING CONDITIONS

	Work Material	Hardness	Grade	Cutting Speed (m/min)
P	Mild Steel	≤180HB	**UP20M**	140 (100—180)
			NX2525	200 (150—250)
			UTi20T	120 (100—150)
	Carbon Steel Alloy Steel	180HB—350HB	**UP20M**	120 (100—150)
			NX2525	170 (150—200)
			UTi20T	100 (70—120)
M	Stainless Steel	≤200HB	**UP20M**	120 (80—150)
			UTi20T	100 (70—130)
K	Gray Cast Iron	Tensile Strength≤350MPa	**UP20M**	80 (60—100)
			UTi20T	80 (60—100)
			HTi10	100 (70—130)

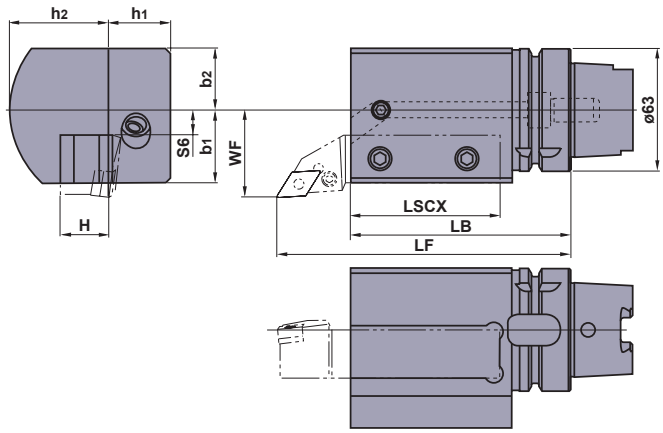
H-TH

Product Information

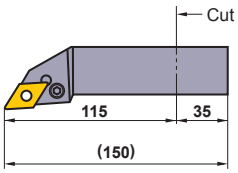
Spare Parts >> 1927
ISO13399 Property >> 1966
Technical Info >> 1971

EXTERNAL TURNING TOOL HOLDERS

External turning • Facing



■ This holder is for 25×25 size tools.
Please shorten the tool as shown below before use.



Right hand tool holder shown.

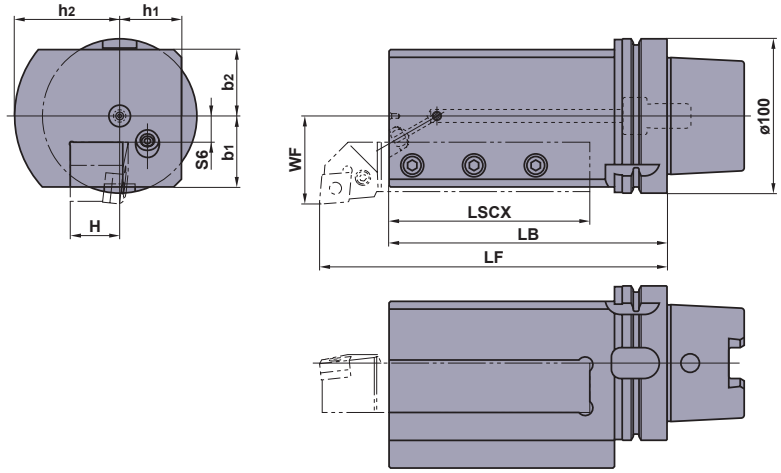
Order Number	Stock		Dimensions (mm)										WT* (kg)	Clamp Screw	Plug
	R	L	LF	LB	LSCX	H	h1	h2	WF	S6	b1	b2			
H63TH-EV2525R/L-112	●	●	150	112	77	25	32	53	45	13	38	32	3.9	HSS12025	HGM-PT1/8

* WT : Tool Weight

● : **Inventory maintained in Japan.**

EXTERNAL TURNING TOOL HOLDERS

External turning • Facing



■This holder is for 32×32 and 32×25 size tools.

Right hand tool holder shown.

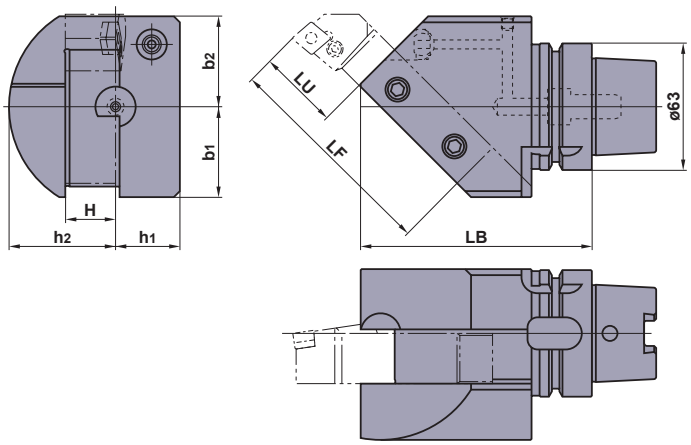
Order Number	Stock		Dimensions (mm)										WT* (kg)	Clamp Screw	Plug
	R	L	LF	LB	LSCX	H	h1	h2	WF	S6	b1	b2			
H100TH-EV3232R/L-180	●	●	220	180	130	32	40	68	57	17	46	43	11.7	HSS14035	HSS06006

* WT : Tool Weight
(Note) Possible to fit a 25 x 25 tool by using a 7mm plate.

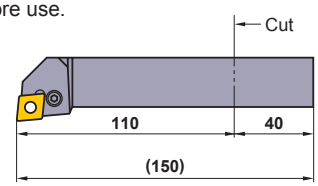
● : Inventory maintained in Japan.

EXTERNAL TURNING TOOL HOLDERS

External turning • Facing



■This holder is for 25×25 size tools.
Please shorten the tool as shown below before use.



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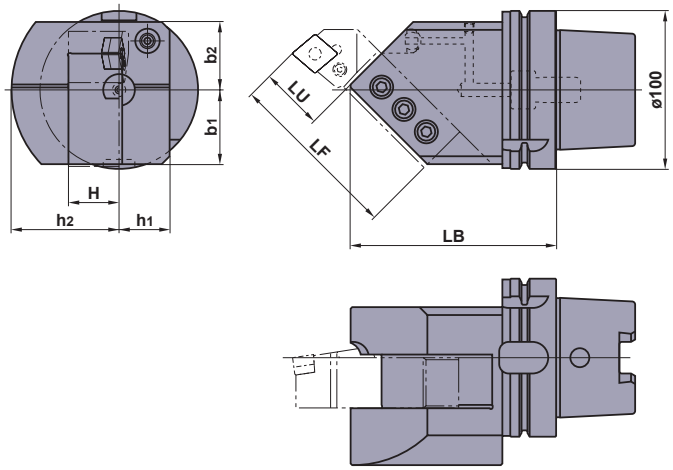
Right hand tool holder shown.

Order Number	Stock		Dimensions (mm)								WT* (kg)	Clamp Screw	Plug
	R	L	LB	LU	LF	H	h1	h2	b1	b2			
H63TH-EN2525R/L-115	●	●	115	40	110	25	32	53	45	45	3.7	HSS12030	HSS06006

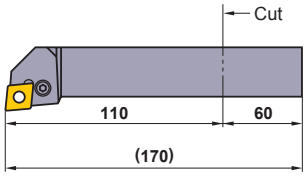
* WT : Tool Weight

EXTERNAL TURNING TOOL HOLDERS

External turning • Facing



■This holder is for 32×32 and 32×25 size tools.
Please shorten the tool as shown below before use.



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Right hand tool holder shown.

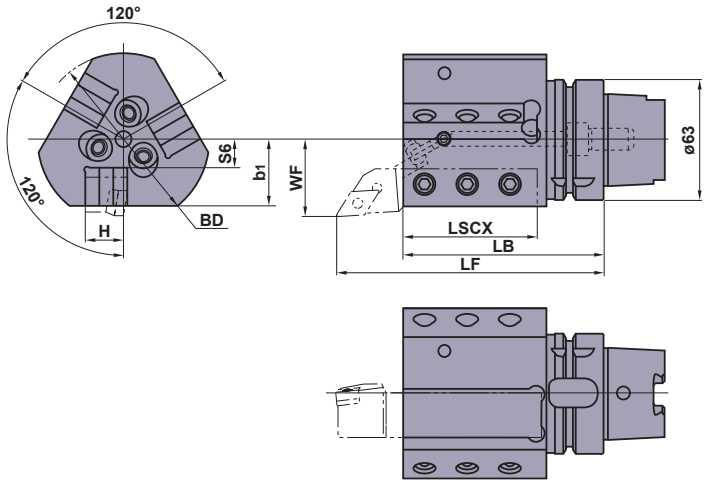
Order Number	Stock		Dimensions (mm)								WT* (kg)	Clamp Screw	Plug
	R	L	LB	LU	LF	H	h1	h2	b1	b2			
H100TH-EN3232R/L-130	●	●	130	40	110	32	32	68	47	43	6.6	HSS14030	HSS06006

* WT : Tool Weight
(Note) Possible to fit a 25 x 25 tool by using a 7mm plate.

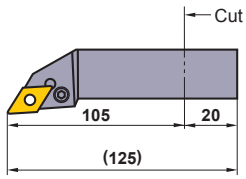
● : **Inventory maintained in Japan.**

EXTERNAL TURNING TOOL HOLDERS

External turning • Facing



■This holder is for 20×20 size tools.
Please shorten the tool as shown below before use.



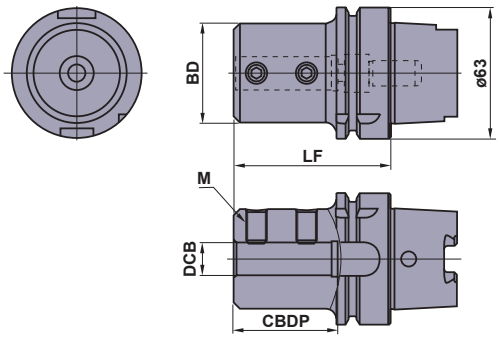
Right hand tool holder shown.

Order Number	Stock		Dimensions (mm)								WT* (kg)	Clamp Screw	Nozzle Plug	Plug
	R	L	LF	LB	LSCX	H	BD	WF	S6	b1				
H63TH-EV2020R/L-105-3	●	●	140	105	70	20	90	40	15	35	2.9	HSS12030	HSS05012	HSS06006

* WT : Tool Weight

BORING BAR HOLDERS

Boring



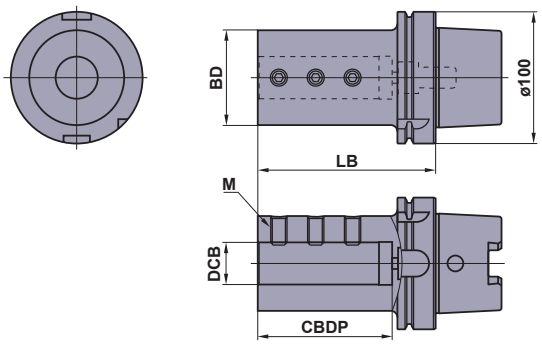
Order Number	Stock	Dimensions (mm)					WT* (kg)	Clamp Screw
		BD	DCB	LF	CBDP	M		
H63TH-B08-65	●	28	8	65	40	M8	0.9	HSS08010
H63TH-B10-70	●	35	10	70	45	M8	1.0	HSS08012
H63TH-B12-70	●	42	12	70	45	M8	1.1	HSS08012
H63TH-B16-75	●	48	16	75	50	M10	1.3	HSS10016
H63TH-B20-75	●	52	20	75	50	M10	1.4	HSS10016
H63TH-B25-83	●	62	25	83	58	M12	1.7	HSS12016
H63TH-B32-87	●	62	32	87	62	M12	1.7	HSS12016
H63TH-B40-97	●	65	40	97	72	M16	1.8	HSS16012

* WT : Tool Weight
(Note) Please shorten a boring bar to the required shank length. This holder is for boring bars and indexable type drills.

● : Inventory maintained in Japan.

BORING BAR HOLDERS

Boring

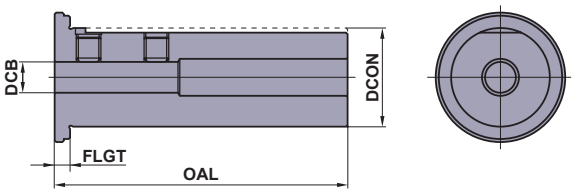


Order Number	Stock	Dimensions (mm)					WT* (kg)	Clamp Screw
		BD	DCB	LB	CBDP	M		
H100TH-B25-120	●	62	25	120	88	12	3.9	HSS12016
H100TH-B32-135	●	72	32	135	102	12	4.8	HSS12018
H100TH-B40-150	●	82	40	150	117	16	5.9	HSS16020
H100TH-B50-180	●	92	50	180	147	16	7.7	HSS16020

* WT : Tool Weight
(Note) Please shorten a boring bar to the required shank length. This holder is for boring bars and indexable type drills.

● : **Inventory maintained in Japan.**

BORING BAR SLEEVES FOR H100TH-B32-135



Order Number	Stock	Dimensions (mm)				WT* (kg)	Clamp Screw
		DCB	DCON	OAL	FLGT		
SL3208-90	●	8	32	95	5	0.6	HSS06008
SL3210-90	●	10	32	95	5	0.5	HSS08008
SL3212-90	●	12	32	95	5	0.5	HSS08008
SL3216-90	●	16	32	95	5	0.5	HSS08006
SL3220-90	●	20	32	95	5	0.4	HSS08005

* WT : Tool Weight
(Note) These sleeves are only compatible with H100TH-B32-135 holder.

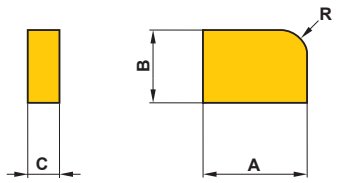
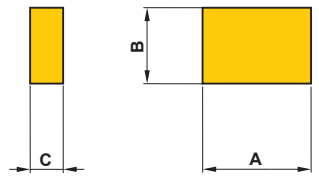
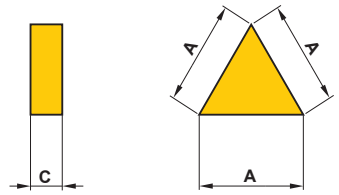
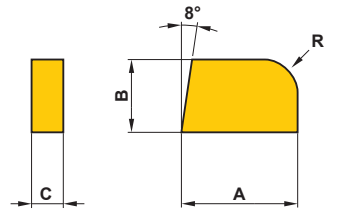
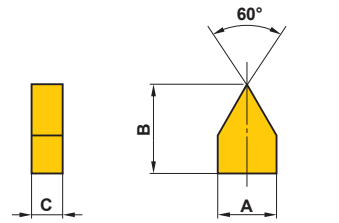
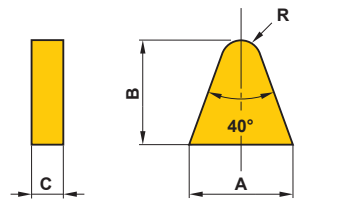
● : **Inventory maintained in Japan.**

TURNING TOOLS

BRAZED TOOLS

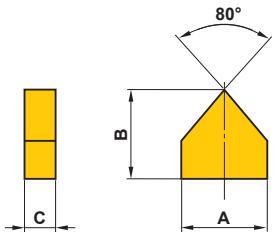
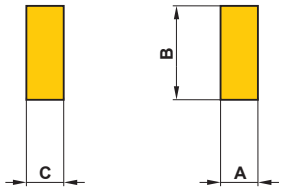
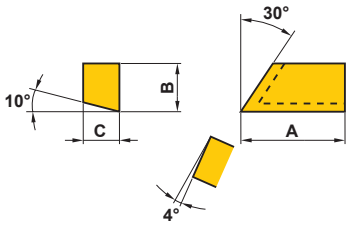
CARBIDE BLANK FOR TURNING TOOLS 654
CARBIDE RODS 656
BRAZED TOOL HOLDERS 657

CARBIDE BLANK FOR TURNING TOOLS

Type	Geometry	Order Number	Stock P: STi10 (HW-P10) *	Stock P: STi20 (HW-P20) *	Stock P: STi40T (HW-P40) *	Stock M: UTi20T (HW-M20) *	Stock K: HTi03A (HW-K01) *	Stock K: HTi05T (HW-K01) *	Stock K: HTi10 (HW-K10) *	Stock K: HTi20 (HW-K20) *	Dimensions (mm) A	B	C	R
01 Type		01-0	●	●	□	●	●	●	●	□	10	6	3	4
		01-1	●	●	●	●	●	●	●	●	13	9	3	5
		01-2	●	●	●	●	●	●	●	●	16	11	4	5
		01-3	●	●	●	●	□	□	●	●	19	13	5	5
		01-4	□	●	●	●	□	□	□	□	22	15	6	8
		01-5	□	□	□	●	□	□	□	□	25	17	7	8
For 31,32 Type		01-6	□	□	□	□	□	□	□	□	30	20	8	8
02 Type		02-0	●	●	●	●	●	●	●	●	10	6	3	—
		02-1	●	●	●	●	●	●	●	●	13	9	3	—
		02-2	●	●	●	●	●	●	●	●	16	11	4	—
		02-3	●	●	●	●	●	●	●	●	19	13	5	—
		02-4	●	●	●	●	□	●	●	●	22	15	6	—
		02-5	□	●	●	●	□	●	●	●	25	17	7	—
For 41,42 Type		02-6	□	●	●	●	□	●	●	●	30	20	8	—
03 Type		03-0	□	●	□	●	□	□	□	□	10	—	3	—
		03-1	□	●	□	●	●	□	●	□	12	—	3	—
		03-2	□	●	□	●	●	□	●	□	15	—	4	—
		03-3	□	●	□	●	□	●	●	●	18	—	5	—
		03-4	□	□	□	□	□	□	□	□	24	—	6	—
		03-5	□	□	□	□	□	□	□	□	24	—	7	—
For 37,38,47 Type		03-6	□	□	□	□	□	□	□	□	28	—	8	—
04 Type		04-0	●	●	□	●	●	●	●	●	10	6	3	4
		04-1	●	●	□	●	●	●	●	●	13	9	3	5
		04-2	●	●	●	●	●	●	●	●	16	11	4	5
		04-3	●	●	●	●	●	●	●	●	19	13	5	5
		04-4	□	●	□	●	□	□	●	□	22	15	6	8
		04-5	□	□	□	□	□	□	□	□	25	17	7	8
For 33,34 Type		04-6	□	□	□	□	□	□	□	□	30	20	8	8
05 Type		05-1	□	●	□	●	□	□	●	□	5	8	3	—
		05-2	●	●	□	●	□	□	●	□	6	10	4	—
		05-3	●	●	□	●	□	□	●	□	7	12	5	—
		05-4	□	●	□	●	□	□	□	□	9	16	6	—
		05-5	□	□	□	□	□	□	□	□	10	18	7	—
		05-6	□	□	□	□	□	□	□	□	11	20	8	—
For 49,51 Type														
06 Type		06-0	●	●	●	●	●	●	●	●	10	10	3	2
		06-1	●	●	●	●	●	●	●	●	13	13	3	2.5
		06-2	●	●	●	●	●	●	●	●	16	16	4	3
		06-3	●	●	●	●	●	●	●	●	19	19	5	4
		06-4	□	●	□	●	□	●	●	●	22	22	6	4
		06-5	□	□	□	□	□	□	□	□	25	25	7	5
		06-6	□	□	□	□	□	□	□	□	30	30	8	6
For 36,39,40 Type														

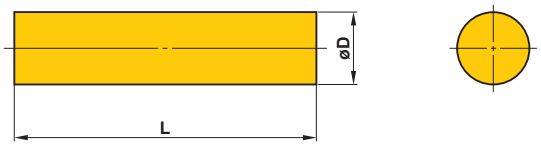
*( ) : Materials for cemented carbide tools and the classification for usage.

● : **Inventory maintained in Japan. (10 inserts in one case)**
□ : **Non stock, produced to order only.**

Type	Geometry	Order Number	Stock								Dimensions (mm)			
			P			M	K							
			STi10 (HW-P10) *	STi20 (HW-P20) *	STi40T (HW-P40) *	UTi20T (HW-M20) *	HTi03A (HW-K01) *	HTi05T (HW-K01) *	HTi10 (HW-K10) *	HTi20 (HW-K20) *	A	B	C	R
07 Type		**07-0**	●	●	□	●	□	●	●	□	10	10	3	—
		07-1	□	●	□	●	□	□	●	□	13	13	3	—
		07-2	□	●	□	●	□	□	●	□	16	16	4	—
		07-3	□	●	□	●	□	□	●	□	19	19	5	—
		07-4	□	□	□	□	□	□	□	□	25	20	6	—
		07-5	□	□	□	□	□	□	□	□	25	22	7	—
For 35 Type		**07-6**	□	□	□	□	□	□	□	□	30	25	8	—
08 Type		**08-1**	●	●	●	●	●	●	●	●	3	8	3	—
		08-3	●	●	●	●	●	●	●	●	4	13	4	—
		08-4	●	●	●	●	●	●	●	●	5	15	5	—
		08-5	●	●	●	●	□	●	●	●	6	17	6	—
		08-6	●	●	□	●	□	□	●	●	8	20	8	—
For 43 Type														
09E Type		**09E1**	●	●	□	□	□	□	□	□	20	10	7	—
For 95 Type														

*( ) : Materials for cemented carbide tools and the classification for usage.

CARBIDE RODS



LRB SERIES

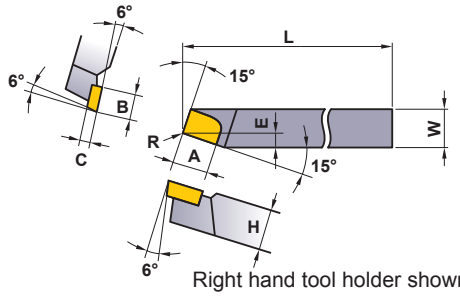
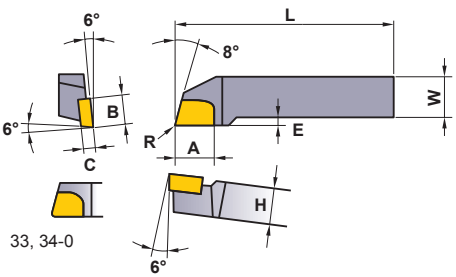
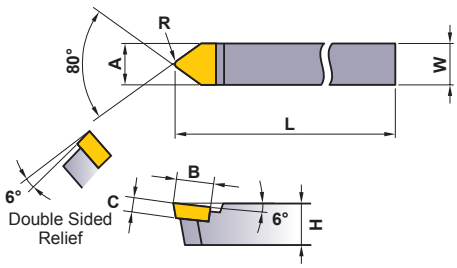
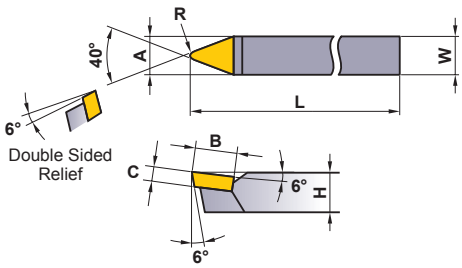
Order Number	Stock			Dimensions (mm)	
	HTi10	TF15	MF10	D	L
LRB030	●	●	●	3	330
LRB040	●	●	●	4	330
LRB050	●	●	●	5	330
LRB060	●	●	●	6	330
LRB070	●	●	●	7	330
LRB080	●	●	●	8	330
LRB100	●	●	●	10	330
LRB120	●	●	●	12	330

Symbol	Dimensions (mm)	Tolerance (mm)
D	0.5—2.5	+0.5 +0.2
	3—8	+0.5 +0.3
	10—12	+0.6 +0.3

Symbol	Dimensions (mm)	Tolerance (mm)	Bend (mm)
L	240	+10 0	0.15
	330	+10 0	0.3

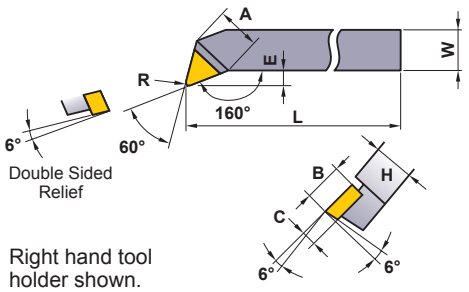
● : Inventory maintained in Japan. (LRB030~LRB080:10pcs/case LRB100&LRB120:5pcs/case)

BRAZED TOOL HOLDERS

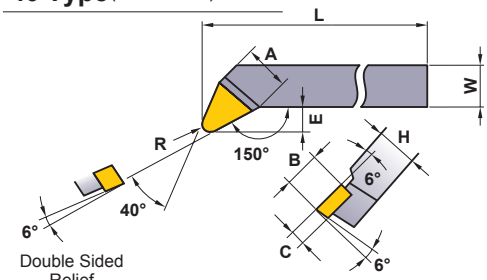
Geometry	Order Number	R/L	Stock P STi10	Stock P STi20	Stock P STi40T	Stock M UTi20T	Stock K HTi05T	Stock K HTi10	Stock K HTi20	Dimensions (mm) Shank W	Shank H	Shank L	Shank E	Carbide A	Carbide B	Carbide C	Carbide R	Blank No.
31 Type(Right Hand)	31-0	R		●		●				10	10	80	2.7	10	6	3	0.3	01-0
32 Type(Left Hand)	32-0	L		●						10	10	80	2.7	10	6	3	0.3	01-0
	31-1	R		●		●		●		13	13	100	4	13	9	3	0.5	01-1
	32-1	L		●		●		●		13	13	100	4	13	9	3	0.5	01-1
	31-2	R		●		●		●		16	16	120	4.5	16	11	4	0.5	01-2
	32-2	L		●		●		●		16	16	120	4.5	16	11	4	0.5	01-2
	31-3	R	●	●		●	●	●	●	19	19	140	5.5	19	13	5	0.5	01-3
	32-3	L		●		●				19	19	140	5.5	19	13	5	0.5	01-3
	31-4	R	●	●		●	●	●		25	25	160	6.5	22	15	6	1	01-4
Right hand tool holder shown.	32-4	L		●	●	●		●		25	25	160	6.5	22	15	6	1	01-4
33 Type(Right Hand)	33-0	R	●	●		●	●	●	●	10	10	80	—	10	6	3	0.3	04-0
34 Type(Left Hand)	34-0	L	●	●		●	●	●	●	10	10	80	—	10	6	3	0.3	04-0
	33-1	R	●	●	●	●	●	●	●	13	13	100	4	13	9	3	0.5	04-1
	34-1	L	●	●		●	●	●	●	13	13	100	4	13	9	3	0.5	04-1
	33-2	R	●	●	●	●	●	●	●	16	16	120	4	16	11	4	0.5	04-2
	34-2	L	●	●		●	●	●	●	16	16	120	4	16	11	4	0.5	04-2
	33-3	R	●	●	●	●	●	●	●	19	19	140	5	19	13	5	0.5	04-3
	34-3	L	●	●	●	●	●	●	●	19	19	140	5	19	13	5	0.5	04-3
	33-4	R	●	●	●	●	●	●	●	25	25	160	5	22	15	6	1	04-4
	34-4	L	●	●	●	●	●	●	●	25	25	160	5	22	15	6	1	04-4
33, 34-0	33-5	R		●		●				25	30	180	6	25	17	7	1	04-5
	34-5	L		●						25	30	180	6	25	17	7	1	04-5
	33-6	R		●		●				30	35	200	6	30	20	8	1	04-6
Right hand tool holder shown.	34-6	L		●		●				30	35	200	6	30	20	8	1	04-6
35 Type	35-0	—	●	●		●	●	●	●	10	10	80	—	10	10	3	0.3	07-0
	35-1	—	●	●		●	●	●	●	13	13	100	—	13	13	3	0.5	07-1
	35-2	—	●	●		●	●	●	●	16	16	120	—	16	16	4	0.5	07-2
	35-3	—	●	●		●	●	●	●	19	19	140	—	19	19	5	0.5	07-3
	35-4	—		●		●	●	●		25	25	160	—	25	20	6	1	07-4
36 Type	36-0	—	●	●		●	●	●	●	10	10	80	—	10	10	3	2	06-0
	36-1	—	●	●		●	●	●	●	13	13	100	—	13	13	3	2.5	06-1
	36-2	—	●	●		●	●	●	●	16	16	120	—	16	16	4	3	06-2
	36-3	—	●	●	●	●	●	●	●	19	19	140	—	19	19	5	4	06-3
	36-4	—	●	●	●	●	●	●	●	25	25	160	—	22	22	6	4	06-4
	36-5	—		●				●		25	30	180	—	25	25	7	5	06-5
	36-6	—		●		●	●	●		30	35	200	—	30	30	8	6	06-6

● : Inventory maintained in Japan.

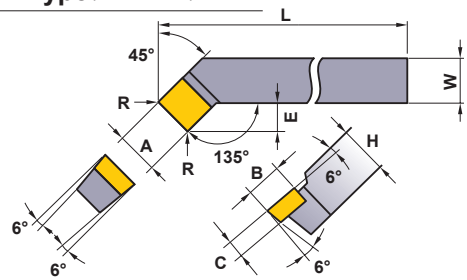
Geometry	Order Number	R/L	Stock P STi10	Stock P STi20	Stock P STi40T	Stock M UTi20T	Stock K HTi05T	Stock K HTi10	Stock K HTi20	Dimensions (mm) Shank W	Shank H	Shank L	Shank E	Carbide A	Carbide B	Carbide C	Carbide R	Blank No.
37 Type(Right Hand)	**37-1**	R	●	●		●	●	●		13	13	100	5	12	—	3	0.5	03-1
38 Type(Left Hand)	**38-1**	L		●				●		13	13	100	5	12	—	3	0.5	03-1
	37-2	R	●	●		●	●	●		16	16	120	6	15	—	4	0.5	03-2
	38-2	L		●		●		●		16	16	120	6	15	—	4	0.5	03-2
	37-3	R	●	●		●	●	●		19	19	140	7	18	—	5	0.5	03-3
	38-3	L		●		●	●	●	●	19	19	140	7	18	—	5	0.5	03-3
	37-4	R	●	●		●	●	●		25	25	160	10	24	—	6	1	03-4
	38-4	L		●				●		25	25	160	10	24	—	6	1	03-4
39 Type(Right Hand)	**39-0**	R	●	●		●	●	●	●	10	10	80	5	10	10	3	2	06-0
40 Type(Left Hand)	**40-0**	L		●		●	●	●	●	10	10	80	5	10	10	3	2	06-0
	39-1	R	●	●		●	●	●	●	13	13	100	7	13	13	3	2.5	06-1
	40-1	L	●	●		●	●	●	●	13	13	100	7	13	13	3	2.5	06-1
	39-2	R	●	●	●	●	●	●	●	16	16	120	10	16	16	4	3	06-2
	40-2	L	●	●		●	●	●	●	16	16	120	10	16	16	4	3	06-2
	39-3	R	●	●	●	●	●	●	●	19	19	140	12	19	19	5	4	06-3
	40-3	L	●	●	●	●	●	●	●	19	19	140	12	19	19	5	4	06-3
	39-4	R	●	●	●	●	●	●	●	25	25	160	13	22	22	6	4	06-4
	40-4	L		●		●	●	●	●	25	25	160	13	22	22	6	4	06-4
41 Type(Right Hand)	**41-0**	R		●		●				10	10	80	6	10	6	3	0.3	02-0
42 Type(Left Hand)	**41-1**	R	●	●		●		●	●	13	13	100	7	13	9	3	0.5	02-1
	42-1	L		●		●		●		13	13	100	7	13	9	3	0.5	02-1
	41-2	R	●	●		●	●	●		16	16	120	10	16	11	4	0.5	02-2
	42-2	L		●		●		●		16	16	120	10	16	11	4	0.5	02-2
	41-3	R	●	●		●	●	●	●	19	19	140	12	19	13	5	0.5	02-3
	42-3	L	●	●		●	●	●		19	19	140	12	19	13	5	0.5	02-3
	41-4	R	●	●		●	●	●		25	25	160	13	22	15	6	1	02-4
	42-4	L		●		●		●		25	25	160	13	22	15	6	1	02-4
43 Type	**43-1**	—	●	●		●	●	●	●	10	16	100	13	3	8	3	—	08-1
	43-2	—	●	●		●	●	●	●	13	19	120	16	3	8	3	—	08-1
	43-3	—	●	●	●	●	●	●	●	16	22	140	20	4	13	4	—	08-3
	43-4	—	●	●		●	●	●	●	19	25	160	25	5	15	5	—	08-4
	43-5	—		●		●				22	32	180	30	6	17	6	—	08-5



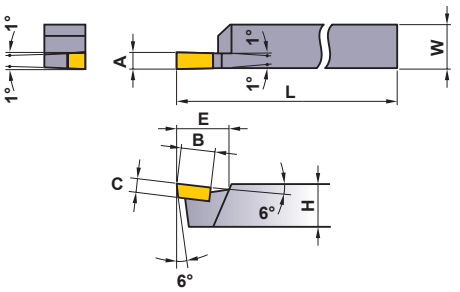
Right hand tool holder shown.



Right hand tool holder shown.

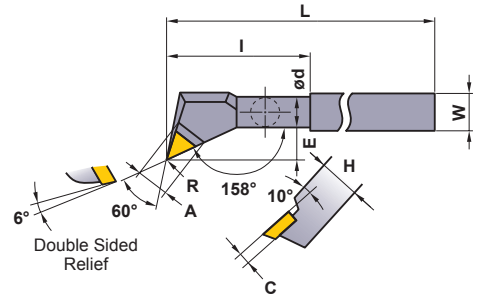


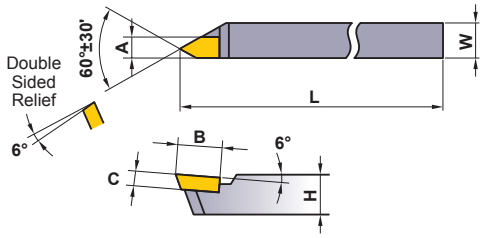
Right hand tool holder shown.

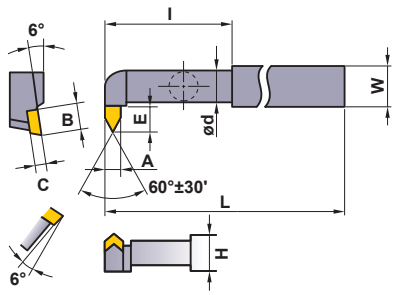


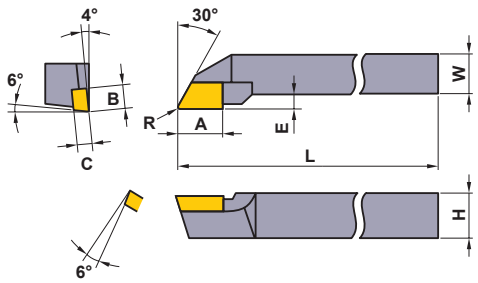
● : Inventory maintained in Japan.

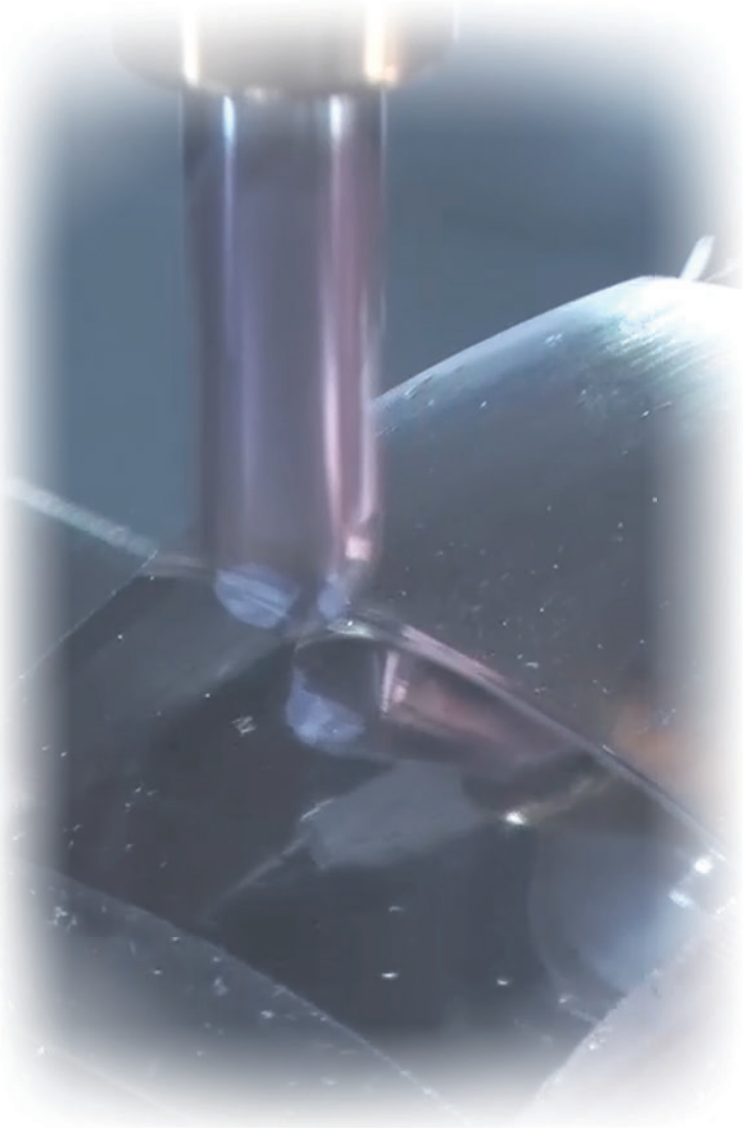
Geometry	Order Number	R/L	Stock P STi10	Stock P STi20	Stock M UTi20T	Stock K HTi05T	Stock K HTi10	Dimensions (mm) Shank W	Shank H	Shank L	Shank d	Shank E	Shank I	Carbide A	Carbide B	Carbide C	Carbide R	Blank No.
47Type (Right Hand)	**47-1**	R	●	●	●	●	●	13	13	140	12	7	50	10	—	3	0.5	03-0
	47-2	R	●	●	●	●	●	16	16	160	15	8	60	12	—	3	0.5	03-1
	47-3	R	●	●	●	●	●	19	19	190	18	9	80	15	—	4	0.5	03-2
	47-4	R		●	●			25	25	230	22	10	100	18	—	5	1	03-3
49Type (Right Hand)	**49-1**	R			●			13	13	100	—	—	—	5	8	3	—	05-1
	49-2	R	●	●	●		●	16	16	120	—	—	—	6	10	4	—	05-2
	49-3	R	●	●	●	●		19	19	140	—	—	—	7	12	5	—	05-3
	49-4	R	●	●	●			25	25	160	—	—	—	9	16	6	—	05-4
51Type (Right Hand)	**51-1**	R		●	●			13	13	140	12	8	50	5	8	3	—	05-1
	51-2	R		●	●			16	16	160	15	10	60	6	10	4	—	05-2
	51-3	R		●	●			19	19	190	18	12	80	7	12	5	—	05-3
95Type	**95-1**	R	●	●				25	25	160	—	5	—	20	10	7	1	09E1











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1MA 1140
2LS 1158
2MK 1161
2MS 1155
2SS 1146
4LC 1184
4MC 1176
C2JS 753
C2LA 761
C2LS 756
C2MA 759
C2MB 968
C2MHA 765
C2MS 749
C2SA 763
C2SS 746
C3SA 789
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C4LATB 1108
C4LC 851
C4MC 845
CBN2XLB 1212
CBN2XLRB 1214
CE4SRB 1216
CE6SRB 1218
CMH 788
CMRA 882
CRN2MB 962
CRN2MRB 1005
CRN2MS 736
CRN2XL 739
CRN2XLB 964
CRN2XLRB 1007
CRN4JC 843
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CSRARB 1013
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DC2XLB 1125
DF2MB 1129
DF2XLB 1131
DF2XLBF 1135
DF3XB 1137
DF4JC 1117
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JR 1205
KMH 1167
LR 1207
MP2MB 900
MP2SB 898
MP2SDB 902
MP2SSB 896
MP2XLB 904
MP3XB 1091
MPJHV 715
MPMHV 717
MPMHVRB 990
MPXLRB 993
MR 1203
MS2ES 713
MS2JS 701
MS2LS 703
MS2MB 915
MS2MD 699
MS2MRB 985
MS2MS 696
MS2MT 1080
MS2MTB 1097
MS2SB 912
MS2SS 694
MS2XL 705
MS2XL6 710
MS2XLB 917
MS2XLRB 988
MS3ES 772
MS4EC 811
MS4JC 804
MS4LT 1085
MS4LTB 1100
MS4MC 802
MS4MRB 1016
MS4SC 800
MS4XL 806
MSJHD 798
MSMHD 794
MSMHDRB 1019
MSMHZD 769
MSSHD 791
S2MD 1149
S2SDA 1163
S4JC 1179
S4MD 1171
SED2KMG 742
SED2KPG 744
SEE2L 767
SEE4L 854
SEG4SA 856
SR 1199
VA2MS 1144
VA2SS 1142
VA4MC 1169
VAJR 1195
VALR 1197
VAMFPR 1191
VAMH 1165
VAMR 1193
VASFPR 1189
VC2C 1110
VC2ESB 951
VC2JS 733
VC2MB 957
VC2MS 730
VC2PSB 953
VC2PSBP 955
VC2SS 727
VC3MB 975
VC4JC 838
VC4JRB 1054
VC4MB 979
VC4MC 835
VC4SRB 1052
VC4STB 1104
VC6MH 873
VC8MH 877
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VCMH 786
VCMHDRB 1063
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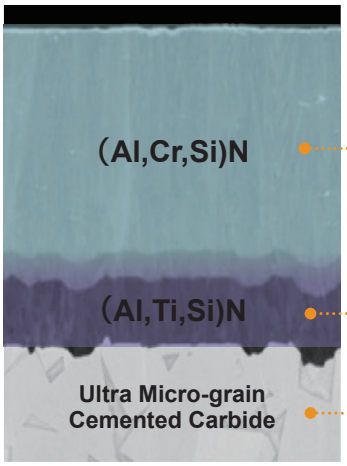
VCSFPR 891
VCXB 959
VF2MD 720
VF2MV 722
VF2SB 933
VF2SDB 936
VF2SDBL 937
VF2SSB 931
VF2WB 929
VF2XL 724
VF2XLB 943
VF2XLBS 939
VF3XB 970
VF4MB 983
VF4MD 813
VF4MV 815
VF4SVB 977
VF6MHV 863
VF6MHVCH 869
VF6MHVRB 1070
VF6MHVRB-CH 1076
VF6SVRCH 894
VF8MHVCH 875
VF8MHVRB-CH 1078
VFFDRB 1023
VFHVRB 1025, 1032
VFJHV 820
VFMD 867
VFMDRB 1074
VFMFPR 887
VFMHV 817
VFMHVCH 822
VFMHVRB 1038
VFMHVRBC-H 1041
VFR2SB 924
VFR2SBF 927
VFSD 865
VFSDRB 1072
VFSFPR 884
VFSFPRCH 889
VQ4SVB 981
VQJHV 830
VQMHV 824
VQMHVRB 1043
VQMHVRBF 1049
VQMHZV 774
VQMHZVOH 782
VQSVR 858
VQXL 832

COATING TECHNOLOGY

VFR IMPACT MIRACLE REVOLUTION Coating

The combination of the (Al, Cr, Si) N coating (newly-developed), which has a high oxidation temperature and high lubricity, together with the (Al, Ti, Si) N coating, which has better wear resistance and high adhesion, allows hardened steel with even greater strength to be maintained.



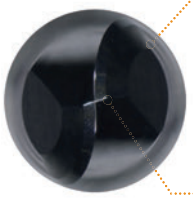
★High Oxidation Temperature
★High Lubricity

★Better Wear Resistance
★High Adhesion

Strong S Curve

New Negative Cutting Edge Shape and Slow Helix Angle Cutting Edge

New ZERO-μ Surface
Newly-developed Surface Reforming Technology



New Ball Geometry for Mirror Finish Cutting

VF ÍMPACT MIRACLE Coating

For higher hardness, higher speed and longer tool life!

In comparison with the conventional coating single-phase nano crystal coating technology offers higher coating hardness and heat resistance. When machining hardened steels it can be seen that the IMPACT MIRACLE coating offers a lower friction of coefficient and as such prevents abnormal damage such as chipping.

FEATURES OF IMPACT MIRACLE COATING

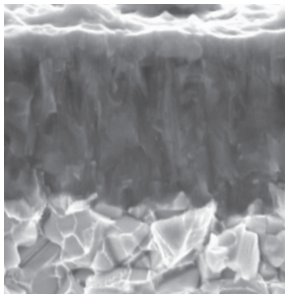
	ÍMPACT MIRACLE Shingle phase nano coating (Al,Ti,Si)N	(Al,Ti,Si)N	(Al,Ti)N
Hardness (HV)	**3700**	3200	2800
Oxidation Temperature (℃)	**1300**	1100	840
Adhesion (N)[1]	**100**	80	80
Wear Coefficient[2] (800℃)	**0.48**	0.53	0.58

1) Adhesion : Measured by critical load scratch test.
2) Coefficient of friction : Measured by ball-on-disk method.
(Counter gear : AISI D2 60HRC)

MS+ (Al,Ti,Cr)N multilayer coating (MS Plus)

Suitable coating for a broad range of workpiece materials such as carbon steel, alloy steel and hardened steel of approx. 50HRC.

Our original coating technology enables a multilayer of (Al,Ti)N and (Al,Cr)N. It allows machining of a wide range of workpiece materials.



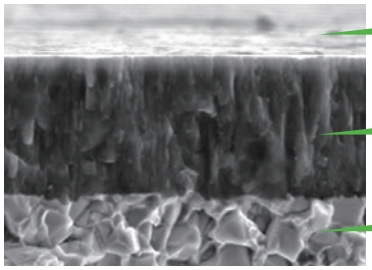
Properties of (Al,Ti,Cr)N multilayer coating (MS Plus)

	(Al,Ti,Cr)N multilayer	(Al,Ti)N	(Al,Cr)N
Hardness (HV)	**3200**	2800	3100
Oxidation Temperature (℃)	**1100**	800	1100
Adhesion (N)	**100**	80	80

MIRACLE SIGMA

VQ SMART MIRACLE® Coating

Newly-developed (Al,Cr)N coating with improved wear resistance.
The smoothig treatment of the coating layer reduces the cutting resistance and improves chip discharge significantly. This next-generation coating offers longer tool life and higher efficiency in machining difficult-to-cut materials.



Smoothed surface"Zero-μ Surface"

Newly developed(Al,Cr)N coating

Super fine grade substrate

SMART MIRACLE Coating

ZERO- μ Surface

The original surface treatment technology offers smooth coatng layer. A good balance of smooth surface and sharpe edge allows smooth chip discharge and reduces the cutting resistance. Machining efficiency and tool life is improved.

MIRACLE SIGMA

DLC DLC Coating

Newly developed DLC coating.
Hardness similar to that of CVD diamond coating achieved with high adhesion strength.

Mitsubishi Materials and NAGATA SEIKI have jointly developed a unique DLC coating that has substantially increased "adhesion strength" compared to previous DLC coatings.

DFC Diamond Coating

Proprietary CVD diamond coating produces excellent wear resistance and smooth hole surface.

The newly developed CVD diamond coated carbide material achieves outstanding abrasion resistance and smoothness due to a proprietary fine multilayer diamond crystal control technology.

DF Diamond Coating

Diamond coating for non-ferrous and new non-metal materials.

Owing to Mitsubishi's unique plasma chemical vapor deposition (CVD) coating technology, great combination of coating hardness similar to that of natural diamond has been combined with a good adhesion to carbide substrates.
DF end mill series suitable for graphite machining.

V VIOLET Coating

(Al,Ti)N coating, excellent adhesion strength for HSS tools.

Violet coating is the name of the technology of successfully applying a Miracle type coating to HSS substrate tools. The newly developed technology of applying (Al,Ti)N coating at the low temperatures required for HSS substrates, means that Violet coating has the same level of adhesion strength as Miracle coating. Additionally high film hardness and excellent oxidation resistance properties have also been realised.

SYMBOL DESCRIPTIONS

Tool material

UWC — Ultra micro grain carbide
Ultra micro grain carbide is used as the substrate material.

CBN — Cubic boron nitride
Mitsubishi's original CBN is used.

Ceramic — Ceramic
Ceramic is used as the substrate material.

KHA S — High hardness powder metallurgy HSS
High hardness powder metallurgy HSS is used as the substrate material.

KHA — Powder metallurgy HSS
Powder metallurgy HSS is used as the substrate material.

CO HSS — Ultra micro grain carbide
Cobalt high speed steel is used as the substrate material.

HSS — High speed steel
High speed steel is used as the substrate material.

Tolerances

Outside diameter tolerance
Indicates diameter tolerance of end mill.

R — R tolerance
Indicates the radial tolerance of a ball nose end mill.

R — R tolerance
Indicates the radial tolerance of an end mill with a corner radius.

Tolerance of Taper angle
Indicates the tolerance of the taper angle.

Tolerance of Point angle
Indicates the tolerance of the point angle.

h6 — Shank diameter tolerance
Indicates the shank diameter tolerance of end mill.

● : Inventory maintained.
▲ : Inventory maintained.
To be replaced by new products.
□ : Non stock, produced to order only.

Coating

VQ — SMART MIRACLE Coating
(Al, Cr)N coaitng optimum for difficult-to-cut materials.

VFR — IMPACT MIRACLE REVOLUTION Coating
A coating which adds the excellent high oxidation temperature of (AL, Cr, Si) N-based films to the nano crystal technology of VF.

VF — IMPACT MIRACLE Coating
Single phase nano crystal coating technology for higher film hardness and heat resistance.

MS+ — (Al,Ti,Cr)N multilayer coating
Offers higher versatility for carbon steel, alloy steel and hardened steel.

MS — (Al,Ti)N Coating
(Al,Ti)N offers higher versatility.

VC — MIRACLE Coating
The original Miracle (Al,Ti)N coating.
Also suitable for dry cutting.

CRN — CRN Coating
Newly developed CrN coating for Copper Electrodes machining.

DLC — DLC Coating
Hardness similar to that of CVD diamond coating achieved with high adhesion strength.
(Jointly developed with SHINMAYWA INDUSTRIES, LTD.)

DFC — CVD diamond coated end mills
Suitable for CFRP

DC — Diamond Coating
Pure Diamond high performance coating excelling in film adhesion to the substrate.

DF — Diamond Coating
Suitable for graphite machining.

V — VIOLET Coating
Increased tool life of 2—3 times that of TiN coated products.

G — TiN Coating
Increased tool life of 2—3 times that of non coated products.

Angle, sharp corner edge and gash land

Helix angle
Indicates the helix angle of the end mill.

Sharp corner edge
Indicates the end mill has a sharp corner edge.

Gash land
Indicates the end mill cutting edge has a gash land.

Work application range

1st Recommenedation

P M K N S H

2nd Recommenedation

P M K N S H

Accuracy

F **Finish Cutting**

M **Medium Cutting**

R **Rough Cutting**

IDENTIFICATION

ORDER NUMBER OF END MILLS

VQ 4 S VB R0100 *

End mill names

- **VQ** : SMART MIRACLE end mills
- **VFR** : IMPACT MIRACLE REVOLUTION end mills
- **VF** : Impact Miracle end mills
- **MP** : MS Plus end mills
- **MS** : Mstar end mills
- **VC** : Miracle end mills
- **CRN** : CRN coated end mills
- **DLC** : DLC coated end mills
- **DFC** : CVD diamond coated end mills
- **DF** : Diamond coated end mills
- **CBN** : CBN end mills
- **CE** Ceramic end mills
- **C** : Carbide end mills
- **VA** : Violet end mills
- **G** : TiN coated end mills
- **S** : KHAS end mills (High-grade powder high-speed steel)
- **K** : KHA end mills (Powder metallurgy HSS)
- **None** : Cobalt high-speed steel

Number of flutes

- **1** : 1flute
- **2** : 2flute
- **3** : 3flute
- **4** : 4flute
- **5** : 5flute
- **6** : 6flute
- **8** : 8flute
- • • •

Flute length

- **ES** : Extra short
- **S** : Short
- **M** : Medium
- **J** : Semi long
- **L** : Long
- **XL** : Long neck
- **X** : Taper neck
- **SX** : Extra long
- **MX** : Extra long

Features

- **S** : General-use
- **U** : For stainless steel
- **K** : For keyway
- **A** : For light alloy
- **C** : Center cut
- **D** : For deep cut
- **V** : Irregular spiral helix angle
- **B** : Ball nose
- **VB** : Irregular spiral helix angle, Ball nose
- **R** : Roughing
- **FPR** : Fine roughing
- **H** : High helix
- **T** : Taper
- **TB** : Taper ball nose
- **RB** : Corner radius
- **CH** : Coolant hole
- **3** : 3mm shank
- **6** : 6mm shank

Dimensions

D＊＊＊＊ : Diameter

ex.

D0050 →ϕ0.5

D0500 →ϕ5

R＊＊＊＊ : Radius of ball nose

ex.

R0050 → R0.5

R0500 → R5

Others

- **S**＊＊ : Shank diameter
- **N**＊＊＊ : Neck length
- **T**＊＊＊＊ : Taper angle one side
- **L**＊＊ : Flute length
- **A**＊＊＊ : Overall Length

＊Other types are available by special order.

SE E 4 040 L G

End mill names

- **SZ** : Super square
- **BZ** : Super ball
- **SE** : Square end mill

Helix angle

- **D** : 30°
- **E** : 45°
- **G** : Irregular spiral helix angle (38°/41°)

Number of flutes

- **2** : 2flute
- **4** : 4flute

Diameter

ex.

010 →ϕ1

050 →ϕ5

Shape

- **S** : Short
- **M** : Standard
- **L** : Long
- **KP** : For key way (+)
- **KM** : For key way (-)

Coating

- **G** : (Al, Ti)N Coating

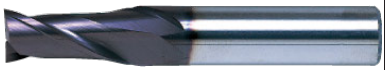
＊Other types are available by special order.

Memo

END MILLS SELECTION CHART CARBIDE

No. of Flutes	Product name, Shape	Applications, Features	Coating	Size range (mm)	Work material	Page
SQUARE END MILLS						
2	**MS2SS**	MSTAR END MILLS ● 2 flute end mill for general use.	MS	0.1-12	P M S H	694
2	**MS2MS**	MSTAR END MILLS ● 2 flute end mill for general use.	MS	0.2-20	P M N S H	696
2	**MS2MD**	MSTAR END MILLS ● Strong edge type, 2 flute end mill with high resistance to corner fracturing.	MS	1-12	P M S H	699
2	**MS2JS**	MSTAR END MILLS ● 2 flute end mill for general use.	MS	0.1-12	P M N S H	701
2	**MS2LS**	MSTAR END MILLS ● 2 flute end mill for general use.	MS	0.2-12	P M N S H	703
2	**MS2XL**	MSTAR END MILLS ● 2 flute long neck end mill.	MS	0.2-6	P M S H	705
2	**MS2XL6**	MSTAR END MILLS ● 2 flute long neck end mill. ● φ6 shank type.	MS	0.3-2.5	P M S H	710
2	**MS2ES**	MSTAR END MILLS ● 2 flute end mill. ● For small automatic lathes.	MS	3-12	P M N S	713
4	**MPJHV**	MS PLUS END MILLS ● 4 flute irregular helix end mill for reduced vibration when machining stainless and carbon steel. ● Semi long flute length suitable for vertical wall finishing.	MS+	1-20	P M S H	715
4	**MPMHV**	MS PLUS END MILLS ● 4 flute irregular helix end mill for reduced vibration when machining stainless and carbon steel.	MS+	1-20	P M S H	717
2	**VF2MD**	IMPACT MIRACLE END MILLS ● 2 flute end mill suitable for high-speed machining of hardened steel.	VF	0.5-6	P H	720
2	**VF2MV**	IMPACT MIRACLE END MILLS ● An irregular helix 2 flute square end mill suitable for high-speed machining of hardened steel.	VF	0.5-6	P H	722

END MILLS SELECTION CHART CARBIDE

No. of Flutes	Product name, Shape	Applications, Features	Coating	Size range (mm)	Work material	Page
2	VF2XL	IMPACT MIRACLE END MILLS ● 2 flute long neck end mill for high-speed machining of hardened steels.	VF	0.1-3	P H	724
2	VC2SS	MIRACLE END MILLS ● 2 flute end mill for general use.	VC	0.3-16	P M S H	727
2	VC2MS 	MIRACLE END MILLS ● 2 flute end mill for general use.	VC	0.3-25	P M S H	730
2	VC2JS	MIRACLE END MILLS ● 2 flute end mill with longer cut length than standard.	VC	1-25	P M S H	733
2	CRN2MS	CRN END MILLS ● 2 flute end mill with CRN coating for copper electrode machining.	CRN	0.2-12	N	736
2	CRN2XL	CRN END MILLS ● 2 flute long neck end mill with CRN coating for copper electrode machining.	CRN	0.2-6	N	739
2	SED2KMG	● 2 flute end mill for key way slotting with minus tolerance.	MS	2-16	P M S	742
2	SED2KPG	● 2 flute end mill for key way slotting with plus tolerance.	MS	2-16	P M S	744
2	C2SS	● 2 flute end mill with short rigid geometry.		0.4-6	P M N S	746
2	C2MS	● 2 flute end mill for general use.		1-20	P M N S	749
2	C2JS	● 2 flute uncoated end mill for general use.		1-25	P M N S	753
2	C2LS	● 2 flute end mill with longer cut length than standard.		1-20	P M N S	756

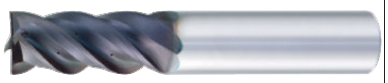
END MILLS SELECTION CHART CARBIDE

No. of Flutes	Product name, Shape	Applications, Features	Coating	Size range (mm)	Work material	Page
2	**C2MA**	ALIMASTER END MILLS ● 2 flute uncoated end mill designed especially for aluminium alloys.		1-20	N	759
2	**C2LA**	ALIMASTER END MILLS ● 2 flute uncoated end mill designed especially for aluminium alloys.		1-20	N	761
2	**C2SA**	ALIMASTER END MILLS ● High efficiency machining for aluminium alloys.		3-20	N	763
2	**C2MHA**	ALIMASTER END MILLS ● High efficiency machining for aluminum alloys.		3-25	N	765
2	**SEE2L**	● 2 flute uncoated high helix end mill.		3-20	P M N S	767
3	**MSMHZD**	MSTAR END MILLS ● A single end mill for both plunging and slotting.	MS	1-20	P M N S H	769
3	**MS3ES**	MSTAR END MILLS ● 3 flute end mill. ● For small automatic lathes.	MS	3-12	P M N S H	772
3	**VQMHZV**	SMART MIRACLE END MILLS ● A single end mill for both plunging and slotting. ● Achieving an excellent vibration resistance due to the adoption of irregular helix.	VQ	1-20	P M N S	774
3	**VQMHZVOH**	SMART MIRACLE END MILLS ● A single end mill for both plunging and slotting. ● Excellent performance in slotting and pocketing with oil supply from the end cutting edge.	VQ	6-16	P M N S	782
3,4	**VCMH**	MIRACLE END MILLS ● 3—4 flute end mill for milling difficult-to-cut and soft materials.	VC	3-25	P M S H	786
3	**CMH**	● 3 flute ultra micro-grain uncoated carbide end mill for general use and cast iron milling.		6-16	P M N S	788

END MILLS SELECTION CHART CARBIDE

No. of Flutes	Product name, Shape	Applications, Features	Coating	Size range (mm)	Work material	Page
3	**C3SA**	ALIMASTER END MILLS ● High efficiency machining for aluminium alloys.		10-26	N	789
4	**MSSHD**	MSTAR END MILLS ● 4 flute high power end mill.	MS	3-20	P M S H	791
4	**MSMHD**	MSTAR END MILLS ● 4 flute high power end mill.	MS	2-25	P M S H	794
4	**MSJHD**	MSTAR END MILLS ● 4 flute high power end mill.	MS	2-20	P M S H	798
4	**MS4SC**	MSTAR END MILLS ● 4 flute end mill for general use.	MS	1-12	P M N S H	800
4	**MS4MC**	MSTAR END MILLS ● 4 flute end mill for general use.	MS	1-20	P M S H	802
4	**MS4JC**	MSTAR END MILLS ● 4 flute end mill for general use.	MS	1-12	P M N S H	804
4	**MS4XL**	MSTAR END MILLS ● 4 flute long neck end mill.	MS	1-10	P M S H	806
4	**MS4EC**	MSTAR END MILLS ● 4 flute end mill. ● For small automatic lathes.	MS	3-14	P M N S H	811
4	**VF4MD**	IMPACT MIRACLE END MILLS ● 4 flute end mill suitable for high-speed machining of hardened steel.	VF	1-20	P H	813
4	**VF4MV**	IMPACT MIRACLE END MILLS ● An irregular helix 4 flute square end mill suitable for high-speed machining of hardened steel.	VF	6-20	P H	815
4	**VFMHV**	IMPACT MIRACLE END MILLS ● Vibration control end mill achieving stable machining of difficult-to-cut materials and for long overhang applications.	VF	2-20	P M S H	817

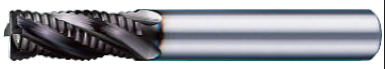
END MILLS SELECTION CHART CARBIDE

No. of Flutes	Product name, Shape	Applications, Features	Coating	Size range (mm)	Work material	Page
4	**VFJHV**	IMPACT MIRACLE END MILLS ● Impact Miracle end mill with irregular helix flutes ensures stable machining of difficult-to-cut materials. Suitable for deep machining with long axial depth of cut.	VF	2-20	P M S H	820
4	**VFMHVCH** 	COOL STAR END MILLS ● Vibration control end mill with multiple internal through coolant holes ensures stable machining on difficult-to-cut materials and applications requiring long overhangs.	VF	16,20	M S	822
4	**VQMHV**	SMART MIRACLE END MILLS ● Smart Miracle vibration control end mill achieving stable machining of difficult-to-cut materials and for long overhang applications.	VQ	2-25	P M N S	824
4	**VQJHV**	SMART MIRACLE END MILLS ● Smart Miracle vibration control end mill achieving stable machining of difficult-to-cut materials and for long overhang applications.	VQ	2-20	P M N S	830
3,4	**VQXL**	SMART MIRACLE END MILLS ● The use of SMART MIRACLE Coating improves chip discharge dramatically. ● Multi-cutters at a small diameter of φ1 is realized.	VQ	0.2-1	P M N S H	832
4	**VC4MC**	MIRACLE END MILLS ● 4 flute end mill for general use.	VC	2-25	P M S H	835
4	**VC4JC**	MIRACLE END MILLS ● 4 flute end mill for general use.	VC	3-25	P M S H	838
4,6	**VCMDSC**	MIRACLE END MILL FOR HIGH HARDNESS STEELS ● Ideal for tool steel and hardened materials machining.	VC	0.5-3	P H	841
4	**CRN4JC**	CRN END MILLS ● 4 flute end mill with CRN coating for copper electrode machining.	CRN	3-12	N	843
4	**C4MC**	● 4 flute uncoated center cutting end mill for general use.		3-20	P M N S	845

END MILLS SELECTION CHART CARBIDE

No. of Flutes	Product name, Shape	Applications, Features	Coating	Size range (mm)	Work material	Page
4	**C4JC**	● 4 flute uncoated end mill for general use.		3-25	P M N S	848
4	**C4LC**	● 4 flute end mill with longer cut length than standard.		3-20	P M N S	851
4	**SEE4L**	● 4 flute high helix end mill.		3-25	P M N S	854
4	**SEG4SA**	● 4 flute end mill with irregular helix angle for aluminium alloy.		6-25	N	856
3,4	**VQSVR**	SMART MIRACLE END MILLS ● Achieving an excellent vibration resistance due to the adoption of irregular helix. ● Use of an asymmetric chip breaker improves fracture resistance substantially. (Compared to a conventional roughing end mill)	VQ	3-20	P M N S	858
6	**VF6MHV**	IMPACT MIRACLE END MILLS ● Irregular helix 6 flute geometry reduces vibrations and achieves high efficiency machining. Suitable for machining of difficult-to-cut materials such as stainless steel, titanium alloy and Inconel.	VF	6-20	P M S H	863
4,6	**VFSD**	IMPACT MIRACLE END MILLS ● End mill with Impact Miracle coating for high hardened materials.	VF	1-12	P H	865
4,6	**VFMD**	IMPACT MIRACLE END MILLS ● End mill with Impact Miracle coating for high hardened materials.	VF	1-25	P H	867
6	**VF6MHVCH**	COOL STAR END MILLS ● Vibration control end mill with multiple internal through coolant holes ensures stable machining on difficult-to-cut materials and applications requiring long overhangs.	VF	10-20	P M S	869
6	**VCLD**	MIRACLE END MILLS FOR HIGH HARDNESS STEEL ● Ideal for tool steel and hardened materials machining	VC	6-25	P H	871
6	**VC6MH**	MIRACLE END MILLS ● 6 flute end mill for milling difficult-to-cut and soft materials.	VC	6-25	P M S H	873

END MILLS SELECTION CHART CARBIDE

No. of Flutes	Product name, Shape	Applications, Features	Coating	Size range (mm)	Work material	Page
8	**VF8MHVCH**	COOL STAR END MILLS ● Vibration control end mill with multiple internal through coolant holes ensures stable machining on difficult-to-cut materials and applications requiring long overhangs.	VF	16,20	P M S	875
8	**VC8MH**	MIRACLE END MILLS ● 8 flute end mill for milling difficult-to-cut and soft materials.	VC	20,25	P M S H	877
3	**CSRA**	ALIMASTER END MILLS ● 3 flute uncoated end mill for roughing aluminium alloy.		10-25	N	879
3	**CMRA**	ALIMASTER END MILLS ● 3 flute uncoated end mill for roughing aluminium alloy.		3-25	N	882
3,4	**VFSFPR** 	IMPACT MIRACLE END MILLS ● Impact Miracle roughing end mills for a wide range of work materials from carbon and alloy steel through to hardened steel and difficult-to-cut materials.	VF	3-20	P M S H	884
4	**VFMFPR**	IMPACT MIRACLE END MILLS ● Impact Miracle roughing end mills suitable for the machining of deep walled components.	VF	5-20	P M S H	887
4	**VFSFPRCH**	COOL STAR END MILLS ● Roughing end mill with multiple internal through coolant holes suitable for difficult-to-cut materials.	VF	16,20	M S	889
3,4	**VCSFPR**	MIRACLE END MILLS ● 3—4 flute roughing end mill for carbon and alloy steel through to difficult-to-cut and hardened materials.	VC	3-20	P M S H	891
6	**VF6SVRCH**	COOL STAR END MILLS ● Irregular helix 6 flute geometry reduces vibrations and achieves high efficiency machining. Suitable for machining of difficult-to-cut materials such as stainless steel, titanium alloy and Inconel.	VF	16,20	M S	894

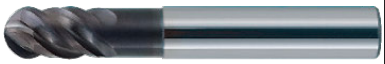
END MILLS SELECTION CHART CARBIDE

No. of Flutes	Product name, Shape	Applications, Features	Coating	Size range (mm)	Work material	Page
BALL NOSE END MILLS						
2	**MP2SSB**	MS PLUS END MILLS ● 2 flute ball nose end mills with short cutting edge length for general purpose. Excellent performance for a wide range of workpiece materials such as carbon steel, alloy steel and hardened steel.	MS+	0.2-12	P M N S H	896
2	**MP2SB**	MS PLUS END MILLS ● 2 flute ball nose end mills with short cutting edge length for general purpose. Excellent performance for a wide range of workpiece materials such as carbon steel, alloy steel and hardened steel.	MS+	0.2-12	P M N S H	898
2	**MP2MB**	MS PLUS END MILLS ● 2 flute ball nose end mills with medium cutting edge length for general purpose. Excellent performance for a wide range of workpiece materials such as carbon steel, alloy steel and hardened steel.	MS+	0.5-12	P M N S H	900
2	**MP2SDB**	MS PLUS END MILLS ● Excellent chipping resistance with a strong S curve cutting edge. Ideal for semi-finish machining of forging dies.	MS+	1-12	P H	902
2	**MP2XLB**	MS PLUS END MILLS ● 2 flute long neck ball nose end mills. Excellent performance for a wide range of workpiece materials such as carbon steel, alloy steel and hardened steel.	MS+	0.1-6	P M N S H	904
2	**MS2SB**	MSTAR END MILLS ● 2 flute ball nose end mill for general use.	MS	0.2-12	P M S H	912
2	**MS2MB**	MSTAR END MILLS ● 2 flute ball nose end mill for general use.	MS	0.5-12	P M S H	915
2	**MS2XLB**	MSTAR END MILLS ● 2 flute long neck ball nose end mills.	MS	0.2-6	P M S H	917
2	**VFR2SB**	IMPACT MIRACLE REVOLUTION ● Optimization of the cutting edge curve, helix angle, and rake angle have improved the edge strength at all areas of the cutting edges.	VFR	0.2-20	P H	924

END MILLS SELECTION CHART CARBIDE

No. of Flutes	Product name, Shape	Applications, Features	Coating	Size range (mm)	Work material	Page
2	**VFR2SBF**	IMPACT MIRACLE REVOLUTION ● New ball geometry for mirror finish cutting.	VFR	1-6	P H	927
2	**VF2WB**	IMPACT MIRACLE END MILLS ● Ball nose end mill suitable for machining of undercut geometries and complex geometries using a 5-axis machine.	VF	2-6	P M S H	929
2	**VF2SSB**	IMPACT MIRACLE END MILLS ● 2 flute ball nose end mill with Impact Miracle coating for high hardened materials.	VF	1-12	P M S H	931
2	**VF2SB**	IMPACT MIRACLE END MILLS ● 2 flute ball nose end mill with Impact Miracle coating for high hardened materials.	VF	0.2-20	P M S H	933
2	**VF2SDB**	IMPACT MIRACLE END MILLS ● 2 flute ball nose end mill with Impact Miracle coating for high hardness materials and achieves excellent fracture resistance.	VF	1-20	P H	936
2	**VF2SDBL**	IMPACT MIRACLE END MILLS ● 2 flute ball nose end mill with long shank for general use.	VF	1-20	P H	937
2	**VF2XLBS**	IMPACT MIRACLE END MILLS ● 2 flute long neck ball nose end mill for high-speed machining of hardened steel. ● Short shank type suitable for use with a shrink fit holder.	VF	0.4-2	P S H	939
2	**VF2XLB**	IMPACT MIRACLE END MILLS ● 2 flute long neck ball nose end mill with Impact Miracle coating for high hardened materials.	VF	0.2-6	P S H	943
2	**VC2ESB**	MIRACLE END MILLS ● 2 flute ball nose end mill for high rigidity.	VC	0.3-12	P M S H	951
2	**VC2PSB**	MIRACLE END MILLS ● MIRACLE NOVA, radial tolerance of ±0.005mm, diameter tolerance 0–-0.01mm and a shank tolerance of h5.	VC	0.1-12	P M S H	953
2	**VC2PSBP**	MIRACLE END MILLS ● MIRACLE NOVA, radial tolerance of ±0.002mm, diameter tolerance 0–-0.01mm and a shank tolerance of h5.	VC	0.4-12	P M S H	955
2	**VC2MB**	MIRACLE END MILLS ● 2 flute ball nose end mill for general use.	VC	0.4-25	P M S H	957

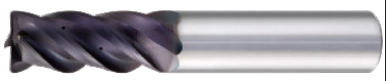
END MILLS SELECTION CHART CARBIDE

No. of Flutes	Product name, Shape	Applications, Features	Coating	Size range (mm)	Work material	Page
2	**VCXB**	MIRACLE END MILLS ● 2 flute ball nose taper end mill with taper neck.	VC	1-12	P M S H	959
2	**CRN2MB**	CRN END MILLS ● 2 flute ball nose end mill with CRN coating for copper electrode machining.	CRN	0.4-12	N	962
2	**CRN2XLB**	CRN END MILLS ● 2 flute long neck ball nose end mill with CRN coating for copper electrode machining.	CRN	0.2-6	N	964
2	**C2MB**	CARBIDE END MILLS ● 2 flute ultra micro-grain carbide end mill for contour milling of alloy and hardened steels.		1-15	P M N S	968
3	**VF3XB**	IMPACT MIRACLE END MILLS ● 3 flute ball nose end mill, high rigidity taper neck type.	VF	0.8-5	P M S H	970
3	**VC3MB**	MIRACLE END MILLS ● 3 flute ball nose end mill for efficient machining.	VC	2-20	P M S H	975
4	**VF4SVB** 	IMPACT MIRACLE END MILLS ● Impact Miracle ball nose end mill with variable curve ensures stable machining of difficult-to-cut materials.	VF	2-20	P M S	977
4	**VC4MB**	MIRACLE END MILLS ● 4 flute ball nose end mill with high durability for hardened steels.	VC	1-20	P M S H	979
4	**VQ4SVB**	SMART MIRACLE END MILLS ● 4 flute ball nose end mill. ● With the special substrate, suitable for finishing of heat resistance alloy, etc.	VQ	2-12	P M N S	981
4	**VF4MB**	IMPACT MIRACLE END MILLS ● 4 flute ball nose end mill for high speed machining of hardened steel.	VF	1-12	P M S H	983
RADIUS END MILLS						
2	**MS2MRB**	MSTAR END MILLS ● 2 flute corner radius end mill for general use.	MS	1-12	P M S H	985
2	**MS2XLRB**	MSTAR END MILLS ● 2 flute long neck corner radius end mill.	MS	1-6	P M S H	988

END MILLS SELECTION CHART CARBIDE

No. of Flutes	Product name, Shape	Applications, Features	Coating	Size range (mm)	Work material	Page
4	**MPMHVRB**	MS PLUS END MILLS ● 4 flute irregular helix end mill for reduced vibration when machining stainless and carbon steel.	MS+	1-20	P M S H	990
4	**MPXLRB**	MS PLUS END MILLS ● Suitable for high precision and high efficient machining of die & mold	MS+	1-20	P M N S H	993
2,4	**VCPSRB**	MIRACLE ORBIT END MILLS ● ±0.01mm corner radius tolerance, 0—-0.01mm outer diameter tolerance. End mill with corner radius for precise and efficient machining.	VC	0.6-12	P M S H	998
2,4	**VCPSRB Taper neck type**	MIRACLE ORBIT END MILLS ● ±0.01mm corner radius tolerance, 0—-0.01mm outer diameter tolerance. End mill with corner radius for precise and efficient machining.	VC	1.5-12	P M S H	1003
2	**CRN2MRB**	CRN END MILLS ● 2 flute corner radius end mill with CRN coating for copper electrode machining.	CRN	6-12	N	1005
2	**CRN2XLRB**	CRN END MILLS ● 2 flute long neck corner radius end mill with CRN coating for copper electrode machining.	CRN	0.5-6	N	1007
3	**C3SARB**	ALIMASTER END MILLS ● High efficiency machining for aluminium alloys.		12-25	N	1011
3	**CSRARB**	ALIMASTER END MILLS ● 3 flute uncoated end mill for roughing aluminium alloy.		10-25	N	1013
4	**MS4MRB**	MSTAR END MILLS ● 4 flute corner radius end mill for general use.	MS	3-20	P M S H	1016
4	**MSMHDRB**	MSTAR END MILLS ● 4 flute high power corner radius end mill.	MS	2-20	P M S H	1019

END MILLS SELECTION CHART CARBIDE

No. of Flutes	Product name, Shape	Applications, Features	Coating	Size range (mm)	Work material	Page
4,6	**VFFDRB**	IMPACT MIRACLE END MILLS ● Multi-task corner radius type allows more efficient high feed. ● Adoption of multiple cuttings realized high feed cutting.	VF	3-12	P H	1023
4	**VFHVRB**	IMPACT MIRACLE END MILLS ● Impact Miracle corner radius end mill for high feed and efficient machining.	VF	1-16	P M S H	1025
4	**VFHVRB Taper neck type**	IMPACT MIRACLE END MILLS ● Impact Miracle corner radius end mill for high feed and efficient machining.	VF	1-12	P M S H	1032
4	**VFMHVRB**	IMPACT MIRACLE END MILLS ● Vibration control end mill achieving stable machining of difficult-to-cut materials and for long overhang applications.	VF	6-20	P M S H	1038
4	**VFMHVRBCH** 	COOL STAR END MILLS ● Vibration control corner radius end mill with multiple internal through coolant holes ensures stable machining on difficult-to-cut materials and applications requiring long overhangs.	VF	16,20	M S	1041
4	**VQMHVRB**	SMART MIRACLE END MILLS ● Smart Miracle vibration control end mill achieving stable machining of difficult-to-cut materials and for long overhang applications.	VQ	2-20	P M N S	1043
4	**VQMHVRBF**	SMART MIRACLE END MILLS ● Smart Miracle vibration control end mill achieving stable machining of difficult-to-cut materials. ● With the special substrate, suitable for finishing of heat resistance alloy, etc.	VQ	6-16	P M S	1049
4	**VC4SRB**	MIRACLE END MILLS ● 4 flute corner radius end mill with relieved neck for DC×3 length of reach.	VC	4-12	P M S H	1052
4	**VC4JRB**	MIRACLE END MILLS ● 4 flute corner radius end mill for general use. ● 4 flute corner radius end mill for longer reach applications.	VC	3-20	P M S H	1054
4	**VCHFRB**	MIRACLE END MILLS ● Suitable for high feed and efficient machining of die & mould.	VC	2-16	P S H	1056

END MILLS SELECTION CHART CARBIDE

No. of Flutes	Product name, Shape	Applications, Features	Coating	Size range (mm)	Work material	Page
4	**VCHFRB Taper neck type**	MIRACLE END MILLS ● Suitable for high feed and efficient machining of die & mould.	VC	2-12	P S H	1060
4	**VCMHDRB**	MIRACLE END MILLS ● 4 flute corner radius end mill with high helix angle for milling difficult-to-cut materials.	VC	2-25	P M S H	1063
2,4	**DFPSRB**	DF END MILLS ● ±0.01mm corner radius tolerance, 0—-0.02mm outer diameter tolerance. Corner radius end mill with original diamond coating for precise and efficient graphite machining.	DF	0.5-12	N	1067
6	**VF6MHVRB**	IMPACT MIRACLE END MILLS ● Irregular helix 6 flute geometry reduces vibrations and achieves high efficiency machining. ● Suitable for machining of difficult-to cut materials such as stainless steel, titanium alloy and Inconel.	VF	6-20	P M S H	1070
6	**VFSDRB**	IMPACT MIRACLE END MILLS ● 6 flute end mill with Impact Miracle coating for high hardened materials.	VF	3-12	P H	1072
6	**VFMDRB**	IMPACT MIRACLE END MILLS ● 6 flute corner radius end mill with Impact Miracle coating for high hardened materials.	VF	3-20	P H	1074
6	**VF6MHVRBCH**	COOL STAR END MILLS ● Vibration control corner radius end mill with multiple internal through coolant holes ensures stable machining on difficult-to-cut materials and applications requiring long overhangs.	VF	10-20	M S	1076
8	**VF8MHVRBCH**	COOL STAR END MILLS ● Vibration control corner radius end mill with multiple internal through coolant holes ensures stable machining on difficult-to-cut materials and applications requiring long overhangs.	VF	16,20	M S	1078
TAPER END MILLS						
2	**MS2MT**	MSTAR END MILLS ● 2 flute taper end mill for general use.	MS	0.2-10	P M S H	1080
4	**MS4LT**	MSTAR END MILLS ● 4 flute taper end mill for rib milling.	MS	0.2-3	P M H	1085

END MILLS SELECTION CHART CARBIDE

No. of Flutes	Product name, Shape	Applications, Features	Coating	Size range (mm)	Work material	Page
TAPER BALL NOSE END MILLS						
3	**MP3XB**	MS PLUS END MILLS ● Ideal for rough milling of long overhang applications and semi-finishing of forging dies (40-52 HRC). ● Rigid, high helix, 3 flute design enables large depths of cut and high feed rates for increased machining efficiency.	MS+	1-12	P M N S H	1091
2	**MS2MTB**	MSTAR END MILLS ● 2 flute taper ball nose end mill.	MS	0.4-3	P M S H	1097
4	**MS4LTB**	MSTAR END MILLS ● 4 flute taper ball nose end mill for rib milling.	MS	0.6-2	P M S H	1100
4	**VC4STB**	MIRACLE END MILLS ● 4 flute ball nose taper end mill with taper neck for maximum rigidity and high performance.	VC	0.6-8	P M S H	1104
4	**C4LATB**	TAPER BALL END MILL FOR ALUMINUM IMPELLERS ● High-efficiency roughing for Aluminum impellers.		1-4	N	1108
CHAMFERING						
2	**VC2C**	MIRACLE END MILLS ● Chamfering cutter for machining hardened steel and difficult-to-cut materials.	VC	2-12	P M N S H	1110
DIAMOND COATED END MILLS						
4	**DF4JC**	DF END MILLS ● 4 flute end mill with original diamond coating for graphite machining.	DF	3-12	N	1117
4	**DF4XL**	DF END MILLS ● 4 flute long neck end mill with original diamond coating for graphite machining.	DF	1-12	N	1114
4	**DFC4JC**	DFC END MILLS ● 4 flute end mill with original CVD diamond coating for CFRP machining.	DFC	6-12	N	1112
2	**DLC2MA**	DLC END MILLS ● 2 flute end mill with new high welding resistance DLC coating, ideal for machining non-ferrous materials.	DLC	1-20	N	1119
10,12	**DFCJRT**	DFC END MILLS ● Cross-nick type end mill with original CVD diamond coating for CFRP machining.	DFC	6-12	N	1121

END MILLS SELECTION CHART CARBIDE

No. of Flutes	Product name, Shape	Applications, Features	Coating	Size range (mm)	Work material	Page
2	**DLC2MB**	DLC END MILLS ● 2 flute ball nose end mill with new high welding resistance DLC coating, ideal for machining non ferrous materials.	DLC	0.2-20	N	1123
2	**DC2XLB**	DC END MILLS ● Suitable DC long neck ball nose end mill for cemented carbide and other hard brittle materials processing.	DC	0.2-6	N	1125
2	**DC2SB**	DC END MILLS ● Suitable DC ball nose end mill for cemented carbide and other hard brittle materials processing.	DC	0.2-6	N	1127
2	**DF2MB**	DF END MILLS ● 2 flute ball nose end mill with original diamond coating for graphite machining.	DF	6-12	N	1129
2	**DF2XLB**	DF END MILLS ● 2 flute long neck ball nose end mill with Mitsubishi's unique diamond coating for graphite machining.	DF	0.2-6	N	1131
2	**DF2XLBF**	DF END MILLS ● DC long-neck ball nose end mills are ideal for finished surfaces of non-ferrous metals.	DF	0.6-3	N	1135
3	**DF3XB**	DF END MILLS ● Ball nose taper end mill with Mitsubishi's unique diamond coating for graphite machining.	DF	1-4	N	1137

Memo

END MILLS SELECTION CHART HSS

No. of Flutes	Product name, Shape	Applications, Features	Coating	Size range (mm)	Work material	Page
SQUARE END MILLS						
1	**1MA**	LIGHT ALLOY STEEL END MILLS ● Single flute end mill for aluminium channel and wood working.		3-8	N	1140
1	**1LA**	LIGHT ALLOY STEEL END MILLS ● Single flute end mill with longer cut length and overall length than standard for deeper machining.		4-12	N	1141
2	**VA2SS**	VIOLET END MILLS ● 2 flute end mill with high grade HSS substrate and Violet coating for general use.	V	3-20	P M S	1142
2	**VA2MS**	VIOLET END MILLS ● 2 flute end mill with high grade HSS substrate and Violet coating for general use.	V	3-40	P M S	1144
2	**2SS**	TWO-FLUTE END MILLS ● 2 flute HSS end mill with rigid design.		0.5-20	P M N S	1146
2	**S2MD**	TWO-FLUTE END MILLS ● 2 flute end mill with KHA Super substrate for high speed milling of difficult-to-cut and hard materials.		0.5-20	P M N S	1149
2	**G2MS**	TWO-FLUTE END MILLS ● 2 flute end mill with high grade HSS substrate and TiN coating for general use.	G	1-40	P M N S	1152
2	**2MS**	TWO-FLUTE END MILLS ● 2 flute end mill with high grade HSS substrate for general use.		1-60	P M N S	1155
2	**2LS**	TWO-FLUTE END MILLS ● 2 flute end mill with high grade HSS substrate for general use.		1-40	P M N S	1158
2	**2MK**	TWO-FLUTE END MILLS ● 2 flute end mill for key way slotting. ● 2 flute end mill for NN (JIS) standards and plus or minus tolerance diameters.		3-20	P M N	1161
2	**S2SDA**	LIGHT ALLOY STEEL END MILLS ● 2 flute end mill for aluminium alloy and soft materials.		3-20	N	1163

END MILLS SELECTION CHART HSS

No. of Flutes	Product name, Shape	Applications, Features	Coating	Size range (mm)	Work material	Page
2,3,4	**VAMH**	VIOLET END MILLS ● 2—4 flute end mill with high grade HSS substrate and Violet coating for general use.	V	5-30	P M S	1165
2,3	**KMH**	HIGH HELIX END MILLS ● 2—3 flute end mill for general use on mild steel through to difficult-to-cut materials.		5-20	P M N S	1167
4	**VA4MC**	VIOLET END MILLS ● 4 flute end mill with high grade HSS substrate and Violet coating for general use.	V	3-30	P M S	1169
4	**S4MD**	FOUR-FLUTE END MILLS ● 4 flute end mill with high grade powder metallurgy HSS (KHA Super) substrate for high speed milling and cutting of high hardness difficult-to-cut materials.		2.5-20	P M N S	1171
4	**G4MC**	FOUR-FLUTE END MILLS ● 4 flute end mill for high speed continuous cutting.	G	3-30	P M N S	1173
4	**4MC**	FOUR-FLUTE END MILLS ● 4 flute end mill for general use.		2.5-40	P M N S	1176
4	**S4JC**	FOUR-FLUTE END MILLS ● 4 flute end mill for general use.		3-40	P M N S	1179
4	**G4LC**	FOUR-FLUTE END MILLS ● 4 flute end mill with long flute for deep cutting applications.	G	3-40	P M N S	1181
4	**4LC**	FOUR-FLUTE END MILLS ● 4 flute end mill with long flute for deep cutting applications.		3-40	P M N S	1184
ROUGHING END MILLS						
3,4,6	**GSFPR**	ROUGHING END MILLS ● 3—6 flute roughing end mill with good chip disposal properties for high feed milling.	G	5-50	P M N S	1187
4,5,6	**VASFPR**	VIOLET END MILLS ● Roughing 4—6 flute end mill with high grade HSS substrate and Violet coating for general use.	V	5-50	P M S	1189

END MILLS SELECTION CHART HSS

No. of Flutes	Product name, Shape	Applications, Features	Coating	Size range (mm)	Work material	Page
4,5,6	**VAMFPR**	VIOLET END MILLS ● 4—6 flute end mill with medium cut length.	V	5-50	P M S	1191
4,5,6	**VAMR**	VIOLET END MILLS ● Roughing 4—6 flute end mill with high grade HSS substrate and Violet coating for general use.	V	5-50	P M S	1193
4,5,6	**VAJR**	VIOLET END MILLS ● 4—6 flute end mill with longer cut length than standard.	V	10-50	P M S	1195
4,5,6	**VALR**	VIOLET END MILLS ● 4—6 flute end mill with long cut length.	V	10-50	P M S	1197
4,5,6	**SR**	ROUGHING END MILLS ● 4—6 flute roughing end mill with full radius cutting edge profile for heavy cutting.		10-40	P M N S	1199
4,5,6	**GMR**	ROUGHING END MILLS ● 4—6 flute roughing end mill with TiN coating for general rough milling of steels through to difficult-to-cut materials.	G	5-50	P M N S	1201
4,5,6	**MR**	ROUGHING END MILLS ● 4—6 flute roughing end mill with full radius cutting edge profile for heavy cutting.		5-50	P M N S	1203
4,5,6	**JR**	ROUGHING END MILLS ● 4—6 flute roughing end mill with full radius cutting edge profile for heavy cutting.		10-50	P M N S	1205
4,5,6	**LR**	ROUGHING END MILLS ● 4—6 flute end mill with longer cut length and overall length than standard.		10-50	P M N S	1207

Memo

END MILLS SELECTION CHART CBN and CERAMIC

No. of Flutes	Product name, Shape	Applications, Features	Coating	Size range (mm)	Work material	Page
CBN END MILLS						
1	**GBE**	CBN END MILLS ● Suitable for shoulder milling and die machining. ● Suitable for re-grinding. ● Carbide shank.		6-12	H	1210
2	**CBN2XLB**	CBN END MILLS ● CBN long neck ball nose end mills. A wide variation of neck lengths available.		0.5-2	P H	1212
2	**CBN2XLRB**	CBN END MILLS ● CBN long neck radius end mill. A wide variation of neck lengths available.		0.5-2	P H	1214
CERAMIC END MILLS						
4	**CE4SRB**	CERAMIC END MILLS ● Ceramic corner radius end mill with high heat resistance. ● Capable of softening Ni based alloys by generating heat during machining.		6-12	S	1216
6	**CE6SRB**	CERAMIC END MILLS ● Ceramic corner radius end mill with high heat resistance. ● Capable of softening Ni based alloys by generating heat during machining.		6-12	S	1218

Memo

INDEXABLE HEAD END MILLS SELECTION CHART

No. of Flutes	Product name, Shape	Applications, Features	Size range (mm)	Work material	Page
SQUARE END MILLS					
3	**iMX-S3HV**	iMX END MILL SERIES ● 3-flute end mills that cover side milling, slotting and plunging. ● Irregular lead controls vibration and achieves stable machining.	10-25	P M N S	1222
4	**iMX-S4HV**	iMX END MILL SERIES ● Irregular lead controls vibration and achieves stable machining even when machining of difficult-to-cut materials and long overhang.	10-32	P M N S	1225
4	**iMX-S4HV Long cutting edge type**	iMX END MILL SERIES ● Irregular lead controls vibration and achieves stable machining even when machining of difficult-to-cut materials and long overhang.	16,20	P M N S	1229
4	**iMX-S4HV-S**	iMX END MILL SERIES ● Coolant holes for each cutting edge enable stable coolant supply. ● Irregular lead controls vibration and achieves stable machining.	10-25	P M N S	1231
3	**iMX-S3A**	iMX END MILL SERIES ● High efficiency machining due to the sharp cutting edge suitable for aluminium alloy machining and polished rake face.	10-28	N	1234
ROUGHING END MILLS					
4	**iMX-R4F**	iMX END MILL SERIES ● Roughing cutting edge reduces the cutting resistance. Effective when the rigidity of the machine or workpiece is low.	10-25	P M N S	1237
BALL NOSE END MILLS					
4	**iMX-B4HV**	iMX END MILL SERIES ● The variable curve cutting edge controls vibration and achieves stable machining of difficult-to-cut materials and for long overhang applications.	10-25	P M N S	1240

INDEXABLE HEAD END MILLS SELECTION CHART

No. of Flutes	Product name, Shape	Applications, Features	Size range (mm)	Work material	Page
4	**iMX-B4HV-E**	iMX END MILL SERIES ● Coolant holes for each cutting edge enable stable coolant supply. ● The variable curve cutting edge controls vibration and achieves stable machining of difficult-to-cut materials and for long overhang applications.	10-25	P M N S	1242
6	**iMX-B6HV**	iMX END MILL SERIES ● The variable curve cutting edge controls vibration and achieves stable machining of difficult-to-cut materials and for long overhang applications. ● 6 flutes enable high machining efficiency.	10-25	P M S	1244
RADIUS END MILLS					
4	**iMX-C4HV**	iMX END MILL SERIES ● Vibration control corner radius type achieving the stable machining of difficult-to-cut materials and for long overhang applications due to the irregular helix.	10-28	P M N S	1246
4	**iMX-C4HV Long cutting edge type**	iMX END MILL SERIES ● Vibration control corner radius type achieving the stable machining of difficult-to-cut materials and for long overhang applications due to the irregular helix.	16,20	P M N S	1251
4	**iMX-C4HV-S**	iMX END MILL SERIES ● Coolant holes for each cutting edge enable stable coolant supply. ● Irregular lead controls vibration and achieves stable machining even on difficult-to-cut materials and long overhang applications.	10-25	P M N S	1253
6	**iMX-C6HV**	iMX END MILL SERIES ● High machining efficiency due to the multi-flute design. ● Irregular lead controls vibration and achieves stable machining.	10,12	P M S	1257
10	**iMX-C10HV**	iMX END MILL SERIES ● High machining efficiency due to the multi-flute design. ● Irregular lead controls vibration and achieves stable machining.	16	P M S	1259

INDEXABLE HEAD END MILLS SELECTION CHART

No. of Flutes	Product name, Shape	Applications, Features	Size range (mm)	Work material	Page
12	**iMX-C12HV**	iMX END MILL SERIES ● High machining efficiency due to the multi-flute design. ● Irregular lead controls vibration and achieves stable machining.	20,25	P M S	1261
4	**iMX-C4FD-C**	iMX END MILL SERIES ● Multi-task corner radius type and 4 flutes offer high feed and high efficiency. ● Coolant hole with the end cutting edge as the center provides a stable supply of coolant.	10-25	P M N S H	1263
4	**iMX-C4FV**	iMX END MILL SERIES ● Corner radius end mill for high efficiency machining. ● Irregular lead controls vibration and achieves stable machining.	10-25	P H	1265
3	**iMX-C3A**	iMX END MILL SERIES ● High efficiency machining due to the sharp cutting edge suitable for aluminium alloy machining and polished rake face.	10-28	N	1267
TAPER RADIUS END MILLS					
8	**iMX-C8T-C**	iMX END MILL SERIES ● Suitable for 3-dimensional free-form surface cutting such as blades. ● High feed cutting is possible due to multiple cutting edges.	8	M S	1270
10	**iMX-C10T-C**	iMX END MILL SERIES ● Suitable for 3-dimensional free-form surface cutting such as blades. ● High feed cutting is possible due to multiple cutting edges.	10	M S	1271
12	**iMX-C12T-C**	iMX END MILL SERIES ● Suitable for 3-dimensional free-form surface cutting such as blades. ● High feed cutting is possible due to multiple cutting edges.	15,19	M S	1272
15	**iMX-C15T-C**	iMX END MILL SERIES ● Suitable for 3-dimensional free-form surface cutting such as blades. ● High feed cutting is possible due to multiple cutting edges.	15,19	M S	1273

INDEXABLE HEAD END MILLS SELECTION CHART

No. of Flutes	Product name, Shape	Applications, Features	Size range (mm)	Work material	Page
CHAMFER					
3	**iMX-CH3L**	iMX END MILL SERIES ● Chamfered cutting head suitable for inner circumference. ● Anti-vibration proprietary design	10-20	P M S H	1274
6	**iMX-CH6V**	iMX END MILL SERIES ● Suitable for outer circumference. ● Multiple cutting design for extended tool life.	12-20	P M S H	1277

MS2SS

MSTAR END MILLS

End mill, Short cut length, 2 flute

Product Information

UWC 30° MS Sharp

DC<3 DC≧3

Technical Info >> 1993

ISO13399 Property >> 1966

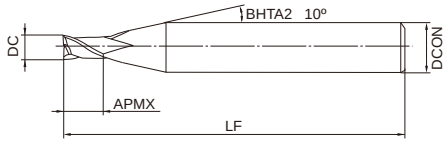
Work Material

P M S H F M

SYMBOL DESCRIPTIONS >> 664

END MILLS SELECTION CHART >> 668

	DC=0.1	DC>0.1	
	0 - 0.010	0 - 0.020	
h6	4≦DCON≦6	8≦DCON≦10	DCON=12
	0 - 0.008	0 - 0.009	0 - 0.011



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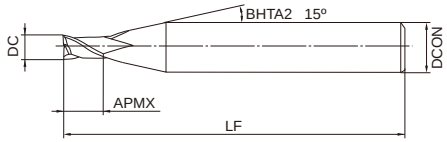

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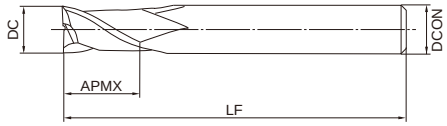


Type3

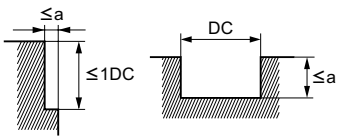
●Inventory maintained in Japan. Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
MS2SSD0010	0.1	0.15	40	4	2	●	1
MS2SSD0020	0.2	0.3	40	4	2	●	2
MS2SSD0030	0.3	0.45	40	4	2	●	2
MS2SSD0040	0.4	0.6	40	4	2	●	2
MS2SSD0050	0.5	0.75	40	4	2	●	2
MS2SSD0060	0.6	0.9	40	4	2	●	2
MS2SSD0070	0.7	1.1	40	4	2	●	2
MS2SSD0080	0.8	1.2	40	4	2	●	2
MS2SSD0090	0.9	1.4	40	4	2	●	2
MS2SSD0100	1	1.5	40	4	2	●	2
MS2SSD0120	1.2	1.8	40	4	2	●	2
MS2SSD0150	1.5	2.3	40	4	2	●	2
MS2SSD0180	1.8	2.7	40	4	2	●	2
MS2SSD0200	2	3	40	4	2	●	2
MS2SSD0250	2.5	3.8	40	4	2	●	2
MS2SSD0300	3	4.5	45	6	2	●	2
MS2SSD0400	4	6	50	6	2	●	2
MS2SSD0500	5	7.5	50	6	2	●	2
MS2SSD0600	6	9	50	6	2	●	3
MS2SSD0700	7	10.5	60	8	2	●	2
MS2SSD0800	8	12	60	8	2	●	3
MS2SSD0900	9	13.5	70	10	2	●	2
MS2SSD1000	10	15	70	10	2	●	3
MS2SSD1100	11	16.5	75	12	2	●	2
MS2SSD1200	12	18	75	12	2	●	3

MS2SS

RECOMMENDED CUTTING CONDITIONS

Work material	Carbon steel, Cast iron, Alloy steel, Pre-hardened steel AISI 1050, AISI No 35 B, AISI P20, AISI P21			Hardened steel (45— 55HRC) AISI H13		
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut a(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut a(mm)
0.1	40000	40	0.001	40000	40	0.001
0.2	40000	100	0.002	40000	100	0.002
0.3	40000	200	0.005	40000	200	0.005
0.4	40000	600	0.01	40000	600	0.01
0.5	40000	1000	0.015	40000	960	0.015
0.6	40000	1200	0.02	40000	1200	0.02
0.7	40000	1400	0.02	40000	1400	0.02
0.8	40000	1600	0.03	40000	1600	0.03
0.9	40000	1800	0.04	40000	1600	0.04
1	40000	2000	0.06	32000	1600	0.06
1.5	40000	3000	0.12	32000	1900	0.08
2	30000	3000	0.18	24000	1900	0.10
2.5	24000	2600	0.25	19000	1600	0.13
3	20000	2300	0.30	16000	1400	0.15
4	15000	2000	0.40	12000	1200	0.20
5	12000	1600	0.50	9000	900	0.25
6	10000	1400	0.60	7000	700	0.30
8	8000	1000	0.80	5600	550	0.40
10	6400	900	1.00	4500	500	0.50
12	5400	820	1.00	3800	450	0.50
16	2400	380	3.00	1200	100	0.80
20	1900	320	4.00	1000	80	1.00



- If the depth of cut is shallow, the revolution and feed rate can be increased.
- In case of slotting with over 3 mm endmill, please reduce revolution to 50—70% of above value, and reduce feed rate to 40—60% of above value.
- When drilling, please set the feed rate at 1/3 or below of the values above.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

MS2MS

MSTAR END MILLS

End mill, Medium cut length, 2 flute

Product Information

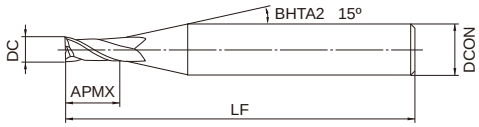
UWC 30° MS Sharp

DC<3 DC≧3

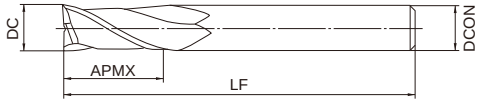
Work Material

P M S H F M

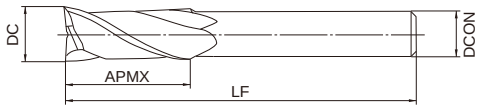
Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668



Type1



Type2



Type3

	DC≦12	DC>12		
	0 - 0.020	0 - 0.030		
h6	4≦DCON≦6	8≦DCON≦10	12≦DCON≦16	DCON=20
	0 -0.008	0 -0.009	0 -0.011	0 -0.013

●Inventory maintained in Japan. Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
MS2MSD0020	0.2	0.4	40	4	2	●	1
MS2MSD0030	0.3	0.6	40	4	2	●	1
MS2MSD0040	0.4	0.8	40	4	2	●	1
MS2MSD0050	0.5	1	40	4	2	●	1
MS2MSD0060	0.6	1.2	40	4	2	●	1
MS2MSD0070	0.7	1.4	40	4	2	●	1
MS2MSD0080	0.8	1.6	40	4	2	●	1
MS2MSD0090	0.9	1.8	40	4	2	●	1
MS2MSD0100	1	2	40	4	2	●	1
MS2MSD0110	1.1	2.2	40	4	2	●	1
MS2MSD0120	1.2	2.4	40	4	2	●	1
MS2MSD0130	1.3	2.6	40	4	2	●	1
MS2MSD0140	1.4	2.8	40	4	2	●	1
MS2MSD0150	1.5	3	40	4	2	●	1
MS2MSD0160	1.6	3.2	40	4	2	●	1
MS2MSD0170	1.7	3.4	40	4	2	●	1
MS2MSD0180	1.8	3.6	40	4	2	●	1
MS2MSD0190	1.9	3.8	40	4	2	●	1
MS2MSD0200	2	4	40	4	2	●	1
MS2MSD0210	2.1	4.2	40	4	2	●	1
MS2MSD0220	2.2	4.4	40	4	2	●	1
MS2MSD0230	2.3	4.6	40	4	2	●	1
MS2MSD0240	2.4	4.8	40	4	2	●	1

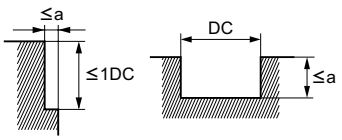
MS2MS

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
MS2MSD0250	2.5	5	40	4	2	●	1
MS2MSD0260	2.6	5.2	40	4	2	●	1
MS2MSD0270	2.7	5.4	40	4	2	●	1
MS2MSD0280	2.8	5.6	40	4	2	●	1
MS2MSD0290	2.9	5.8	40	4	2	●	1
MS2MSD0300	3	6	45	6	2	●	1
MS2MSD0310	3.1	6.2	45	6	2	●	1
MS2MSD0320	3.2	6.4	45	6	2	●	1
MS2MSD0330	3.3	6.6	45	6	2	●	1
MS2MSD0340	3.4	6.8	45	6	2	●	1
MS2MSD0350	3.5	7	45	6	2	●	1
MS2MSD0360	3.6	7.2	45	6	2	●	1
MS2MSD0370	3.7	7.4	45	6	2	●	1
MS2MSD0380	3.8	7.6	45	6	2	●	1
MS2MSD0390	3.9	7.8	45	6	2	●	1
MS2MSD0400	4	8	50	6	2	●	1
MS2MSD0410	4.1	8.2	50	6	2	●	1
MS2MSD0420	4.2	8.4	50	6	2	●	1
MS2MSD0430	4.3	8.6	50	6	2	●	1
MS2MSD0440	4.4	8.8	50	6	2	●	1
MS2MSD0450	4.5	9	50	6	2	●	1
MS2MSD0460	4.6	9.2	50	6	2	●	1
MS2MSD0470	4.7	9.4	50	6	2	●	1
MS2MSD0480	4.8	9.6	50	6	2	●	1
MS2MSD0490	4.9	9.8	50	6	2	●	1
MS2MSD0500	5	10	50	6	2	●	1
MS2MSD0510	5.1	10.2	50	6	2	●	1
MS2MSD0520	5.2	10.4	50	6	2	●	1
MS2MSD0530	5.3	10.6	50	6	2	●	1
MS2MSD0540	5.4	10.8	50	6	2	●	1
MS2MSD0550	5.5	11	50	6	2	●	1
MS2MSD0560	5.6	11.2	50	6	2	●	1
MS2MSD0570	5.7	11.4	50	6	2	●	1
MS2MSD0580	5.8	11.6	50	6	2	●	1
MS2MSD0590	5.9	11.8	50	6	2	●	1
MS2MSD0600	6	12	50	6	2	●	2
MS2MSD0650	6.5	13	60	8	2	●	1
MS2MSD0700	7	14	60	8	2	●	1
MS2MSD0750	7.5	15	60	8	2	●	1
MS2MSD0800	8	16	60	8	2	●	2
MS2MSD0850	8.5	17	70	10	2	●	1
MS2MSD0900	9	18	70	10	2	●	1
MS2MSD0950	9.5	19	70	10	2	●	1
MS2MSD1000	10	20	70	10	2	●	2
MS2MSD1100	11	22	75	12	2	●	1
MS2MSD1200	12	24	75	12	2	●	2
MS2MSD1600	16	32	90	16	2	●	2
MS2MSD1800	18	36	90	16	2	●	3
MS2MSD2000	20	40	100	20	2	●	2

MS2MS

RECOMMENDED CUTTING CONDITIONS

Work material	Carbon steel, Cast iron, Alloy steel, Pre-hardened steel AISI 1050, AISI No 35 B, AISI P20, AISI P21			Hardened steel (45— 55HRC) AISI H13		
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut a(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut a(mm)
0.1	40000	40	0.001	40000	40	0.001
0.2	40000	100	0.002	40000	100	0.002
0.3	40000	200	0.005	40000	200	0.005
0.4	40000	600	0.01	40000	600	0.01
0.5	40000	1000	0.015	40000	960	0.015
0.6	40000	1200	0.02	40000	1200	0.02
0.7	40000	1400	0.02	40000	1400	0.02
0.8	40000	1600	0.03	40000	1600	0.03
0.9	40000	1800	0.04	40000	1600	0.04
1	40000	2000	0.06	32000	1600	0.06
1.5	40000	3000	0.12	32000	1900	0.08
2	30000	3000	0.18	24000	1900	0.10
2.5	24000	2600	0.25	19000	1600	0.13
3	20000	2300	0.30	16000	1400	0.15
4	15000	2000	0.40	12000	1200	0.20
5	12000	1600	0.50	9000	900	0.25
6	10000	1400	0.60	7000	700	0.30
8	8000	1000	0.80	5600	550	0.40
10	6400	900	1.00	4500	500	0.50
12	5400	820	1.00	3800	450	0.50
16	2400	380	3.00	1200	100	0.80
20	1900	320	4.00	1000	80	1.00



- If the depth of cut is shallow, the revolution and feed rate can be increased.
- In case of slotting with over 3 mm endmill, please reduce revolution to 50—70% of above value, and reduce feed rate to 40—60% of above value.
- When drilling, please set the feed rate at 1/3 or below of the values above.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

MS2MD

MSTAR END MILLS

End mill, Medium cut length, 2 flute

Product Information

UWC 30° MS Gash

DC<3 DC≧3

Technical Info >> 1993

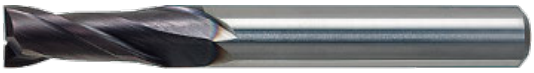
ISO13399 Property >> 1966

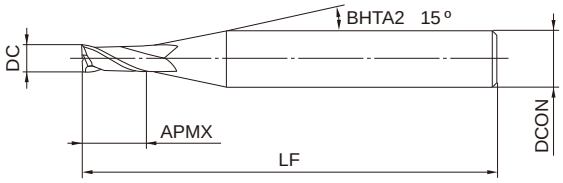
Work Material

P M S H

SYMBOL DESCRIPTIONS >> 664

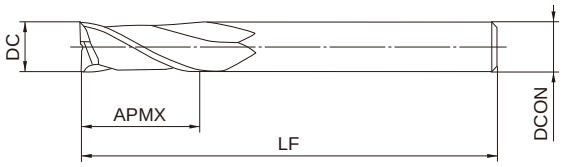
END MILLS SELECTION CHART >> 668





Type1

	1≦DC≦12		
	0 - 0.020		
h6	4≦DCON≦6	8≦DCON≦10	DCON=12
	0 - 0.008	0 - 0.009	0 - 0.011



Type2

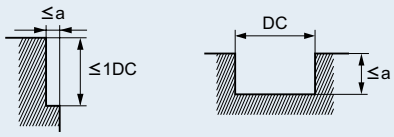
●Inventory maintained in Japan. Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
MS2MDD0100	1	2.5	40	4	2	●	1
MS2MDD0150	1.5	3.8	40	4	2	●	1
MS2MDD0200	2	5	40	4	2	●	1
MS2MDD0250	2.5	6.3	40	4	2	●	1
MS2MDD0300	3	7.5	50	6	2	●	1
MS2MDD0400	4	10	50	6	2	●	1
MS2MDD0500	5	12.5	50	6	2	●	1
MS2MDD0600	6	15	50	6	2	●	2
MS2MDD0800	8	20	60	8	2	●	2
MS2MDD1000	10	25	70	10	2	●	2
MS2MDD1200	12	30	90	12	2	●	2

MS2MD

RECOMMENDED CUTTING CONDITIONS

Work material	Carbon steel, Cast iron, Alloy steel, Pre-hardened steel AISI 1050, AISI No 35 B, AISI P20, AISI P21			Hardened steel (45— 55HRC) AISI H13		
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut a(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut a(mm)
1	40000	2000	0.06	32000	1600	0.06
1.5	40000	3000	0.12	32000	1900	0.08
2	30000	3000	0.18	24000	1900	0.10
2.5	24000	2600	0.25	19000	1600	0.13
3	20000	2300	0.30	16000	1400	0.15
4	15000	2000	0.40	12000	1200	0.20
5	12000	1600	0.50	9000	900	0.25
6	10000	1400	0.60	7000	700	0.30
8	8000	1000	0.80	5600	550	0.40
10	6400	900	1.00	4500	500	0.50
12	5400	820	1.00	3800	450	0.50



- If the depth of cut is shallow, the revolution and feed rate can be increased.
- When drilling, please set the feed rate at 1/3 or below of the values above.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

MS2JS

MSTAR END MILLS

End mill, Semi long cut length, 2 flute

Product Information

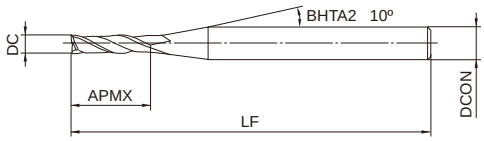
UWC 30° MS Gash Sharp

DC≧3 DC<3 DC<3 DC≧3

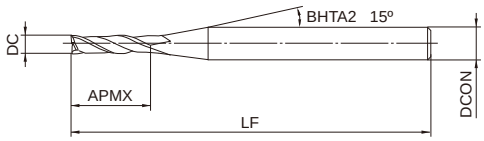
Work Material

P M S H F M

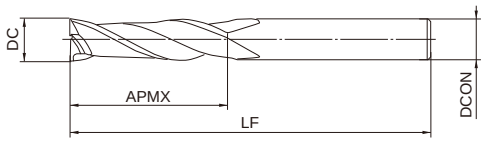
Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668



Type1



Type2



Type3

h6	DC=0.1	DC>0.1	
	0 - 0.010	0 - 0.020	
	4≦DCON≦6	8≦DCON≦10	DCON=12
	0 - 0.008	0 - 0.009	0 - 0.011

●Inventory maintained in Japan. Unit : mm

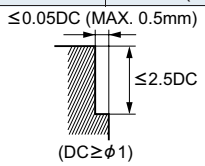
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
MS2JSD0010	0.1	0.3	40	4	2	●	1
MS2JSD0020	0.2	0.6	40	4	2	●	2
MS2JSD0030	0.3	0.9	40	4	2	●	2
MS2JSD0040	0.4	1.2	40	4	2	●	2
MS2JSD0050	0.5	1.5	40	4	2	●	2
MS2JSD0060	0.6	1.8	40	4	2	●	2
MS2JSD0070	0.7	2.1	40	4	2	●	2
MS2JSD0080	0.8	2.4	40	4	2	●	2
MS2JSD0090	0.9	2.7	40	4	2	●	2
MS2JSD0100	1	3	40	4	2	●	2
MS2JSD0120	1.2	3.6	40	4	2	●	2
MS2JSD0150	1.5	4.5	40	4	2	●	2
MS2JSD0180	1.8	5.4	40	4	2	●	2
MS2JSD0200	2	6	40	4	2	●	2
MS2JSD0250	2.5	7.5	40	4	2	●	2
MS2JSD0300	3	9	45	6	2	●	2
MS2JSD0400	4	12	50	6	2	●	2
MS2JSD0500	5	15	50	6	2	●	2
MS2JSD0600	6	18	50	6	2	●	3
MS2JSD0800	8	24	70	8	2	●	3
MS2JSD1000	10	30	90	10	2	●	3
MS2JSD1200	12	36	90	12	2	●	3

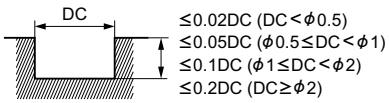
MS2JS

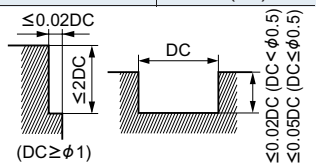
RECOMMENDED CUTTING CONDITIONS

( ) : Indicates standard revolution and feed rate for slotting.

Work material	Carbon steel, Cast iron, Alloy steel (—30HRC) AISI 1050, AISI No 35 B, AISI P20		Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V		Hardened steel (45— 55HRC) AISI H13	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
0.1	40000	—(40)	40000	—(40)	40000	—(35)	40000	—(25)
0.2	40000	—(45)	40000	—(45)	40000	—(35)	32000	—(25)
0.3	40000	—(55)	32000	—(45)	27000	—(35)	21000	—(25)
0.4	32000	—(60)	24000	—(45)	20000	—(35)	16000	—(25)
0.5	25000	—(60)	19000	—(45)	16000	—(35)	13000	—(25)
0.6	21000	—(60)	16000	—(45)	13000	—(35)	11000	—(25)
0.7	18000	—(60)	14000	—(45)	11000	—(35)	9100	—(25)
0.8	16000	—(60)	12000	—(45)	9900	—(35)	8000	—(25)
0.9	14000	—(60)	11000	—(45)	8800	—(35)	7100	—(25)
1	13000	60(60)	9500	45(45)	8000	35(35)	6400	25(25)
1.5	8500	60(60)	6400	45(45)	5300	35(35)	4200	25(25)
2	6400	60(60)	4800	45(45)	4000	35(35)	3200	25(25)
2.5	5100	60(60)	3800	45(45)	3200	40(40)	2500	25(25)
3	4200	65(60)	3400	55(45)	2600	40(40)	2100	25(25)
4	3400	80(60)	2700	65(45)	2100(1600)	50(30)	1700	35(25)
5	2900	100(60)	2300	80(45)	1800(1350)	60(30)	1500	40(25)
6	2500	120(60)	2000	100(50)	1500(1100)	75(30)	1300	50(25)
8	1900	130(60)	1500	100(50)	1200(900)	80(30)	1000	50(25)
10	1600	130(60)	1300	100(50)	950(710)	75(30)	800	50(25)
12	1300	120(60)	1100	100(50)	800(600)	75(30)	670	50(25)







- When cutting austenitic stainless steel, the use of water-soluble cutting fluid is effective.
- If the depth of cut is shallow, the revolution and feed rate can be increased.
- When drilling, please set the feed rate at 1/3 or below of the values above.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

MS2LS

MSTAR END MILLS

End mill, Long cut length, 2 flute

Product Information

UWC 30° MS Gash Sharp

DC≧3 DC<3 DC<3 DC≧3

Technical Info >> 1993

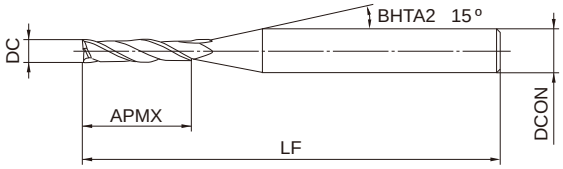
ISO13399 Property >> 1966

Work Material

P M S H F M

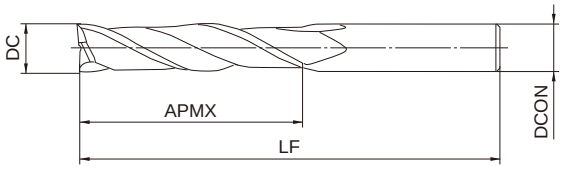
SYMBOL DESCRIPTIONS >> 664

END MILLS SELECTION CHART >> 668



Type1

	0.2≦DC≦12		
	0 - 0.020		
h6	4≦DCON≦6	8≦DCON≦10	DCON=12
	0 - 0.008	0 - 0.009	0 - 0.011



Type2

●Inventory maintained in Japan. Unit : mm

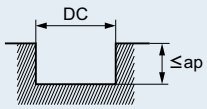
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
MS2LSD0020	0.2	0.8	40	4	2	●	1
MS2LSD0030	0.3	1.2	40	4	2	●	1
MS2LSD0040	0.4	1.6	40	4	2	●	1
MS2LSD0050	0.5	2	40	4	2	●	1
MS2LSD0060	0.6	2.4	40	4	2	●	1
MS2LSD0070	0.7	2.8	40	4	2	●	1
MS2LSD0080	0.8	3.2	40	4	2	●	1
MS2LSD0090	0.9	3.6	40	4	2	●	1
MS2LSD0100	1	4	40	4	2	●	1
MS2LSD0150	1.5	6	40	4	2	●	1
MS2LSD0200	2	8	40	4	2	●	1
MS2LSD0250	2.5	10	50	4	2	●	1
MS2LSD0300	3	12	50	6	2	●	1
MS2LSD0400	4	16	50	6	2	●	1
MS2LSD0500	5	20	60	6	2	●	1
MS2LSD0600	6	24	60	6	2	●	2
MS2LSD0800	8	32	70	8	2	●	2
MS2LSD1000	10	40	90	10	2	●	2
MS2LSD1200	12	48	110	12	2	●	2

MS2LS

RECOMMENDED CUTTING CONDITIONS

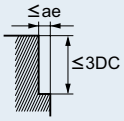
·Slotting

Work material	Carbon steel, Cast iron, Alloy steel (—30HRC) AISI 1050, AISI No 35 B, AISI P20			Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		
Dia. DC(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap(mm)
0.2	40000	400	0.001	30000	250	0.001
0.3	40000	600	0.005	35000	420	0.005
0.4	40000	700	0.007	30000	420	0.007
0.5	40000	800	0.01	24000	380	0.01
0.6	33000	800	0.015	21000	480	0.01
0.7	28000	800	0.015	18000	480	0.015
0.8	25000	800	0.02	16000	480	0.02
0.9	22000	800	0.03	15000	500	0.03
1	20000	800	0.04	13000	500	0.04
1.5	13000	800	0.10	9000	500	0.10
2	10000	800	0.15	6700	500	0.15
2.5	9000	800	0.20	6000	500	0.20
3	8000	800	0.20	5200	460	0.20
4	6000	600	0.20	4000	340	0.20
5	4800	480	0.30	3200	280	0.20
6	4000	400	0.30	2600	210	0.20
8	3000	300	0.30	2000	170	0.30
10	2400	240	0.30	1600	140	0.30
12	2000	200	0.30	1300	110	0.30



·Side milling

Work material	Carbon steel, Cast iron, Alloy steel (—30HRC) AISI 1050, AISI No 35 B, AISI P20			Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		
Dia. DC(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ae(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ae(mm)
3	3500	370	0.05	2600	250	0.03
4	2800	370	0.06	2100	200	0.03
5	2200	330	0.06	1700	160	0.03
6	1800	300	0.06	1500	140	0.03
8	1600	270	0.08	1100	140	0.04
10	1400	240	0.10	900	140	0.05
12	1200	200	0.10	750	120	0.06



- If the depth of cut is shallow, the revolution and feed rate can be increased.
- When drilling, please set the feed rate at 1/3 or below of the values above.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

MS2XL

MSTAR END MILLS

End mill, Short cut length, 2 flute, Long neck

Product Information

UWC 30° MS Gash

DC<0.4 DC≧0.4

Technical Info >> 1993

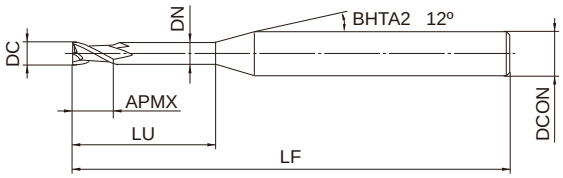
ISO13399 Property >> 1966

Work Material

P M H F

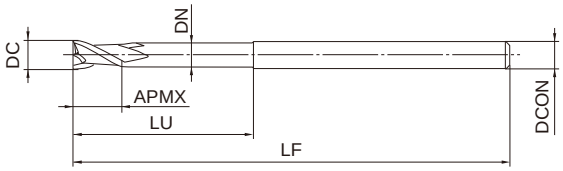
SYMBOL DESCRIPTIONS >> 664

END MILLS SELECTION CHART >> 668



Type1

	DC<0.5	DC≧0.5
	0 - 0.010	0 - 0.020
h6	4≦DCON≦6	
	0 - 0.008	



Type2

●Inventory maintained in Japan. Unit : mm

Order Number	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	type
MS2XLD0020N005	0.2	0.3	0.5	0.17	45	4	2	●	1
MS2XLD0020N010	0.2	0.3	1	0.17	45	4	2	●	1
MS2XLD0020N015	0.2	0.3	1.5	0.17	45	4	2	●	1
MS2XLD0030N010	0.3	0.4	1	0.27	45	4	2	●	1
MS2XLD0030N020	0.3	0.4	2	0.27	45	4	2	●	1
MS2XLD0030N030	0.3	0.4	3	0.27	45	4	2	●	1
MS2XLD0030N060	0.3	0.4	6	0.27	45	4	2	●	1
MS2XLD0030N090	0.3	0.4	9	0.27	45	4	2	●	1
MS2XLD0040N020	0.4	0.6	2	0.36	45	4	2	●	1
MS2XLD0040N030	0.4	0.6	3	0.36	45	4	2	●	1
MS2XLD0040N040	0.4	0.6	4	0.36	45	4	2	●	1
MS2XLD0040N080	0.4	0.6	8	0.36	45	4	2	●	1
MS2XLD0040N120	0.4	0.6	12	0.36	45	4	2	●	1
MS2XLD0050N020	0.5	0.7	2	0.46	45	4	2	●	1
MS2XLD0050N040	0.5	0.7	4	0.46	45	4	2	●	1
MS2XLD0050N060	0.5	0.7	6	0.46	45	4	2	●	1
MS2XLD0050N080	0.5	0.7	8	0.46	50	4	2	●	1
MS2XLD0050N100	0.5	0.7	10	0.46	50	4	2	●	1
MS2XLD0050N150	0.5	0.7	15	0.46	50	4	2	●	1
MS2XLD0060N020	0.6	0.9	2	0.56	45	4	2	●	1
MS2XLD0060N040	0.6	0.9	4	0.56	45	4	2	●	1
MS2XLD0060N060	0.6	0.9	6	0.56	45	4	2	●	1
MS2XLD0060N080	0.6	0.9	8	0.56	50	4	2	●	1
MS2XLD0060N100	0.6	0.9	10	0.56	50	4	2	●	1
MS2XLD0060N120	0.6	0.9	12	0.56	50	4	2	●	1
MS2XLD0060N180	0.6	0.9	18	0.56	50	4	2	●	1
MS2XLD0070N020	0.7	1	2	0.66	45	4	2	●	1
MS2XLD0070N040	0.7	1	4	0.66	45	4	2	●	1

MS2XL

Order Number	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	type
MS2XLD0070N060	0.7	1	6	0.66	45	4	2	●	1
MS2XLD0070N080	0.7	1	8	0.66	50	4	2	●	1
MS2XLD0070N100	0.7	1	10	0.66	50	4	2	●	1
MS2XLD0080N040	0.8	1.2	4	0.76	45	4	2	●	1
MS2XLD0080N060	0.8	1.2	6	0.76	45	4	2	●	1
MS2XLD0080N080	0.8	1.2	8	0.76	50	4	2	●	1
MS2XLD0080N100	0.8	1.2	10	0.76	50	4	2	●	1
MS2XLD0080N120	0.8	1.2	12	0.76	50	4	2	●	1
MS2XLD0080N160	0.8	1.2	16	0.76	50	4	2	●	1
MS2XLD0080N240	0.8	1.2	24	0.76	60	4	2	●	1
MS2XLD0090N060	0.9	1.4	6	0.86	45	4	2	●	1
MS2XLD0090N080	0.9	1.4	8	0.86	50	4	2	●	1
MS2XLD0090N100	0.9	1.4	10	0.86	50	4	2	●	1
MS2XLD0090N150	0.9	1.4	15	0.86	60	4	2	●	1
MS2XLD0100N040	1	1.5	4	0.94	50	4	2	●	1
MS2XLD0100N060	1	1.5	6	0.94	50	4	2	●	1
MS2XLD0100N080	1	1.5	8	0.94	50	4	2	●	1
MS2XLD0100N100	1	1.5	10	0.94	50	4	2	●	1
MS2XLD0100N120	1	1.5	12	0.94	50	4	2	●	1
MS2XLD0100N160	1	1.5	16	0.94	60	4	2	●	1
MS2XLD0100N200	1	1.5	20	0.94	60	4	2	●	1
MS2XLD0100N250	1	1.5	25	0.94	70	4	2	●	1
MS2XLD0100N300	1	1.5	30	0.94	70	4	2	●	1
MS2XLD0120N060	1.2	1.8	6	1.14	50	4	2	●	1
MS2XLD0120N080	1.2	1.8	8	1.14	50	4	2	●	1
MS2XLD0120N100	1.2	1.8	10	1.14	50	4	2	●	1
MS2XLD0120N120	1.2	1.8	12	1.14	50	4	2	●	1
MS2XLD0120N160	1.2	1.8	16	1.14	60	4	2	●	1
MS2XLD0120N200	1.2	1.8	20	1.14	60	4	2	●	1
MS2XLD0150N060	1.5	2.3	6	1.44	50	4	2	●	1
MS2XLD0150N080	1.5	2.3	8	1.44	50	4	2	●	1
MS2XLD0150N100	1.5	2.3	10	1.44	50	4	2	●	1
MS2XLD0150N120	1.5	2.3	12	1.44	50	4	2	●	1
MS2XLD0150N140	1.5	2.3	14	1.44	60	4	2	●	1
MS2XLD0150N160	1.5	2.3	16	1.44	60	4	2	●	1
MS2XLD0150N180	1.5	2.3	18	1.44	60	4	2	●	1
MS2XLD0150N200	1.5	2.3	20	1.44	60	4	2	●	1
MS2XLD0150N250	1.5	2.3	25	1.44	70	4	2	●	1
MS2XLD0150N300	1.5	2.3	30	1.44	70	4	2	●	1
MS2XLD0150N380	1.5	2.3	38	1.44	80	4	2	●	1
MS2XLD0150N450	1.5	2.3	45	1.44	80	4	2	●	1
MS2XLD0200N060	2	3	6	1.9	50	4	2	●	1
MS2XLD0200N080	2	3	8	1.9	50	4	2	●	1
MS2XLD0200N100	2	3	10	1.9	50	4	2	●	1
MS2XLD0200N120	2	3	12	1.9	50	4	2	●	1
MS2XLD0200N140	2	3	14	1.9	60	4	2	●	1
MS2XLD0200N160	2	3	16	1.9	60	4	2	●	1
MS2XLD0200N180	2	3	18	1.9	60	4	2	●	1
MS2XLD0200N200	2	3	20	1.9	60	4	2	●	1
MS2XLD0200N250	2	3	25	1.9	70	4	2	●	1
MS2XLD0200N300	2	3	30	1.9	70	4	2	●	1
MS2XLD0200N350	2	3	35	1.9	80	4	2	●	1
MS2XLD0200N400	2	3	40	1.9	90	4	2	●	1
MS2XLD0200N500	2	3	50	1.9	100	4	2	●	1

MS2XL

Order Number	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	type
MS2XLD0200N600	2	3	60	1.9	110	4	2	●	1
MS2XLD0250N080	2.5	3.7	8	2.4	50	4	2	●	1
MS2XLD0250N120	2.5	3.7	12	2.4	50	4	2	●	1
MS2XLD0250N160	2.5	3.7	16	2.4	60	4	2	●	1
MS2XLD0250N200	2.5	3.7	20	2.4	60	4	2	●	1
MS2XLD0250N250	2.5	3.7	25	2.4	70	4	2	●	1
MS2XLD0250N300	2.5	3.7	30	2.4	70	4	2	●	1
MS2XLD0250N400	2.5	3.7	40	2.4	90	4	2	●	1
MS2XLD0250N500	2.5	3.7	50	2.4	100	4	2	●	1
MS2XLD0300N080	3	4.5	8	2.8	50	6	2	●	1
MS2XLD0300N120	3	4.5	12	2.8	50	6	2	●	1
MS2XLD0300N160	3	4.5	16	2.8	60	6	2	●	1
MS2XLD0300N200	3	4.5	20	2.8	60	6	2	●	1
MS2XLD0300N250	3	4.5	25	2.8	70	6	2	●	1
MS2XLD0300N300	3	4.5	30	2.8	70	6	2	●	1
MS2XLD0300N400	3	4.5	40	2.8	90	6	2	●	1
MS2XLD0300N500	3	4.5	50	2.8	100	6	2	●	1
MS2XLD0400N120	4	6	12	3.8	50	6	2	●	1
MS2XLD0400N160	4	6	16	3.8	60	6	2	●	1
MS2XLD0400N200	4	6	20	3.8	60	6	2	●	1
MS2XLD0400N250	4	6	25	3.8	70	6	2	●	1
MS2XLD0400N300	4	6	30	3.8	70	6	2	●	1
MS2XLD0400N350	4	6	35	3.8	80	6	2	●	1
MS2XLD0400N400	4	6	40	3.8	90	6	2	●	1
MS2XLD0400N450	4	6	45	3.8	90	6	2	●	1
MS2XLD0400N500	4	6	50	3.8	100	6	2	●	1
MS2XLD0400N600	4	6	60	3.8	110	6	2	●	1
MS2XLD0500N160	5	7.5	16	4.8	60	6	2	●	1
MS2XLD0500N250	5	7.5	25	4.8	70	6	2	●	1
MS2XLD0500N350	5	7.5	35	4.8	80	6	2	●	1
MS2XLD0500N500	5	7.5	50	4.8	110	6	2	●	1
MS2XLD0500N600	5	7.5	60	4.8	120	6	2	●	1
MS2XLD0600N200	6	9	20	5.8	80	6	2	●	2
MS2XLD0600N300	6	9	30	5.8	90	6	2	●	2
MS2XLD0600N400	6	9	40	5.8	100	6	2	●	2
MS2XLD0600N500	6	9	50	5.8	110	6	2	●	2
MS2XLD0600N600	6	9	60	5.8	120	6	2	●	2

MS2XL

RECOMMENDED CUTTING CONDITIONS

Work material		Carbon steel, Cast iron, Alloy steel, Pre-hardened steel AISI 1050, AISI No 35 B, AISI P20, AISI P21		
Dia. DC(mm)	Neck length LU(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)
0.2	0.5	40000	600	0.004
	1	40000	400	0.001
0.3	1	40000	650	0.007
	3	40000	500	0.002
	9	22000	150	0.001
0.4	2	40000	800	0.007
	4	40000	800	0.003
	12	17000	150	0.001
0.5	2	40000	950	0.01
	6	40000	700	0.003
	10	25000	400	0.002
	15	14000	150	0.001
0.6	2	40000	950	0.01
	6	40000	800	0.005
	10	25000	450	0.003
	18	12000	150	0.001
0.7	2	40000	1000	0.02
	6	40000	900	0.01
	8	30000	700	0.005
	10	11000	300	0.005
0.8	4	40000	1200	0.02
	8	40000	1000	0.01
	12	25000	400	0.003
	24	10000	150	0.001
0.9	6	40000	1300	0.02
	10	35000	1000	0.01
	15	9000	400	0.003
1	6	40000	1600	0.04
	8	40000	1600	0.03
	12	30000	1000	0.02
	20	15000	400	0.005
	30	8000	150	0.001
1.2	6	40000	1900	0.06
	8	40000	1900	0.04
	12	25000	1000	0.03
	20	6500	150	0.01
1.5	6	40000	2400	0.10
	10	30000	1800	0.05
	20	15000	600	0.02
	30	7500	300	0.005
	45	5000	150	0.001
1.6	6	40000	2400	0.12
	10	30000	1800	0.07
	16	20000	1000	0.04
2	6	40000	2400	0.18
	10	30000	1800	0.10
	16	20000	1000	0.06
	30	8000	500	0.04
	40	6000	250	0.01
	60	4200	150	0.003
2.5	8	25000	2500	0.20
	16	18000	1700	0.10
	20	12000	1000	0.08
	40	8000	400	0.03

MS2XL

Work material		Carbon steel, Cast iron, Alloy steel, Pre-hardened steel AISI 1050, AISI No 35 B, AISI P20, AISI P21		
Dia. DC(mm)	Neck length LU(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)
	50	4000	150	0.015
3	8	20000	2000	0.30
	16	15000	1400	0.15
	20	10000	800	0.10
	40	5000	250	0.02
	50	3700	150	0.010
4	12	15000	3000	0.30
	20	11000	2200	0.22
	30	6400	1200	0.12
	40	4500	400	0.05
	50	2800	150	0.018
	60	1800	60	0.005
5	16	12000	2500	0.35
	35	5100	750	0.15
	60	2200	150	0.02
6	20	10000	2000	0.40
	40	4200	800	0.20
	60	1900	150	0.10

- If the depth of cut is shallow, the revolution and feed rate can be increased.
- Cutting condition may be considerably different due to the overhang (milling depth), depth of cut, and machine tools. Please see the above table as a standard.

MS2XL6

MSTAR END MILLS

End mill, Short cut length, 2 flute, Long neck

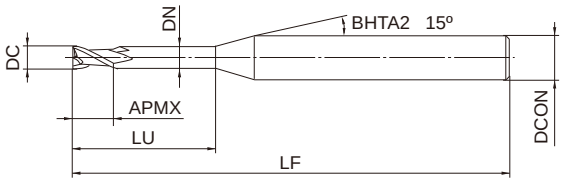
Product Information

UWC 30° MS Sharp

Work Material

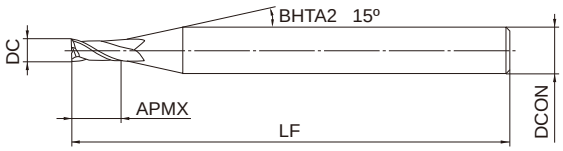
P M S H F

Technical Info >> 1993
ISO13399 Property >> 1966
SYMBOL DESCRIPTIONS >> 664
END MILLS SELECTION CHART >> 668



Type1

0.3≦DC≦2.5	0 / - 0.020
DCON=6	0 / - 0.008



Type2

●Inventory maintained in Japan. Unit : mm

Order Number	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	type
MS2XL6D0030N008	0.3	0.8			50	6	2	●	2
MS2XL6D0030N015	0.3	0.5	1.5	0.27	50	6	2	●	1
MS2XL6D0040N010	0.4	0.6	1	0.36	50	6	2	●	1
MS2XL6D0040N020	0.4	0.6	2	0.36	50	6	2	●	1
MS2XL6D0050N013	0.5	0.8	1.3	0.46	50	6	2	●	1
MS2XL6D0050N025	0.5	0.8	2.5	0.46	50	6	2	●	1
MS2XL6D0060N015	0.6	0.9	1.5	0.56	50	6	2	●	1
MS2XL6D0060N030	0.6	0.9	3	0.56	50	6	2	●	1
MS2XL6D0070N018	0.7	1.1	1.8	0.66	50	6	2	●	1
MS2XL6D0070N035	0.7	1.1	3.5	0.66	50	6	2	●	1
MS2XL6D0080N020	0.8	1.2	2	0.76	50	6	2	●	1
MS2XL6D0080N040	0.8	1.2	4	0.76	50	6	2	●	1
MS2XL6D0090N023	0.9	1.4	2.3	0.86	50	6	2	●	1
MS2XL6D0090N045	0.9	1.4	4.5	0.86	50	6	2	●	1
MS2XL6D0100N025	1	1.5	2.5	0.94	50	6	2	●	1
MS2XL6D0100N050	1	1.5	5	0.94	50	6	2	●	1
MS2XL6D0110N028	1.1	1.7	2.8	1.04	50	6	2	●	1
MS2XL6D0110N055	1.1	1.7	5.5	1.04	50	6	2	●	1
MS2XL6D0120N030	1.2	1.8	3	1.14	50	6	2	●	1
MS2XL6D0120N060	1.2	1.8	6	1.14	50	6	2	●	1
MS2XL6D0130N033	1.3	2	3.3	1.24	50	6	2	●	1
MS2XL6D0130N065	1.3	2	6.5	1.24	50	6	2	●	1
MS2XL6D0140N035	1.4	2.1	3.5	1.34	50	6	2	●	1
MS2XL6D0140N070	1.4	2.1	7	1.34	50	6	2	●	1
MS2XL6D0150N038	1.5	2.3	3.8	1.44	50	6	2	●	1
MS2XL6D0150N075	1.5	2.3	7.5	1.44	50	6	2	●	1
MS2XL6D0160N040	1.6	2.4	4	1.54	50	6	2	●	1
MS2XL6D0160N080	1.6	2.4	8	1.54	50	6	2	●	1

MS2XL6

Order Number	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	type
MS2XL6D0170N043	1.7	2.6	4.3	1.64	50	6	2	●	1
MS2XL6D0170N085	1.7	2.6	8.5	1.64	50	6	2	●	1
MS2XL6D0180N045	1.8	2.7	4.5	1.74	50	6	2	●	1
MS2XL6D0180N090	1.8	2.7	9	1.74	50	6	2	●	1
MS2XL6D0190N048	1.9	2.9	4.8	1.84	50	6	2	●	1
MS2XL6D0190N095	1.9	2.9	9.5	1.84	50	6	2	●	1
MS2XL6D0200N050	2	3	5	1.9	50	6	2	●	1
MS2XL6D0200N100	2	3	10	1.9	50	6	2	●	1
MS2XL6D0210N053	2.1	3.2	5.3	2	50	6	2	●	1
MS2XL6D0210N105	2.1	3.2	10.5	2	60	6	2	●	1
MS2XL6D0220N055	2.2	3.3	5.5	2.1	50	6	2	●	1
MS2XL6D0220N110	2.2	3.3	11	2.1	60	6	2	●	1
MS2XL6D0230N058	2.3	3.5	5.8	2.2	50	6	2	●	1
MS2XL6D0230N115	2.3	3.5	11.5	2.2	60	6	2	●	1
MS2XL6D0240N060	2.4	3.6	6	2.3	50	6	2	●	1
MS2XL6D0240N120	2.4	3.6	12	2.3	60	6	2	●	1
MS2XL6D0250N063	2.5	3.8	6.3	2.4	50	6	2	●	1
MS2XL6D0250N125	2.5	3.8	12.5	2.4	60	6	2	●	1

MS2XL6

RECOMMENDED CUTTING CONDITIONS

Work material		Carbon steel, Cast iron, Alloy steel (—30HRC) AISI 1050, AISI No 35 B, AISI P20			Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		
Dia. DC(mm)	Neck length LU(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap(mm)
0.3	—	40000	500—1000	0.01	30000	300—800	0.01
	1.5			0.007			0.007
0.4	1	40000	500—1000	0.015	30000	300—800	0.015
	2			0.01			0.01
0.5	1.3	40000	500—1000	0.02	30000	300—800	0.02
	2.5			0.013			0.013
0.6	1.5	33000	500—1000	0.03	25000	300—800	0.03
	3			0.018			0.018
0.7	1.8	29000	500—1000	0.04	22000	300—800	0.04
	3.5			0.025			0.025
0.8	2	25000	500—1000	0.06	20000	300—800	0.06
	4			0.03			0.03
0.9	2.3	22000	500—1000	0.08	18000	300—800	0.08
	4.5			0.05			0.05
1	2.5	20000	500—1000	0.1	16000	300—800	0.1
	5			0.07			0.07
1.1	2.8	18000	500—1000	0.12	14000	300—800	0.12
	5.5			0.08			0.08
1.2	3	16000	500—1000	0.12	13000	300—800	0.12
	6			0.08			0.08
1.3	3.3	15000	500—1000	0.12	12000	300—800	0.12
	6.5			0.08			0.08
1.4	3.5	14000	500—1000	0.12	11000	300—800	0.12
	7			0.08			0.08
1.5	3.8	13000	500—1000	0.15	10000	300—800	0.15
	7.5			0.1			0.1
1.6	4	12000	500—1000	0.15	10000	300—800	0.15
	8			0.1			0.1
1.7	4.3	12000	500—1000	0.17	9500	300—800	0.17
	8.5			0.12			0.12
1.8	4.5	11000	500—1000	0.17	9000	300—800	0.17
	9			0.12			0.12
1.9	4.8	10000	500—1000	0.17	9000	300—800	0.17
	9.5			0.12			0.12
2	5	10000	500—1000	0.2	9000	300—800	0.2
	10			0.15			0.15
2.1	5.3	9800	500—1000	0.2	9000	300—800	0.2
	10.5			0.15			0.15
2.2	5.5	9600	500—1000	0.2	9000	300—800	0.2
	11			0.15			0.15
2.3	5.8	9400	500—1000	0.2	8800	300—800	0.2
	11.5			0.15			0.15
2.4	6	9200	500—1000	0.25	8700	300—800	0.25
	12			0.2			0.2
2.5	6.3	9000	500—1000	0.25	8500	300—800	0.25
	12.5			0.2			0.2

- If the depth of cut is shallow, the revolution and feed rate can be increased.
- Cutting condition may be considerably different due to the overhang (milling depth), depth of cut, and machine tools. Please see the above table as a standard.

MS2ES

MSTAR END MILLS

End mill, 2 flute, For small automatic lathes

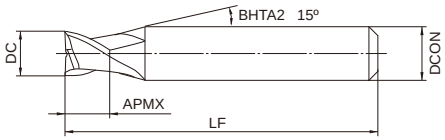
Product Information

UWC 30° MS Sharp

Work Material

P M S F M

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668



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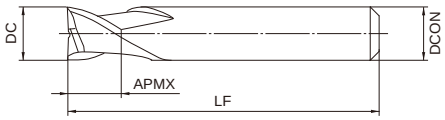

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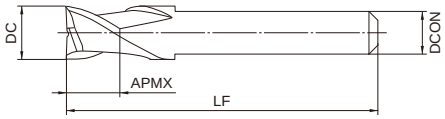


Type3

	3≦DC≦12	
	0 - 0.020	
h6	4≦DCON≦6	7≦DCO N≦10
	0 - 0.008	0 - 0.009

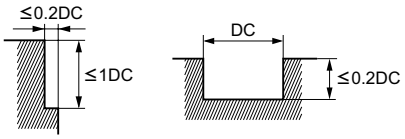
●Inventory maintained in Japan. Unit : mm

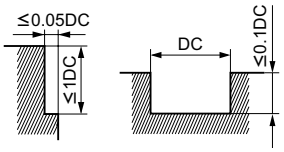
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
MS2ESD0300L35S04	3	3	35	4	2	●	1
MS2ESD0300L45S04	3	3	45	4	2	●	1
MS2ESD0350L35S04	3.5	3.5	35	4	2	●	1
MS2ESD0350L45S04	3.5	3.5	45	4	2	●	1
MS2ESD0400L35S04	4	4	35	4	2	●	2
MS2ESD0400L45S04	4	4	45	4	2	●	2
MS2ESD0500L35S05	5	5	35	5	2	●	2
MS2ESD0500L35S06	5	5	35	6	2	●	1
MS2ESD0500L45S06	5	5	45	6	2	●	1
MS2ESD0600L35S05	6	6	35	5	2	●	3
MS2ESD0600L35S06	6	6	35	6	2	●	2
MS2ESD0600L45S06	6	6	45	6	2	●	2
MS2ESD0700L35S07	7	6	35	7	2	●	2
MS2ESD0700L45S07	7	7	45	7	2	●	2
MS2ESD0800L35S07	8	6	35	7	2	●	3
MS2ESD0800L35S08	8	6	35	8	2	●	2
MS2ESD0800L45S07	8	8	45	7	2	●	3
MS2ESD0800L45S08	8	8	45	8	2	●	2
MS2ESD1000L35S07	10	6	35	7	2	●	3
MS2ESD1000L35S10	10	6	35	10	2	●	2
MS2ESD1000L45S07	10	10	45	7	2	●	3
MS2ESD1000L45S10	10	10	45	10	2	●	2
MS2ESD1200L35S10	12	6	35	10	2	●	3
MS2ESD1200L45S10	12	12	45	10	2	●	3

MS2ES

RECOMMENDED CUTTING CONDITIONS

Work material	Carbon steel, Cast iron, Alloy steel (—30HRC) AISI 1050, AISI No 35 B, AISI P20		Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V		Hardened steel (45— 55HRC) AISI H13	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
3	10000	600	7000	400	6000	300	5000	120
4	7500	600	5200	400	4500	300	4000	120
5	6000	600	4200	400	3600	300	3200	120
6	5000	600	3500	400	3000	300	2700	120
7	4500	560	3000	360	2700	280	2300	110
8	4000	520	2800	350	2400	260	2000	110
10	3200	450	2200	300	1900	230	1600	100
12	2700	410	1900	270	1600	210	1300	100





- When cutting austenitic stainless steel, the use of water-soluble cutting fluid is effective.
- If the depth of cut is shallow, the revolution and feed rate can be increased.
- When drilling, please set the feed rate at 1/3 or below of the values above.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

MPJHV

MS PLUS END MILLS

End mill, Semi long cut length, 4 flute, Irregular helix flutes

Product Information

UWC 37.5° 40° 38° 40° MS+ Gash

APMX= 3.3DC APMX= 4DC

Technical Info >> 1993

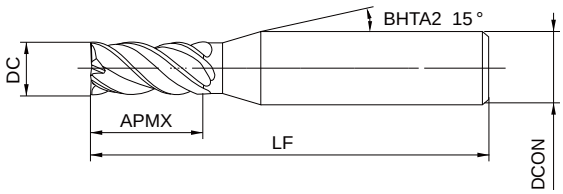
ISO13399 Property >> 1966

Work Material

P M S H F

SYMBOL DESCRIPTIONS >> 664

END MILLS SELECTION CHART >> 668



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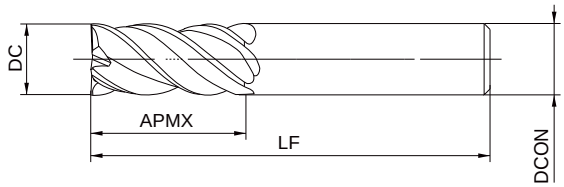


Type2

	DC≦12	DC>12		
	0 - 0.02	0 - 0.03		
h5	DCON=4	DCON=6	DCON=8	
	0 - 0.005	0 - 0.005	0 - 0.005	
h6	DCON=10	DCON=12	DCON=16	DCON=20
	0 - 0.009	0 - 0.011	0 - 0.011	0 - 0.013

●Inventory maintained in Japan. Unit : mm

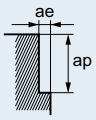
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
MPJHVD0100AP04	1	4	45	4	4	●	1
MPJHVD0150AP06	1.5	6	45	4	4	●	1
MPJHVD0200AP06	2	6.5	60	6	4	●	1
MPJHVD0200AP08	2	8	60	6	4	●	1
MPJHVD0250AP10	2.5	10	60	6	4	●	1
MPJHVD0300AP10	3	10	60	6	4	●	1
MPJHVD0300AP12	3	12	60	6	4	●	1
MPJHVD0400AP13	4	13	60	6	4	●	1
MPJHVD0400AP16	4	16	60	6	4	●	1
MPJHVD0500AP17	5	17	60	6	4	●	1
MPJHVD0500AP20	5	20	60	6	4	●	1
MPJHVD0600AP20	6	20	60	6	4	●	2
MPJHVD0600AP24	6	24	60	6	4	●	2
MPJHVD0800AP26	8	26	80	8	4	●	2
MPJHVD0800AP32	8	32	80	8	4	●	2
MPJHVD1000AP33	10	33	100	10	4	●	2
MPJHVD1000AP40	10	40	100	10	4	●	2
MPJHVD1200AP40	12	40	110	12	4	●	2
MPJHVD1200AP48	12	48	110	12	4	●	2
MPJHVD1600AP53	16	53	125	16	4	●	2
MPJHVD1600AP64	16	64	125	16	4	●	2
MPJHVD2000AP66	20	66	140	20	4	●	2
MPJHVD2000AP80	20	80	140	20	4	●	2

MPJHV

RECOMMENDED CUTTING CONDITIONS

·Side milling

Work material		Carbon steel, Alloy steel (180—280HB) Ductile Cast Iron AISI 1045, AISI 4140, FCD450				Carbon steel, Alloy steel (280—350HB) Pre-hardened steel, Alloy tool steel AISI 4340, AISI P21, AISI P20, SKD, SKT				Austenitic stainless steel (≦200HB) Titanium alloy AISI 304, AISI 306,Ti-6Al-4V				Hardened steel (45— 52HRC) AISI H13, AISI L6			
Dia. DC(mm)	Length of Cut APMX(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)
1	4	19000	300	3	0.03	15000	240	3	0.03	13000	210	3	0.03	13000	160	3	0.02
1.5	6	16000	320	4.5	0.05	13000	260	4.5	0.05	11000	220	4.5	0.05	8500	170	4.5	0.03
2	6.5	15000	500	5	0.1	12000	380	5	0.1	10000	320	5	0.1	7700	220	5	0.06
2	8	14000	470	6	0.06	11000	350	6	0.06	9500	300	6	0.06	7300	200	6	0.04
2.5	10	13000	660	7.5	0.08	11000	520	7.5	0.08	8900	390	7.5	0.08	6300	250	7.5	0.05
3	10	13000	890	7.4	0.15	10000	620	7.4	0.15	8400	470	7.4	0.15	5900	300	7.4	0.09
3	12	12000	820	9	0.09	9500	590	9	0.09	8000	450	9	0.09	5600	280	9	0.06
4	13	9400	940	9.9	0.2	7500	650	9.9	0.2	6300	530	9.9	0.2	4700	320	9.9	0.12
4	16	9000	900	12	0.12	7200	620	12	0.12	6000	500	12	0.12	4500	310	12	0.08
5	17	7500	990	12.4	0.25	6000	680	12.4	0.25	5000	560	12.4	0.25	3800	350	12.4	0.15
5	20	7200	950	15	0.15	5700	650	15	0.15	4800	540	15	0.15	3600	330	15	0.1
6	20	6300	1100	14.9	0.3	5000	760	14.9	0.3	4200	640	14.9	0.3	3200	350	14.9	0.18
6	24	6000	1000	18	0.18	4800	730	18	0.18	4000	610	18	0.18	3000	330	18	0.12
8	26	4700	1100	19.8	0.4	3800	800	19.8	0.4	3100	620	19.8	0.4	2400	360	19.8	0.24
8	32	4500	1000	24	0.24	3600	760	24	0.24	3000	600	24	0.24	2300	350	24	0.16
10	33	3800	1000	24.8	0.5	3000	760	24.8	0.5	2500	590	24.8	0.5	1900	330	24.8	0.3
10	40	3600	970	30	0.3	2900	730	30	0.3	2400	570	30	0.3	1800	310	30	0.2
12	40	3100	1000	29.7	0.6	2500	720	29.7	0.6	2100	550	29.7	0.6	1600	300	29.7	0.36
12	48	3000	970	36	0.36	2400	690	36	0.36	2000	520	36	0.36	1500	280	36	0.24
16	53	2400	780	27.2	0.48	1900	550	39.6	0.8	1600	420	39.6	0.8	1200	240	39.6	0.48
16	64	2200	710	48	0.48	1800	520	48	0.48	1500	390	48	0.48	1100	220	48	0.32
20	66	1900	620	34	0.6	1500	430	49.5	1	1300	340	49.5	1	950	190	49.5	0.6
20	80	1800	580	60	0.6	1400	400	60	0.6	1200	310	60	0.6	900	180	60	0.4



- Water-soluble cutting fluids are recommended for stainless steel and titanium alloys. Air blowing is recommended for carbon steel.
- The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abnormal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.

MPMHV

MS PLUS END MILLS

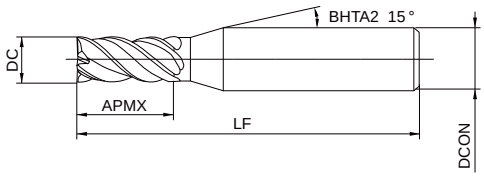
End mill, Medium cut length, 4 flute, Irregular helix flutes

Product Information

Work Material

P M S H

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668



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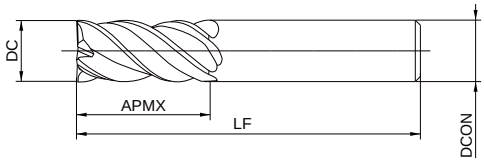
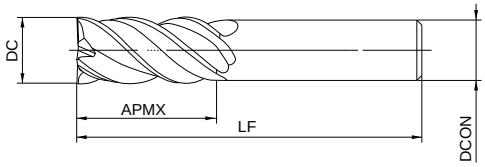


Type2



Type3

	DC≦12	DC>12			
	0 - 0.02	0 - 0.03			
h5	DCON=4	DCON=6	DCON=8		
	0 - 0.005	0 - 0.005	0 - 0.006		
h6	DCON=6(DC=8)	DCON=8(DC=10)	DCON=10	12≦DCON≦16	DCON=20
	0 - 0.008	0 - 0.009	0 - 0.009	0 - 0.011	0 - 0.013

●Inventory maintained in Japan. Unit : mm

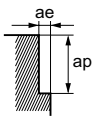
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
MPMHVD0100	1	2.5	45	4	4	●	1
MPMHVD0150	1.5	3.8	45	4	4	●	1
MPMHVD0200	2	5	45	4	4	●	1
MPMHVD0250	2.5	6.3	45	4	4	●	1
MPMHVD0300	3	7.5	45	6	4	●	1
MPMHVD0400	4	10	45	6	4	●	1
MPMHVD0500	5	12.5	50	6	4	●	1
MPMHVD0600	6	15	60	6	4	●	2
MPMHVD0700	7	17.5	70	8	4	●	2
MPMHVD0800	8	20	70	8	4	●	2
MPMHVD0800S06	8	20	90	6	4	●	3
MPMHVD1000	10	25	80	10	4	●	2
MPMHVD1000S08	10	25	100	8	4	●	3
MPMHVD1100S10	11	28	100	10	4	●	3
MPMHVD1200	12	30	100	12	4	●	2
MPMHVD1200S10	12	30	110	10	4	●	3
MPMHVD1300S12	13	32	110	12	4	●	3
MPMHVD1600	16	40	110	16	4	●	2
MPMHVD2000	20	50	125	20	4	●	2

MPMHV

Recommended cutting condition

·Shoulder milling

Work material	Carbon steel, Alloy steel (180—280HB), Ductile Cast Iron AISI 1045,AISI 4140,FCD450				Carbon steel, Alloy steel (280—350HB) Pre-hardened steel, Alloy tool steel AISI 4340,AISI P21,PX5,SKD,SKT				Austenitic stainless steel (<200HB) Titanium alloy AISI 304,AISI 306,Ti-6Al-4V				Hardened steel (45— 52HRC) AISI H13,AISI L6			
DC (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)
1	38000	910	1.7	0.2	31000	500	1.7	0.2	25000	500	1.7	0.2	18000	290	1.7	0.05
1.5	27000	970	2.5	0.3	22000	530	2.5	0.3	18000	500	2.5	0.3	13000	310	2.5	0.08
2	21000	1500	3.5	0.4	17000	820	3.5	0.4	14000	640	3.5	0.4	10000	320	3.5	0.1
2.5	18000	1700	4.2	0.5	15000	900	4.2	0.5	12000	820	4.2	0.5	8500	360	4.2	0.13
3	16000	1800	5	0.6	13000	940	5	0.6	11000	880	5	0.6	7400	380	5	0.15
4	12000	1700	7	0.8	9500	950	7	0.8	8000	900	7	0.8	5600	400	7	0.2
5	9500	1800	8.5	1	7600	1100	8.5	1	6400	900	8.5	1	4500	430	8.5	0.25
6	8000	2100	10	1.2	6400	1300	10	1.2	5300	1100	10	1.2	3700	440	10	0.3
7	6800	2000	12	1.4	5500	1400	12	1.4	4500	1200	12	1.4	3200	450	12	0.35
8	6000	2000	13.5	1.6	4800	1400	13.5	1.6	4000	1200	13.5	1.6	2800	450	13.5	0.4
10	4800	2100	17	2	3800	1500	17	2	3200	1100	17	2	2200	440	17	0.5
11	2600	1200	18.5	1.1	2100	880	18.5	1.1	1700	520	18.5	1.1	1200	190	18.5	0.55
12	4000	1900	20.5	2.4	3200	1400	20.5	2.4	2700	1100	20.5	2.4	1900	380	20.5	0.6
13	2200	1100	22	1.3	1800	790	22	1.3	1500	490	22	1.3	1000	160	22	0.65
16	3000	1400	27.2	3.2	2400	1100	27.2	3.2	2000	840	27.2	3.2	1400	340	27.2	0.8
20	2400	1200	34	4	1900	840	34	4	1600	670	34	4	1100	260	34	1

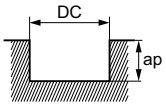


- DC=11 and 13 are specialized for slim shanks. Therefore, the recommended conditions for an overhang length of DC x 5 are indicated.
- When using a slim shank with DC=8 or 10 or 12, reduce the cutting speed by 60%, the feed rate by 80%, and the depth of cutting ae by 50% from the above conditions.
- Water-soluble cutting fluids are recommended for Stainless steel and Titanium alloys. Air blowing is recommended for carbon steel.
- The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abnormal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.

MPMHV

·Slotting

Work material	Carbon steel, Alloy steel (180—280HB), Ductile Cast Iron AISI 1045,AISI 4140,FCD450			Carbon steel, Alloy steel (280—350HB) Pre-hardened steel, Alloy tool steel AISI 4340,AISI P21,PX5,SKD,SKT			Austenitic stainless steel (<200HB) Titanium alloy AISI 304,AISI 306,Ti-6Al-4V			Hardened steel (45— 52HRC) AISI H13,AISI L6		
Diameter DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)
1	31000	620	0.5	24000	380	0.5	20000	320	0.5	9500	110	0.2
1.5	22000	630	0.8	17000	410	0.8	14000	340	0.8	6400	130	0.3
2	17000	650	2	14000	450	2	11000	350	2	4800	130	0.4
2.5	15000	830	2.5	12000	580	2.5	9700	470	2.5	3800	130	0.5
3	13000	940	3	10000	660	3	8500	510	3	3200	140	0.6
4	9500	820	4	7600	600	4	6400	460	4	2400	150	0.8
5	7600	910	5	6100	670	5	5100	510	5	1900	170	1
6	6400	860	6	5100	630	6	4200	470	6	1600	190	1.2
7	5500	960	7	4400	710	7	3600	530	7	1400	190	1.4
8	4800	1000	8	3800	750	8	3200	580	8	1200	190	1.6
10	3800	910	10	3100	680	10	2500	500	10	950	150	2
12	3200	920	12	2500	660	12	2100	500	12	800	160	2.4
16	2400	690	16	1900	500	16	1600	380	16	600	120	3.2
20	1900	550	20	1500	400	20	1300	310	20	480	96	4



- Slotting is not recommended when using a slim shank type.

VF2MD

IMPACT MIRACLE END MILLS

End mill, Medium cut length, 2 flute, For hardened materials

Product Information

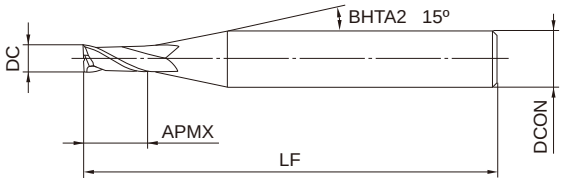
UWC 35° VF Gash

DC<3 DC≧3

Work Material

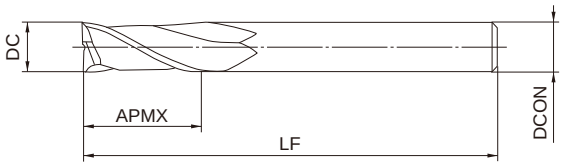
P H F M

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668



Type1

h6	0.5≦DC≦6
	0 / - 0.020
	4≦DCON≦6
	0 / - 0.008



Type2

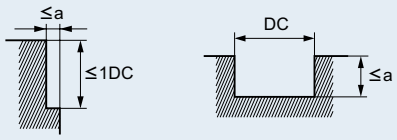
●Inventory maintained in Japan. Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
VF2MDD0050	0.5	1.3	40	4	2	●	1
VF2MDD0100	1	2.5	40	4	2	●	1
VF2MDD0150	1.5	3.8	40	4	2	●	1
VF2MDD0200	2	5	40	4	2	●	1
VF2MDD0250	2.5	6.3	40	4	2	●	1
VF2MDD0300	3	7.5	50	6	2	●	1
VF2MDD0400	4	10	50	6	2	●	1
VF2MDD0500	5	12.5	50	6	2	●	1
VF2MDD0600	6	15	50	6	2	●	2

VF2MD

RECOMMENDED CUTTING CONDITIONS

Work material	Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21			Hardened steel (45— 55HRC) AISI H13			Hardened steel (55— 62HRC) AISI D2		
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut a(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut a(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut a(mm)
0.5	40000	1000	0.015	40000	960	0.015	30000	600	0.01
1	40000	2000	0.06	32000	1600	0.06	16000	550	0.05
1.5	40000	3000	0.12	32000	1900	0.08	10600	500	0.08
2	30000	3000	0.18	24000	1900	0.10	8100	400	0.1
2.5	24000	2600	0.25	19000	1600	0.13	6400	350	0.13
3	20000	2300	0.30	16000	1400	0.15	5400	300	0.15
4	15000	2000	0.40	12000	1200	0.20	4000	240	0.2
5	12000	1600	0.50	9000	900	0.25	3200	190	0.2
6	10000	1400	0.60	7000	700	0.30	2700	160	0.2



- If the depth of cut is shallow, the revolution and feed rate can be increased.
- When drilling, please set the feed rate at 1/3 or below of the values above.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

VF2MV

IMPACT MIRACLE END MILLS

End mill, Medium cut length, 2 flute, Irregular helix flutes

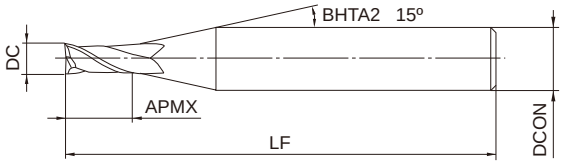
Product Information

UWC 32.5° 37.5° VF Gash

Work Material

P H F M

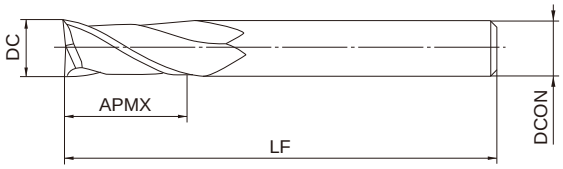
Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668



Type1

0.5≦DC≦6	0 / - 0.020
4≦DCON≦6	0 / - 0.008

h6



Type2

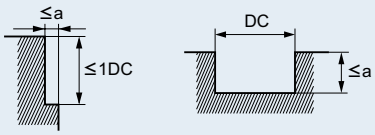
●Inventory maintained in Japan. Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
VF2MVD0050	0.5	1.3	40	4	2	●	1
VF2MVD0100	1	2.5	40	4	2	●	1
VF2MVD0150	1.5	3.8	40	4	2	●	1
VF2MVD0200	2	5	40	4	2	●	1
VF2MVD0250	2.5	6.3	40	4	2	●	1
VF2MVD0300	3	7.5	50	6	2	●	1
VF2MVD0400	4	10	50	6	2	●	1
VF2MVD0500	5	12.5	50	6	2	●	1
VF2MVD0600	6	15	50	6	2	●	2

VF2MV

RECOMMENDED CUTTING CONDITIONS

Work material	Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21			Hardened steel (45— 55HRC) AISI H13			Hardened steel (55— 62HRC) AISI D2		
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut a(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut a(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut a(mm)
0.5	40000	1000	0.015	40000	960	0.015	30000	600	0.01
1	40000	2000	0.06	32000	1600	0.06	16000	550	0.05
1.5	40000	3000	0.12	32000	1900	0.08	10600	500	0.08
2	30000	3000	0.18	24000	1900	0.10	8100	400	0.1
2.5	24000	2600	0.25	19000	1600	0.13	6400	350	0.13
3	20000	2300	0.30	16000	1400	0.15	5400	300	0.15
4	15000	2000	0.40	12000	1200	0.20	4000	240	0.2
5	12000	1600	0.50	9000	900	0.25	3200	190	0.2
6	10000	1400	0.60	7000	700	0.30	2700	160	0.2



- When slotting, reduce the revolutions by 50 — 70% and the feed rate by 40 —60%.
- For austenitic stainless steel, titanium alloy and heat resistant alloys, the VFMHV is recommended.
- The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abnormal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.

VF2XL

IMPACT MIRACLE END MILLS

End mill, 2 flute, Long neck

Product Information

UWC 30° VF Gash

DC<3 DC=3

Technical Info >> 1993

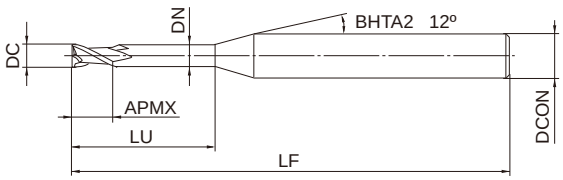
ISO13399 Property >> 1966

Work Material

P H F M

SYMBOL DESCRIPTIONS >> 664

END MILLS SELECTION CHART >> 668



Type1

	0.1≦DC≦3
	0 - 0.020
h6	4≦DCON≦6
	0 - 0.008

●Inventory maintained in Japan. Unit : mm

Order Number	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	type
VF2XLD0010N005	0.1	0.15	0.5	0.085	45	4	2	●	1
VF2XLD0020N006	0.2	0.3	0.6	0.17	45	4	2	●	1
VF2XLD0020N010	0.2	0.3	1	0.17	45	4	2	●	1
VF2XLD0020N015	0.2	0.3	1.5	0.17	45	4	2	●	1
VF2XLD0030N010	0.3	0.5	1	0.27	45	4	2	●	1
VF2XLD0030N020	0.3	0.5	2	0.27	45	4	2	●	1
VF2XLD0030N030	0.3	0.5	3	0.27	45	4	2	●	1
VF2XLD0040N010	0.4	0.6	1	0.36	45	4	2	●	1
VF2XLD0040N020	0.4	0.6	2	0.36	45	4	2	●	1
VF2XLD0040N040	0.4	0.6	4	0.36	45	4	2	●	1
VF2XLD0050N020	0.5	0.8	2	0.46	45	4	2	●	1
VF2XLD0050N040	0.5	0.8	4	0.46	45	4	2	●	1
VF2XLD0050N060	0.5	0.8	6	0.46	45	4	2	●	1
VF2XLD0060N020	0.6	0.9	2	0.56	45	4	2	●	1
VF2XLD0060N040	0.6	0.9	4	0.56	45	4	2	●	1
VF2XLD0060N060	0.6	0.9	6	0.56	45	4	2	●	1
VF2XLD0080N040	0.8	1.2	4	0.76	45	4	2	●	1
VF2XLD0080N060	0.8	1.2	6	0.76	45	4	2	●	1
VF2XLD0080N080	0.8	1.2	8	0.76	50	4	2	●	1
VF2XLD0080N100	0.8	1.2	10	0.76	50	4	2	●	1
VF2XLD0100N040	1	1.5	4	0.94	50	4	2	●	1
VF2XLD0100N060	1	1.5	6	0.94	50	4	2	●	1
VF2XLD0100N080	1	1.5	8	0.94	50	4	2	●	1
VF2XLD0100N100	1	1.5	10	0.94	50	4	2	●	1
VF2XLD0100N120	1	1.5	12	0.94	50	4	2	●	1
VF2XLD0150N060	1.5	2.3	6	1.44	50	4	2	●	1
VF2XLD0150N080	1.5	2.3	8	1.44	50	4	2	●	1
VF2XLD0150N100	1.5	2.3	10	1.44	50	4	2	●	1
VF2XLD0150N120	1.5	2.3	12	1.44	50	4	2	●	1
VF2XLD0150N160	1.5	2.3	16	1.44	60	4	2	●	1
VF2XLD0200N060	2	3	6	1.9	50	4	2	●	1
VF2XLD0200N080	2	3	8	1.9	50	4	2	●	1
VF2XLD0200N100	2	3	10	1.9	50	4	2	●	1
VF2XLD0200N120	2	3	12	1.9	50	4	2	●	1
VF2XLD0200N160	2	3	16	1.9	60	4	2	●	1

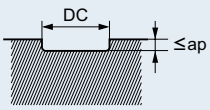
VF2XL

Order Number	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	type
VF2XLD0200N200	2	3	20	1.9	60	4	2	●	1
VF2XLD0300N120	3	4.5	12	2.9	50	6	2	●	1
VF2XLD0300N160	3	4.5	16	2.9	60	6	2	●	1
VF2XLD0300N200	3	4.5	20	2.9	60	6	2	●	1

VF2XL

RECOMMENDED CUTTING CONDITIONS

Work material		Hardened steel (45— 55HRC) AISI H13			Hardened steel (55— 62HRC) AISI D2		
Dia. DC(mm)	Neck length LU(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)
0.1	0.5	40000	100	0.002	40000	80	0.001
0.2	0.6	40000	400	0.004	40000	360	0.004
	1	40000	300	0.003	40000	250	0.002
	1.5	40000	200	0.002	40000	150	0.001
0.3	1	40000	500	0.006	40000	450	0.004
	2	40000	400	0.003	38000	350	0.002
	3	38000	250	0.002	36000	200	0.001
0.4	1	40000	800	0.008	36000	500	0.006
	2	40000	500	0.007	30000	350	0.005
	4	36000	300	0.004	27000	200	0.003
0.5	2	40000	800	0.01	30000	600	0.009
	4	36000	600	0.008	27000	450	0.007
	6	30000	400	0.005	22000	300	0.004
0.6	2	40000	1000	0.015	30000	700	0.012
	4	36000	800	0.01	27000	500	0.01
	6	30000	600	0.006	22000	350	0.006
0.8	4	36000	1200	0.03	27000	900	0.02
	6	30000	900	0.02	22000	650	0.015
	8	24000	600	0.01	18000	450	0.008
	10	20000	400	0.008	15000	300	0.005
1	4	32000	1600	0.05	24000	1100	0.04
	6	32000	1400	0.04	24000	1000	0.03
	8	28000	1000	0.03	21000	750	0.02
	10	28000	800	0.02	21000	600	0.015
	12	24000	500	0.02	18000	370	0.01
1.5	6	22000	1200	0.08	16000	900	0.06
	8	22000	1100	0.07	16000	800	0.05
	10	22000	1000	0.06	16000	750	0.04
	12	20000	800	0.05	15000	600	0.03
	16	18000	500	0.03	13000	350	0.02
2	6	16000	1000	0.15	12000	750	0.15
	8	16000	1000	0.15	12000	750	0.1
	10	16000	800	0.1	12000	600	0.08
	12	16000	800	0.08	12000	600	0.06
	16	15000	600	0.06	11000	450	0.05
	20	14000	500	0.05	10000	350	0.04
3	12	11000	800	0.2	8200	600	0.15
	16	11000	600	0.15	8200	450	0.15
	20	11000	500	0.1	8200	350	0.1



- If the depth of cut is shallow, the revolution and feed rate can be increased.
- Cutting condition may be considerably different due to the overhang (milling depth), depth of cut, and machine tools. Please see the above table as a standard.

VC2SS

MIRACLE END MILLS

End mill, Extra short cut length, 2 flute

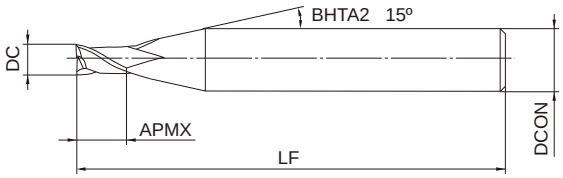
Product Information

UWC 30° VC Sharp DC<3 DC≧3

Work Material

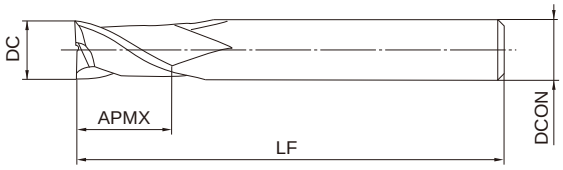
P M S H F M

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668



Type1

	DC≦12	DC>12	
	0 - 0.020	0 - 0.030	
h6	DCON=6	8≦DCO N≦10	12≦DCO N≦16
	0 - 0.008	0 - 0.009	0 - 0.011



Type2

●Inventory maintained in Japan. Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
VC2SSD0030	0.3	0.6	50	6	2	●	1
VC2SSD0040	0.4	0.8	50	6	2	●	1
VC2SSD0050	0.5	0.8	50	6	2	●	1
VC2SSD0060	0.6	1	50	6	2	●	1
VC2SSD0070	0.7	1	50	6	2	●	1
VC2SSD0080	0.8	1.3	50	6	2	●	1
VC2SSD0090	0.9	1.3	50	6	2	●	1
VC2SSD0100	1	1.5	50	6	2	●	1
VC2SSD0110	1.1	1.5	50	6	2	●	1
VC2SSD0120	1.2	2	50	6	2	●	1
VC2SSD0130	1.3	2	50	6	2	●	1
VC2SSD0140	1.4	2	50	6	2	●	1
VC2SSD0150	1.5	2.5	50	6	2	●	1
VC2SSD0160	1.6	2.5	50	6	2	●	1
VC2SSD0170	1.7	2.5	50	6	2	●	1
VC2SSD0180	1.8	3	50	6	2	●	1
VC2SSD0190	1.9	3	50	6	2	●	1
VC2SSD0200	2	3	50	6	2	●	1
VC2SSD0210	2.1	3	50	6	2	●	1
VC2SSD0220	2.2	3.5	50	6	2	●	1
VC2SSD0230	2.3	3.5	50	6	2	●	1
VC2SSD0240	2.4	3.5	50	6	2	●	1
VC2SSD0250	2.5	4	50	6	2	●	1
VC2SSD0260	2.6	4	50	6	2	●	1
VC2SSD0270	2.7	4	50	6	2	●	1
VC2SSD0280	2.8	4	50	6	2	●	1
VC2SSD0290	2.9	4.5	50	6	2	●	1
VC2SSD0300	3	4.5	50	6	2	●	1

VC2SS

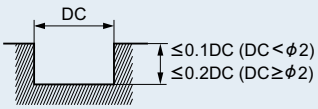
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
VC2SSD0350	3.5	5.5	50	6	2	●	1
VC2SSD0400	4	6	50	6	2	●	1
VC2SSD0450	4.5	7	50	6	2	●	1
VC2SSD0500	5	7.5	50	6	2	●	1
VC2SSD0550	5.5	8.5	50	6	2	●	1
VC2SSD0600	6	9	50	6	2	●	2
VC2SSD0800	8	12	60	8	2	●	2
VC2SSD1000	10	15	70	10	2	●	2
VC2SSD1200	12	18	75	12	2	●	2
VC2SSD1400	14	21	75	16	2	●	1
VC2SSD1500	15	23	80	16	2	●	1
VC2SSD1600	16	24	90	16	2	●	2

VC2SS

RECOMMENDED CUTTING CONDITIONS

·Slotting

Work material	Carbon steel, Cast iron, Alloy steel (—30HRC) AISI 1050, AISI No 35 B, AISI P20		Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Hardened steel (45— 55HRC) AISI H13	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
0.3	40000	190	40000	190	40000	100
0.5	40000	380	40000	380	30000	140
1	30000	720	20000	480	15000	180
1.5	20000	960	14000	670	10000	190
2	15000	1100	10000	720	8000	200
3	10000	1150	7000	800	5000	210
4	7500	900	5200	620	4000	200
5	6000	720	4200	500	3200	160
6	5000	600	3500	420	2700	140
8	4000	520	2800	350	2000	120
10	3200	450	2200	290	1600	110
12	2700	410	1900	260	1300	100
16	2000	340	1400	210	1000	90



- If the depth of cut is shallow, the revolution and feed rate can be increased.
- When drilling, please set the feed rate at 1/3 or below of the values above.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

VC2MS

MIRACLE END MILLS

End mill, Medium cut length, 2 flute

Product Information

UWC 30° VC Sharp

DC<3 DC≧3

Work Material

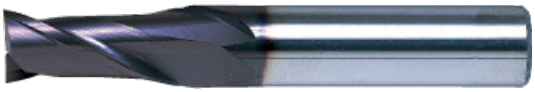
P M S H F M

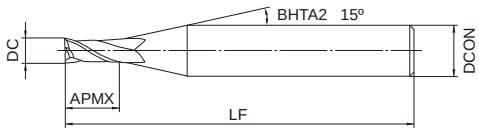
Technical Info >> 1993

ISO13399 Property >> 1966

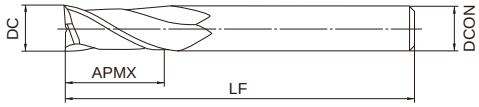
SYMBOL DESCRIPTIONS >> 664

END MILLS SELECTION CHART >> 668

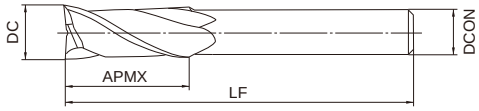




Type1



Type2



Type3

DC≦12	DC>12			
0 - 0.020	0 - 0.030			
DCON=3	4≦DCON≦6	8≦DCON≦10	12≦DCON≦16	20≦DCON≦25
0 - 0.006	0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013

h6

●Inventory maintained in Japan. Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
VC2MSD0030	0.3	0.6	38	3	2	●	1
VC2MSD0040	0.4	0.8	38	3	2	●	1
VC2MSD0050	0.5	1	38	3	2	●	1
VC2MSD0060	0.6	1.2	38	3	2	●	1
VC2MSD0070	0.7	1.4	38	3	2	●	1
VC2MSD0080	0.8	1.6	38	3	2	●	1
VC2MSD0090	0.9	2	38	3	2	●	1
VC2MSD0100	1	2.5	40	4	2	●	1
VC2MSD0110	1.1	2.5	40	4	2	●	1
VC2MSD0120	1.2	3	40	4	2	●	1
VC2MSD0130	1.3	3	40	4	2	●	1
VC2MSD0140	1.4	3	40	4	2	●	1
VC2MSD0150	1.5	4	40	4	2	●	1
VC2MSD0160	1.6	4	40	4	2	●	1
VC2MSD0170	1.7	4	40	4	2	●	1
VC2MSD0180	1.8	5	40	4	2	●	1
VC2MSD0190	1.9	5	40	4	2	●	1
VC2MSD0200	2	6	40	4	2	●	1
VC2MSD0210	2.1	6	40	4	2	●	1
VC2MSD0220	2.2	6	40	4	2	●	1
VC2MSD0230	2.3	6	40	4	2	●	1
VC2MSD0240	2.4	8	40	4	2	●	1
VC2MSD0250	2.5	8	40	4	2	●	1

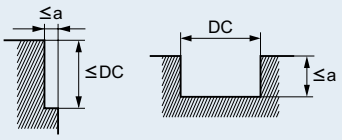
VC2MS

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
VC2MSD0260	2.6	8	40	4	2	●	1
VC2MSD0270	2.7	8	40	4	2	●	1
VC2MSD0280	2.8	8	40	4	2	●	1
VC2MSD0290	2.9	8	40	4	2	●	1
VC2MSD0300	3	8	45	6	2	●	1
VC2MSD0350	3.5	10	45	6	2	●	1
VC2MSD0400	4	11	45	6	2	●	1
VC2MSD0450	4.5	11	45	6	2	●	1
VC2MSD0500	5	13	50	6	2	●	1
VC2MSD0550	5.5	13	50	6	2	●	1
VC2MSD0600	6	13	50	6	2	●	2
VC2MSD0650	6.5	16	60	8	2	●	1
VC2MSD0700	7	16	60	8	2	●	1
VC2MSD0750	7.5	16	60	8	2	●	1
VC2MSD0800	8	19	60	8	2	●	2
VC2MSD0850	8.5	19	70	10	2	●	1
VC2MSD0900	9	19	70	10	2	●	1
VC2MSD0950	9.5	19	70	10	2	●	1
VC2MSD1000	10	22	70	10	2	●	2
VC2MSD1050	10.5	22	75	12	2	●	1
VC2MSD1100	11	22	75	12	2	●	1
VC2MSD1150	11.5	22	75	12	2	●	1
VC2MSD1200	12	26	75	12	2	●	2
VC2MSD1250	12.5	26	75	12	2	●	3
VC2MSD1300	13	26	75	12	2	●	3
VC2MSD1400	14	26	75	12	2	●	3
VC2MSD1500	15	30	80	16	2	●	1
VC2MSD1600	16	32	90	16	2	●	2
VC2MSD1700	17	32	90	16	2	●	3
VC2MSD1800	18	32	90	16	2	●	3
VC2MSD1900	19	32	100	20	2	●	1
VC2MSD2000	20	38	100	20	2	●	2
VC2MSD2200	22	38	100	20	2	●	3
VC2MSD2400	24	45	120	25	2	●	1
VC2MSD2500	25	45	120	25	2	●	2

VC2MS

RECOMMENDED CUTTING CONDITIONS

Work material	Carbon steel, Cast iron, Alloy steel, Pre-hardened steel AISI 1050, AISI No 35 B, AISI P20, AISI P21			Hardened steel (45— 55HRC) AISI H13		
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut a(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut a(mm)
0.3	40000	200	0.005	40000	200	0.005
0.5	40000	950	0.015	40000	950	0.015
1	40000	2000	0.06	32000	1600	0.06
1.5	40000	3000	0.12	32000	1900	0.08
2	30000	3000	0.18	24000	1900	0.10
2.5	24000	2600	0.25	19000	1600	0.13
3	20000	2300	0.30	16000	1400	0.15
4	15000	2000	0.40	12000	1200	0.20
5	12000	1600	0.50	9000	900	0.25
6	10000	1400	0.60	7000	700	0.30
8	8000	1000	0.80	5600	550	0.40
10	6400	900	1.00	4500	500	0.50
12	5400	820	1.00	3800	450	0.50
16	2400	380	3.00	1200	100	0.80
20	1900	320	4.00	1000	80	1.00



- If the depth of cut is shallow, the revolution and feed rate can be increased.
- In case of slotting with over 3 mm endmill, please reduce revolution to 50—70% of above value, and reduce feed rate to 40—60% of above value.
- When drilling, please set the feed rate at 1/3 or below of the values above.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

VC2JS

MIRACLE END MILLS

End mill, Semi long cut length, 2 flute

Product Information

UWC 30° VC Gash Sharp

DC≧3 DC<3 DC<3 DC≧3

Technical Info >> 1993

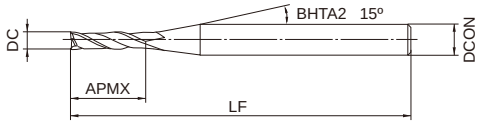
ISO13399 Property >> 1966

Work Material

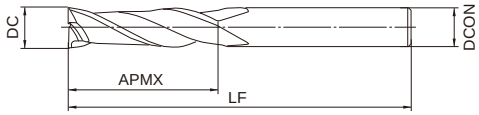
P M S H F M

SYMBOL DESCRIPTIONS >> 664

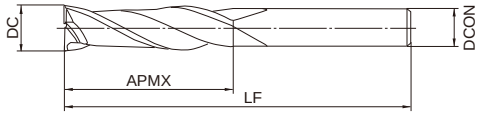
END MILLS SELECTION CHART >> 668



Type1



Type2



Type3

	DC≦12	DC>12		
	0 - 0.020	0 - 0.030		
h6	4≦DCON≦6	8≦DCON≦10	12≦DCON≦16	20≦DCON≦25
	0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013

●Inventory maintained in Japan. Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
VC2JSD0100	1	3.5	40	4	2	●	1
VC2JSD0150	1.5	5	40	4	2	●	1
VC2JSD0200	2	8	40	4	2	●	1
VC2JSD0250	2.5	10	40	4	2	●	1
VC2JSD0300	3	12	50	6	2	●	1
VC2JSD0350	3.5	15	50	6	2	●	1
VC2JSD0400	4	15	50	6	2	●	1
VC2JSD0450	4.5	15	50	6	2	●	1
VC2JSD0500	5	20	60	6	2	●	1
VC2JSD0550	5.5	20	60	6	2	●	1
VC2JSD0600	6	20	60	6	2	●	2
VC2JSD0650	6.5	25	70	8	2	●	1
VC2JSD0700	7	25	70	8	2	●	1
VC2JSD0750	7.5	25	70	8	2	●	1
VC2JSD0800	8	25	70	8	2	●	2
VC2JSD0850	8.5	25	90	10	2	●	1
VC2JSD0900	9	25	90	10	2	●	1
VC2JSD0950	9.5	25	90	10	2	●	1
VC2JSD1000	10	30	90	10	2	●	2
VC2JSD1050	10.5	30	90	12	2	●	1
VC2JSD1100	11	30	90	12	2	●	1
VC2JSD1150	11.5	30	90	12	2	●	1
VC2JSD1200	12	30	90	12	2	●	2

VC2JS

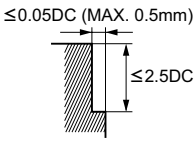
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
VC2JSD1300	13	35	90	12	2	●	3
VC2JSD1400	14	40	110	16	2	●	1
VC2JSD1500	15	40	110	16	2	●	1
VC2JSD1600	16	50	110	16	2	●	2
VC2JSD1700	17	50	110	20	2	●	1
VC2JSD1800	18	50	110	20	2	●	1
VC2JSD1900	19	55	110	20	2	●	1
VC2JSD2000	20	55	110	20	2	●	2
VC2JSD2200	22	65	140	25	2	●	1
VC2JSD2400	24	75	140	25	2	●	1
VC2JSD2500	25	75	140	25	2	●	2

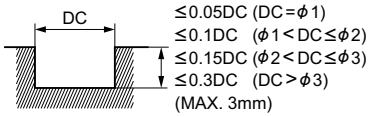
VC2JS

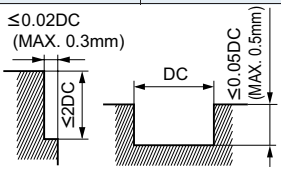
RECOMMENDED CUTTING CONDITIONS

( ) : Indicates standard revolution and feed rate for slotting.

Work material	Carbon steel, Cast iron, Alloy steel (—30HRC) AISI 1050, AISI No 35 B, AISI P20		Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V		Hardened steel (45— 55HRC) AISI H13	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
1	13000	60(60)	9000	35(35)	6500(6500)	20(20)	5700	20(15)
2	6400	60(60)	4800	45(45)	3500(3500)	30(30)	3000	25(15)
3	4200	65(60)	3400	55(55)	2600(2600)	40(40)	2100	30(20)
4	3400	80(60)	2700	65(30)	2100(1600)	50(20)	1700	35(20)
5	2900	100(60)	2300	80(40)	1800(1350)	60(25)	1500	40(20)
6	2500	120(60)	2000	100(50)	1500(1100)	75(30)	1300	50(25)
8	1900	130(60)	1500	100(50)	1200(900)	85(35)	1000	50(25)
10	1600	130(60)	1300	100(50)	950(710)	75(30)	800	50(25)
12	1300	120(60)	1100	90(45)	800(600)	60(25)	670	40(20)
16	1000	80(40)	820	65(30)	600(450)	45(20)	500	30(15)
20	800	65(30)	650	50(25)	480(360)	40(15)	400	25(13)
25	650	50(25)	520	40(20)	380(280)	30(12)	320	20(10)







- When cutting austenitic stainless steel, the use of water-soluble cutting fluid is effective.
- If the depth of cut is shallow, the revolution and feed rate can be increased.
- When drilling, please set the feed rate at 1/3 or below of the values above.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

CRN2MS

CRN END MILLS

End mill, Medium cut length, 2 flute, For copper electrodes

Product Information

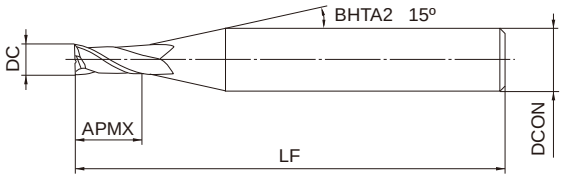
UWC 30° CRN Sharp

DC<3 DC≧3

Work Material

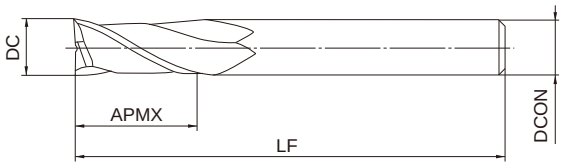
N F M

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668



Type1

	0.2≦DC≦12		
	0 - 0.02		
h6	4≦DCON≦6	8≦DCON≦10	DCON=12
	0 - 0.008	0 - 0.009	0 - 0.011



Type2

●Inventory maintained in Japan. Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
CRN2MSD0020S04	0.2	0.4	40	4	2	●	1
CRN2MSD0020S06	0.2	0.4	45	6	2	●	1
CRN2MSD0030S04	0.3	0.6	40	4	2	●	1
CRN2MSD0030S06	0.3	0.6	45	6	2	●	1
CRN2MSD0040S04	0.4	0.8	40	4	2	●	1
CRN2MSD0040S06	0.4	0.8	45	6	2	●	1
CRN2MSD0050S04	0.5	1	40	4	2	●	1
CRN2MSD0050S06	0.5	1	45	6	2	●	1
CRN2MSD0060S04	0.6	1.2	40	4	2	●	1
CRN2MSD0070S04	0.7	1.4	40	4	2	●	1
CRN2MSD0080S04	0.8	1.6	40	4	2	●	1
CRN2MSD0080S06	0.8	1.6	45	6	2	●	1
CRN2MSD0090S04	0.9	2	40	4	2	●	1
CRN2MSD0100S04	1	2.5	40	4	2	●	1
CRN2MSD0100S06	1	2.5	45	6	2	●	1
CRN2MSD0110S04	1.1	2.5	40	4	2	●	1
CRN2MSD0120S04	1.2	3	40	4	2	●	1
CRN2MSD0120S06	1.2	3	45	6	2	●	1
CRN2MSD0130S04	1.3	3	40	4	2	●	1
CRN2MSD0140S04	1.4	3	40	4	2	●	1
CRN2MSD0150S04	1.5	4	40	4	2	●	1
CRN2MSD0150S06	1.5	4	45	6	2	●	1
CRN2MSD0160S04	1.6	4	40	4	2	●	1
CRN2MSD0170S04	1.7	4	40	4	2	●	1
CRN2MSD0180S04	1.8	5	40	4	2	●	1
CRN2MSD0190S04	1.9	5	40	4	2	●	1
CRN2MSD0200S06	2	6	45	6	2	●	1
CRN2MSD0250S06	2.5	8	45	6	2	●	1

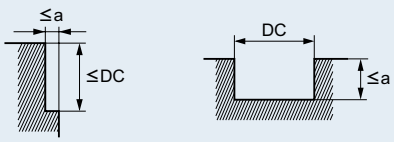
CRN2MS

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
CRN2MSD0300S06	3	8	45	6	2	●	1
CRN2MSD0400S06	4	11	45	6	2	●	1
CRN2MSD0500S06	5	13	50	6	2	●	1
CRN2MSD0600S06	6	13	50	6	2	●	2
CRN2MSD0800S08	8	19	60	8	2	●	2
CRN2MSD1000S10	10	22	70	10	2	●	2
CRN2MSD1200S12	12	26	75	12	2	●	2

CRN2MS

RECOMMENDED CUTTING CONDITIONS

Work material	Copper, Copper alloys		
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (mm)
0.2	40000	600	0.01
0.3	40000	600	0.01
0.4	40000	800	0.01
0.5	40000	960	0.015
0.6	40000	1200	0.02
0.7	40000	1400	0.02
0.8	40000	1600	0.03
0.9	40000	1800	0.04
1	40000	2000	0.06
1.5	40000	3000	0.12
2	30000	3000	0.18
2.5	24000	2600	0.25
3	20000	2300	0.30
4	15000	2000	0.40
5	12000	1600	0.50
6	10000	1400	0.60
8	8000	1000	0.80
10	6400	900	1.00
12	5400	820	1.00



- If the depth of cut is shallow, the revolution and feed rate can be increased.
- The use of water-soluble coolant is recommended.
- When drilling, please set the feed rate at 1/3 or below of the values above.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

CRN2XL

CRN END MILLS

End mill, Medium cut length, 2 flute, Long neck, For copper electrodes

Product Information

UWC 30° CRN Sharp

DC<3 DC≧3

Technical Info >> 1993

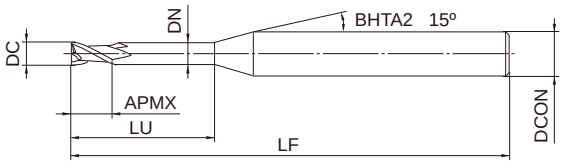
ISO13399 Property >> 1966

Work Material

N F M

SYMBOL DESCRIPTIONS >> 664

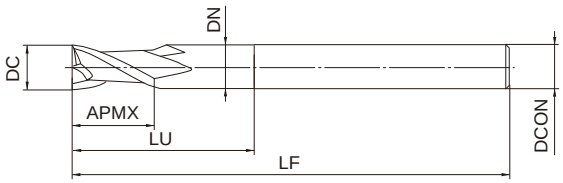
END MILLS SELECTION CHART >> 668



Type1

0.2≦DC≦6	0 / - 0.02
4≦DCON≦6	0 / - 0.008

h6



Type2

●Inventory maintained in Japan. Unit : mm

Order Number	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	type
CRN2XLD0020N005S04	0.2	0.3	0.5	0.17	50	4	2	●	1
CRN2XLD0020N005S06	0.2	0.3	0.5	0.17	50	6	2	●	1
CRN2XLD0020N010S04	0.2	0.3	1	0.17	50	4	2	●	1
CRN2XLD0020N010S06	0.2	0.3	1	0.17	50	6	2	●	1
CRN2XLD0020N015S04	0.2	0.3	1.5	0.17	50	4	2	●	1
CRN2XLD0020N015S06	0.2	0.3	1.5	0.17	50	6	2	●	1
CRN2XLD0030N010S04	0.3	0.5	1	0.27	50	4	2	●	1
CRN2XLD0030N010S06	0.3	0.5	1	0.27	50	6	2	●	1
CRN2XLD0030N030S04	0.3	0.5	3	0.27	50	4	2	●	1
CRN2XLD0030N030S06	0.3	0.5	3	0.27	50	6	2	●	1
CRN2XLD0040N020S04	0.4	0.6	2	0.36	50	4	2	●	1
CRN2XLD0040N020S06	0.4	0.6	2	0.36	50	6	2	●	1
CRN2XLD0040N040S04	0.4	0.6	4	0.36	50	4	2	●	1
CRN2XLD0040N040S06	0.4	0.6	4	0.36	50	6	2	●	1
CRN2XLD0040N060S04	0.4	0.6	6	0.36	50	4	2	●	1
CRN2XLD0040N060S06	0.4	0.6	6	0.36	50	6	2	●	1
CRN2XLD0050N020S04	0.5	0.8	2	0.46	50	4	2	●	1
CRN2XLD0050N020S06	0.5	0.8	2	0.46	50	6	2	●	1
CRN2XLD0050N040S04	0.5	0.8	4	0.46	50	4	2	●	1
CRN2XLD0050N040S06	0.5	0.8	4	0.46	50	6	2	●	1
CRN2XLD0050N060S04	0.5	0.8	6	0.46	50	4	2	●	1
CRN2XLD0050N060S06	0.5	0.8	6	0.46	50	6	2	●	1
CRN2XLD0050N080S04	0.5	0.8	8	0.46	50	4	2	●	1
CRN2XLD0050N080S06	0.5	0.8	8	0.46	50	6	2	●	1
CRN2XLD0080N040S04	0.8	1.2	4	0.76	50	4	2	●	1
CRN2XLD0080N040S06	0.8	1.2	4	0.76	50	6	2	●	1
CRN2XLD0080N060S04	0.8	1.2	6	0.76	50	4	2	●	1
CRN2XLD0080N060S06	0.8	1.2	6	0.76	50	6	2	●	1

CRN2XL

Order Number	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	type
CRN2XLD0080N080S04	0.8	1.2	8	0.76	50	4	2	●	1
CRN2XLD0080N080S06	0.8	1.2	8	0.76	50	6	2	●	1
CRN2XLD0080N100S04	0.8	1.2	10	0.76	50	4	2	●	1
CRN2XLD0080N100S06	0.8	1.2	10	0.76	50	6	2	●	1
CRN2XLD0100N060S04	1	1.5	6	0.94	50	4	2	●	1
CRN2XLD0100N060S06	1	1.5	6	0.94	50	6	2	●	1
CRN2XLD0100N080S04	1	1.5	8	0.94	50	4	2	●	1
CRN2XLD0100N080S06	1	1.5	8	0.94	50	6	2	●	1
CRN2XLD0100N100S04	1	1.5	10	0.94	50	4	2	●	1
CRN2XLD0100N100S06	1	1.5	10	0.94	50	6	2	●	1
CRN2XLD0100N120S04	1	1.5	12	0.94	50	4	2	●	1
CRN2XLD0100N120S06	1	1.5	12	0.94	50	6	2	●	1
CRN2XLD0100N160S04	1	1.5	16	0.94	55	4	2	●	1
CRN2XLD0100N160S06	1	1.5	16	0.94	55	6	2	●	1
CRN2XLD0150N060S04	1.5	2.3	6	1.44	50	4	2	●	1
CRN2XLD0150N060S06	1.5	2.3	6	1.44	50	6	2	●	1
CRN2XLD0150N080S04	1.5	2.3	8	1.44	50	4	2	●	1
CRN2XLD0150N080S06	1.5	2.3	8	1.44	50	6	2	●	1
CRN2XLD0150N100S04	1.5	2.3	10	1.44	50	4	2	●	1
CRN2XLD0150N100S06	1.5	2.3	10	1.44	50	6	2	●	1
CRN2XLD0150N120S04	1.5	2.3	12	1.44	50	4	2	●	1
CRN2XLD0150N120S06	1.5	2.3	12	1.44	50	6	2	●	1
CRN2XLD0150N160S04	1.5	2.3	16	1.44	55	4	2	●	1
CRN2XLD0150N160S06	1.5	2.3	16	1.44	55	6	2	●	1
CRN2XLD0150N200S04	1.5	2.3	20	1.44	60	4	2	●	1
CRN2XLD0150N200S06	1.5	2.3	20	1.44	60	6	2	●	1
CRN2XLD0200N060S06	2	3	6	1.9	50	6	2	●	1
CRN2XLD0200N080S06	2	3	8	1.9	50	6	2	●	1
CRN2XLD0200N100S06	2	3	10	1.9	50	6	2	●	1
CRN2XLD0200N120S06	2	3	12	1.9	50	6	2	●	1
CRN2XLD0200N160S06	2	3	16	1.9	55	6	2	●	1
CRN2XLD0200N200S06	2	3	20	1.9	60	6	2	●	1
CRN2XLD0250N080S06	2.5	3.8	8	2.4	50	6	2	●	1
CRN2XLD0250N120S06	2.5	3.8	12	2.4	55	6	2	●	1
CRN2XLD0250N160S06	2.5	3.8	16	2.4	60	6	2	●	1
CRN2XLD0250N200S06	2.5	3.8	20	2.4	65	6	2	●	1
CRN2XLD0300N200S06	3	4.5	20	2.9	65	6	2	●	1
CRN2XLD0400N200S06	4	6	20	3.9	65	6	2	●	1
CRN2XLD0500N250S06	5	7.5	25	4.9	70	6	2	●	1
CRN2XLD0600N300S06	6	9	30	5.85	70	6	2	●	2

CRN2XL

RECOMMENDED CUTTING CONDITIONS

Work material		Copper, Copper alloys		
Dia. DC (mm)	Neck length LU (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (mm)
0.2	0.5	40000	800	0.004
	1.0	40000	700	0.003
	1.5	40000	600	0.002
0.3	1	40000	800	0.007
	3	40000	600	0.002
0.4	2	40000	950	0.007
	4	40000	800	0.003
	6	40000	600	0.001
0.5	2	40000	950	0.01
	4	40000	800	0.005
	6	40000	700	0.002
0.8	4	40000	1200	0.02
	6	40000	1200	0.015
	8	40000	1000	0.01
1	6	40000	2000	0.04
	8	40000	2000	0.03
	10	30000	1200	0.02
	12	30000	1000	0.015
1.5	6	40000	2400	0.10
	8	40000	2200	0.09
	10	40000	2000	0.08
	12	30000	1800	0.05
	16	20000	1200	0.03
	20	15000	800	0.02
2	6	40000	2400	0.18
	8	40000	2200	0.15
	10	40000	2000	0.12
	12	30000	1500	0.10
	16	30000	1000	0.06
	20	15000	600	0.03
2.5	8	40000	3000	0.20
	12	40000	2800	0.15
	16	30000	2100	0.10
	20	20000	1000	0.08
3	20	20000	2000	0.12
4	20	15000	2000	0.30
5	25	12000	1500	0.35
6	30	10000	1200	0.40

- If the depth of cut is shallow, the revolution and feed rate can be increased.
- The use of water-soluble coolant is recommended.
- Cutting condition may be considerably different due to the overhang (milling depth), depth of cut, and machine tools. Please see the above table as a standard.

SED2KMG

END MILL FOR SLOTTING

End mill, Medium cut length, 2 flute, For key ways, Minus tolerance

Product Information

UWC 30° MS Gash Sharp

DC>10 DC≦10 DC<3 3≦DC≦10 DC≧11

Technical Info >> 1993

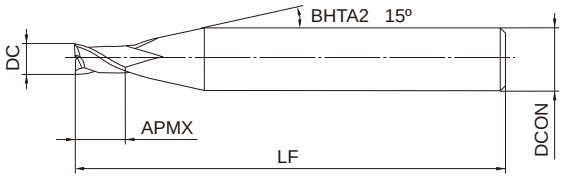
ISO13399 Property >> 1966

Work Material

P M S F M

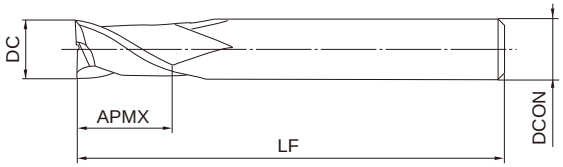
SYMBOL DESCRIPTIONS >> 664

END MILLS SELECTION CHART >> 668



Type1

2≦DC≦16		
0 - 0.02		
4≦DCON≦6	8≦DCON≦10	12≦DCON≦16
0 - 0.008	0 - 0.009	0 - 0.011



Type2

●Inventory maintained in Japan. Unit : mm

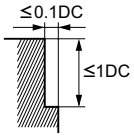
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
SED2020KMG	2	3	45	4	2	●	1
SED2030KMG	3	5	45	6	2	●	1
SED2040KMG	4	6	45	6	2	●	1
SED2050KMG	5	8	50	6	2	●	1
SED2060KMG	6	9	50	6	2	●	2
SED2070KMG	7	10	60	8	2	●	1
SED2080KMG	8	12	60	8	2	●	2
SED2100KMG	10	15	65	10	2	●	2
SED2120KMG	12	15	65	12	2	●	2
SED2140KMG	14	15	70	16	2	●	1
SED2150KMG	15	15	70	16	2	●	1
SED2160KMG	16	15	70	16	2	●	2

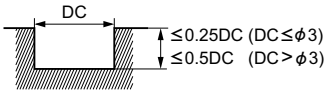
SED2KMG

RECOMMENDED CUTTING CONDITIONS

( ) : Indicates standard feed rate for slotting.

Work material	Carbon steel, Alloy steel (180—280HB) AISI 1045, AISI P20		Carbon steel, Alloy steel (280—380HB) AISI 1045, AISI P20		Pre-hardened steel (35—45HRC) NAK55		Stainless steel (270HB>) AISI 420		Cast iron (Tensile Strength 350MPa>) AISI No 35 B	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
2	13000	260(260)	10300	200(200)	8800	110(110)	9800	170(170)	21500	830(830)
3	8500	340(340)	6900	200(200)	6400	110(110)	6400	170(170)	14300	850(850)
4	6500	380(380)	5200	250(200)	4400	140(110)	4800	200(160)	10700	860(860)
5	5100	400(400)	4100	290(230)	3500	140(110)	3800	190(150)	8600	850(850)
6	4300	410(410)	3400	290(230)	2900	150(120)	3200	180(140)	7200	870(870)
8	3200	410(410)	2600	250(200)	2200	140(110)	2400	150(120)	5400	880(880)
10	2600	400(400)	2070	240(190)	1800	140(110)	1900	140(110)	4300	860(860)
12	2200	360(360)	1700	210(170)	1500	130(100)	1600	130(105)	3600	860(860)
14	1900	340(340)	1500	200(160)	1250	130(100)	1400	130(100)	3100	860(860)
16	1600	320(320)	1300	200(160)	1100	130(100)	1200	120(95)	2700	870(870)





- The cutting conditions above are a guide only to milling within the standard depth of cut.
- Ductile cast iron milling has the same cutting conditions as carbon steel and alloy steel. (180— 280HB)
- When drilling, please set the feed rate at 1/3 or below of the values above.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

SED2KPG

END MILL FOR SLOTTING

End mill, Medium cut length, 2 flute, For key ways, Plus tolerance

Product Information

UWC 30° MS Gash Sharp

DC>10 DC≦10 DC<3 3≦DC≦10 DC≧11

Technical Info >> 1993

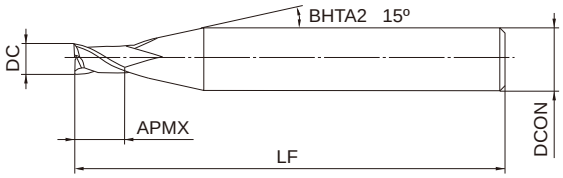
ISO13399 Property >> 1966

Work Material

P M S F M

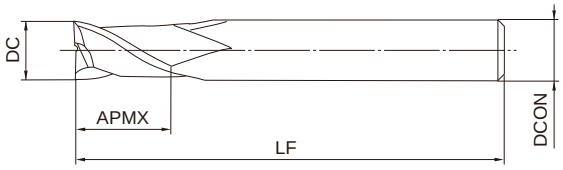
SYMBOL DESCRIPTIONS >> 664

END MILLS SELECTION CHART >> 668



Type1

	2≦DC≦16		
	0 + 0.02		
h6	4≦DCON≦6	8≦DCON≦10	12≦DCON≦16
	0 - 0.008	0 - 0.009	0 - 0.011



Type2

●Inventory maintained in Japan. Unit : mm

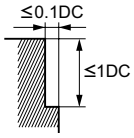
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
SED2020KPG	2	3	45	4	2	●	1
SED2030KPG	3	5	45	6	2	●	1
SED2040KPG	4	6	45	6	2	●	1
SED2050KPG	5	8	50	6	2	●	1
SED2060KPG	6	9	50	6	2	●	2
SED2070KPG	7	10	60	8	2	●	1
SED2080KPG	8	12	60	8	2	●	2
SED2100KPG	10	15	65	10	2	●	2
SED2120KPG	12	15	65	12	2	●	2
SED2140KPG	14	15	70	16	2	●	1
SED2150KPG	15	15	70	16	2	●	1
SED2160KPG	16	15	70	16	2	●	2

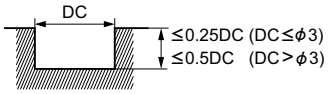
SED2KPG

RECOMMENDED CUTTING CONDITIONS

( ) : Indicates standard feed rate for slotting.

Work material	Carbon steel, Alloy steel (180—280HB) AISI 1045, AISI P20		Carbon steel, Alloy steel (280—380HB) AISI 1045, AISI P20		Pre-hardened steel (35—45HRC) NAK55		Stainless steel (270HB>) AISI 420		Cast iron (Tensile Strength 350MPa>) AISI No 35 B	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
2	13000	260(260)	10300	200(200)	8800	110(110)	9800	170(170)	21500	830(830)
3	8500	340(340)	6900	200(200)	6400	110(110)	6400	170(170)	14300	850(850)
4	6500	380(380)	5200	250(200)	4400	140(110)	4800	200(160)	10700	860(860)
5	5100	400(400)	4100	290(230)	3500	140(110)	3800	190(150)	8600	850(850)
6	4300	410(410)	3400	290(230)	2900	150(120)	3200	180(140)	7200	870(870)
8	3200	410(410)	2600	250(200)	2200	140(110)	2400	150(120)	5400	880(880)
10	2600	400(400)	2070	240(190)	1800	140(110)	1900	140(110)	4300	860(860)
12	2200	360(360)	1700	210(170)	1500	130(100)	1600	130(105)	3600	860(860)
14	1900	340(340)	1500	200(160)	1250	130(100)	1400	130(100)	3100	860(860)
16	1600	320(320)	1300	200(160)	1100	130(100)	1200	120(95)	2700	870(870)





- The cutting conditions above are a guide only to milling within the standard depth of cut.
- Ductile cast iron milling has the same cutting conditions as carbon steel and alloy steel. (180— 280HB)
- When drilling, please set the feed rate at 1/3 or below of the values above.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

C2SS

CARBIDE END MILLS

End mill, Short cut length, 2 flute

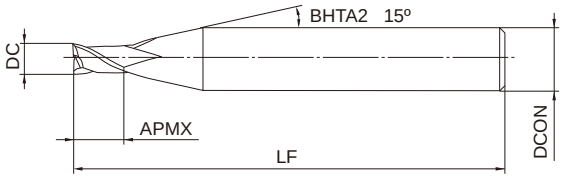
Product Information

UWC 30° Sharp DC<3 DC≧3

Work Material

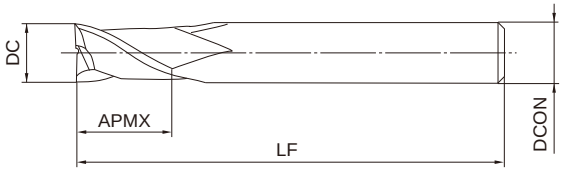
P M N S F M

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668



Type1

h6	0.4≦DC≦6
	0 / - 0.020
	4≦DCON≦6
	0 / - 0.008



Type2

●Inventory maintained in Japan. Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
C2SSD0040	0.4	0.8	40	4	2	●	1
C2SSD0050	0.5	0.8	40	4	2	●	1
C2SSD0060	0.6	1	40	4	2	●	1
C2SSD0070	0.7	1	40	4	2	●	1
C2SSD0080	0.8	1.3	40	4	2	●	1
C2SSD0090	0.9	1.3	40	4	2	●	1
C2SSD0100	1	1.5	40	4	2	●	1
C2SSD0110	1.1	1.5	40	4	2	●	1
C2SSD0120	1.2	2	40	4	2	●	1
C2SSD0130	1.3	2	40	4	2	●	1
C2SSD0140	1.4	2	40	4	2	●	1
C2SSD0150	1.5	2.5	40	4	2	●	1
C2SSD0160	1.6	2.5	40	4	2	●	1
C2SSD0170	1.7	2.5	40	4	2	●	1
C2SSD0180	1.8	3	40	4	2	●	1
C2SSD0190	1.9	3	40	4	2	●	1
C2SSD0200	2	3	40	4	2	●	1
C2SSD0210	2.1	3	40	4	2	●	1
C2SSD0220	2.2	3.5	40	4	2	●	1
C2SSD0230	2.3	3.5	40	4	2	●	1
C2SSD0240	2.4	3.5	40	4	2	●	1
C2SSD0250	2.5	4	40	4	2	●	1
C2SSD0260	2.6	4	40	4	2	●	1
C2SSD0270	2.7	4	40	4	2	●	1
C2SSD0280	2.8	4	40	4	2	●	1
C2SSD0290	2.9	4.5	40	4	2	●	1
C2SSD0300	3	4.5	45	6	2	●	1
C2SSD0350	3.5	5.5	45	6	2	●	1

C2SS

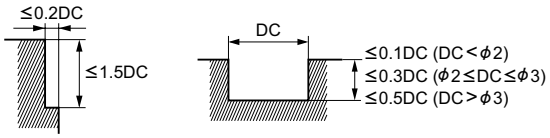
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
C2SSD0400	4	6	45	6	2	●	1
C2SSD0450	4.5	7	45	6	2	●	1
C2SSD0500	5	7.5	50	6	2	●	1
C2SSD0550	5.5	8.5	50	6	2	●	1
C2SSD0600	6	9	50	6	2	●	2

C2SS

RECOMMENDED CUTTING CONDITIONS

( ) : Indicates standard feed rate for slotting.

Work material	Structural steel, Cast iron, Carbon steel AISI 1045, AISI No 35 B, AISI 1050		Carbon steel, Alloy steel (20—30HRC) AISI 1050, AISI P20		Alloy steel, Tool steel, Pre-hardened steel (30—45HRC) AISI H13, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
0.5	17000	50(50)	14000	45(45)	11000	30(30)	9000	30(30)
1	10000	65(65)	8500	55(55)	6400	40(40)	5200	35(35)
2	5500	90(90)	4800	80(80)	3800	55(55)	3100	50(50)
3	4100	100(100)	3500	85(85)	2800	65(65)	2300	60(60)
4	3400	170(135)	2900	140(110)	2200	90(70)	1900	80(60)
5	2900	190(150)	2400	150(120)	1800	100(80)	1500	90(60)
6	2500	200(160)	2100	170(135)	1600	110(90)	1300	95(65)
8	1900	200(160)	1600	170(135)	1200	105(85)	1000	100(70)
10	1500	180(145)	1250	150(120)	950	95(75)	800	90(65)
12	1250	150(120)	1050	130(100)	800	80(65)	660	75(50)
16	940	110(90)	800	95(75)	600	60(50)	500	55(40)
20	750	90(70)	640	80(65)	480	50(40)	400	45(30)



- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

C2MS

CARBIDE END MILLS

End mill, Medium cut length, 2 flute

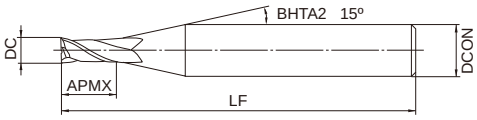
Product Information

UWC 30° Sharp DC<3 DC≧3

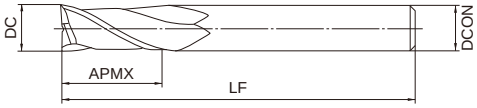
Work Material

P M N S F M

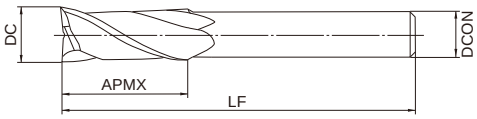
Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668



Type1



Type2



Type3

	DC≦12	DC>12		
	0 - 0.020	0 - 0.030		
h6	4≦DCON≦6	8≦DCON≦10	12≦DCON≦16	DCON=20
	0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013

●Inventory maintained in Japan. Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
C2MSD0100	1	2.5	40	4	2	●	1
C2MSD0110	1.1	2.5	40	4	2	●	1
C2MSD0120	1.2	3	40	4	2	●	1
C2MSD0130	1.3	3	40	4	2	●	1
C2MSD0140	1.4	3	40	4	2	●	1
C2MSD0150	1.5	4	40	4	2	●	1
C2MSD0160	1.6	4	40	4	2	●	1
C2MSD0170	1.7	4	40	4	2	●	1
C2MSD0180	1.8	5	40	4	2	●	1
C2MSD0190	1.9	5	40	4	2	●	1
C2MSD0200	2	6	40	4	2	●	1
C2MSD0210	2.1	6	40	4	2	●	1
C2MSD0220	2.2	6	40	4	2	●	1
C2MSD0230	2.3	6	40	4	2	●	1
C2MSD0240	2.4	8	40	4	2	●	1
C2MSD0250	2.5	8	40	4	2	●	1
C2MSD0260	2.6	8	40	4	2	●	1
C2MSD0270	2.7	8	40	4	2	●	1
C2MSD0280	2.8	8	40	4	2	●	1
C2MSD0290	2.9	8	40	4	2	●	1
C2MSD0300	3	8	45	6	2	●	1
C2MSD0310	3.1	8	45	6	2	●	1
C2MSD0320	3.2	8	45	6	2	●	1

C2MS

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
C2MSD0330	3.3	8	45	6	2	●	1
C2MSD0340	3.4	10	45	6	2	●	1
C2MSD0350	3.5	10	45	6	2	●	1
C2MSD0360	3.6	10	45	6	2	●	1
C2MSD0370	3.7	10	45	6	2	●	1
C2MSD0380	3.8	11	45	6	2	●	1
C2MSD0390	3.9	11	45	6	2	●	1
C2MSD0400	4	11	45	6	2	●	1
C2MSD0410	4.1	11	45	6	2	●	1
C2MSD0420	4.2	11	45	6	2	●	1
C2MSD0430	4.3	11	45	6	2	●	1
C2MSD0440	4.4	11	45	6	2	●	1
C2MSD0450	4.5	11	45	6	2	●	1
C2MSD0460	4.6	11	45	6	2	●	1
C2MSD0470	4.7	11	45	6	2	●	1
C2MSD0480	4.8	13	50	6	2	●	1
C2MSD0490	4.9	13	50	6	2	●	1
C2MSD0500	5	13	50	6	2	●	1
C2MSD0510	5.1	13	50	6	2	●	1
C2MSD0520	5.2	13	50	6	2	●	1
C2MSD0530	5.3	13	50	6	2	●	1
C2MSD0540	5.4	13	50	6	2	●	1
C2MSD0550	5.5	13	50	6	2	●	1
C2MSD0560	5.6	13	50	6	2	●	1
C2MSD0570	5.7	13	50	6	2	●	1
C2MSD0580	5.8	13	50	6	2	●	1
C2MSD0590	5.9	13	50	6	2	●	1
C2MSD0600	6	13	50	6	2	●	2
C2MSD0610	6.1	16	60	8	2	●	1
C2MSD0620	6.2	16	60	8	2	●	1
C2MSD0630	6.3	16	60	8	2	●	1
C2MSD0640	6.4	16	60	8	2	●	1
C2MSD0650	6.5	16	60	8	2	●	1
C2MSD0660	6.6	16	60	8	2	●	1
C2MSD0670	6.7	16	60	8	2	●	1
C2MSD0680	6.8	16	60	8	2	●	1
C2MSD0690	6.9	16	60	8	2	●	1
C2MSD0700	7	16	60	8	2	●	1
C2MSD0710	7.1	16	60	8	2	●	1
C2MSD0720	7.2	16	60	8	2	●	1
C2MSD0730	7.3	16	60	8	2	●	1
C2MSD0740	7.4	16	60	8	2	●	1
C2MSD0750	7.5	16	60	8	2	●	1
C2MSD0760	7.6	19	60	8	2	●	1
C2MSD0770	7.7	19	60	8	2	●	1
C2MSD0780	7.8	19	60	8	2	●	1
C2MSD0790	7.9	19	60	8	2	●	1
C2MSD0800	8	19	60	8	2	●	2
C2MSD0810	8.1	19	70	10	2	●	1
C2MSD0820	8.2	19	70	10	2	●	1
C2MSD0830	8.3	19	70	10	2	●	1
C2MSD0840	8.4	19	70	10	2	●	1
C2MSD0850	8.5	19	70	10	2	●	1
C2MSD0860	8.6	19	70	10	2	●	1

C2MS

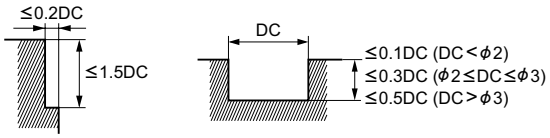
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
C2MSD0870	8.7	19	70	10	2	●	1
C2MSD0880	8.8	19	70	10	2	●	1
C2MSD0890	8.9	19	70	10	2	●	1
C2MSD0900	9	19	70	10	2	●	1
C2MSD0910	9.1	19	70	10	2	●	1
C2MSD0920	9.2	19	70	10	2	●	1
C2MSD0930	9.3	19	70	10	2	●	1
C2MSD0940	9.4	19	70	10	2	●	1
C2MSD0950	9.5	19	70	10	2	●	1
C2MSD0960	9.6	22	70	10	2	●	1
C2MSD0970	9.7	22	70	10	2	●	1
C2MSD0980	9.8	22	70	10	2	●	1
C2MSD0990	9.9	22	70	10	2	●	1
C2MSD1000	10	22	70	10	2	●	2
C2MSD1100	11	22	75	12	2	●	1
C2MSD1200	12	26	75	12	2	●	2
C2MSD1300	13	26	75	12	2	●	3
C2MSD1400	14	26	75	12	2	●	3
C2MSD1500	15	30	80	16	2	●	1
C2MSD1600	16	32	90	16	2	●	2
C2MSD1700	17	32	90	16	2	●	3
C2MSD1800	18	32	90	16	2	●	3
C2MSD1900	19	32	100	20	2	●	1
C2MSD2000	20	38	100	20	2	●	2

C2MS

RECOMMENDED CUTTING CONDITIONS

( ) : Indicates standard feed rate for slotting.

Work material	Structural steel, Cast iron, Carbon steel AISI 1045, AISI No 35 B, AISI 1050		Carbon steel, Alloy steel (20—30HRC) AISI 1050, AISI P20		Alloy steel, Tool steel, Pre-hardened steel (30—45HRC) AISI H13, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
0.5	17000	50(50)	14000	45(45)	11000	30(30)	9000	30(30)
1	10000	65(65)	8500	55(55)	6400	40(40)	5200	35(35)
2	5500	90(90)	4800	80(80)	3800	55(55)	3100	50(50)
3	4100	100(100)	3500	85(85)	2800	65(65)	2300	60(60)
4	3400	170(135)	2900	140(110)	2200	90(70)	1900	80(60)
5	2900	190(150)	2400	150(120)	1800	100(80)	1500	90(60)
6	2500	200(160)	2100	170(135)	1600	110(90)	1300	95(65)
8	1900	200(160)	1600	170(135)	1200	105(85)	1000	100(70)
10	1500	180(145)	1250	150(120)	950	95(75)	800	90(65)
12	1250	150(120)	1050	130(100)	800	80(65)	660	75(50)
16	940	110(90)	800	95(75)	600	60(50)	500	55(40)
20	750	90(70)	640	80(65)	480	50(40)	400	45(30)



- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

C2JS

CARBIDE END MILLS

End mill, Semi long cut length, 2 flute

Product Information

UWC | 30° | Gash DC≧3 | Sharp DC<3 | DC<3 | DC≧3

Work Material

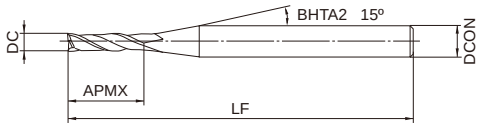
P M N S F M

Technical Info >> 1993

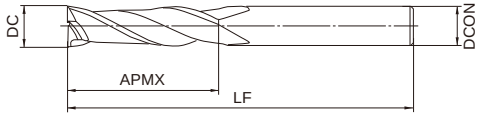
ISO13399 Property >> 1966

SYMBOL DESCRIPTIONS >> 664

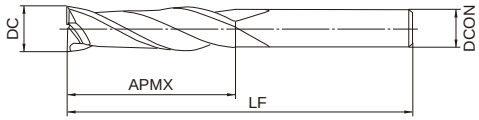
END MILLS SELECTION CHART >> 668



Type1



Type2



Type3

h6	DC≦12	DC>12		
	0 - 0.020	0 - 0.030		
	4≦DCON≦6	8≦DCON≦10	12≦DCON≦16	20≦DCON≦25
	0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013

●Inventory maintained in Japan. Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
C2JSD0100	1	3.5	40	4	2	●	1
C2JSD0150	1.5	5	40	4	2	●	1
C2JSD0200	2	8	40	4	2	●	1
C2JSD0250	2.5	10	40	4	2	●	1
C2JSD0300	3	12	50	6	2	●	1
C2JSD0350	3.5	15	50	6	2	●	1
C2JSD0400	4	15	50	6	2	●	1
C2JSD0450	4.5	15	50	6	2	●	1
C2JSD0500	5	20	60	6	2	●	1
C2JSD0550	5.5	20	60	6	2	●	1
C2JSD0600	6	20	60	6	2	●	2
C2JSD0650	6.5	25	70	8	2	●	1
C2JSD0700	7	25	70	8	2	●	1
C2JSD0750	7.5	25	70	8	2	●	1
C2JSD0800	8	25	70	8	2	●	2
C2JSD0850	8.5	25	90	10	2	●	1
C2JSD0900	9	25	90	10	2	●	1
C2JSD0950	9.5	25	90	10	2	●	1
C2JSD1000	10	30	90	10	2	●	2
C2JSD1050	10.5	30	90	12	2	●	1
C2JSD1100	11	30	90	12	2	●	1
C2JSD1150	11.5	30	90	12	2	●	1
C2JSD1200	12	30	90	12	2	●	2

C2JS

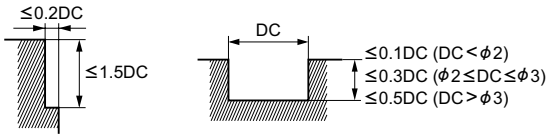
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
C2JSD1300	13	35	90	12	2	●	3
C2JSD1400	14	40	110	16	2	●	1
C2JSD1500	15	40	110	16	2	●	1
C2JSD1600	16	50	110	16	2	●	2
C2JSD1700	17	50	110	20	2	●	1
C2JSD1800	18	50	110	20	2	●	1
C2JSD1900	19	55	110	20	2	●	1
C2JSD2000	20	55	110	20	2	●	2
C2JSD2200	22	65	140	25	2	●	1
C2JSD2400	24	75	140	25	2	●	1
C2JSD2500	25	75	140	25	2	●	2

C2JS

RECOMMENDED CUTTING CONDITIONS

( ) : Indicates standard feed rate for slotting.

Work material	Structural steel, Cast iron, Carbon steel AISI 1045, AISI No 35 B, AISI 1050		Carbon steel, Alloy steel (20—30HRC) AISI 1050, AISI P20		Alloy steel, Tool steel, Pre-hardened steel (30—45HRC) AISI H13, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
0.5	17000	40(40)	14000	35(35)	11000	25(25)	9000	25(25)
1	10000	50(50)	8500	40(40)	6400	30(30)	5200	25(30)
2	5500	70(70)	4800	60(60)	3800	40(40)	3100	40(40)
3	4100	80(80)	3500	65(65)	2800	50(50)	2300	45(45)
4	3400	130(100)	2900	100(80)	2200	70(50)	1900	60(45)
5	2900	140(110)	2400	110(90)	1800	75(60)	1500	70(45)
6	2500	150(120)	2100	130(100)	1600	80(70)	1300	70(50)
8	1900	150(120)	1600	130(100)	1200	80(65)	1000	75(55)
10	1500	135(110)	1300	110(90)	950	70(60)	800	70(50)
12	1300	110(90)	1100	100(75)	800	60(50)	660	60(40)
16	940	80(70)	800	70(60)	600	45(40)	500	40(30)
20	750	70(50)	640	60(50)	480	40(30)	400	35(25)



- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

C2LS

CARBIDE END MILLS

End mill, Long cut length, 2 flute

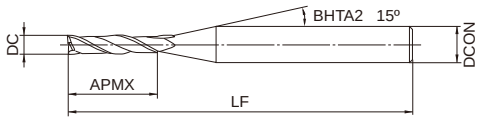
Product Information

UWC 30° Sharp

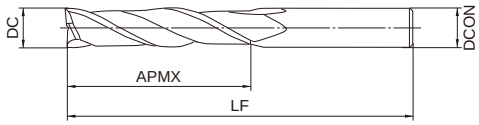
Work Material

P M N S F M

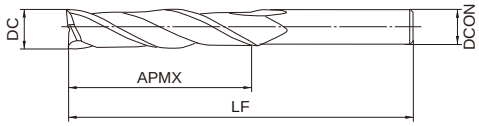
Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668



Type1



Type2



Type3

h6	DC≦12	DC>12		
	0 - 0.020	0 - 0.030		
	4≦DCON≦6	8≦DCON≦10	12≦DCON≦16	DCON=20
	0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013

●Inventory maintained in Japan. Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
C2LSD0100	1	4	40	4	2	●	1
C2LSD0150	1.5	6	40	4	2	●	1
C2LSD0200	2	9	40	4	2	●	1
C2LSD0250	2.5	12	40	4	2	●	1
C2LSD0300	3	20	60	6	2	●	1
C2LSD0350	3.5	22	60	6	2	●	1
C2LSD0400	4	25	60	6	2	●	1
C2LSD0450	4.5	25	60	6	2	●	1
C2LSD0500	5	30	70	6	2	●	1
C2LSD0550	5.5	30	70	6	2	●	1
C2LSD0600	6	30	70	6	2	●	2
C2LSD0650	6.5	30	90	8	2	●	1
C2LSD0700	7	40	90	8	2	●	1
C2LSD0750	7.5	40	90	8	2	●	1
C2LSD0800	8	40	90	8	2	●	2
C2LSD0850	8.5	40	100	10	2	●	1
C2LSD0900	9	40	100	10	2	●	1
C2LSD0950	9.5	40	100	10	2	●	1
C2LSD1000	10	50	100	10	2	●	2
C2LSD1050	10.5	50	110	12	2	●	1
C2LSD1100	11	50	110	12	2	●	1
C2LSD1150	11.5	50	110	12	2	●	1
C2LSD1200	12	50	110	12	2	●	2

C2LS

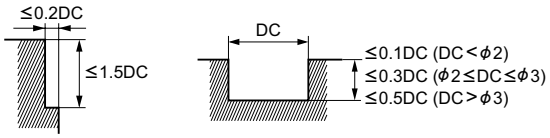
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
C2LSD1250	12.5	50	120	12	2	●	3
C2LSD1300	13	50	120	12	2	●	3
C2LSD1400	14	70	130	16	2	●	1
C2LSD1500	15	70	130	16	2	●	1
C2LSD1600	16	70	130	16	2	●	2
C2LSD1700	17	70	140	20	2	●	1
C2LSD1800	18	70	140	20	2	●	1
C2LSD1900	19	70	140	20	2	●	1
C2LSD2000	20	70	140	20	2	●	2

C2LS

RECOMMENDED CUTTING CONDITIONS

( ) : Indicates standard feed rate for slotting.

Work material	Structural steel, Cast iron, Carbon steel AISI 1045, AISI No 35 B, AISI 1050		Carbon steel, Alloy steel (20—30HRC) AISI 1050, AISI P20		Alloy steel, Tool steel, Pre-hardened steel (30—45HRC) AISI H13, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
0.5	13000	30(30)	11000	25(25)	8300	16(16)	6800	15(15)
1	7500	35(35)	6400	30(30)	4800	20(20)	3900	20(20)
2	4100	50(50)	3600	45(45)	2900	30(30)	2300	30(30)
3	3100	55(55)	2600	45(45)	2100	35(35)	1700	35(35)
4	2600	100(75)	2200	80(60)	1700	50(40)	1400	45(35)
5	2200	100(85)	1800	80(65)	1400	55(45)	1100	50(35)
6	1900	110(90)	1600	95(75)	1200	60(50)	980	55(35)
8	1400	110(90)	1200	95(75)	900	60(45)	750	55(40)
10	1100	100(80)	940	85(65)	710	50(40)	600	50(35)
12	940	85(65)	790	70(55)	600	45(35)	500	40(30)
16	710	60(50)	600	55(40)	450	30(30)	380	30(20)
20	560	50(40)	480	45(35)	360	30(20)	300	25(16)



- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

C2MA

ALIMASTER END MILLS

End mill, Medium cut length, 2 flute, For aluminium alloy

Product Information

UWC 30° 37.5° Sharp

DC<3 DC≧3 DC<3 DC≧3

Technical Info >> 1993

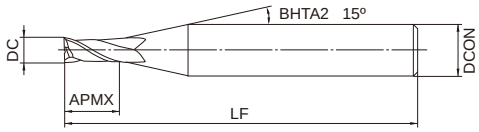
ISO13399 Property >> 1966

Work Material

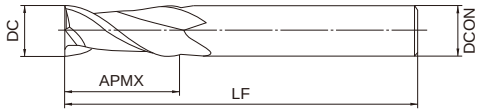
N F M

SYMBOL DESCRIPTIONS >> 664

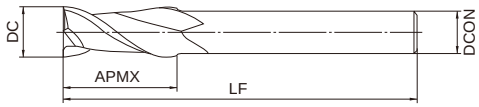
END MILLS SELECTION CHART >> 668



Type1



Type2



Type3

	DC≦12	DC>12		
	0 - 0.020	0 - 0.030		
h6	4≦DCON≦6	8≦DCON≦10	12≦DCON≦16	DCON=20
	0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013

●Inventory maintained in Japan. Unit : mm

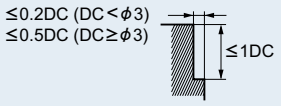
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
C2MAD0100	1	2.5	40	4	2	●	1
C2MAD0150	1.5	4	40	4	2	●	1
C2MAD0200	2	6	40	4	2	●	1
C2MAD0250	2.5	8	40	4	2	●	1
C2MAD0300	3	8	45	6	2	●	1
C2MAD0400	4	11	45	6	2	●	1
C2MAD0500	5	13	50	6	2	●	1
C2MAD0600	6	13	50	6	2	●	2
C2MAD0800	8	19	60	8	2	●	2
C2MAD1000	10	22	70	10	2	●	2
C2MAD1200	12	26	75	12	2	●	2
C2MAD1400	14	26	75	12	2	●	3
C2MAD1500	15	30	80	16	2	●	1
C2MAD1600	16	32	90	16	2	●	2
C2MAD1800	18	32	90	16	2	●	3
C2MAD2000	20	38	100	20	2	●	2

C2MA

RECOMMENDED CUTTING CONDITIONS

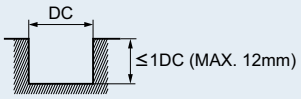
·Side milling

Work material	Aluminium alloy A7075		Aluminium cast AC4B	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
1	40000	600	40000	460
2	40000	1100	38000	850
3	32000	1400	25000	950
4	24000	1500	19000	1000
5	19000	1600	15000	1000
6	16000	1900	13000	1100
8	12000	1900	9500	1200
10	9500	1900	7600	1200
12	8000	1900	6400	1200
16	6000	1900	4800	1200
20	4800	1500	3800	1000



·Slotting

Work material	Aluminium alloy A7075		Aluminium cast AC4B	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
1	40000	460	40000	350
2	38000	850	32000	550
3	25000	950	21000	600
4	19000	1000	16000	650
5	15000	1000	13000	700
6	13000	1100	11000	750
8	9500	1200	8000	800
10	7600	1200	6400	800
12	6400	1200	5300	800
16	4800	1000	4000	720
20	3800	970	3200	660



- If the depth of cut is shallow, the revolution and feed rate can be increased.
- The use of water-soluble coolant is recommended.
- Climb cutting is recommended for side milling.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

C2LA

ALIMASTER END MILLS

End mill, Long cut length, 2 flute, For aluminium alloy

Product Information

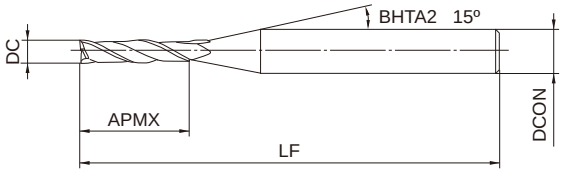
UWC 30° 37.5° Sharp

DC<3 DC≧3 DC<3 DC≧3

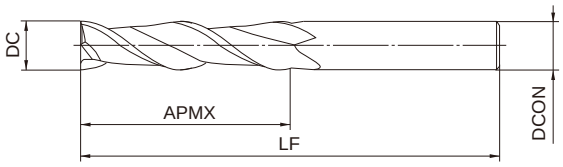
Work Material

N F M

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668



Type1



Type2

h6

DC≦12	DC>12		
0 - 0.020	0 - 0.030		
4≦DCON≦6	8≦DCON≦10	12≦DCON≦16	DCON=20
0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013

●Inventory maintained in Japan. Unit : mm

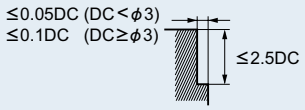
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
C2LAD0100	1	4	40	4	2	●	1
C2LAD0150	1.5	6	40	4	2	●	1
C2LAD0200	2	9	40	4	2	●	1
C2LAD0250	2.5	12	40	4	2	●	1
C2LAD0300	3	20	60	6	2	●	1
C2LAD0400	4	25	60	6	2	●	1
C2LAD0500	5	30	70	6	2	●	1
C2LAD0600	6	30	70	6	2	●	2
C2LAD0800	8	40	90	8	2	●	2
C2LAD1000	10	50	100	10	2	●	2
C2LAD1200	12	50	110	12	2	●	2
C2LAD1400	14	70	130	16	2	●	1
C2LAD1500	15	70	130	16	2	●	1
C2LAD1600	16	70	130	16	2	●	2
C2LAD1800	18	70	140	20	2	●	1
C2LAD2000	20	70	140	20	2	●	2

C2LA

RECOMMENDED CUTTING CONDITIONS

·Side milling

Work material	Aluminium alloy A7075			Aluminium cast AC4B		
Dia. DC (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)
1	150	40000	320	120	38000	240
2	150	24000	380	120	19000	240
3	150	16000	510	120	13000	330
4	150	12000	580	120	9500	380
5	150	9500	640	120	7600	400
6	150	8000	640	120	6400	400
8	150	6000	770	120	4800	480
10	150	4800	770	120	3800	480
12	150	4000	770	120	3200	480
16	150	3000	670	120	2400	430
20	150	2400	610	120	1900	390



- If the depth of cut is shallow, the revolution and feed rate can be increased.
- The use of water-soluble coolant is recommended.
- Climb cutting is recommended for side milling.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

C2SA

ALIMASTER END MILLS

End mill, Short cut length, 2 flute, For aluminium alloy

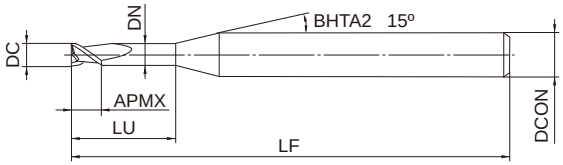
Product Information

UWC 37.5° Gash

Work Material

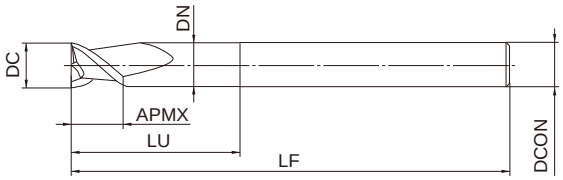
N F M

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668



Type1

DC≦12	DC>12		
0 - 0.020	0 - 0.030		
DCON=6	8≦DCON≦10	12≦DCON≦16	DCON=20
0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013



Type2

●Inventory maintained in Japan. Unit : mm

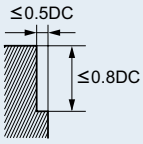
Order Number	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	type
C2SAD0300N120	3	6	12	2.7	60	6	2	●	1
C2SAD0400N120	4	6	12	3.7	60	6	2	●	1
C2SAD0500N150	5	8	15	4.7	60	6	2	●	1
C2SAD0600N160	6	8	16	5.7	75	6	2	●	2
C2SAD0800N200	8	10	20	7.4	75	8	2	●	2
C2SAD1000N300	10	12	30	9.4	75	10	2	●	2
C2SAD1000N350	10	12	35	9.4	100	10	2	●	2
C2SAD1200N300	12	15	30	11.4	75	12	2	●	2
C2SAD1200N350	12	15	35	11.4	100	12	2	●	2
C2SAD1200N400	12	15	40	11.4	125	12	2	●	2
C2SAD1600N300	16	15	30	15.4	75	16	2	●	2
C2SAD1600N400	16	15	40	15.4	100	16	2	●	2
C2SAD1600N450	16	15	45	15.4	125	16	2	●	2
C2SAD2000N400	20	20	40	18	100	20	2	●	2
C2SAD2000N500	20	20	50	18	125	20	2	●	2

C2SA

RECOMMENDED CUTTING CONDITIONS

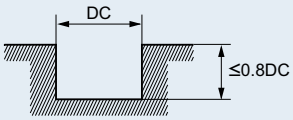
·Side milling

Work material	Aluminium alloy A7075	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)
3	40000	1800
4	36000	2400
5	30000	3000
6	27000	3200
8	20000	3400
10	16000	3600
12	13000	3600
16	10000	3600
20	8000	3300



·Slotting

Work material	Aluminium alloy A7075	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)
3	40000	1600
4	36000	2100
5	30000	2700
6	27000	2800
8	20000	3000
10	16000	3200
12	13000	3200
16	10000	3200
20	8000	3000



- The use of water-soluble coolant is recommended.
- Climb cutting is recommended for side milling.
- If tool clamping is poor, the tool can be pulled out of the holder. Ensure that the tool is sufficiently clamped.
- This table shows the cutting condition with less than 4DC overhang length. If more than 4DC, spindle speed, feed rate and depth of cut should be reduced.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

C2MHA

ALIMASTER END MILLS

End mill, Medium cut length, 2 flute, For aluminium alloy

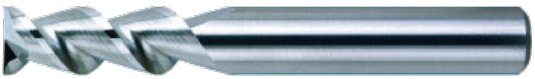
Product Information

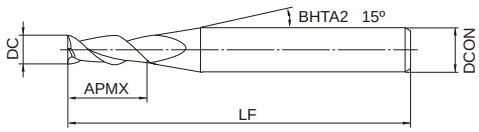
UWC 55° Gash

Work Material

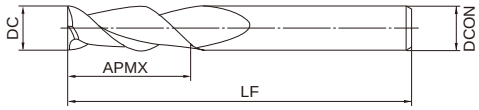
N F M

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668

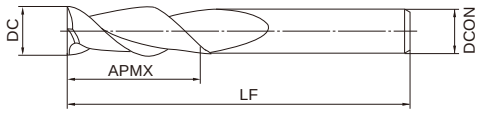




Type1



Type2



Type3

h6

DC≦12	DC>12		
0 - 0.020	0 - 0.030		
DCON=6	8≦DCON≦10	12≦DCON≦16	20≦DCON≦25
0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013

●Inventory maintained in Japan. Unit : mm

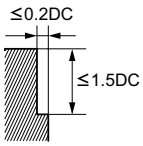
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
C2MHAD0300	3	9	60	6	2	●	1
C2MHAD0400	4	12	60	6	2	●	1
C2MHAD0500	5	15	60	6	2	●	1
C2MHAD0600	6	18	60	6	2	●	2
C2MHAD0800	8	20	75	8	2	●	2
C2MHAD1000	10	25	75	10	2	●	2
C2MHAD1200	12	25	75	12	2	●	2
C2MHAD1400	14	32	75	12	2	●	3
C2MHAD1600	16	32	100	16	2	●	2
C2MHAD2000	20	38	125	20	2	●	2
C2MHAD2500	25	38	125	25	2	●	2

C2MHA

RECOMMENDED CUTTING CONDITIONS

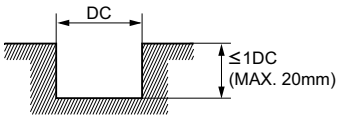
·Side milling

Work material	Aluminium alloy A7075 (Excluding low hardness materials such as A1000 series)	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)
3	40000	2400
4	36000	2600
5	30000	4000
6	27000	4000
8	20000	4000
10	16000	4500
12	13000	4500
16	10000	4500
20	8000	4300
25	6000	3600



·Slotting

Work material	Aluminium alloy A7075 (Excluding low hardness materials such as A1000 series)	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)
3	40000	1500
4	36000	1800
5	30000	2800
6	27000	2800
8	20000	2800
10	16000	3200
12	13000	3200
16	10000	3200
20	8000	3000
25	6000	2500



- The use of water-soluble coolant is recommended.
- Climb cutting is recommended for side milling.
- If tool clamping is poor, the tool can be pulled out of the holder. Ensure that the tool is sufficiently clamped.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

SEE2L

CARBIDE END MILLS

End mill, Long cut length, 2 flute

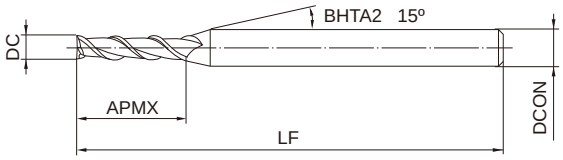
Product Information

UWC 45° Gash

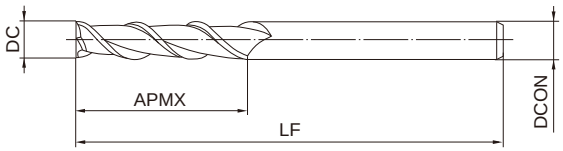
Work Material

P M N S F M

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668



Type1



Type2

DC≦12	DC>12		
0 - 0.020	0 - 0.030		
DCON=6	8≦DCON≦10	12≦DCON≦16	DCON=20
0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013

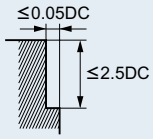
●Inventory maintained in Japan. Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
SEE2030L	3	15	55	6	2	●	1
SEE2040L	4	20	60	6	2	●	1
SEE2050L	5	25	65	6	2	●	1
SEE2060L	6	25	65	6	2	●	2
SEE2070L	7	35	80	8	2	●	1
SEE2080L	8	35	80	8	2	●	2
SEE2090L	9	45	90	10	2	●	1
SEE2100L	10	45	95	10	2	●	2
SEE2110L	11	55	105	12	2	●	1
SEE2120L	12	55	105	12	2	●	2
SEE2150L	15	70	125	16	2	●	1
SEE2160L	16	70	125	16	2	●	2
SEE2200L	20	75	140	20	2	●	2

SEE2L

RECOMMENDED CUTTING CONDITIONS

Work material	Carbon steel, Alloy steel (180—280HB) AISI 1045, AISI P20		Carbon steel, Alloy steel (280—380HB) AISI 1045, AISI P20		Pre-hardened steel (35—45HRC) NAK55		stainless steel (270HB>) AISI 420		Cast iron (Tensile Strength 350MPa>) AISI No 35 B	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
3	3400	100	3000	40	2100	20	2600	40	5500	160
4	2400	110	2200	60	1600	30	1900	50	4200	180
5	2000	120	1800	60	1300	40	1500	50	3300	200
6	1600	120	1500	60	1000	40	1300	50	2800	210
8	1200	110	1100	60	800	40	960	50	2100	210
10	1000	100	880	60	640	40	760	50	1600	210
12	800	100	760	70	520	40	640	60	1400	210
16	600	90	560	70	400	40	480	70	1000	220
20	480	80	440	80	320	40	400	70	840	230



- The cutting conditions above are a guide only to milling within the standard depth of cut.
- Ductile cast iron milling has the same cutting conditions as carbon steel and alloy steel. (180— 280HB)
- When drilling, please set the feed rate at 1/3 or below of the values above.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

MSMHZD

MSTAR END MILLS

Slotting, Medium cut length, 3 flute

Product Information

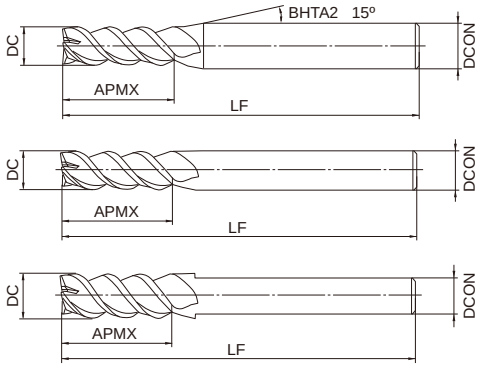
UWC 45° MS Gash

Work Material

P M S H F M

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668

	DC≦12	DC>12		
	0 - 0.020	0 - 0.030		
h6	4≦DCON≦6	8≦DCON≦10	12≦DCON≦16	DCON=20
	0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013



●Inventory maintained in Japan. Unit : mm

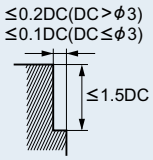
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
MSMHZDD0100	1	2	45	4	3	●	1
MSMHZDD0150	1.5	3	45	4	3	●	1
MSMHZDD0200	2	4	50	6	3	●	1
MSMHZDD0250	2.5	5	50	6	3	●	1
MSMHZDD0300	3	6	50	6	3	●	1
MSMHZDD0350	3.5	8	50	6	3	●	1
MSMHZDD0400	4	8	50	6	3	●	1
MSMHZDD0450	4.5	10	50	6	3	●	1
MSMHZDD0500	5	10	50	6	3	●	1
MSMHZDD0550	5.5	13	50	6	3	●	1
MSMHZDD0600	6	13	60	6	3	●	2
MSMHZDD0650	6.5	16	60	8	3	●	1
MSMHZDD0700	7	16	60	8	3	●	1
MSMHZDD0750	7.5	16	60	8	3	●	1
MSMHZDD0800	8	19	70	8	3	●	2
MSMHZDD0850	8.5	19	70	10	3	●	1
MSMHZDD0900	9	19	70	10	3	●	1
MSMHZDD0950	9.5	19	70	10	3	●	1
MSMHZDD1000	10	22	80	10	3	●	2
MSMHZDD1100	11	22	80	12	3	●	1
MSMHZDD1200	12	26	90	12	3	●	2
MSMHZDD1300	13	26	90	12	3	●	3
MSMHZDD1400	14	26	90	12	3	●	3
MSMHZDD1500	15	26	110	16	3	●	1
MSMHZDD1600	16	30	110	16	3	●	2
MSMHZDD2000	20	32	140	20	3	●	2

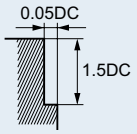
MSMHZD

RECOMMENDED CUTTING CONDITIONS

·Side milling

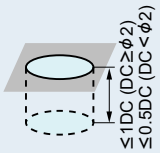
Work material	Carbon steel, Cast iron, Alloy steel (—30HRC) AISI 1050, AISI No 35 B, AISI P20		Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304, AISI 316, Ti-6Al-4V		Heat resistant alloys Inconel718	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
1	19000	600	13000	310	10000	200	9500	65
1.5	14000	600	9000	310	7500	210	6400	75
2	11000	600	7200	310	6000	210	4800	75
3	8500	770	5300	380	4400	220	3200	100
4	7200	850	4400	480	3700	250	2400	130
6	5300	940	3200	490	2700	270	1600	130
8	4000	1010	2400	560	2000	280	1200	120
10	3200	1000	1900	480	1600	300	950	110
12	2700	950	1600	440	1300	300	800	90
16	2000	720	1200	350	1000	260	600	70
20	1600	600	1000	290	800	240	480	60

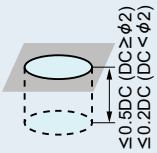




·Plunging

Work material	Carbon steel, Cast iron, Alloy steel (—30HRC) AISI 1050, AISI No 35 B, AISI P20		Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304, AISI 316, Ti-6Al-4V	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
1	13000	80	10000	50	6000	10
1.5	12000	120	8000	80	6000	20
2	11000	200	7200	140	6000	30
3	8500	250	5300	180	4200	50
4	7200	300	4400	210	3300	60
6	5300	300	3200	210	2200	70
8	4000	320	2400	220	1600	80
10	3200	340	1900	240	1300	70
12	2700	320	1600	220	1100	70
16	2000	250	1200	180	800	55
20	1600	200	1000	140	640	55

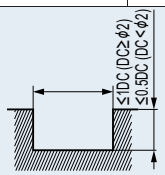


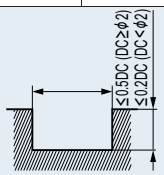


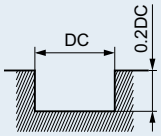
MSMHZD

·Slotting

Work material	Carbon steel, Cast iron, Alloy steel (—30HRC) AISI 1050, AISI No 35 B, AISI P20		Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304, AISI 316, Ti-6Al-4V		Heat resistant alloys Inconel718	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
1	13000	130	10000	80	6000	30	5700	25
1.5	12000	250	8000	150	6000	60	3800	30
2	11000	500	7200	260	6000	130	2800	35
3	8500	640	5300	320	4200	130	1900	50
4	7200	650	4400	370	3300	140	1400	70
6	5300	720	3200	380	2200	140	950	70
8	4000	780	2400	430	1600	140	720	60
10	3200	770	1900	370	1300	150	570	50
12	2700	730	1600	340	1100	150	480	40
16	2000	600	1200	290	800	130	360	30
20	1600	500	1000	240	640	120	290	25







- When cutting austenitic stainless steel, the use of water-soluble cutting fluid is effective.
- If the depth of cut is shallow, the revolution and feed rate can be increased.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

MS3ES

MSTAR END MILLS

End mill, 3 flute, For small automatic lathes

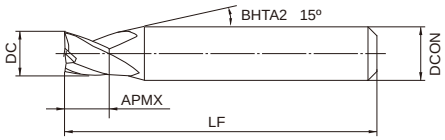
Product Information

UWC 30° MS Sharp

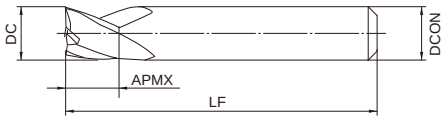
Work Material

P M S H F M

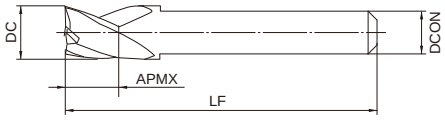
Technical Info >> 1993
ISO13399 Property >> 1966
SYMBOL DESCRIPTIONS >> 664
END MILLS SELECTION CHART >> 668



Type1



Type2



Type3

	3≦DC≦12	
	0 - 0.020	
h6	4≦DCON≦6	7≦DCON≦10
	0 - 0.008	0 - 0.009

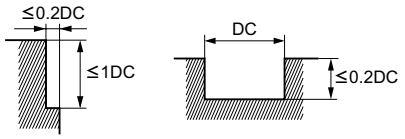
●Inventory maintained in Japan. Unit : mm

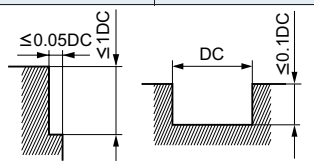
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
MS3ESD0300L35S04	3	3	35	4	3	●	1
MS3ESD0300L45S04	3	3	45	4	3	●	1
MS3ESD0350L35S04	3.5	3.5	35	4	3	●	1
MS3ESD0350L45S04	3.5	3.5	45	4	3	●	1
MS3ESD0400L35S04	4	4	35	4	3	●	2
MS3ESD0400L45S04	4	4	45	4	3	●	2
MS3ESD0500L35S05	5	5	35	5	3	●	2
MS3ESD0500L35S06	5	5	35	6	3	●	1
MS3ESD0500L45S06	5	5	45	6	3	●	1
MS3ESD0600L35S05	6	6	35	5	3	●	3
MS3ESD0600L35S06	6	6	35	6	3	●	2
MS3ESD0600L45S06	6	6	45	6	3	●	2
MS3ESD0700L35S07	7	6	35	7	3	●	2
MS3ESD0700L45S07	7	7	45	7	3	●	2
MS3ESD0800L35S07	8	6	35	7	3	●	3
MS3ESD0800L35S08	8	6	35	8	3	●	2
MS3ESD0800L45S07	8	8	45	7	3	●	3
MS3ESD0800L45S08	8	8	45	8	3	●	2
MS3ESD1000L35S07	10	6	35	7	3	●	3
MS3ESD1000L35S10	10	6	35	10	3	●	2
MS3ESD1000L45S07	10	10	45	7	3	●	3
MS3ESD1000L45S10	10	10	45	10	3	●	2
MS3ESD1200L35S10	12	6	35	10	3	●	3
MS3ESD1200L45S10	12	12	45	10	3	●	3

MS3ES

RECOMMENDED CUTTING CONDITIONS

Work material	Carbon steel, Cast iron, Alloy steel (—30HRC) AISI 1050, AISI No 35 B, AISI P20		Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V		Hardened steel (45— 55HRC) AISI H13	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
3	10000	600	7000	400	6000	300	5000	120
4	7500	600	5200	400	4500	300	4000	120
5	6000	600	4200	400	3600	300	3200	120
6	5000	600	3500	400	3000	300	2700	120
7	4500	560	3000	360	2700	280	2300	110
8	4000	520	2800	350	2400	260	2000	110
10	3200	450	2200	300	1900	230	1600	100
12	2700	410	1900	270	1600	210	1300	100





- When cutting austenitic stainless steel, the use of water-soluble cutting fluid is effective.
- If the depth of cut is shallow, the revolution and feed rate can be increased.
- When drilling, please set the feed rate at 1/3 or below of the values above.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

VQMHZV

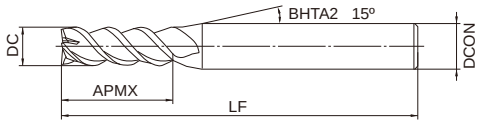
SMART MIRACLE END MILLS

End mill, Medium cutting length, 3 flute for drilling and slotting

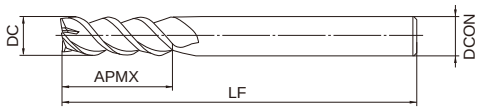
Product Information

Work Material

Technical Info >> 1993
ISO13399 Property >> 1966
SYMBOL DESCRIPTIONS >> 664
END MILLS SELECTION CHART >> 668



Type1



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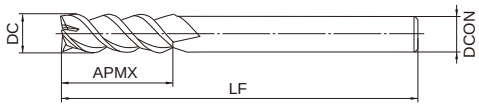


Type3

h6	DC≦12	DC>12		
	0 - 0.02	0 - 0.03		
	4≦DCON≦6	8≦DCON≦10	12≦DCON≦16	DCON=20
	0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013

●Inventory maintained in Japan. Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
VQMHZVD0100	1	2	45	4	3	●	1
VQMHZVD0110	1.1	2.2	45	4	3	●	1
VQMHZVD0120	1.2	2.4	45	4	3	●	1
VQMHZVD0130	1.3	2.6	45	4	3	●	1
VQMHZVD0140	1.4	2.8	45	4	3	●	1
VQMHZVD0150	1.5	3	45	4	3	●	1
VQMHZVD0160	1.6	3.2	45	4	3	●	1
VQMHZVD0170	1.7	3.4	45	4	3	●	1
VQMHZVD0180	1.8	3.6	45	4	3	●	1
VQMHZVD0190	1.9	3.8	45	4	3	●	1
VQMHZVD0200	2	4	50	6	3	●	1
VQMHZVD0210	2.1	4.2	50	6	3	●	1
VQMHZVD0220	2.2	4.4	50	6	3	●	1
VQMHZVD0230	2.3	4.6	50	6	3	●	1
VQMHZVD0240	2.4	4.8	50	6	3	●	1
VQMHZVD0250	2.5	5	50	6	3	●	1
VQMHZVD0260	2.6	5.2	50	6	3	●	1
VQMHZVD0270	2.7	5.4	50	6	3	●	1
VQMHZVD0280	2.8	5.6	50	6	3	●	1

VQMHZV

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
VQMHZVD0290	2.9	5.8	50	6	3	●	1
VQMHZVD0300	3	6	50	6	3	●	1
VQMHZVD0310	3.1	7	50	6	3	●	1
VQMHZVD0320	3.2	7	50	6	3	●	1
VQMHZVD0330	3.3	7	50	6	3	●	1
VQMHZVD0340	3.4	7	50	6	3	●	1
VQMHZVD0350	3.5	8	50	6	3	●	1
VQMHZVD0360	3.6	8	50	6	3	●	1
VQMHZVD0370	3.7	8	50	6	3	●	1
VQMHZVD0380	3.8	8	50	6	3	●	1
VQMHZVD0390	3.9	8	50	6	3	●	1
VQMHZVD0400	4	8	50	6	3	●	1
VQMHZVD0450	4.5	10	50	6	3	●	1
VQMHZVD0500	5	10	50	6	3	●	1
VQMHZVD0550	5.5	13	50	6	3	●	1
VQMHZVD0600	6	13	60	6	3	●	2
VQMHZVD0650	6.5	16	60	8	3	●	1
VQMHZVD0700	7	16	60	8	3	●	1
VQMHZVD0750	7.5	16	60	8	3	●	1
VQMHZVD0800	8	19	70	8	3	●	2
VQMHZVD0850	8.5	19	70	10	3	●	1
VQMHZVD0900	9	19	70	10	3	●	1
VQMHZVD0950	9.5	19	70	10	3	●	1
VQMHZVD1000	10	22	80	10	3	●	2
VQMHZVD1100	11	22	80	12	3	●	1
VQMHZVD1200	12	26	90	12	3	●	2
VQMHZVD1300	13	26	90	12	3	●	3
VQMHZVD1400	14	26	90	12	3	●	3
VQMHZVD1500	15	26	110	16	3	●	1
VQMHZVD1600	16	30	110	16	3	●	2
VQMHZVD2000	20	32	140	20	3	●	2

VQMHZV

Recommended cutting condition

·Shoulder milling

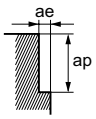
The rigidity of the machine or workpiece and chip discharge are sufficient at high efficiency conditions.

The rigidity of the machine or workpiece or chip discharge is insufficient at general-purpose conditions.

High efficiency conditions

Work material	Carbon steel, Alloy steel, Mild steel AISI 1045, AISI 4140, ASTM A36, AISI 1010					Pre-hardened steel Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT					Austenitic stainless steel, Ferritic and Martensitic stainless steels, Titanium alloys Titanium alloys AISI 304, AISI 316, Ti-6Al-4V				
DC (mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)
1	100	32000	720	1.5	0.2	80	25000	530	1.5	0.2	60	19000	430	1.5	0.2
1.5	130	28000	1300	2.25	0.3	100	21000	630	2.25	0.3	85	18000	540	2.25	0.3
2	150	24000	1800	3	0.6	120	19000	860	3	0.6	100	16000	620	3	0.6
3	150	16000	1900	4.5	0.9	120	13000	940	4.5	0.9	100	11000	660	4.5	0.9
4	150	12000	2000	6	1.2	120	9500	940	6	1.2	100	8000	670	6	1.2
5	150	9500	1900	7.5	1.5	120	7600	960	7.5	1.5	100	6400	670	7.5	1.5
6	150	8000	1900	9	1.8	120	6400	960	9	1.8	100	5300	830	9	1.8
8	150	6000	1900	12	2.4	120	4800	1000	12	2.4	100	4000	900	12	2.4
10	150	4800	1700	15	3	120	3800	910	15	3	100	3200	960	15	3
12	150	4000	1400	18	3.6	120	3200	860	18	3.6	100	2700	890	18	3.6
16	150	3000	1200	24	4.8	120	2400	720	24	4.8	100	2000	720	24	4.8
20	150	2400	970	30	6	120	1900	570	30	6	100	1600	580	30	6

Work material	Hardened stainless steels, Cobalt chromium alloy AISI 630, AISI 631 15-5PH,17-4PH					Copper, Copper alloys					Heat resistant alloys Inconel718				
DC (mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)
1	50	16000	340	1.5	0.1	120	38000	860	1.5	0.2	40	13000	160	1.5	0.05
1.5	65	14000	420	2.25	0.15	150	32000	1400	2.25	0.3	40	8500	170	2.25	0.08
2	75	12000	540	3	0.4	180	29000	2200	3	0.6	40	6400	170	3	0.2
3	75	8000	580	4.5	0.6	180	19000	2300	4.5	0.9	40	4200	180	4.5	0.3
4	75	6000	590	6	0.8	180	14000	2300	6	1.2	40	3200	180	6	0.4
5	75	4800	600	7.5	1	180	11000	2300	7.5	1.5	40	2500	180	7.5	0.5
6	75	4000	600	9	1.2	180	9500	2300	9	1.8	40	2100	190	9	0.6
8	75	3000	630	12	1.6	180	7200	2300	12	2.4	40	1600	190	12	0.8
10	75	2400	580	15	2	180	5700	2100	15	3	40	1300	220	15	1
12	75	2000	540	18	2.4	180	4800	1700	18	3.6	40	1100	210	18	1.2
16	75	1500	450	24	3.2	180	3600	1500	24	4.8	40	800	150	24	1.6
20	75	1200	360	30	4	180	2900	1200	30	6	40	640	120	30	2



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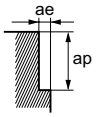
General-purpose conditions

Work material	Carbon steel, Alloy steel, Mild steel AISI 1045, AISI 4140, ASTM A36, AISI 1010					Pre-hardened steel Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT					Austenitic stainless steel, Ferritic and Martensitic stainless steels, Titanium alloys Titanium alloys AISI 304, AISI 316, Ti-6Al-4V				
Diameter DC(mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)
1	100	32000	480	1.5	0.2	80	25000	350	1.5	0.2	60	19000	280	1.5	0.2
1.5	120	25000	740	2.25	0.3	100	21000	420	2.25	0.3	80	17000	340	2.25	0.3
2	120	19000	940	3	0.6	100	16000	480	3	0.6	80	13000	340	3	0.6
3	120	13000	1000	4.5	0.9	100	11000	520	4.5	0.9	80	8500	340	4.5	0.9
4	120	9500	1000	6	1.2	100	8000	520	6	1.2	80	6400	350	6	1.2
5	120	7600	980	7.5	1.5	100	6400	530	7.5	1.5	80	5100	350	7.5	1.5
6	120	6400	1000	9	1.8	100	5300	540	9	1.8	80	4200	400	9	1.8
8	120	4800	1000	12	2.4	100	4000	550	12	2.4	80	3200	430	12	2.4
10	120	3800	900	15	3	100	3200	510	15	3	80	2500	450	15	3
12	120	3200	760	18	3.6	100	2700	480	18	3.6	80	2100	420	18	3.6
16	120	2400	640	24	4.8	100	2000	400	24	4.8	80	1600	340	24	4.8
20	120	1900	510	30	6	100	1600	320	30	6	80	1300	270	30	6

Work material	Hardened stainless steels, Cobalt chromium alloy AISI 630, AISI 631 15-5PH,17-4PH					Copper, Copper alloys					Heat resistant alloys Inconel718				
Diameter DC(mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)
1	50	16000	220	1.5	0.1	120	38000	560	1.5	0.2	30	9500	75	1.5	0.05
1.5	65	14000	280	2.25	0.15	140	30000	890	2.25	0.3	30	6400	82	2.25	0.07
2	70	11000	330	3	0.4	140	22000	1100	3	0.6	30	4800	86	3	0.2
3	70	7400	350	4.5	0.6	140	15000	1200	4.5	0.9	30	3200	89	4.5	0.3
4	70	5600	370	6	0.8	140	11000	1200	6	1.2	30	2400	90	6	0.4
5	70	4500	370	7.5	1	140	8900	1200	7.5	1.5	30	1900	90	7.5	0.5
6	70	3700	370	9	1.2	140	7400	1200	9	1.8	30	1600	95	9	0.6
8	70	2800	390	12	1.6	140	5600	1200	12	2.4	30	1200	95	12	0.8
10	70	2200	350	15	2	140	4500	1100	15	3	30	950	110	15	1
12	70	1900	340	18	2.4	140	3700	880	18	3.6	30	800	100	18	1.2
16	70	1400	280	24	3.2	140	2800	750	24	4.8	30	600	76	24	1.6
20	70	1100	220	30	4	140	2200	590	30	6	30	480	61	30	2



- SMART MIRACLE Coating is not energized because of its nature. Therefore, an external contact (voltaic type) tool setter cannot be used. An internal contact (non-voltaic) type or laser type tool setter is recommended to measure the length of the tool. An internal contact (non-voltaic) type or laser type tool setter is recommended to measure the length of the tool.
- For stainless steel, titanium alloy and heat resistant alloy, the use of water-soluble coolant is effective
- The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abonrmal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.
- If the depth of cut is shallow, the revolution and feed rate can be increased.

VQMHZV

·Slotting

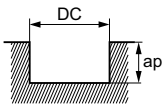
The rigidity of the machine or workpiece and chip discharge are sufficient at high efficiency conditions.

The rigidity of the machine or workpiece or chip discharge is insufficient at general-purpose conditions.

High efficiency conditions

Work material	Carbon steel, Alloy steel, Mild steel AISI 1045, AISI 4140, ASTM A36, AISI 1010				Pre-hardened steel Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT				Austenitic stainless steel, Ferritic and Martensitic stainless steels, Titanium alloys stainless steels, Titanium alloys AISI 304, AISI 316, Ti-6Al-4V			
DC (mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)
1	100	32000	380	0.5	80	25000	150	0.5	60	19000	100	0.5
1.5	130	28000	590	0.75	100	21000	250	0.75	85	18000	220	0.75
2	150	24000	940	2	120	19000	460	2	100	16000	480	2
3	150	16000	1100	3	120	13000	550	3	100	11000	500	3
4	150	12000	1400	4	120	9500	680	4	100	8000	530	4
5	150	9500	1400	5	120	7600	680	5	100	6400	540	5
6	150	8000	1400	6	120	6400	770	6	100	5300	560	6
8	150	6000	1300	8	120	4800	720	8	100	4000	600	8
10	150	4800	1200	10	120	3800	630	10	100	3200	670	10
12	150	4000	960	12	120	3200	580	12	100	2700	650	12
16	150	3000	810	12	120	2400	500	12	100	2000	480	12
20	150	2400	650	12	120	1900	400	12	100	1600	380	12

Work material	Hardened stainless steels, Cobalt chromium alloy AISI 630, AISI 631 15-5PH,17-4PH				Copper, Copper alloys				Heat resistant alloys Inconel718			
DC (mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)
1	45	14000	80	0.3	120	38000	460	0.5	30	9500	60	0.2
1.5	60	12000	140	0.4	150	32000	670	0.75	30	6400	80	0.3
2	60	9500	230	1	180	29000	1100	2	30	4800	100	0.6
3	60	6400	270	1.5	180	19000	1300	3	30	3200	120	0.9
4	60	4800	350	2	180	14000	1700	4	30	2400	130	1.2
5	60	3800	350	2.5	180	11000	1700	5	30	1900	130	1.5
6	60	3200	380	3	180	9500	1700	6	30	1600	130	1.8
8	60	2400	360	4	180	7200	1500	8	30	1200	140	2.4
10	60	1900	310	5	180	5700	1400	10	30	950	160	3
12	60	1600	290	6	180	4800	1200	12	30	800	150	3.6
16	60	1200	250	8	180	3600	970	12	30	600	120	4.8
20	60	950	200	10	180	2900	780	12	30	480	90	6

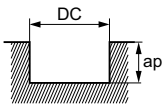


VQMHZV

General-purpose conditions

Work material	Carbon steel, Alloy steel, Mild steel AISI 1045, AISI 4140, ASTM A36, AISI 1010				Pre-hardened steel Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT				Austenitic stainless steel, Ferritic and Martensitic stainless steels, Titanium alloys Titanium alloys AISI 304, AISI 316, Ti-6Al-4V			
DC (mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)
1	100	32000	250	0.5	80	25000	99	0.5	60	19000	80	0.5
1.5	100	21000	290	0.75	80	17000	130	0.75	60	13000	100	0.75
2	100	16000	410	2	80	13000	210	2	60	9500	190	2
3	100	11000	500	3	80	8500	240	3	60	6400	190	3
4	100	8000	630	4	80	6400	300	4	60	4800	210	4
5	100	6400	630	5	80	5100	300	5	60	3800	210	5
6	100	5300	630	6	80	4200	330	6	60	3200	220	6
8	100	4000	550	8	80	3200	320	8	60	2400	240	8
10	100	3200	510	10	80	2500	270	10	60	1900	260	10
12	100	2700	430	12	80	2100	250	12	60	1600	250	12
16	100	2000	360	12	80	1600	220	12	60	1200	190	12
20	100	1600	290	12	80	1300	180	12	60	950	150	12

Work material	Hardened stainless steels, Cobalt chromium alloy AISI 630, AISI 631 15-5PH,17-4PH				Copper, Copper alloys				Heat resistant alloys Inconel718			
DC (mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)
1	45	14000	60	0.3	120	38000	300	0.5	25	8000	30	0.2
1.5	50	11000	87	0.4	120	25000	350	0.75	25	5300	40	0.3
2	50	8000	130	1	120	19000	490	2	25	4000	55	0.6
3	50	5300	150	1.5	120	13000	590	3	25	2700	64	0.9
4	50	4000	190	2	120	9500	750	4	25	2000	70	1.2
5	50	3200	190	2.5	120	7600	750	5	25	1600	71	1.5
6	50	2700	210	3	120	6400	760	6	25	1300	72	1.8
8	50	2000	200	4	120	4800	670	8	25	990	78	2.4
10	50	1600	170	5	120	3800	600	10	25	800	89	3
12	50	1300	150	6	120	3200	510	12	25	660	84	3.6
16	50	990	140	8	120	2400	430	12	25	500	63	4.8
20	50	800	110	10	120	1900	340	12	25	400	50	6



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- For stainless steel, titanium alloy and heat resistant alloy, the use of water-soluble coolant is effective
- The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abonrmal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.
- When the Depth of cut is small, the feed rate can be increased.

VQMHZV

·Plunging

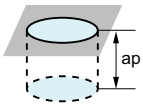
The rigidity of the machine or workpiece and chip discharge are sufficient at high efficiency conditions.

The rigidity of the machine or workpiece or chip discharge is insufficient at general-purpose conditions.

High efficiency conditions

Work material	Carbon steel, Alloy steel, Mild steel AISI 1045, AISI 4140,ASTM A36, AISI 1010					Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20,AISI 4340, SKD, SKT					Austenitic stainless steel, Ferritic and Martensitic stainless steels, Titanium alloys stainless steels, Titanium alloys AISI 304, AISI 316, Ti-6Al-4V				
DC (mm)	Cutting Speed (m/min)	Revolution (min-1)	Feed rate (mm/min)	Depth of Hole ap(mm)	Step (mm)	Cutting Speed (m/min)	Revolution (min-1)	Feed rate (mm/min)	Depth of Hole ap(mm)	Step (mm)	Cutting Speed (m/min)	Revolution (min-1)	Feed rate (mm/min)	Depth of Hole ap(mm)	Step (mm)
1	65	20000	160	0.5	0.1	50	16000	100	0.5	0.1	50	16000	50	0.5	0.05
1.5	85	18000	270	0.75	0.3	60	13000	120	0.75	0.3	60	13000	80	0.75	0.1
2	100	16000	480	2	0.5	70	11000	200	2	0.4	60	9500	90	1	0.15
3	100	11000	660	3	1	70	7400	270	3	0.6	60	6400	100	1.5	0.2
4	100	8000	800	4	2	70	5600	340	4	0.8	60	4800	100	2	0.4
5	100	6400	960	5	2.5	70	4500	410	5	1	60	3800	100	2.5	0.5
6	100	5300	950	6	3	70	3700	440	6	1.2	60	3200	100	3	0.6
8	100	4000	720	8	4	70	2800	340	8	1.6	60	2400	70	4	0.6
10	100	3200	580	10	5	70	2200	260	10	2.5	60	1900	60	5	0.6
12	100	2700	490	12	5	70	1900	230	12	3	60	1600	50	6	0.6
16	100	2000	360	16	5	70	1400	170	16	4	60	1200	40	8	0.6
20	100	1600	290	20	5	70	1100	130	20	5	60	950	30	10	0.6

Work material	Hardened stainless steels, Cobalt chromium alloy AISI 630, AISI 631 15-5PH,17-4PH					Copper, Copper alloys				
DC (mm)	Cutting Speed (m/min)	Revolution (min-1)	Feed rate (mm/min)	Depth of Hole ap(mm)	Step (mm)	Cutting Speed (m/min)	Revolution (min-1)	Feed rate (mm/min)	Depth of Hole ap(mm)	Step (mm)
1	30	9500	30	0.5	0.05	75	24000	190	0.5	0.1
1.5	35	7400	40	0.75	0.1	100	21000	320	0.75	0.3
2	40	6400	60	1	0.1	120	19000	570	2	0.5
3	40	4200	60	1.5	0.2	120	13000	780	3	1.0
4	40	3200	60	2	0.4	120	9500	950	4	2
5	40	2500	60	2.5	0.5	120	7600	1100	5	2.5
6	40	2100	60	3	0.6	120	6400	1200	6	3
8	40	1600	50	4	0.6	120	4800	860	8	4
10	40	1300	40	5	0.6	120	3800	680	10	5
12	40	1100	30	6	0.6	120	3200	580	12	5
16	40	800	20	8	0.6	120	2400	430	16	5
20	40	640	20	10	0.6	120	1900	340	20	5

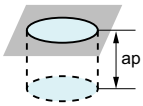


VQMHZV

General-purpose conditions

Work material	Carbon steel, Alloy steel, Mild steel AISI 1045, AISI 4140,ASTM A36, AISI 1010					Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT					Austenitic stainless steel, Ferritic and Martensitic stainless steels, Titanium alloys stainless steels, Titanium alloys AISI 304, AISI 316, Ti-6Al-4V				
DC (mm)	Cutting Speed (m/min)	Revolution (min-1)	Feed rate (mm/min)	Depth of Hole ap(mm)	Step (mm)	Cutting Speed (m/min)	Revolution (min-1)	Feed rate (mm/min)	Depth of Hole ap(mm)	Step (mm)	Cutting Speed (m/min)	Revolution (min-1)	Feed rate (mm/min)	Depth of Hole ap(mm)	Step (mm)
1	65	20000	160	0.5	0.05	50	16000	100	0.5	0.05	50	16000	50	0.5	0.05
1.5	85	18000	270	0.75	0.15	60	13000	120	0.75	0.1	60	13000	80	0.75	0.05
2	100	16000	480	2	0.25	70	11000	200	2	0.2	60	9500	90	1	0.05
3	100	11000	660	3	0.3	70	7400	270	3	0.3	60	6400	100	1.5	0.1
4	100	8000	800	4	0.4	70	5600	340	4	0.4	60	4800	100	2	0.2
5	100	6400	960	5	0.5	70	4500	410	5	0.5	60	3800	100	2.5	0.25
6	100	5300	950	6	0.6	70	3700	440	6	0.6	60	3200	100	3	0.3
8	100	4000	720	8	0.7	70	2800	340	8	0.7	60	2400	70	4	0.3
10	100	3200	580	10	0.75	70	2200	260	10	0.75	60	1900	60	5	0.3
12	100	2700	490	12	0.75	70	1900	230	12	0.75	60	1600	50	6	0.3
16	100	2000	360	16	0.75	70	1400	170	16	0.75	60	1200	40	8	0.3
20	100	1600	290	20	0.75	70	1100	130	20	0.75	60	950	30	10	0.3

Work material	Hardened stainless steels, Cobalt chromium alloy AISI 630, AISI 631 15-5PH,17-4PH					Copper, Copper alloys				
DC (mm)	Cutting Speed (m/min)	Revolution (min-1)	Feed rate (mm/min)	Depth of Hole ap(mm)	Step (mm)	Cutting Speed (m/min)	Revolution (min-1)	Feed rate (mm/min)	Depth of Hole ap(mm)	Step (mm)
1	30	9500	30	0.5	0.05	75	24000	190	0.5	0.05
1.5	35	7400	40	0.75	0.05	100	21000	320	0.75	0.15
2	40	6400	60	1	0.05	120	19000	570	2	0.25
3	40	4200	60	1.5	0.1	120	13000	780	3	0.3
4	40	3200	60	2	0.2	120	9500	950	4	0.4
5	40	2500	60	2.5	0.25	120	7600	1100	5	0.5
6	40	2100	60	3	0.3	120	6400	1200	6	0.6
8	40	1600	50	4	0.3	120	4800	860	8	0.7
10	40	1300	40	5	0.3	120	3800	680	10	0.75
12	40	1100	30	6	0.3	120	3200	580	12	0.75
16	40	800	20	8	0.3	120	2400	430	16	0.75
20	40	640	20	10	0.3	120	1900	340	20	0.75



- SMART MIRACLE Coating is not energized because of its nature. Therefore, an external contact (voltaic type) tool setter cannot be used. An internal contact (non-voltaic) type or laser type tool setter is recommended to measure the length of the tool. An internal contact (non-voltaic) type or laser type tool setter is recommended to measure the length of the tool.
- For stainless steel, titanium alloy and heat resistant alloy, the use of water-soluble coolant is effective
- The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abonrmal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.

VQMHZVOH

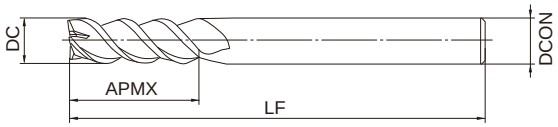
SMART MIRACLE END MILLS

End mill, Medium cutting length, 3 flute for drilling and slotting with internal through coolant holes

Product Information

Work Material

Technical Info >> 1993
ISO13399 Property >> 1966
SYMBOL DESCRIPTIONS >> 664
END MILLS SELECTION CHART >> 668



Type1

	DC≦12	DC=16	
	0 - 0.02	0 - 0.03	
h6	DCON=6	8≦DCON≦10	12≦DCON≦16
	0 - 0.008	0 - 0.009	0 - 0.011

●Inventory maintained in Japan. Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
VQMHZVOHD0600	6	13	60	6	3	●	1
VQMHZVOHD0800	8	19	70	8	3	●	1
VQMHZVOHD1000	10	22	80	10	3	●	1
VQMHZVOHD1200	12	26	90	12	3	●	1
VQMHZVOHD1600	16	30	110	16	3	●	1

VQMHZVOH

Recommended cutting condition

·Slotting

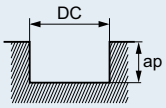
The rigidity of the machine or workpiece and chip discharge are sufficient at high efficiency conditions.

The rigidity of the machine or workpiece or chip discharge is insufficient at general-purpose conditions.

High efficiency conditions

Work material	Carbon steel, Alloy steel, Mild steel AISI 1045, AISI 4140, ASTM A36, AISI 1010				Pre-hardened steel Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT				Austenitic stainless steel, Ferritic and Martensitic stainless steels, Titanium alloys stainless steels, Titanium alloys AISI 304, AISI 316, Ti-6Al-4V etc.			
Diameter DC(mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)
6	150	8000	1400	6	120	6400	770	6	100	5300	560	6
8	150	6000	1300	8	120	4800	720	8	100	4000	600	8
10	150	4800	1200	10	120	3800	630	10	100	3200	670	10
12	150	4000	960	12	120	3200	580	12	100	2700	650	12
16	150	3000	810	12	120	2400	500	12	100	2000	480	12

Work material	Hardened stainless steels, Cobalt chromium alloy AISI 630, AISI 631 15-5PH,17-4PH				Copper, Copper alloys				Heat resistant alloys Inconel718			
Diameter DC(mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)
6	60	3200	380	3	180	9500	1700	6	30	1600	130	1.8
8	60	2400	360	4	180	7200	1500	8	30	1200	140	2.4
10	60	1900	310	5	180	5700	1400	10	30	950	160	3
12	60	1600	290	6	180	4800	1200	12	30	800	150	3.6
16	60	1200	250	8	180	3600	970	12	30	600	120	4.8

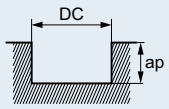


General-purpose conditions

Work material	Carbon steel, Alloy steel, Mild steel AISI 1045, AISI 4140, ASTM A36, AISI 1010				Pre-hardened steel Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT				Austenitic stainless steel, Ferritic and Martensitic stainless steels, Titanium alloys stainless steels, Titanium alloys AISI 304, AISI 316, Ti-6Al-4V etc.			
Diameter DC(mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)
6	100	5300	630	6	80	4200	330	6	60	3200	220	6
8	100	4000	550	8	80	3200	320	8	60	2400	240	8
10	100	3200	510	10	80	2500	270	10	60	1900	260	10
12	100	2700	430	12	80	2100	250	12	60	1600	250	12
16	100	2000	360	12	80	1600	220	12	60	1200	190	12

VQMHZVOH

Work material	Hardened stainless steels, Cobalt chromium alloy AISI 630, AISI 631 15-5PH,17-4PH				Copper, Copper alloys				Heat resistant alloys Inconel718			
Diameter DC(mm)	Cutting Speed (m/min)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap(mm)	Cutting Speed (m/min)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap(mm)	Cutting Speed (m/min)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap(mm)
6	50	2700	210	3	120	6400	760	6	25	1300	72	1.8
8	50	2000	200	4	120	4800	670	8	25	990	78	2.4
10	50	1600	170	5	120	3800	600	10	25	800	89	3
12	50	1300	150	6	120	3200	510	12	25	660	84	3.6
16	50	990	140	8	120	2400	430	12	25	500	63	4.8



- SMART MIRACLE Coating is not energized because of its nature. Therefore, an external contact (voltaic type) tool setter cannot be used. An internal contact (non-voltaic) type or laser type tool setter is recommended to measure the length of the tool. An internal contact (non-voltaic) type or laser type tool setter is recommended to measure the length of the tool.
- For stainless steel, titanium alloy and heat resistant alloy, the use of water-soluble coolant is effective
- The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abonrmal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.
- When the Depth of cut is small, the feed rate can be increased.

·Plunging

The rigidity of the machine or workpiece and chip discharge are sufficient at high efficiency conditions.

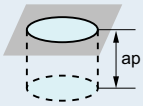
The rigidity of the machine or workpiece or chip discharge is insufficient at general-purpose conditions.

High efficiency conditions

Work material	Carbon steel, Alloy steel, Mild steel AISI 1045, AISI 4140,ASTM A36, AISI 1010					Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20,AISI 4340, SKD, SKT					Austenitic stainless steel, Ferritic and Martensitic stainless steels, Titanium alloys stainless steels, Titanium alloys AISI 304, AISI 316, Ti-6Al-4V etc.				
Diameter DC(mm)	Cutting Speed (m/min)	Revolution (min-1)	Feed rate (mm/min)	Depth of Hole ap(mm)	Step (mm)	Cutting Speed (m/min)	Revolution (min-1)	Feed rate (mm/min)	Depth of Hole ap(mm)	Step (mm)	Cutting Speed (m/min)	Revolution (min-1)	Feed rate (mm/min)	Depth of Hole ap(mm)	Step (mm)
6	100	5300	950	9	3	70	3700	440	9	1.2	60	3200	100	6	0.6
8	100	4000	720	12	4	70	2800	340	12	1.6	60	2400	70	8	0.6
10	100	3200	580	15	5	70	2200	260	15	2.5	60	1900	60	10	0.6
12	100	2700	490	18	5	70	1900	230	18	3	60	1600	50	12	0.6
16	100	2000	360	24	5	70	1400	170	24	4	60	1200	40	16	0.6

VQMHZVOH

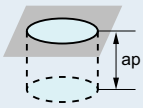
Work material	Hardened stainless steels, Cobalt chromium alloy AISI 630, AISI 631 15-5PH,17-4PH					Copper, Copper alloys				
Diameter DC(mm)	Cutting Speed (m/min)	Revolution (min-1)	Feed rate (mm/min)	Depth of Hole ap(mm)	Step (mm)	Cutting Speed (m/min)	Revolution (min-1)	Feed rate (mm/min)	Depth of Hole ap(mm)	Step (mm)
6	40	2100	60	6	0.6	120	6400	1200	9	3
8	40	1600	50	8	0.6	120	4800	860	12	4
10	40	1300	40	10	0.6	120	3800	680	15	5
12	40	1100	30	12	0.6	120	3200	580	18	5
16	40	800	20	16	0.6	120	2400	430	24	5



General-purpose conditions

Work material	Carbon steel, Alloy steel, Mild steel AISI 1045, AISI 4140,ASTM A36, AISI 1010					Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20,AISI 4340, SKD, SKT					Austenitic stainless steel, Ferritic and Martensitic stainless steels, Titanium alloys stainless steels, Titanium alloys AISI 304, AISI 316, Ti-6Al-4V etc.				
Diameter DC(mm)	Cutting Speed (m/min)	Revolution (min-1)	Feed rate (mm/min)	Depth of Hole ap(mm)	Step (mm)	Cutting Speed (m/min)	Revolution (min-1)	Feed rate (mm/min)	Depth of Hole ap(mm)	Step (mm)	Cutting Speed (m/min)	Revolution (min-1)	Feed rate (mm/min)	Depth of Hole ap(mm)	Step (mm)
6	100	5300	950	9	0.6	70	3700	440	9	0.6	60	3200	100	6	0.3
8	100	4000	720	12	0.7	70	2800	340	12	0.7	60	2400	70	8	0.3
10	100	3200	580	15	0.75	70	2200	260	15	0.75	60	1900	60	10	0.3
12	100	2700	490	18	0.75	70	1900	230	18	0.75	60	1600	50	12	0.3
16	100	2000	360	24	0.75	70	1400	170	24	0.75	60	1200	40	16	0.3

Work material	Hardened stainless steels, Cobalt chromium alloy AISI 630, AISI 631 15-5PH,17-4PH					Copper, Copper alloys				
Diameter DC(mm)	Cutting Speed (m/min)	Revolution (min-1)	Feed rate (mm/min)	Depth of Hole ap(mm)	Step (mm)	Cutting Speed (m/min)	Revolution (min-1)	Feed rate (mm/min)	Depth of Hole ap(mm)	Step (mm)
6	40	2100	60	6	0.3	120	6400	1200	9	0.6
8	40	1600	50	8	0.3	120	4800	860	12	0.7
10	40	1300	40	10	0.3	120	3800	680	15	0.75
12	40	1100	30	12	0.3	120	3200	580	18	0.75
16	40	800	20	16	0.3	120	2400	430	24	0.75



- SMART MIRACLE Coating is not energized because of its nature. Therefore, an external contact (voltaic type) tool setter cannot be used. An internal contact (non-voltaic) type or laser type tool setter is recommended to measure the length of the tool. An internal contact (non-voltaic) type or laser type tool setter is recommended to measure the length of the tool.
- For stainless steel, titanium alloy and heat resistant alloy, the use of water-soluble coolant is effective
- The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abonrmal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.

VCMH

MIRACLE END MILLS

End mill, Medium cut length, 3—4 flute, High helix angle

Product Information

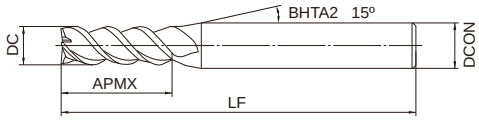
UWC 50° VC Gash

DC≦18 DC≧20

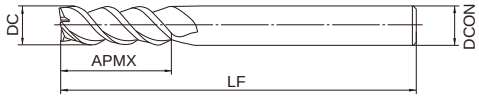
Work Material

P M S H F M

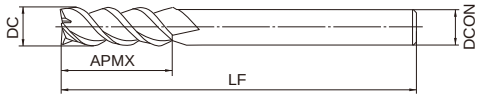
Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668



Type1



Type2



Type3

	DC≦12	DC>12		
	0 - 0.020	0 - 0.030		
h6	DCON=6	8≦DCON≦10	12≦DCON≦16	20≦DCON≦25
	0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013

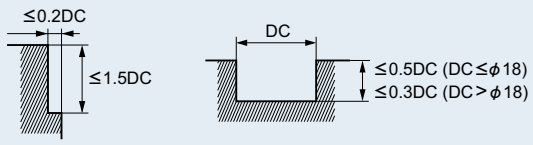
●Inventory maintained in Japan. Unit : mm

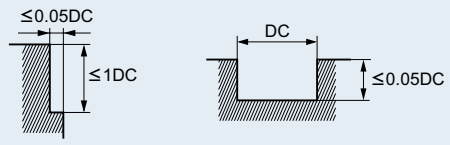
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
VCMHD0300	3	8	45	6	3	●	1
VCMHD0400	4	11	45	6	3	●	1
VCMHD0500	5	13	50	6	3	●	1
VCMHD0600	6	13	50	6	3	●	2
VCMHD0700	7	16	60	8	3	●	1
VCMHD0800	8	19	60	8	3	●	2
VCMHD0900	9	19	70	10	3	●	1
VCMHD1000	10	22	70	10	3	●	2
VCMHD1100	11	22	75	12	3	●	1
VCMHD1200	12	26	75	12	3	●	2
VCMHD1300	13	26	75	12	3	●	3
VCMHD1400	14	26	75	12	3	●	3
VCMHD1500	15	30	80	16	3	●	1
VCMHD1600	16	32	90	16	3	●	2
VCMHD1800	18	32	90	16	3	●	3
VCMHD2000	20	38	100	20	4	●	2
VCMHD2500	25	45	120	25	4	●	2

VCMH

RECOMMENDED CUTTING CONDITIONS

Work material	Carbon steel, Cast iron, Alloy steel, Pre-hardened steel AISI 1050, AISI No 35 B, AISI P20, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V		Hardened steel (45— 55HRC) AISI H13		Heat resistant alloys Inconel718	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
3	5300	130	4400	100	2400	50	1500	25
4	4400	220	3700	160	2000	80	1300	40
5	3600	260	3000	190	1700	100	1100	50
6	3200	280	2700	200	1500	100	1000	50
8	2400	300	2000	210	1200	110	800	45
10	1900	290	1600	210	960	115	640	45
12	1600	250	1300	170	800	95	530	40
16	1200	180	1000	130	600	70	400	30
18	1100	170	900	120	530	65	350	25
20	960	190	800	140	480	75	320	25
25	760	150	640	110	380	60	260	20





- If the depth of cut is shallow, the revolution and feed rate can be increased.
- The above table shows cutting conditions for standard side milling. For slotting, please set the revolution at 80 — 100% and the feed rate at 60 —80% of the table figure. Please set the revolution rate at 60% and the feed rate at 40% when slotting austenitic stainless steels.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

CMH

CARBIDE END MILLS

End mill, Medium cut length, 3 flute

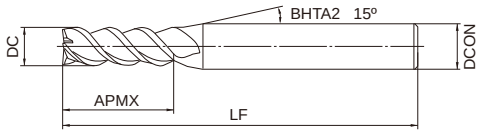
Product Information

UWC 50° Gash

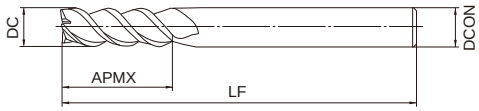
Work Material

P M N S F M

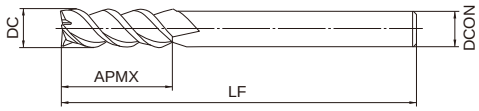
Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668



Type1



Type2



Type3

h6	DC≦12	DC>12	
	0 - 0.020	0 - 0.030	
	DCON=6	8≦DCON≦10	12≦DCON≦16
	0 - 0.008	0 - 0.009	0 - 0.011

●Inventory maintained in Japan. Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
CMHD0600	6	13	50	6	3	●	2
CMHD0700	7	16	60	8	3	●	1
CMHD0800	8	19	60	8	3	●	2
CMHD0900	9	19	70	10	3	●	1
CMHD1000	10	22	70	10	3	●	2
CMHD1100	11	22	75	12	3	●	1
CMHD1200	12	26	75	12	3	●	2
CMHD1300	13	26	75	12	3	●	3
CMHD1400	14	26	75	12	3	●	3
CMHD1500	15	30	80	16	3	●	1
CMHD1600	16	32	90	16	3	●	2

C3SA

ALIMASTER END MILLS

End mill, Short cut length, 3 flute, For aluminium alloy

Product Information

UWC 37.5° Gash

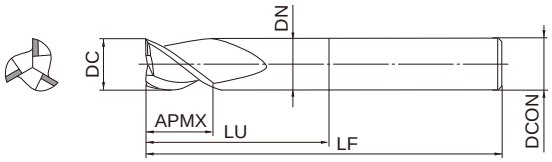
Non-center Cutting Center Cutting

Technical Info >> 1993 ISO13399 Property >> 1966

Work Material

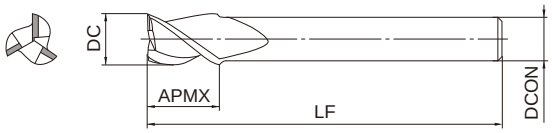
N F M

SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668



Type1

	DC≦12	DC>12	
	0 - 0.020	0 - 0.030	
h6	8≦DCON≦10	12≦DCON≦16	20≦DCON≦25
	0 - 0.009	0 - 0.011	0 - 0.013



Type2

●Inventory maintained in Japan. Unit : mm

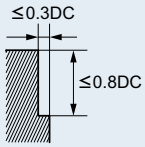
Order Number	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	type
C3SAD1000A100S08	10	12			100	8	3	●	2
C3SAD1000N300	10	12	30	9.4	75	10	3	●	1
C3SAD1000N350	10	12	35	9.4	100	10	3	●	1
C3SAD1200A150S10	12	15			150	10	3	●	2
C3SAD1200N300	12	15	30	11.4	75	12	3	●	1
C3SAD1200N350	12	15	35	11.4	100	12	3	●	1
C3SAD1200N400	12	15	40	11.4	125	12	3	●	1
C3SAD1600A200S14	16	15			200	14	3	●	2
C3SAD1600N300	16	15	30	15.4	75	16	3	●	1
C3SAD1600N400	16	15	40	15.4	100	16	3	●	1
C3SAD1600N450	16	15	45	15.4	125	16	3	●	1
C3SAD1700A150S16	17	18			150	16	3	●	2
C3SAD1800A200S16	18	18			200	16	3	●	2
C3SAD2000A200S18	20	20			200	18	3	●	2
C3SAD2000N400	20	20	40	18	100	20	3	●	1
C3SAD2000N600	20	20	60	18	125	20	3	●	1
C3SAD2000N850	20	20	85	18	150	20	3	●	1
C3SAD2500N500	25	20	50	23	100	25	3	●	1
C3SAD2500N650	25	20	65	23	125	25	3	●	1
C3SAD2500N900	25	20	90	23	150	25	3	●	1
C3SAD2600A200S25	26	20			200	25	3	●	2

C3SA

RECOMMENDED CUTTING CONDITIONS

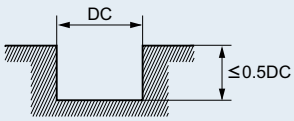
·Side milling

Work material	Aluminium alloy A7075	
Dia. DC(mm)	Revolution (min⁻¹)	Feed rate (mm/min)
12	13000	5400
16	10000	5400
18	9000	5000
20	8000	5000
25	6000	4500



·Slotting

Work material	Aluminium alloy A7075	
Dia. DC(mm)	Revolution (min⁻¹)	Feed rate (mm/min)
12	13000	3200
16	10000	3200
18	9000	3000
20	8000	3000
25	6000	2800



- The use of water-soluble coolant is recommended.
- Climb cutting is recommended for side milling.
- This table shows the cutting condition with less than 4DC overhang length. If more than 4DC, spindle speed, feed rate and depth of cut should be reduced.
- These end mills do not have a centre cutting edge, therefore when entering a workpiece use a ramping process rather than vertical feed.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately, or set the depth of cut smaller.

MSSHD

MSTAR END MILLS

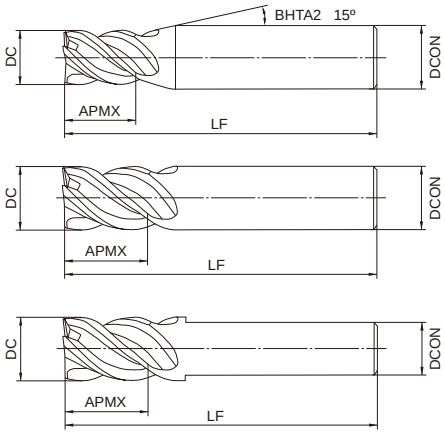
High power, Short cut length, 4 flute

Product Information

Work Material

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668

	DC≦12	DC>12		
	0 - 0.020	0 - 0.030		
h6	DCON=6	8≦DCON≦10	12≦DCON≦16	DCON=20
	0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013



●Inventory maintained in Japan. Unit : mm

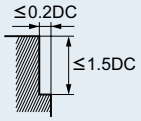
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
MSSHDD0300	3	4.5	45	6	4	●	1
MSSHDD0350	3.5	5.3	45	6	4	●	1
MSSHDD0400	4	6	45	6	4	●	1
MSSHDD0450	4.5	6.8	45	6	4	●	1
MSSHDD0500	5	7.5	50	6	4	●	1
MSSHDD0550	5.5	8.3	50	6	4	●	1
MSSHDD0600	6	9	50	6	4	●	2
MSSHDD0650	6.5	9.8	60	8	4	●	1
MSSHDD0700	7	10.5	60	8	4	●	1
MSSHDD0750	7.5	11.3	60	8	4	●	1
MSSHDD0800	8	12	60	8	4	●	2
MSSHDD0850	8.5	12.8	70	10	4	●	1
MSSHDD0900	9	13.5	70	10	4	●	1
MSSHDD0950	9.5	14.3	70	10	4	●	1
MSSHDD1000	10	15	70	10	4	●	2
MSSHDD1100	11	16.5	75	12	4	●	1
MSSHDD1200	12	18	75	12	4	●	2
MSSHDD1300	13	19.5	75	12	4	●	3
MSSHDD1400	14	21	90	16	4	●	1
MSSHDD1500	15	22.5	90	16	4	●	1
MSSHDD1600	16	24	90	16	4	●	2
MSSHDD1700	17	25.5	100	16	4	●	3
MSSHDD1800	18	27	100	16	4	●	3
MSSHDD1900	19	28.5	110	20	4	●	1
MSSHDD2000	20	30	110	20	4	●	2

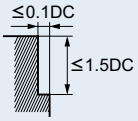
MSSHD

RECOMMENDED CUTTING CONDITIONS

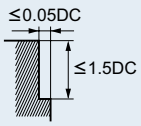
·Side milling

Work material	Carbon steel, Cast iron, Alloy steel (—30HRC) AISI 1050, AISI No 35 B, AISI P20		Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
2	15000	550	10000	340	10000	320
3	11000	800	7400	500	7400	480
4	8000	900	5600	540	5600	520
5	6400	1000	4500	600	4500	580
6	5800	1100	3700	640	3700	600
8	4400	1100	2800	660	2800	600
10	3500	1000	2200	640	2200	560
12	2900	1000	1900	640	1900	530
16	2200	800	1400	500	1400	450
20	1800	750	1100	460	1100	440
25	1400	600	900	400	900	380





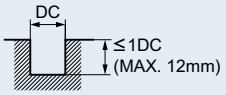
Work material	Hardened steel (45— 55HRC) AISI H13		Heat resistant alloys Inconel718	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
2	6400	160	4800	100
3	4800	250	4000	170
4	3600	270	3200	240
5	2900	300	2600	240
6	2400	320	2100	230
8	1800	330	1600	220
10	1400	320	1300	200
12	1200	320	1100	170
16	900	250	800	130
20	720	230	640	100
25	570	200	510	80

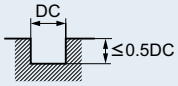


MSSHD

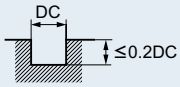
·Slotting

Work material	Carbon steel, Cast iron, Alloy steel (—30HRC) AISI 1050, AISI No 35 B, AISI P20		Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
2	12000	400	7000	200	7000	100
3	9000	600	5300	300	5300	150
4	7200	720	4000	360	4000	180
5	5800	720	3200	360	3200	180
6	5000	800	2700	400	2700	200
8	3700	800	2000	400	2000	200
10	3000	720	1600	360	1600	180
12	2500	720	1300	360	1300	180
16	2000	600	1000	280	1000	150
20	1600	540	800	250	800	130
25	1300	480	640	220	640	120





Work material	Hardened steel (45— 55HRC) AISI H13		Heat resistant alloys Inconel718	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
2	4200	80	2300	40
3	3200	130	1900	70
4	2400	140	1400	95
5	1900	150	1100	95
6	1600	160	950	95
8	1200	170	720	90
10	960	160	570	80
12	800	160	480	70
16	600	130	360	50
20	480	120	290	40
25	380	100	230	35



- When cutting austenitic stainless steel, the use of water-soluble cutting fluid is effective.
- If the depth of cut is shallow, the revolution and feed rate can be increased.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

MSMHD

MSTAR END MILLS

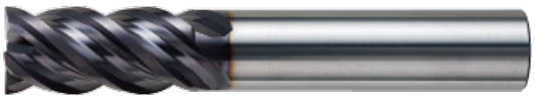
High power, Medium cut length, 4 flute

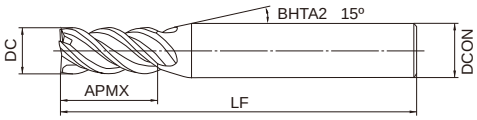
Product Information

Work Material

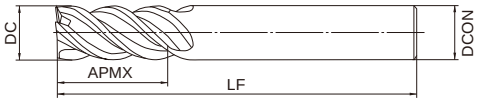
P M S H F M

Technical Info >> 1993
ISO13399 Property >> 1966
SYMBOL DESCRIPTIONS >> 664
END MILLS SELECTION CHART >> 668

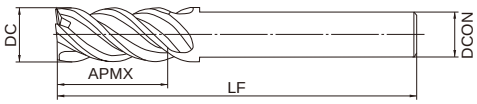




Type1



Type2



Type3

DC≦12	DC>12		
0 - 0.020	0 - 0.030		
4≦DCON≦6	8≦DCON≦10	12≦DCON≦16	20≦DCON≦25
0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013

h6

●Inventory maintained in Japan. Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
MSMHDD0200	2	4	45	4	4	●	1
MSMHDD0210	2.1	5	45	4	4	●	1
MSMHDD0220	2.2	5	45	4	4	●	1
MSMHDD0230	2.3	5	45	4	4	●	1
MSMHDD0240	2.4	5	45	4	4	●	1
MSMHDD0250	2.5	5	45	4	4	●	1
MSMHDD0260	2.6	6	45	4	4	●	1
MSMHDD0270	2.7	6	45	4	4	●	1
MSMHDD0280	2.8	6	45	4	4	●	1
MSMHDD0290	2.9	6	45	4	4	●	1
MSMHDD0300	3	8	45	6	4	●	1
MSMHDD0310	3.1	8	45	6	4	●	1
MSMHDD0320	3.2	8	45	6	4	●	1
MSMHDD0330	3.3	8	45	6	4	●	1
MSMHDD0340	3.4	8	45	6	4	●	1
MSMHDD0350	3.5	8	45	6	4	●	1
MSMHDD0360	3.6	11	45	6	4	●	1
MSMHDD0370	3.7	11	45	6	4	●	1
MSMHDD0380	3.8	11	45	6	4	●	1
MSMHDD0390	3.9	11	45	6	4	●	1
MSMHDD0400	4	11	45	6	4	●	1
MSMHDD0410	4.1	12	45	6	4	●	1
MSMHDD0420	4.2	12	45	6	4	●	1

MSMHD

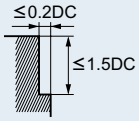
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
MSMHDD0430	4.3	12	45	6	4	●	1
MSMHDD0440	4.4	12	45	6	4	●	1
MSMHDD0450	4.5	12	45	6	4	●	1
MSMHDD0460	4.6	13	50	6	4	●	1
MSMHDD0470	4.7	13	50	6	4	●	1
MSMHDD0480	4.8	13	50	6	4	●	1
MSMHDD0490	4.9	13	50	6	4	●	1
MSMHDD0500	5	13	50	6	4	●	1
MSMHDD0510	5.1	13	50	6	4	●	1
MSMHDD0520	5.2	13	50	6	4	●	1
MSMHDD0530	5.3	13	50	6	4	●	1
MSMHDD0540	5.4	13	50	6	4	●	1
MSMHDD0550	5.5	13	50	6	4	●	1
MSMHDD0560	5.6	13	50	6	4	●	1
MSMHDD0570	5.7	13	50	6	4	●	1
MSMHDD0580	5.8	13	50	6	4	●	1
MSMHDD0590	5.9	13	50	6	4	●	1
MSMHDD0600	6	13	50	6	4	●	2
MSMHDD0650	6.5	16	60	8	4	●	1
MSMHDD0700	7	19	60	8	4	●	1
MSMHDD0750	7.5	19	60	8	4	●	1
MSMHDD0800	8	19	60	8	4	●	2
MSMHDD0850	8.5	19	70	10	4	●	1
MSMHDD0900	9	22	70	10	4	●	1
MSMHDD0950	9.5	22	70	10	4	●	1
MSMHDD1000	10	22	70	10	4	●	2
MSMHDD1100	11	26	75	12	4	●	1
MSMHDD1200	12	26	75	12	4	●	2
MSMHDD1200S10	12	26	75	10	4	●	3
MSMHDD1300	13	26	75	12	4	●	3
MSMHDD1400	14	30	90	16	4	●	1
MSMHDD1500	15	35	90	16	4	●	1
MSMHDD1600	16	35	90	16	4	●	2
MSMHDD1700	17	35	100	16	4	●	3
MSMHDD1800	18	40	100	16	4	●	3
MSMHDD1900	19	40	110	20	4	●	1
MSMHDD2000	20	45	110	20	4	●	2
MSMHDD2200	22	50	125	20	4	●	3
MSMHDD2500	25	55	125	25	4	●	2

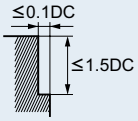
MSMHD

RECOMMENDED CUTTING CONDITIONS

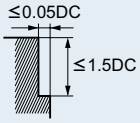
·Side milling

Work material	Carbon steel, Cast iron, Alloy steel (—30HRC) AISI 1050, AISI No 35 B, AISI P20		Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
2	15000	550	10000	340	10000	320
3	11000	800	7400	500	7400	480
4	8000	900	5600	540	5600	520
5	6400	1000	4500	600	4500	580
6	5800	1100	3700	640	3700	600
8	4400	1100	2800	660	2800	600
10	3500	1000	2200	640	2200	560
12	2900	1000	1900	640	1900	530
16	2200	800	1400	500	1400	450
20	1800	750	1100	460	1100	440
25	1400	600	900	400	900	380





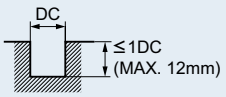
Work material	Hardened steel (45— 55HRC) AISI H13		Heat resistant alloys Inconel718	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
2	6400	160	4800	100
3	4800	250	4000	170
4	3600	270	3200	240
5	2900	300	2600	240
6	2400	320	2100	230
8	1800	330	1600	220
10	1400	320	1300	200
12	1200	320	1100	170
16	900	250	800	130
20	720	230	640	100
25	570	200	510	80

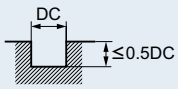


MSMHD

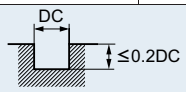
·Slotting

Work material	Carbon steel, Cast iron, Alloy steel (—30HRC) AISI 1050, AISI No 35 B, AISI P20		Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
2	12000	400	7000	200	7000	100
3	9000	600	5300	300	5300	150
4	7200	720	4000	360	4000	180
5	5800	720	3200	360	3200	180
6	5000	800	2700	400	2700	200
8	3700	800	2000	400	2000	200
10	3000	720	1600	360	1600	180
12	2500	720	1300	360	1300	180
16	2000	600	1000	280	1000	150
20	1600	540	800	250	800	130
25	1300	480	640	220	640	120





Work material	Hardened steel (45— 55HRC) AISI H13		Heat resistant alloys Inconel718	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
2	4200	80	2300	40
3	3200	130	1900	70
4	2400	140	1400	95
5	1900	150	1100	95
6	1600	160	950	95
8	1200	170	720	90
10	960	160	570	80
12	800	160	480	70
16	600	130	360	50
20	480	120	290	40
25	380	100	230	35



- When cutting austenitic stainless steel, the use of water-soluble cutting fluid is effective.
- If the depth of cut is shallow, the revolution and feed rate can be increased.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

MSJHD

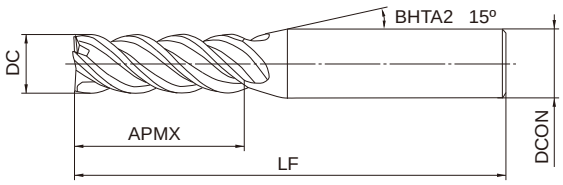
MSTAR END MILLS

High power, Semi long cut length, 4 flute

Product Information

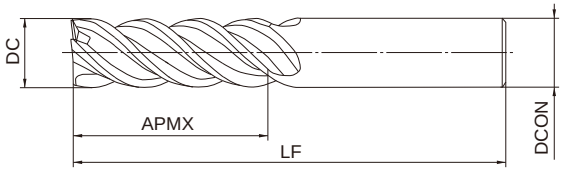
Work Material

Technical Info >> 1993
ISO13399 Property >> 1966
SYMBOL DESCRIPTIONS >> 664
END MILLS SELECTION CHART >> 668



Type1

DC≦12	DC>12		
0 - 0.020	0 - 0.030		
DCON=6	8≦DCON≦10	12≦DCON≦16	DCON=20
0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013



Type2

●Inventory maintained in Japan. Unit : mm

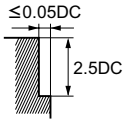
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
MSJHDD0200	2	8	60	6	4	●	1
MSJHDD0250	2.5	10	60	6	4	●	1
MSJHDD0300	3	12	60	6	4	●	1
MSJHDD0350	3.5	14	60	6	4	●	1
MSJHDD0400	4	16	60	6	4	●	1
MSJHDD0450	4.5	18	60	6	4	●	1
MSJHDD0500	5	20	60	6	4	●	1
MSJHDD0600	6	24	60	6	4	●	2
MSJHDD0700	7	25	80	8	4	●	1
MSJHDD0800	8	28	80	8	4	●	2
MSJHDD0900	9	32	90	10	4	●	1
MSJHDD1000	10	35	90	10	4	●	2
MSJHDD1100	11	35	100	12	4	●	1
MSJHDD1200	12	36	100	12	4	●	2
MSJHDD1400	14	42	110	16	4	●	1
MSJHDD1500	15	45	110	16	4	●	1
MSJHDD1600	16	48	125	16	4	●	2
MSJHDD2000	20	55	140	20	4	●	2

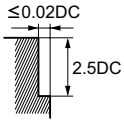
MSJHD

RECOMMENDED CUTTING CONDITIONS

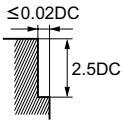
·Side milling

Work material	Carbon steel, Cast iron, Alloy steel (—30HRC) AISI 1050, AISI No 35 B, AISI P20		Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
2	11000	370	7000	230	7000	210
3	8000	550	5100	320	5100	300
4	6200	620	4000	350	4000	340
5	5000	670	3200	370	3200	360
6	4200	750	2600	400	2600	390
8	3200	780	2000	420	2000	400
10	2500	690	1600	410	1600	380
12	2100	670	1300	380	1300	340
16	1600	570	1000	320	1000	280
20	1200	470	800	290	800	260





Work material	Hardened steel (45— 55HRC) AISI H13		Heat resistant alloys Inconel718	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
2	5000	100	3800	55
3	3800	190	2500	80
4	3000	210	1900	110
5	2400	220	1500	110
6	2000	220	1300	110
8	1500	230	960	100
10	1200	210	760	100
12	1000	190	640	80
16	750	170	480	65
20	600	150	380	50



- When cutting austenitic stainless steel, the use of water-soluble cutting fluid is effective.
- If the depth of cut is shallow, the revolution and feed rate can be increased.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

MS4SC

MSTAR END MILLS

End mill, Short cut length, 4 flute

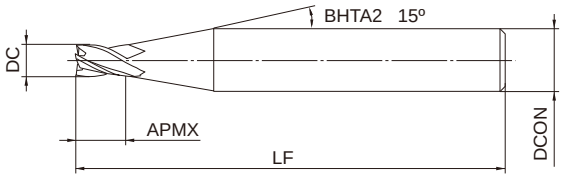
Product Information

UWC 30° MS Sharp

Work Material

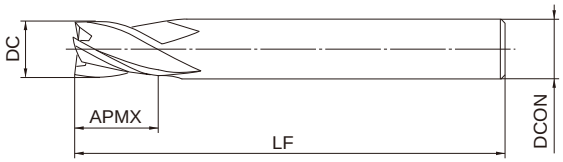
P M S H F M

Technical Info >> 1993
ISO13399 Property >> 1966
SYMBOL DESCRIPTIONS >> 664
END MILLS SELECTION CHART >> 668



Type1

	1≦DC≦12		
	0 - 0.020		
h6	4≦DCON≦6	8≦DCON≦10	DCON=12
	0 - 0.008	0 - 0.009	0 - 0.011



Type2

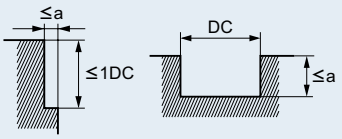
●Inventory maintained in Japan. Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
MS4SCD0100	1	1.5	40	4	4	●	1
MS4SCD0150	1.5	2.3	40	4	4	●	1
MS4SCD0200	2	3	40	4	4	●	1
MS4SCD0250	2.5	3.8	40	4	4	●	1
MS4SCD0300	3	4.5	50	6	4	●	1
MS4SCD0400	4	6	50	6	4	●	1
MS4SCD0500	5	7.5	50	6	4	●	1
MS4SCD0600	6	9	50	6	4	●	2
MS4SCD0800	8	12	60	8	4	●	2
MS4SCD1000	10	15	70	10	4	●	2
MS4SCD1200	12	18	75	12	4	●	2

MS4SC

RECOMMENDED CUTTING CONDITIONS

Work material	Carbon steel, Cast iron, Alloy steel, Pre-hardened steel AISI 1050, AISI No 35 B, AISI P20, AISI P21			Hardened steel (45— 55HRC) AISI H13		
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut a(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut a(mm)
1	40000	3000	0.06	32000	2400	0.06
1.5	40000	4500	0.12	32000	3600	0.08
2	30000	4500	0.18	24000	3600	0.10
2.5	24000	3900	0.25	19000	3000	0.13
3	20000	3500	0.30	16000	2700	0.15
4	15000	3000	0.40	12000	2400	0.20
5	12000	2400	0.50	9000	1800	0.25
6	10000	2100	0.60	7000	1500	0.30
8	8000	1500	0.80	5600	1100	0.40
10	6400	1400	1.00	4500	950	0.50
12	5400	1200	1.00	3800	860	0.50
16	2400	550	3.00	1200	120	0.80
20	1900	480	4.00	1000	100	1.00



- If the depth of cut is shallow, the revolution and feed rate can be increased.
- In case of slotting with over 3 mm endmill, please reduce revolution to 50—70% of above value, and reduce feed rate to 40—60% of above value.
- When drilling, please set the feed rate at 1/3 or below of the values above.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

MS4MC

MSTAR END MILLS

End mill, Medium cut length, 4 flute

Product Information

UWC 30° MS Sharp

Work Material

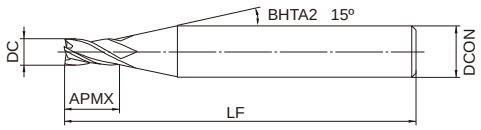
P M S H F M

Technical Info >> 1993

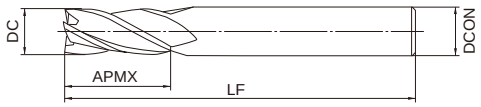
ISO13399 Property >> 1966

SYMBOL DESCRIPTIONS >> 664

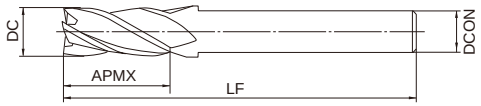
END MILLS SELECTION CHART >> 668



Type1



Type2



Type3

h6	DC≦12	DC>12		
	0 - 0.020	0 - 0.030		
	4≦DCON≦6	8≦DCON≦10	12≦DCON≦16	DCON=20
	0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013

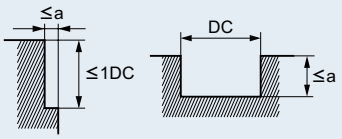
●Inventory maintained in Japan. Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
MS4MCD0100	1	2.5	40	4	4	●	1
MS4MCD0150	1.5	3.8	40	4	4	●	1
MS4MCD0200	2	5	40	4	4	●	1
MS4MCD0250	2.5	6.3	40	4	4	●	1
MS4MCD0300	3	7.5	50	6	4	●	1
MS4MCD0350	3.5	9	50	6	4	●	1
MS4MCD0400	4	10	50	6	4	●	1
MS4MCD0450	4.5	11.5	50	6	4	●	1
MS4MCD0500	5	12.5	50	6	4	●	1
MS4MCD0550	5.5	14	50	6	4	●	1
MS4MCD0600	6	15	50	6	4	●	2
MS4MCD0650	6.5	16.5	60	8	4	●	1
MS4MCD0700	7	17.5	60	8	4	●	1
MS4MCD0750	7.5	19	60	8	4	●	1
MS4MCD0800	8	20	60	8	4	●	2
MS4MCD0850	8.5	21.5	70	10	4	●	1
MS4MCD0900	9	22.5	70	10	4	●	1
MS4MCD0950	9.5	24	70	10	4	●	1
MS4MCD1000	10	25	70	10	4	●	2
MS4MCD1100	11	27.5	75	12	4	●	1
MS4MCD1200	12	30	90	12	4	●	2
MS4MCD1400	14	35	90	12	4	●	3
MS4MCD1600	16	40	100	16	4	●	2
MS4MCD1800	18	45	100	16	4	●	3
MS4MCD2000	20	50	110	20	4	●	2

MS4MC

RECOMMENDED CUTTING CONDITIONS

Work material	Carbon steel, Cast iron, Alloy steel, Pre-hardened steel AISI 1050, AISI No 35 B, AISI P20, AISI P21			Hardened steel (45— 55HRC) AISI H13		
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut a(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut a(mm)
1	40000	3000	0.06	32000	2400	0.06
1.5	40000	4500	0.12	32000	3600	0.08
2	30000	4500	0.18	24000	3600	0.10
2.5	24000	3900	0.25	19000	3000	0.13
3	20000	3500	0.30	16000	2700	0.15
4	15000	3000	0.40	12000	2400	0.20
5	12000	2400	0.50	9000	1800	0.25
6	10000	2100	0.60	7000	1500	0.30
8	8000	1500	0.80	5600	1100	0.40
10	6400	1400	1.00	4500	950	0.50
12	5400	1200	1.00	3800	860	0.50
16	2400	550	3.00	1200	120	0.80
20	1900	480	4.00	1000	100	1.00



- If the depth of cut is shallow, the revolution and feed rate can be increased.
- In case of slotting with over 3 mm endmill, please reduce revolution to 50—70% of above value, and reduce feed rate to 40—60% of above value.
- When drilling, please set the feed rate at 1/3 or below of the values above.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

MS4JC

MSTAR END MILLS

End mill, Semi long cut length, 4 flute

Product Information

UWC 30° MS Gash Sharp

DC≧3 DC<3 DC≧3 DC<3

Technical Info >> 1993

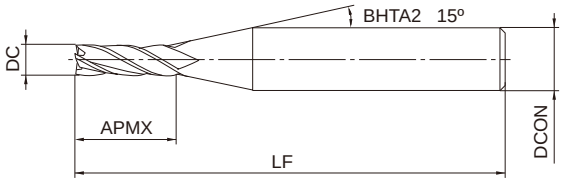
ISO13399 Property >> 1966

Work Material

P M S H F M

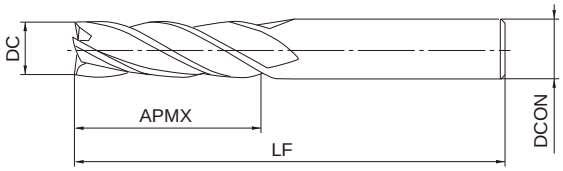
SYMBOL DESCRIPTIONS >> 664

END MILLS SELECTION CHART >> 668



Type1

	1≦DC≦12		
	0 - 0.020		
h6	4≦DCON≦6	8≦DCON≦10	DCON=12
	0 - 0.008	0 - 0.009	0 - 0.011



Type2

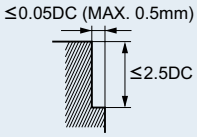
●Inventory maintained in Japan. Unit : mm

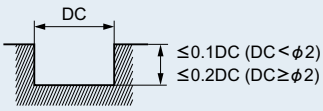
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
MS4JCD0100	1	4	40	4	4	●	1
MS4JCD0150	1.5	6	40	4	4	●	1
MS4JCD0200	2	8	40	4	4	●	1
MS4JCD0250	2.5	10	50	4	4	●	1
MS4JCD0300	3	12	50	6	4	●	1
MS4JCD0400	4	16	50	6	4	●	1
MS4JCD0500	5	20	60	6	4	●	1
MS4JCD0600	6	24	60	6	4	●	2
MS4JCD0800	8	32	70	8	4	●	2
MS4JCD1000	10	40	90	10	4	●	2
MS4JCD1200	12	48	110	12	4	●	2

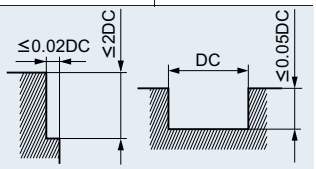
MS4JC

RECOMMENDED CUTTING CONDITIONS

Work material	Carbon steel, Cast iron, Alloy steel (—30HRC) AISI 1050, AISI No 35 B, AISI P20		Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V		Hardened steel (45— 55HRC) AISI H13	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
1	11100	85	9500	65	8000	50	6400	35
1.5	7400	85	6400	90	5300	50	4200	35
2	5600	85	4800	90	4000	50	3200	35
2.5	4500	85	3800	90	3200	55	2500	35
3	3700	90	3400	90	2600	60	2100	35
4	3000	110	2700	90	2100	70	1700	50
5	2600	140	2300	110	1800	85	1500	55
6	2300	170	2000	140	1500	110	1300	70
8	1700	180	1500	140	1200	110	1000	70
10	1400	180	1300	140	950	110	800	70
12	1200	170	1100	140	800	110	670	70







- When cutting austenitic stainless steel, the use of water-soluble cutting fluid is effective.
- If the depth of cut is shallow, the revolution and feed rate can be increased.
- When drilling, please set the feed rate at 1/3 or below of the values above.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

MS4XL

MSTAR END MILLS

End mill, Short cut length, 4 flute, Long neck

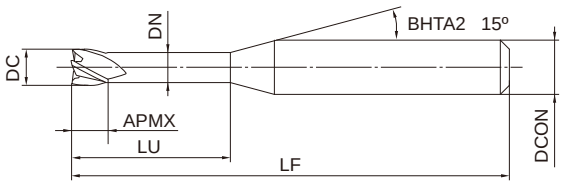
Product Information

UWC 30° MS Gash

Work Material

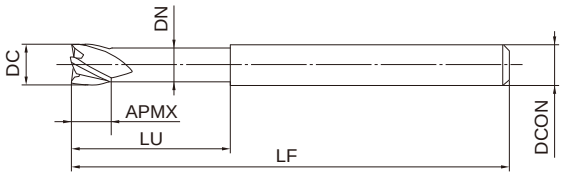
P M S H F M

Technical Info >> 1993
ISO13399 Property >> 1966
SYMBOL DESCRIPTIONS >> 664
END MILLS SELECTION CHART >> 668



Type1

	1≦DC≦10	
	0 - 0.020	
h6	4≦DCON≦6	8≦DCON≦10
	0 - 0.008	0 - 0.009



Type2

●Inventory maintained in Japan. Unit : mm

Order Number	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	type
MS4XLD0100N040	1	1	4	0.94	50	4	4	●	1
MS4XLD0100N060	1	1	6	0.94	50	4	4	●	1
MS4XLD0100N080	1	1	8	0.94	50	4	4	●	1
MS4XLD0100N100	1	1	10	0.94	50	4	4	●	1
MS4XLD0100N120	1	1	12	0.94	50	4	4	●	1
MS4XLD0100N160	1	1	16	0.94	60	4	4	●	1
MS4XLD0110N060	1.1	1.1	6	1.04	50	4	4	●	1
MS4XLD0110N100	1.1	1.1	10	1.04	50	4	4	●	1
MS4XLD0110N160	1.1	1.1	16	1.04	60	4	4	●	1
MS4XLD0120N060	1.2	1.2	6	1.14	50	4	4	●	1
MS4XLD0120N080	1.2	1.2	8	1.14	50	4	4	●	1
MS4XLD0120N100	1.2	1.2	10	1.14	50	4	4	●	1
MS4XLD0120N120	1.2	1.2	12	1.14	50	4	4	●	1
MS4XLD0120N160	1.2	1.2	16	1.14	60	4	4	●	1
MS4XLD0130N060	1.3	1.3	6	1.24	50	4	4	●	1
MS4XLD0130N120	1.3	1.3	12	1.24	50	4	4	●	1
MS4XLD0130N180	1.3	1.3	18	1.24	60	4	4	●	1
MS4XLD0140N060	1.4	1.4	6	1.34	50	4	4	●	1
MS4XLD0140N080	1.4	1.4	8	1.34	50	4	4	●	1
MS4XLD0140N100	1.4	1.4	10	1.34	50	4	4	●	1
MS4XLD0140N120	1.4	1.4	12	1.34	50	4	4	●	1
MS4XLD0140N140	1.4	1.4	14	1.34	60	4	4	●	1
MS4XLD0140N160	1.4	1.4	16	1.34	60	4	4	●	1
MS4XLD0140N220	1.4	1.4	22	1.34	60	4	4	●	1
MS4XLD0150N060	1.5	1.5	6	1.44	50	4	4	●	1
MS4XLD0150N080	1.5	1.5	8	1.44	50	4	4	●	1
MS4XLD0150N100	1.5	1.5	10	1.44	50	4	4	●	1
MS4XLD0150N120	1.5	1.5	12	1.44	50	4	4	●	1

MS4XL

Order Number	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	type
MS4XLD0150N140	1.5	1.5	14	1.44	60	4	4	●	1
MS4XLD0150N160	1.5	1.5	16	1.44	60	4	4	●	1
MS4XLD0150N180	1.5	1.5	18	1.44	60	4	4	●	1
MS4XLD0150N200	1.5	1.5	20	1.44	60	4	4	●	1
MS4XLD0160N060	1.6	1.6	6	1.54	50	4	4	●	1
MS4XLD0160N080	1.6	1.6	8	1.54	50	4	4	●	1
MS4XLD0160N100	1.6	1.6	10	1.54	50	4	4	●	1
MS4XLD0160N120	1.6	1.6	12	1.54	50	4	4	●	1
MS4XLD0160N140	1.6	1.6	14	1.54	60	4	4	●	1
MS4XLD0160N160	1.6	1.6	16	1.54	60	4	4	●	1
MS4XLD0160N180	1.6	1.6	18	1.54	60	4	4	●	1
MS4XLD0160N200	1.6	1.6	20	1.54	60	4	4	●	1
MS4XLD0160N260	1.6	1.6	26	1.54	70	4	4	●	1
MS4XLD0170N060	1.7	1.7	6	1.64	50	4	4	●	1
MS4XLD0170N140	1.7	1.7	14	1.64	60	4	4	●	1
MS4XLD0170N240	1.7	1.7	24	1.64	70	4	4	●	1
MS4XLD0180N060	1.8	1.8	6	1.74	50	4	4	●	1
MS4XLD0180N080	1.8	1.8	8	1.74	50	4	4	●	1
MS4XLD0180N100	1.8	1.8	10	1.74	50	4	4	●	1
MS4XLD0180N120	1.8	1.8	12	1.74	50	4	4	●	1
MS4XLD0180N140	1.8	1.8	14	1.74	60	4	4	●	1
MS4XLD0180N160	1.8	1.8	16	1.74	60	4	4	●	1
MS4XLD0180N180	1.8	1.8	18	1.74	60	4	4	●	1
MS4XLD0180N200	1.8	1.8	20	1.74	60	4	4	●	1
MS4XLD0180N250	1.8	1.8	25	1.74	70	4	4	●	1
MS4XLD0190N060	1.9	1.9	6	1.84	50	4	4	●	1
MS4XLD0190N160	1.9	1.9	16	1.84	60	4	4	●	1
MS4XLD0190N280	1.9	1.9	28	1.84	70	4	4	●	1
MS4XLD0200N060	2	2	6	1.9	50	4	4	●	1
MS4XLD0200N080	2	2	8	1.9	50	4	4	●	1
MS4XLD0200N100	2	2	10	1.9	50	4	4	●	1
MS4XLD0200N120	2	2	12	1.9	50	4	4	●	1
MS4XLD0200N140	2	2	14	1.9	60	4	4	●	1
MS4XLD0200N160	2	2	16	1.9	60	4	4	●	1
MS4XLD0200N180	2	2	18	1.9	60	4	4	●	1
MS4XLD0200N200	2	2	20	1.9	60	4	4	●	1
MS4XLD0200N250	2	2	25	1.9	70	4	4	●	1
MS4XLD0200N300	2	2	30	1.9	70	4	4	●	1
MS4XLD0250N080	2.5	2.5	8	2.4	50	4	4	●	1
MS4XLD0250N120	2.5	2.5	12	2.4	50	4	4	●	1
MS4XLD0250N160	2.5	2.5	16	2.4	60	4	4	●	1
MS4XLD0250N200	2.5	2.5	20	2.4	60	4	4	●	1
MS4XLD0250N250	2.5	2.5	25	2.4	70	4	4	●	1
MS4XLD0300N080	3	3	8	2.9	50	6	4	●	1
MS4XLD0300N120	3	3	12	2.9	50	6	4	●	1
MS4XLD0300N160	3	3	16	2.9	60	6	4	●	1
MS4XLD0300N200	3	3	20	2.9	60	6	4	●	1
MS4XLD0300N250	3	3	25	2.9	70	6	4	●	1
MS4XLD0300N300	3	3	30	2.9	70	6	4	●	1
MS4XLD0350N150	3.5	3.5	15	3.4	60	6	4	●	1
MS4XLD0350N250	3.5	3.5	25	3.4	70	6	4	●	1
MS4XLD0350N350	3.5	3.5	35	3.4	80	6	4	●	1
MS4XLD0400N120	4	4	12	3.9	50	6	4	●	1
MS4XLD0400N160	4	4	16	3.9	60	6	4	●	1

MS4XL

Order Number	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	type
MS4XLD0400N200	4	4	20	3.9	60	6	4	●	1
MS4XLD0400N250	4	4	25	3.9	70	6	4	●	1
MS4XLD0400N300	4	4	30	3.9	70	6	4	●	1
MS4XLD0400N350	4	4	35	3.9	80	6	4	●	1
MS4XLD0400N400	4	4	40	3.9	90	6	4	●	1
MS4XLD0400N450	4	4	45	3.9	90	6	4	●	1
MS4XLD0400N500	4	4	50	3.9	100	6	4	●	1
MS4XLD0500N160	5	5	16	4.9	60	6	4	●	1
MS4XLD0500N250	5	5	25	4.9	70	6	4	●	1
MS4XLD0500N350	5	5	35	4.9	80	6	4	●	1
MS4XLD0500N500	5	5	50	4.9	110	6	4	●	1
MS4XLD0600N200	6	6	20	5.85	80	6	4	●	2
MS4XLD0600N300	6	6	30	5.85	90	6	4	●	2
MS4XLD0600N400	6	6	40	5.85	100	6	4	●	2
MS4XLD0600N500	6	6	50	5.85	110	6	4	●	2
MS4XLD0800N300	8	8	30	7.85	90	8	4	●	2
MS4XLD0800N500	8	8	50	7.85	110	8	4	●	2
MS4XLD0800N700	8	8	70	7.85	130	8	4	●	2
MS4XLD1000N400	10	10	40	9.7	100	10	4	●	2
MS4XLD1000N600	10	10	60	9.7	120	10	4	●	2
MS4XLD1000N800	10	10	80	9.7	140	10	4	●	2

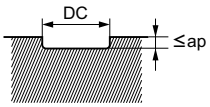
MS4XL

RECOMMENDED CUTTING CONDITIONS

Work material		Carbon steel, Cast iron, Alloy steel, Pre-hardened steel AISI 1050, AISI No 35 B, AISI P20, AISI P21		
Dia. DC(mm)	Neck length LU(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)
1	4	40000	3000	0.04
	8	36000	2400	0.03
	12	20000	1000	0.02
	16	10000	500	0.005
1.2	6	40000	3000	0.05
	10	36000	2400	0.04
	12	20000	1200	0.03
	16	12000	600	0.01
1.5	6	40000	3200	0.06
	12	32000	2400	0.05
	16	16000	1100	0.03
	20	10000	600	0.01
1.8	6	40000	3600	0.08
	12	32000	2800	0.06
	20	12000	1000	0.02
	25	7000	600	0.01
2	6	40000	4000	0.1
	12	32000	3200	0.07
	16	24000	2400	0.05
	20	12000	1200	0.03
	30	5000	500	0.01
2.5	8	32000	4000	0.2
	25	9000	1100	0.04
	50	2500	300	0.005
3	8	25000	3600	0.4
	16	18000	2500	0.2
	25	12000	1700	0.1
	30	7000	800	0.05
3.5	15	20000	3000	0.6
	25	11000	1600	0.15
	35	5500	800	0.06
4	12	18000	3000	1
	20	12000	2000	0.5
	30	8000	1300	0.2
	40	4200	700	0.08
	50	2400	400	0.03
5	16	14000	2700	1
	25	9500	1800	0.50
	35	6400	1200	0.20
	50	3200	600	0.05
6	20	11000	2200	1.20
	30	8000	1600	0.60
	40	5400	1100	0.25
	50	3200	640	0.15
8	30	8000	1600	1.60
	50	4000	800	0.50
	70	2000	400	0.20
10	40	6400	1300	2
	60	3200	640	0.60

M54XL

Work material		Carbon steel, Cast iron, Alloy steel, Pre-hardened steel AISI 1050, AISI No 35 B, AISI P20, AISI P21		
Dia. DC(mm)	Neck length LU(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)
	80	1600	320	0.30



- If the depth of cut is shallow, the revolution and feed rate can be increased.
- Cutting condition may be considerably different due to the overhang (milling depth), depth of cut, and machine tools. Please see the above table as a standard.

MS4EC

MSTAR END MILLS

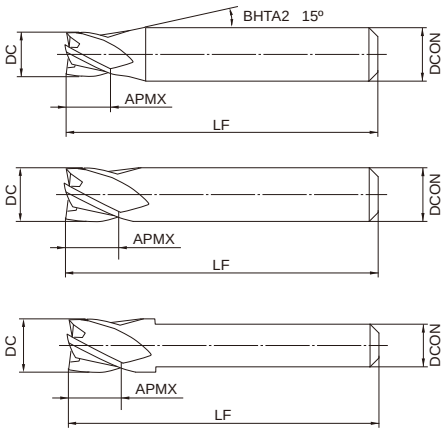
End mill, 4 flute, For small automatic lathes

Product Information

Work Material

P M S H F M

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668



h6	DC≦12	DC>12
	0 - 0.020	0 - 0.030
	4≦DCON≦6	7≦DCON≦10
	0 - 0.008	0 - 0.009

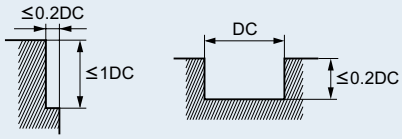
●Inventory maintained in Japan. Unit : mm

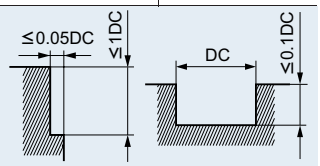
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
MS4ECD0300L35S04	3	3	35	4	4	●	1
MS4ECD0300L45S04	3	3	45	4	4	●	1
MS4ECD0350L35S04	3.5	3.5	35	4	4	●	1
MS4ECD0350L45S04	3.5	3.5	45	4	4	●	1
MS4ECD0400L35S04	4	4	35	4	4	●	2
MS4ECD0400L45S04	4	4	45	4	4	●	2
MS4ECD0500L35S05	5	5	35	5	4	●	2
MS4ECD0500L35S06	5	5	35	6	4	●	1
MS4ECD0500L45S06	5	5	45	6	4	●	1
MS4ECD0600L35S05	6	6	35	5	4	●	3
MS4ECD0600L35S06	6	6	35	6	4	●	2
MS4ECD0600L45S06	6	6	45	6	4	●	2
MS4ECD0700L35S07	7	6	35	7	4	●	2
MS4ECD0700L45S07	7	7	45	7	4	●	2
MS4ECD0800L35S07	8	6	35	7	4	●	3
MS4ECD0800L35S08	8	6	35	8	4	●	2
MS4ECD0800L45S07	8	8	45	7	4	●	3
MS4ECD0800L45S08	8	8	45	8	4	●	2
MS4ECD1000L35S07	10	6	35	7	4	●	3
MS4ECD1000L35S10	10	6	35	10	4	●	2
MS4ECD1000L45S07	10	10	45	7	4	●	3
MS4ECD1000L45S10	10	10	45	10	4	●	2
MS4ECD1200L35S10	12	6	35	10	4	●	3
MS4ECD1200L45S10	12	12	45	10	4	●	3
MS4ECD1400L45S10	14	14	45	10	4	●	3

MS4EC

RECOMMENDED CUTTING CONDITIONS

Work material	Carbon steel, Cast iron, Alloy steel (—30HRC) AISI 1050, AISI No 35 B, AISI P20		Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V		Hardened steel (45— 55HRC) AISI H13	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
3	10000	900	7000	600	6000	450	5000	180
4	7500	900	5200	600	4500	450	4000	180
5	6000	900	4200	600	3600	450	3200	180
6	5000	900	3500	600	3000	450	2700	180
7	4500	840	3000	540	2700	420	2300	160
8	4000	780	2800	520	2400	390	2000	160
10	3200	680	2200	450	1900	340	1600	140
12	2700	620	1900	410	1600	310	1300	120
14	2300	550	1600	350	1400	280	1200	120





- When cutting austenitic stainless steel, the use of water-soluble cutting fluid is effective.
- If the depth of cut is shallow, the revolution and feed rate can be increased.
- When drilling, please set the feed rate at 1/3 or below of the values above.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

VF4MD

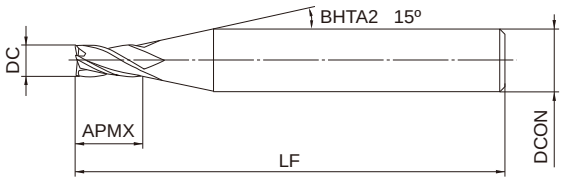
IMPACT MIRACLE END MILLS

End mill, Medium cut length, 4 flute, For hardened materials

Product Information

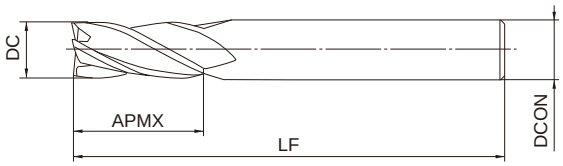
Work Material

Technical Info >> 1993
ISO13399 Property >> 1966
SYMBOL DESCRIPTIONS >> 664
END MILLS SELECTION CHART >> 668



Type1

	DC≦12	DC>12		
	0 - 0.020	0 - 0.030		
h6	4≦DCON≦6	8≦DCON≦10	12≦DCON≦16	DCON=20
	0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013



Type2

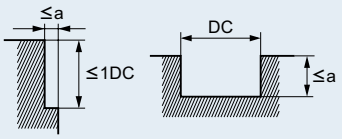
●Inventory maintained in Japan. Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
VF4MDD0100	1	2.5	40	4	4	●	1
VF4MDD0150	1.5	3.8	40	4	4	●	1
VF4MDD0200	2	5	40	4	4	●	1
VF4MDD0250	2.5	6.3	40	4	4	●	1
VF4MDD0300	3	7.5	50	6	4	●	1
VF4MDD0400	4	10	50	6	4	●	1
VF4MDD0500	5	12.5	50	6	4	●	1
VF4MDD0600	6	15	50	6	4	●	2
VF4MDD0800	8	20	60	8	4	●	2
VF4MDD1000	10	25	70	10	4	●	2
VF4MDD1200	12	30	90	12	4	●	2
VF4MDD1600	16	40	100	16	4	●	2
VF4MDD2000	20	50	110	20	4	●	2

VF4MD

RECOMMENDED CUTTING CONDITIONS

Work material	Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21			Hardened steel (45— 55HRC) AISI H13			Hardened steel (55— 62HRC) AISI D2		
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut a(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut a(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut a(mm)
1	40000	3000	0.06	32000	2400	0.06	16000	710	0.05
1.5	40000	4500	0.12	32000	3600	0.08	10600	650	0.08
2	30000	4500	0.18	24000	3600	0.10	8100	520	0.10
2.5	24000	3900	0.25	19000	3000	0.13	6400	450	0.13
3	20000	3500	0.30	16000	2700	0.15	5400	390	0.15
4	15000	3000	0.40	12000	2400	0.20	4000	450	0.20
5	12000	2400	0.50	9000	1800	0.25	3200	380	0.20
6	10000	2100	0.60	7000	1400	0.30	2700	320	0.20
8	8000	1500	0.80	5600	1100	0.40	2000	240	0.20
10	6400	1400	1.00	4500	950	0.50	1600	210	0.30
12	5400	1200	1.00	3800	860	0.50	1300	160	0.30
16	2400	550	3.00	1200	280	0.80	1000	130	0.30
20	1900	480	4.00	1000	240	1.00	800	100	0.30



- If the depth of cut is shallow, the revolution and feed rate can be increased.
- When drilling, please set the feed rate at 1/3 or below of the values above.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

VF4MV

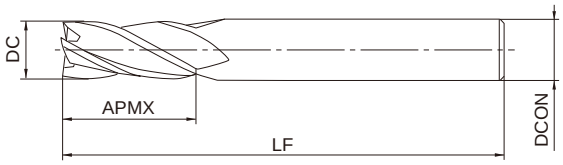
IMPACT MIRACLE END MILLS

End mill, Medium cut length, 4 flute, For hardened materials

Product Information

Work Material

Technical Info >> 1993
ISO13399 Property >> 1966
SYMBOL DESCRIPTIONS >> 664
END MILLS SELECTION CHART >> 668



Type1

DC≦12	DC>12		
0 - 0.020	0 - 0.030		
DCON=6	8≦DCON≦10	12≦DCON≦16	DCON=20
0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013

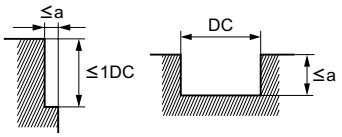
●Inventory maintained in Japan. Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
VF4MVD0600	6	15	50	6	4	●	1
VF4MVD0800	8	20	60	8	4	●	1
VF4MVD1000	10	25	70	10	4	●	1
VF4MVD1200	12	30	90	12	4	●	1
VF4MVD1600	16	40	100	16	4	●	1
VF4MVD2000	20	50	110	20	4	●	1

VF4MV

RECOMMENDED CUTTING CONDITIONS

Work material	Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21			Hardened steel (45— 55HRC) AISI H13			Hardened steel (55— 62HRC) AISI D2		
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut a(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut a(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut a(mm)
6	10000	2100	0.60	7000	1400	0.30	2700	320	0.20
8	8000	1500	0.80	5600	1100	0.40	2000	240	0.20
10	6400	1400	1.00	4500	950	0.50	1600	210	0.30
12	5400	1200	1.00	3800	860	0.50	1300	160	0.30
16	2400	550	3.00	1200	280	0.80	1000	130	0.30
20	1900	480	4.00	1000	240	1.00	800	100	0.30



- When slotting, reduce the revolutions by 50 — 70% and the feed rate by 40 —60%.
- For austenitic stainless steel, titanium alloy and heat resistant alloys, the VFMHV is recommended.
- The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abnormal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.

VFMHV

IMPACT MIRACLE END MILLS

End mill, Medium cut length, Irregular helix flutes

Product Information

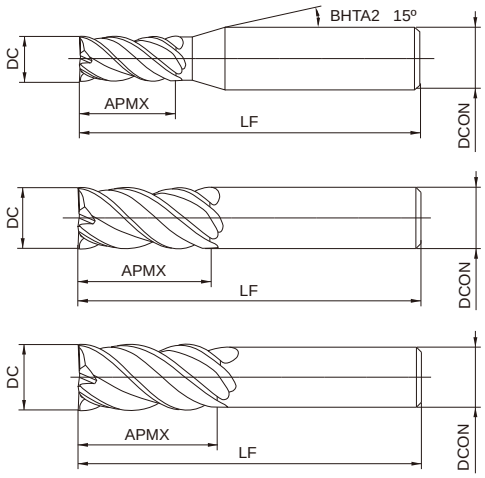
UWC 42° 45° 43° 45° VF Gash

DC≧6 DC<6

Work Material

P M S H F M

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668



	DC≦12	DC>12		
	0 - 0.020	0 - 0.030		
h6	4≦DCON≦6	8≦DCON≦10	12≦DCON≦16	DCON=20
	0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013

●Inventory maintained in Japan. Unit : mm

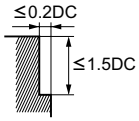
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
VFMHVD0200	2	4	45	4	4	●	1
VFMHVD0250	2.5	5	45	4	4	●	1
VFMHVD0300	3	8	45	6	4	●	1
VFMHVD0350	3.5	8	45	6	4	●	1
VFMHVD0400	4	11	45	6	4	●	1
VFMHVD0500	5	13	50	6	4	●	1
VFMHVD0600	6	13	50	6	4	●	2
VFMHVD0600A070	6	13	70	6	4	●	2
VFMHVD0700	7	19	60	8	4	●	1
VFMHVD0800	8	19	60	8	4	●	2
VFMHVD0800A080	8	19	80	8	4	●	2
VFMHVD0900	9	22	70	10	4	●	1
VFMHVD1000	10	22	70	10	4	●	2
VFMHVD1000A100	10	22	100	10	4	●	2
VFMHVD1000A100S08	10	22	100	8	4	●	3
VFMHVD1100	11	26	100	10	4	●	3
VFMHVD1200	12	26	75	12	4	●	2
VFMHVD1200A110	12	26	110	12	4	●	2
VFMHVD1200A110S10	12	26	110	10	4	●	3
VFMHVD1300	13	26	110	12	4	●	3
VFMHVD1400A130S12	14	32	130	12	4	●	3
VFMHVD1600	16	35	90	16	4	●	2
VFMHVD1800A150S16	18	42	150	16	4	●	3
VFMHVD2000	20	45	110	20	4	●	2

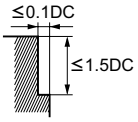
VFMHV

RECOMMENDED CUTTING CONDITIONS

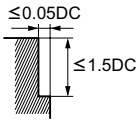
·Side milling

Work material	Carbon steel, Cast iron, Alloy steel (—30HRC) AISI 1050, AISI No 35 B, AISI P20		Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
2	21000	1100	21000	1100	14000	560
3	15000	1250	15000	1250	10600	850
4	11000	1400	11000	1400	8000	960
5	9600	1920	9600	1920	6400	1020
6	8000	2240	8000	2240	5300	1060
7	6800	1900	6800	1900	4500	1010
8	6000	1680	6000	1680	4000	960
9	5300	1480	5300	1480	3500	840
10	4800	1440	4800	1440	3200	770
11	4400	1350	4400	1350	2900	760
12	4000	1250	4000	1250	2700	760
13	3700	1180	3700	1180	2500	700
14	3400	1160	3400	1160	2300	640
16	3000	1140	3000	1140	2000	560
18	2700	970	2700	970	1800	550
20	2400	860	2400	860	1600	510





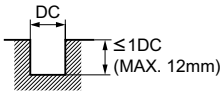
Work material	Hardened steel (45— 55HRC) AISI H13		Heat resistant alloys Inconel718	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
2	9600	310	4800	130
3	7400	380	4200	200
4	5600	400	3200	220
5	4500	430	2500	250
6	3700	440	2100	250
7	3200	450	1800	260
8	2800	450	1600	260
9	2500	450	1400	220
10	2200	440	1300	210
11	2000	400	1200	190
12	1900	380	1100	180
13	1700	360	1000	160
14	1600	350	900	140
16	1400	340	800	130
18	1200	340	700	110
20	1100	330	600	100

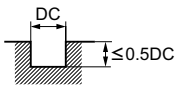


VFMHV

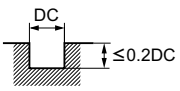
·Slotting

Work material	Carbon steel, Cast iron, Alloy steel (—30HRC) AISI 1050, AISI No 35 B, AISI P20		Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V	
Dia. DC(mm)	Revolution (min⁻¹)	Feed rate (mm/min)	Revolution (min⁻¹)	Feed rate (mm/min)	Revolution (min⁻¹)	Feed rate (mm/min)
2	17000	680	10000	400	9600	310
3	12000	720	6900	410	7400	380
4	9200	810	5600	490	5600	400
5	7600	1060	4500	630	4500	410
6	6400	1280	3700	740	3700	440
7	5500	1210	3200	700	3200	410
8	4800	1150	2800	670	2800	390
9	4200	1010	2500	600	2500	350
10	3800	910	2200	530	2200	350
11	3500	900	2000	530	2000	320
12	3200	900	1900	530	1900	300
13	2900	810	1700	480	1700	290
14	2700	760	1600	450	1600	290
16	2400	670	1400	390	1400	280
18	2100	670	1200	380	1200	270
20	1900	610	1100	350	1100	260





Work material	Hardened steel (45— 55HRC) AISI H13		Heat resistant alloys Inconel718	
Dia. DC(mm)	Revolution (min⁻¹)	Feed rate (mm/min)	Revolution (min⁻¹)	Feed rate (mm/min)
2	4800	130	3200	80
3	3200	140	2700	110
4	2400	150	2000	120
5	1900	170	1600	130
6	1600	190	1300	160
7	1400	190	1100	140
8	1200	190	1000	130
9	1100	180	900	130
10	1000	160	800	130
11	900	160	720	120
12	800	160	660	110
13	730	150	610	100
14	680	140	570	90
16	600	120	500	80
18	530	120	440	70
20	480	120	400	60



- When cutting austenitic stainless steel, the use of water-soluble cutting fluid is effective.
- If the depth of cut is shallow, the revolution and feed rate can be increased.
- The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abnormal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.

VFJHV

IMPACT MIRACLE END MILLS

End mill, Semi long cut length, 4 flute, Irregular helix flutes

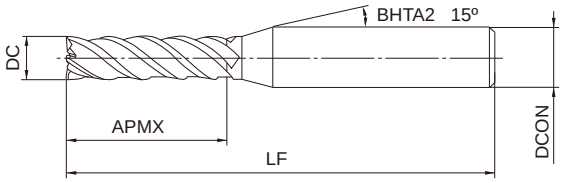
Product Information

UWC 43° 45° DC>6 43.5° 45° DC≦6 VF Gash

Work Material

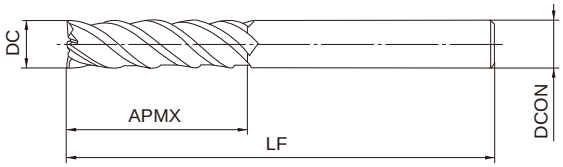
P M S H F M

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668



Type1

	DC≦12	DC>12		
	0 - 0.020	0 - 0.030		
h6	DCON=6	8≦DCON≦10	12≦DCON≦16	DCON=20
	0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013



Type2

●Inventory maintained in Japan. Unit : mm

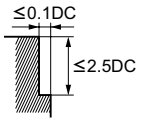
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
VFJHVD0200	2	8	60	6	4	●	1
VFJHVD0300	3	12	60	6	4	●	1
VFJHVD0400	4	16	60	6	4	●	1
VFJHVD0500	5	20	60	6	4	●	1
VFJHVD0600	6	24	60	6	4	●	2
VFJHVD0800	8	28	80	8	4	●	2
VFJHVD1000	10	35	90	10	4	●	2
VFJHVD1200	12	40	100	12	4	●	2
VFJHVD1600	16	55	125	16	4	●	2
VFJHVD2000	20	60	140	20	4	●	2

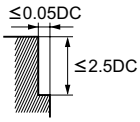
VFJHV

RECOMMENDED CUTTING CONDITIONS

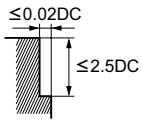
·Side milling

Work material	Carbon steel, Cast iron, Alloy steel (—30HRC) AISI 1050, AISI No 35 B, AISI P20		Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
2	16000	530	10000	320	10000	300
3	12000	820	7600	470	7600	440
4	9500	950	6000	520	6000	510
5	7600	1000	4800	550	4800	540
6	6300	1100	4000	610	4000	600
8	4700	1100	3000	630	3000	600
10	3800	1000	2400	610	2400	570
12	3100	980	2000	580	2000	520
16	2300	810	1500	480	1500	420
20	1900	740	1200	430	1200	390





Work material	Hardened steel (45— 55HRC) AISI H13		Heat resistant alloys Inconel718	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
2	7400	140	3800	55
3	5600	280	2500	80
4	4500	310	1900	110
5	3600	330	1500	110
6	3000	330	1300	110
8	2200	330	960	100
10	1800	310	760	100
12	1500	280	640	80
16	1100	240	480	65
20	900	220	380	50



- When cutting austenitic stainless steel, the use of water-soluble cutting fluid is effective.
- If the depth of cut is shallow, the revolution and feed rate can be increased.
- The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abnormal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.

VFMHVCH

COOL STAR END MILLS

End mill, Medium cut length, 4 flute, Irregular helix flutes, with multiple internal through coolant holes

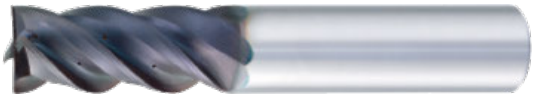
Product Information

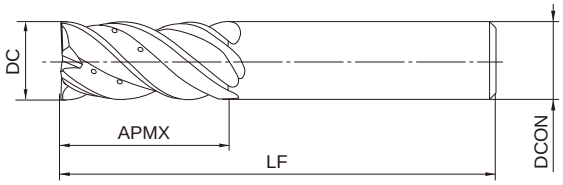
UWC 42° 45° VF Gash

Work Material

M S F M

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668





Type1

	16≦DC≦20	
	0 - 0.03	
h6	DCON=16	DCON=20
	0 - 0.011	0 - 0.013

●Inventory maintained in Japan. Unit : mm

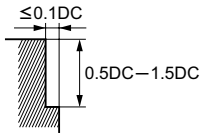
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
VFMHVCHD1600	16	35	90	16	4	●	1
VFMHVCHD2000	20	45	110	20	4	●	1

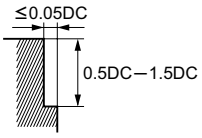
VFMHVCH

RECOMMENDED CUTTING CONDITIONS

·Side milling

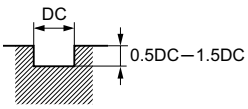
Work material	Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V		Heat resistant alloys Inconel718	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
16	2000	560	800	110
20	1600	510	600	100





·Slotting

Work material	Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)
16	1400	170
20	1100	130



- If the depth of cut is shallow, the revolution and feed rate can be increased.
- The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abnormal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.

VQMHV

SMART MIRACLE END MILLS

End mill, Medium cut length, 4 flute, Irregular helix flutes

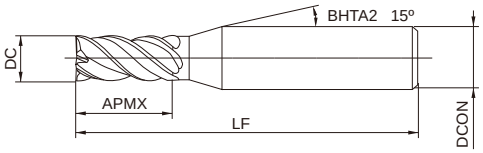
Product Information

UWC 37° 40° VQ Gash

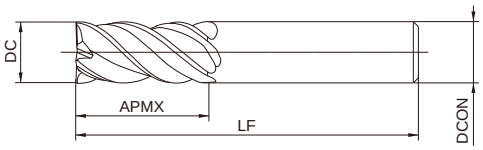
Work Material

P M S F M

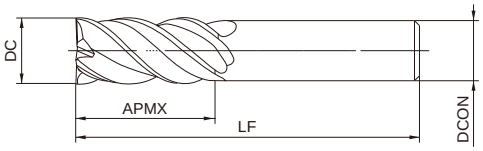
Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668



Type1



Type2



Type3

h6	DC≦12	DC>12		
	0 - 0.020	0 - 0.030		
	4≦DCON≦6	8≦DCON≦10	12≦DCON≦16	20≦DCON≦25
	0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013

●Inventory maintained in Japan. Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
VQMHVD0200	2	4	45	4	4	●	1
VQMHVD0250	2.5	5	45	4	4	●	1
VQMHVD0300	3	8	45	6	4	●	1
VQMHVD0350	3.5	8	45	6	4	●	1
VQMHVD0400	4	11	45	6	4	●	1
VQMHVD0500	5	13	50	6	4	●	1
VQMHVD0600	6	13	50	6	4	●	2
VQMHVD0700	7	19	60	8	4	●	1
VQMHVD0800	8	19	60	8	4	●	2
VQMHVD0900	9	22	70	10	4	●	1
VQMHVD0900S08	9	22	75	8	4	●	3
VQMHVD1000	10	22	70	10	4	●	2
VQMHVD1000S08	10	22	100	8	4	●	3
VQMHVD1100	11	26	75	12	4	●	1
VQMHVD1100S10	11	26	100	10	4	●	3
VQMHVD1200	12	26	75	12	4	●	2
VQMHVD1200S10	12	26	110	10	4	●	3
VQMHVD1300	13	26	75	12	4	●	3
VQMHVD1300S12	13	26	110	12	4	●	3

VQMHV

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
VQMHVD1400	14	30	90	16	4	●	1
VQMHVD1400S12	14	32	130	12	4	●	3
VQMHVD1600	16	35	90	16	4	●	2
VQMHVD1800	18	40	100	16	4	●	3
VQMHVD1800S16	18	42	150	16	4	●	3
VQMHVD2000	20	45	110	20	4	●	2
VQMHVD2500	25	55	125	25	4	●	2

VQMHV

RECOMMENDED CUTTING CONDITIONS

·Side milling

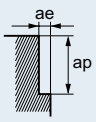
The rigidity of the machine or workpiece and chip discharge are sufficient at high efficiency conditions.

The rigidity of the machine or workpiece or chip discharge is insufficient at general-purpose conditions.

High efficiency conditions

Work material	Carbon steel, Alloy steel, Mild steel AISI 1045, AISI 4140, ASTM A36, AISI 1010					Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT					Austenitic stainless steel, Ferritic and Martensitic Stainless steels, Titanium alloys AISI 304, AISI 306, Ti-6Al-4V				
Dia. DC(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)
2	150	24000	2400	3	0.6	120	19000	1100	3	0.6	100	16000	830	3	0.6
3	150	16000	2600	4.5	0.9	120	13000	1200	4.5	0.9	100	11000	880	4.5	0.9
4	150	12000	2600	6	1.2	120	9500	1300	6	1.2	100	8000	900	6	1.2
5	150	9500	2600	7.5	1.5	120	7600	1300	7.5	1.5	100	6400	900	7.5	1.5
6	150	8000	2600	9	1.8	120	6400	1300	9	1.8	100	5300	1100	9	1.8
8	150	6000	2500	12	2.4	120	4800	1300	12	2.4	100	4000	1200	12	2.4
10	150	4800	2300	15	3	120	3800	1200	15	3	100	3200	1300	15	3
12	150	4000	1900	18	3.6	120	3200	1200	18	3.6	100	2700	1200	18	3.6
16	150	3000	1600	24	4.8	120	2400	960	24	4.8	100	2000	960	24	4.8
20	150	2400	1300	30	6	120	1900	760	30	6	100	1600	770	30	6
25	150	1900	1100	37.5	7.5	120	1500	600	37.5	7.5	100	1300	620	37.5	7.5

Work material	Precipitation hardening stainless steel, Cobalt chromium alloy AISI 630, AISI 631, 15-5PH, 17-4PH					Copper, Copper alloys					Heat resistant alloys Inconel718				
Dia. DC(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)
2	75	12000	720	3	0.4	180	29000	2900	3	0.6	40	6400	230	3	0.2
3	75	8000	770	4.5	0.6	180	19000	3000	4.5	0.9	40	4200	240	4.5	0.3
4	75	6000	790	6	0.8	180	14000	3000	6	1.2	40	3200	240	6	0.4
5	75	4800	810	7.5	1	180	11000	3000	7.5	1.5	40	2500	240	7.5	0.5
6	75	4000	810	9	1.2	180	9500	3000	9	1.8	40	2100	250	9	0.6
8	75	3000	840	12	1.6	180	7200	3000	12	2.4	40	1600	260	12	0.8
10	75	2400	770	15	2	180	5700	2700	15	3	40	1300	290	15	1
12	75	2000	720	18	2.4	180	4800	2300	18	3.6	40	1100	280	18	1.2
16	75	1500	600	24	3.2	180	3600	1900	24	4.8	40	800	200	24	1.6
20	75	1200	480	30	4	180	2900	1600	30	6	40	640	160	30	2
25	75	950	380	37.5	5	180	2300	1300	37.0	7.5	40	510	130	37.5	2.5

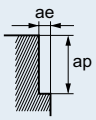


VQMHV

General purpose cutting conditions

Work material	Carbon steel, Alloy steel, Mild steel AISI 1045, AISI 4140, ASTM A36, AISI 1010					Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT					Austenitic stainless steel, Ferritic and Martensitic Stainless steels, Titanium alloys AISI 304, AISI 306, Ti-6Al-4V				
Dia. DC(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)
2	120	19000	1300	3	0.6	100	16000	630	3	0.6	80	13000	450	1.5	0.2
3	120	13000	1400	4.5	0.9	100	11000	700	4.5	0.9	80	8500	450	2.2	0.3
4	120	9500	1400	6	1.2	100	8000	700	6	1.2	80	6400	470	3	0.6
5	120	7600	1400	7.5	1.5	100	6400	710	7.5	1.5	80	5100	470	4.5	0.9
6	120	6400	1400	9	1.8	100	5300	710	9	1.8	80	4200	580	6	1.2
8	120	4800	1300	12	2.4	100	4000	740	12	2.4	80	3200	630	7.5	1.5
10	120	3800	1200	15	3	100	3200	680	15	3	80	2500	660	9	1.8
12	120	3200	1000	18	3.6	100	2700	640	18	3.6	80	2100	610	12	2.4
16	120	2400	860	24	4.8	100	2000	530	24	4.8	80	1600	510	15	3
20	120	1900	680	30	6	100	1600	420	30	6	80	1300	410	18	3.6
25	120	1500	390	37.5	7.5	100	1300	340	37.5	7.5	80	1000	210	24	4.8

Work material	Precipitation hardening stainless steel, Cobalt chromium alloy AISI 630, AISI 631, 15-5PH, 17-4PH					Copper, Copper alloys					Heat resistant alloys Inconel718				
Dia. DC(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)
2	70	11000	440	3	0.4	140	22000	1500	3	0.6	30	4800	110	3	0.2
3	70	7400	470	4.5	0.6	140	15000	1600	4.5	0.9	30	3200	120	4.5	0.3
4	70	5600	490	6	0.8	140	11000	1600	6	1.2	30	2400	120	6	0.4
5	70	4500	500	7.5	1	140	8900	1600	7.5	1.5	30	1900	120	7.5	0.5
6	70	3700	500	9	1.2	140	7400	1600	9	1.8	30	1600	130	9	0.6
8	70	2800	520	12	1.6	140	5600	1600	12	2.4	30	1200	130	12	0.8
10	70	2200	460	15	2	140	4500	1400	15	3	30	950	140	15	1
12	70	1900	450	18	2.4	140	3700	1200	18	3.6	30	800	140	18	1.2
16	70	1400	370	24	3.2	140	2800	1000	24	4.8	30	600	100	24	1.6
20	70	1100	290	30	4	140	2200	780	30	6	30	480	81	30	2
25	70	890	230	37.5	5	140	1800	670	37.5	7.5	30	380	64	37.5	2.5



- SMART MIRACLE Coating is not energized because of its nature. Therefore, an external contact (voltaic type) tool setter cannot be used. An internal contact (non-voltaic) type or laser type tool setter is recommended to measure the length of the tool.
- For stainless steel, titanium alloy and heat resistant alloy, the use of water-soluble coolant is effective.
- The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abnormal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.
- If the depth of cut is shallow, the revolution and feed rate can be increased.

VQMHV

·Slotting

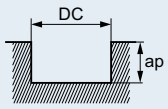
The rigidity of the machine or workpiece and chip discharge are sufficient at high efficiency conditions.

The rigidity of the machine or workpiece or chip discharge is insufficient at general-purpose conditions.

High efficiency conditions

Work material	Carbon steel, Alloy steel, Mild steel AISI 1045, AISI 4140, ASTM A36, AISI 1010				Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT				Austenitic stainless steel, Ferritic and Martensitic Stainless steels, Titanium alloys AISI 304, AISI 316, Ti-6Al-4V			
Dia. DC(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)
2	150	24000	1200	2	120	19000	610	2	100	16000	640	2
3	150	16000	1500	3	120	13000	730	3	100	11000	660	3
4	150	12000	1900	4	120	9500	910	4	100	8000	700	4
5	150	9500	1900	5	120	7600	910	5	100	6400	720	5
6	150	8000	1900	6	120	6400	1000	6	100	5300	740	6
8	150	6000	1700	8	120	4800	960	8	100	4000	800	8
10	150	4800	1500	10	120	3800	840	10	100	3200	900	10
12	150	4000	1300	12	120	3200	770	12	100	2700	860	12
16	150	3000	1100	12	120	2400	670	12	100	2000	640	12
20	150	2400	860	12	120	1900	530	12	100	1600	510	12
25	150	1900	760	12	120	1500	420	12	100	1300	420	12

Work material	Precipitation hardening stainless steel, Cobalt chromium alloy AISI 630, AISI 631, 15-5PH, 17-4PH				Copper, Copper alloys				Heat resistant alloys Inconel718			
Dia. DC(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)
2	60	9500	300	1	180	29000	1500	2	30	4800	130	0.6
3	60	6400	360	1.5	180	19000	1700	3	30	3200	150	0.9
4	60	4800	460	2	180	14000	2200	4	30	2400	170	1.2
5	60	3800	460	2.5	180	11000	2200	5	30	1900	170	1.5
6	60	3200	510	3	180	9500	2300	6	30	1600	180	1.8
8	60	2400	480	4	180	7200	2000	8	30	1200	190	2.4
10	60	1900	420	5	180	5700	1800	10	30	950	210	3
12	60	1600	380	6	180	4800	1500	12	30	800	200	3.6
16	60	1200	340	8	180	3600	1300	12	30	600	150	4.8
20	60	950	270	10	180	2900	1000	12	30	480	120	6
25	60	760	210	12	180	2300	920	12	30	380	100	7.5

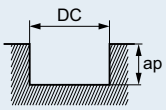


VQMHV

General purpose cutting conditions

Work material	Carbon steel, Alloy steel, Mild steel AISI 1045, AISI 4140, ASTM A36, AISI 1010				Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT				Austenitic stainless steel, Ferritic and Martensitic Stainless steels, Titanium alloys AISI 304, AISI 316, Ti-6Al-4V			
Dia. DC(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)
2	100	16000	550	2	80	13000	270	2	60	9500	250	2
3	100	11000	670	3	80	8500	310	3	60	6400	250	3
4	100	8000	840	4	80	6400	410	4	60	4800	280	4
5	100	6400	840	5	80	5100	410	5	60	3800	280	5
6	100	5300	840	6	80	4200	440	6	60	3200	300	6
8	100	4000	740	8	80	3200	420	8	60	2400	320	8
10	100	3200	680	10	80	2500	360	10	60	1900	350	10
12	100	2700	570	12	80	2100	330	12	60	1600	340	12
16	100	2000	480	12	80	1600	300	12	60	1200	250	12
20	100	1600	380	12	80	1300	240	12	60	950	200	12
25	100	1300	340	12	80	1000	180	12	60	760	160	12

Work material	Precipitation hardening stainless steel, Cobalt chromium alloy AISI 630, AISI 631, 15-5PH, 17-4PH				Copper, Copper alloys				Heat resistant alloys Inconel718			
Dia. DC(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)
2	50	8000	170	1	120	19000	650	2	25	4000	74	0.6
3	50	5300	200	1.5	120	13000	790	3	25	2700	86	0.9
4	50	4000	250	2	120	9500	1000	4	25	2000	93	1.2
5	50	3200	250	2.5	120	7600	1000	5	25	1600	95	1.5
6	50	2700	290	3	120	6400	1000	6	25	1300	96	1.8
8	50	2000	260	4	120	4800	890	8	25	990	100	2.4
10	50	1600	230	5	120	3800	800	10	25	800	120	3
12	50	1300	210	6	120	3200	680	12	25	660	110	3.6
16	50	990	180	8	120	2400	570	12	25	500	84	4.8
20	50	800	150	10	120	1900	450	12	25	400	68	6
25	50	640	120	12	120	1500	400	12	25	320	50	7.5



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- For stainless steel, titanium alloy and heat resistant alloy, the use of water-soluble coolant is effective.
- The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abnormal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.
- If the depth of cut is shallow, the revolution and feed rate can be increased.

VQJHV

SMART MIRACLE END MILLS

End mill, Medium cut length, 4 flute, Irregular helix flutes

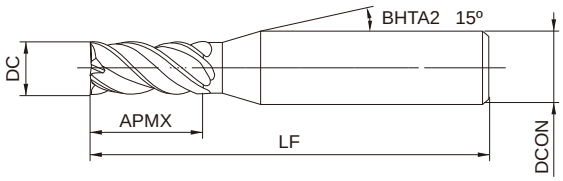
Product Information

UWC 37.5° 40° (DC>6) 38° 40° (DC≦6) VQ Gash

Work Material

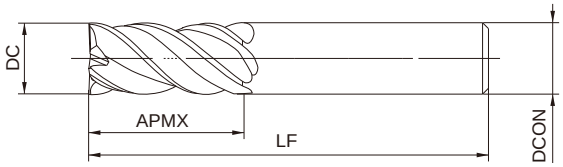
P M S F M

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668



Type1

h6	DC≦12	DC>12		
	0 - 0.020	0 - 0.030		
	DCON=6	8≦DCON≦10	12≦DCON≦16	DCON=20
	0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013



Type2

●Inventory maintained in Japan. Unit : mm

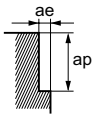
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
VQJHVD0200	2	8	60	6	4	●	1
VQJHVD0250	2.5	10	60	6	4	●	1
VQJHVD0300	3	12	60	6	4	●	1
VQJHVD0350	3.5	14	60	6	4	●	1
VQJHVD0400	4	16	60	6	4	●	1
VQJHVD0450	4.5	18	60	6	4	●	1
VQJHVD0500	5	20	60	6	4	●	1
VQJHVD0600	6	24	60	6	4	●	2
VQJHVD0700	7	25	80	8	4	●	1
VQJHVD0800	8	28	80	8	4	●	2
VQJHVD0900	9	32	90	10	4	●	1
VQJHVD1000	10	35	90	10	4	●	2
VQJHVD1200	12	40	100	12	4	●	2
VQJHVD1600	16	55	125	16	4	●	2
VQJHVD2000	20	70	140	20	4	●	2

VQJHV

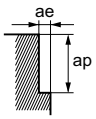
RECOMMENDED CUTTING CONDITIONS

·Side milling

Work material	Carbon steel, Alloy steel, Mild steel AISI 1045, AISI 4140, ASTM A36, AISI 1010					Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT					Austenitic stainless steel, Ferritic and Martensitic Stainless steels, Titanium alloys AISI 304, AISI 306, Ti-6Al-4V				
Dia. DC(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)
2	130	21000	700	5	0.2	100	16000	510	5	0.2	80	13000	390	5	0.1
3	130	14000	960	7.5	0.3	100	11000	680	7.5	0.3	80	8500	490	7.5	0.15
4	130	10000	1000	10	0.4	100	8000	690	10	0.4	80	6400	540	10	0.2
5	130	8300	1100	12.5	0.5	100	6400	730	12.5	0.5	80	5100	570	12.5	0.25
6	130	6900	1200	15	0.6	100	5300	810	15	0.6	80	4200	630	15	0.3
8	130	5200	1200	20	0.8	100	4000	840	20	0.8	80	3200	640	20	0.4
10	130	4100	1100	25	1	100	3200	810	25	1	80	2500	590	25	0.5
12	130	3400	1100	30	1.2	100	2700	780	30	1.2	80	2100	550	30	0.6
16	130	2600	920	40	1.6	100	2000	640	40	1.6	80	1600	450	40	0.8
20	130	2100	820	50	2	100	1600	570	50	2	80	1300	420	50	1



Work material	Precipitation hardening stainless steel, Cobalt chromium alloy AISI 630, AISI 631, 15-5PH, 17-4PH					Copper, Copper alloys					Heat resistant alloys Inconel718				
Dia. DC(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)
2	75	12000	360	5	0.1	160	25000	830	5	0.2	40	6400	90	5	0.04
3	75	8000	460	7.5	0.15	160	17000	1200	7.5	0.3	40	4200	130	7.5	0.06
4	75	6000	510	10	0.2	160	13000	1300	10	0.4	40	3200	190	10	0.08
5	75	4800	540	12.5	0.25	160	10000	1300	12.5	0.5	40	2500	180	12.5	0.1
6	75	4000	600	15	0.3	160	8500	1500	15	0.6	40	2100	180	15	0.12
8	75	3000	600	20	0.4	160	6400	1500	20	0.8	40	1600	170	20	0.16
10	75	2400	570	25	0.5	160	5100	1300	25	1	40	1300	170	25	0.2
12	75	2000	520	30	0.6	160	4200	1300	30	1.2	40	1100	140	30	0.24
16	75	1500	420	40	0.8	160	3200	1100	40	1.6	40	800	110	40	0.32
20	75	1200	390	50	1	160	2500	970	50	2	40	640	80	50	0.4



- SMART MIRACLE Coating is not energized because of its nature. Therefore, an external contact (voltaic type) tool setter cannot be used. An internal contact (non-voltaic) type or laser type tool setter is recommended to measure the length of the tool.
- For stainless steel, titanium alloy and heat resistant alloy, the use of water-soluble coolant is effective.
- The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abnormal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.
- If the depth of cut is shallow, the revolution and feed rate can be increased.

VQXL

SMART MIRACLE END MILLS

End mill, Short cut length, 3-4 flute, Long neck

Product Information

UWC 35° VQ Gash

DC≦0.3 DC≧0.4

Technical Info >> 1993

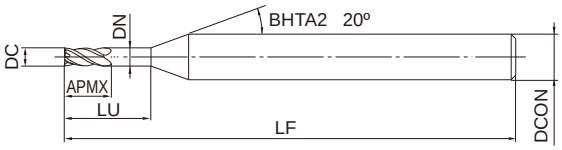
ISO13399 Property >> 1966

Work Material

P M S H F M

SYMBOL DESCRIPTIONS >> 664

END MILLS SELECTION CHART >> 668



Type1

	DC≦1
	0 - 0.010
h5	DCON=4
	0 - 0.005

●Inventory maintained in Japan. Unit : mm

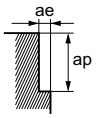
Order Number	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	type
VQXLD0020N006	0.2	0.3	0.6	0.18	40	4	3	●	1
VQXLD0030N009	0.3	0.5	0.9	0.28	40	4	3	●	1
VQXLD0030N015	0.3	0.5	1.5	0.28	40	4	3	●	1
VQXLD0040N010	0.4	0.6	1	0.37	40	4	4	●	1
VQXLD0040N018	0.4	0.6	1.8	0.37	40	4	4	●	1
VQXLD0050N015	0.5	0.7	1.5	0.47	40	4	4	●	1
VQXLD0050N025	0.5	0.7	2.5	0.47	40	4	4	●	1
VQXLD0050N030	0.5	0.7	3	0.47	40	4	4	●	1
VQXLD0060N030	0.6	0.9	3	0.57	40	4	4	●	1
VQXLD0070N035	0.7	1	3.5	0.67	40	4	4	●	1
VQXLD0080N024	0.8	1.2	2.4	0.77	40	4	4	●	1
VQXLD0080N030	0.8	1.2	3	0.77	40	4	4	●	1
VQXLD0080N040	0.8	1.2	4	0.77	40	4	4	●	1
VQXLD0100N050	1	1.5	5	0.96	40	4	4	●	1

VQXL

Recommended cutting condition

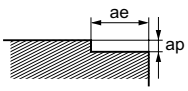
·Shoulder milling

Work material		Carbon steel, Alloy steel, Austenitic stainless steel, Titanium alloy, Cobaly chromium alloy, Copper, Copper alloy AISI 1045, AISI 4140, AISI 4340, AISI 304, AISI 316, AISI 304LN, AISI 316LN, Ti-6Al-4V					Heat resistant alloys, Pre-hardened steel, Hardened steel Inconel718, AISI P21, AISI P20, AISI H13, AISI L6, AISI 431, AISI 420				
Diameter DC(mm)	Neck length LU(mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)
0.2	0.6	25	40000	360	0.03	0.01	20	32000	290	0.03	0.01
0.3	0.9	40	40000	480	0.045	0.015	20	21000	250	0.045	0.015
0.3	1.5	40	40000	360	0.045	0.015	20	21000	190	0.045	0.015
0.4	1	50	40000	800	0.06	0.02	20	16000	320	0.06	0.02
0.4	1.8	50	40000	560	0.06	0.02	20	16000	220	0.06	0.025
0.5	1.5	60	38000	910	0.075	0.025	20	13000	310	0.075	0.025
0.5	2.5	60	38000	610	0.075	0.025	20	13000	210	0.075	0.025
0.5	3	60	38000	550	0.075	0.025	20	13000	180	0.075	0.025
0.6	3	60	32000	640	0.09	0.03	20	10500	210	0.09	0.03
0.7	3.5	60	27000	650	0.11	0.035	20	9100	200	0.11	0.035
0.8	2.4	60	24000	960	0.12	0.04	20	8000	260	0.12	0.04
0.8	3	60	24000	860	0.12	0.04	20	8000	230	0.12	0.04
0.8	4	60	24000	670	0.12	0.04	20	8000	190	0.12	0.04
1	5	60	20000	800	0.15	0.05	20	6500	210	0.15	0.05



·Bottom face milling

Work material		Carbon steel, Alloy steel, Austenitic stainless steel, Titanium alloy, Cobaly chromium alloy, Copper, Copper alloy AISI 1045, AISI 4140, AISI 4340, AISI 304, AISI 316, AISI 304LN, AISI 316LN, Ti-6Al-4V					Heat resistant alloys, Pre-hardened steel, Hardened steel Inconel718, AISI P21, AISI P20, AISI H13, AISI L6, AISI 431, AISI 420				
Diameter DC(mm)	Neck length LU(mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)
0.2	0.6	25	40000	360	0.015	≦0.2	20	32000	290	0.015	≦0.1
0.3	0.9	40	40000	480	0.025	≦0.3	20	21000	250	0.025	≦0.15
0.3	1.5	40	40000	360	0.02	≦0.3	20	21000	190	0.02	≦0.15
0.4	1	50	40000	800	0.03	≦0.4	20	16000	320	0.03	≦0.2
0.4	1.8	50	40000	560	0.02	≦0.4	20	16000	220	0.02	≦0.2
0.5	1.5	60	38000	910	0.04	≦0.5	20	13000	310	0.04	≦0.25
0.5	2.5	60	38000	610	0.03	≦0.5	20	13000	210	0.03	≦0.25
0.5	3	60	38000	550	0.03	≦0.5	20	13000	180	0.03	≦0.25
0.6	3	60	32000	640	0.035	≦0.6	20	10500	210	0.035	≦0.3
0.7	3.5	60	27000	640	0.035	≦0.7	20	9100	190	0.035	≦0.35
0.8	2.4	60	24000	960	0.06	≦0.8	20	8000	260	0.06	≦0.4
0.8	3	60	24000	840	0.05	≦0.8	20	8000	230	0.05	≦0.4
0.8	4	60	24000	670	0.04	≦0.8	20	8000	190	0.04	≦0.4
1	5	60	20000	800	0.05	≦1	20	6500	210	0.05	≦0.5

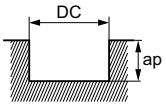


- SMART MIRACLE Coating is not energized because of its nature. Therefore, an external contact (voltaic type) tool setter cannot be used. An internal contact (non-voltaic) type or laser type tool setter is recommended to measure the length of the tool. An internal contact (non-voltaic) type or laser type tool setter is recommended to measure the length of the tool.
- For stainless steel, titanium alloy and heat resistant alloy, the use of water-soluble coolant is effective
- If the depth of cut is shallow, the revolution and feed rate can be increased.

VQXL

·Slotting

Work material		Carbon steel, Alloy steel, Austenitic stainless steel, Titanium alloy, Cobaly chromium alloy, Copper, Copper alloy AISI 1045, AISI 4140, AISI 4340, AISI 304, AISI 316, AISI 304LN, AISI 316LN, Ti-6Al-4V				Heat resistant alloys, Pre-hardened steel, Hardened steel Inconel718, AISI P21, AISI P20, AISI H13, AISI L6, AISI 431, AISI 420			
Diameter DC(mm)	Neck length LU(mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)
0.2	0.6	20	30000	270	0.03	15	24000	220	0.03
0.3	0.9	30	30000	360	0.045	14	15000	180	0.045
0.3	1.5	30	30000	270	0.045	14	15000	140	0.045
0.4	1	40	30000	600	0.06	15	12000	240	0.06
0.4	1.8	40	30000	420	0.06	15	12000	170	0.06
0.5	1.5	45	28000	670	0.075	15	9500	230	0.075
0.5	2.5	45	28000	450	0.075	15	9500	150	0.075
0.5	3	45	28000	390	0.075	15	9500	130	0.075
0.6	3	45	24000	480	0.09	15	7800	160	0.09
0.7	3.5	45	20000	480	0.11	15	6800	140	0.11
0.8	2.4	45	18000	720	0.12	15	6000	190	0.12
0.8	3	45	18000	650	0.12	15	6000	170	0.12
0.8	4	45	18000	500	0.12	15	6000	140	0.12
1	5	45	15000	600	0.15	15	4800	150	0.15



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- For stainless steel, titanium alloy and heat resistant alloy, the use of water-soluble coolant is effective
- When the Depth of cut is small, the feed rate can be increased.

VC4MC

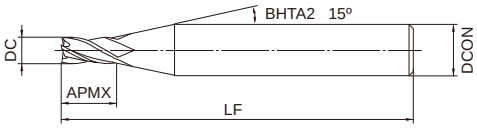
MIRACLE END MILLS

End mill, Medium cut length, 4 flute

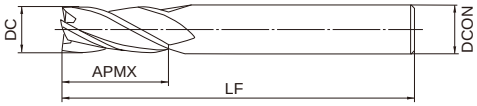
Product Information

Work Material

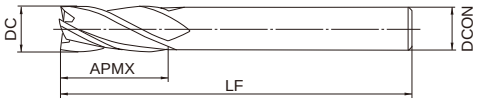
Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668



Type1



Type2



Type3

	DC≦12	DC>12		
	0 - 0.020	0 - 0.030		
h6	4≦DCON≦6	8≦DCON≦10	12≦DCON≦16	20≦DCON≦25
	0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013

●Inventory maintained in Japan. Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
VC4MCD0200	2	6	40	4	4	●	1
VC4MCD0250	2.5	8	40	4	4	●	1
VC4MCD0300	3	8	45	6	4	●	1
VC4MCD0350	3.5	10	45	6	4	●	1
VC4MCD0400	4	11	45	6	4	●	1
VC4MCD0450	4.5	11	45	6	4	●	1
VC4MCD0500	5	13	50	6	4	●	1
VC4MCD0550	5.5	13	50	6	4	●	1
VC4MCD0600	6	13	50	6	4	●	2
VC4MCD0650	6.5	16	60	8	4	●	1
VC4MCD0700	7	16	60	8	4	●	1
VC4MCD0750	7.5	16	60	8	4	●	1
VC4MCD0800	8	19	60	8	4	●	2
VC4MCD0850	8.5	19	70	10	4	●	1
VC4MCD0900	9	19	70	10	4	●	1
VC4MCD0950	9.5	19	70	10	4	●	1
VC4MCD1000	10	22	70	10	4	●	2
VC4MCD1050	10.5	22	75	12	4	●	1
VC4MCD1100	11	22	75	12	4	●	1
VC4MCD1150	11.5	22	75	12	4	●	1
VC4MCD1200	12	26	75	12	4	●	2
VC4MCD1250	12.5	26	75	12	4	●	3
VC4MCD1300	13	26	75	12	4	●	3

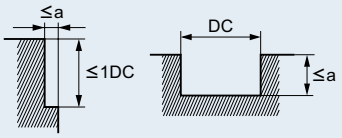
VC4MC

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
VC4MCD1400	14	26	75	12	4	●	3
VC4MCD1500	15	30	80	16	4	●	1
VC4MCD1600	16	32	90	16	4	●	2
VC4MCD1700	17	32	90	16	4	●	3
VC4MCD1800	18	32	90	16	4	●	3
VC4MCD1900	19	32	100	20	4	●	1
VC4MCD2000	20	38	100	20	4	●	2
VC4MCD2200	22	38	100	20	4	●	3
VC4MCD2400	24	45	120	25	4	●	1
VC4MCD2500	25	45	120	25	4	●	2

VC4MC

RECOMMENDED CUTTING CONDITIONS

Work material	Carbon steel, Cast iron, Alloy steel, Pre-hardened steel AISI 1050, AISI No 35 B, AISI P20, AISI P21			Hardened steel (45— 55HRC) AISI H13		
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut a(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut a(mm)
2	30000	4500	0.18	24000	3600	0.10
2.5	24000	3900	0.25	19000	3000	0.13
3	20000	3500	0.30	16000	2700	0.15
4	15000	3000	0.40	12000	2400	0.20
5	12000	2400	0.50	9000	1800	0.25
6	10000	2100	0.60	7000	1470	0.30
8	8000	1500	0.80	5600	1050	0.40
10	6400	1400	1.00	4500	950	0.50
12	5400	1200	1.00	3800	860	0.50
16	2400	550	2.00	1200	120	0.80
20	1900	480	3.00	1000	100	1.00



- If the depth of cut is shallow, the revolution and feed rate can be increased.
- In case of slotting with over 3 mm endmill, please reduce revolution to 50—70% of above value, and reduce feed rate to 40—60% of above value.
- When drilling, please set the feed rate at 1/3 or below of the values above.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

VC4JC

MIRACLE END MILLS

End mill, Semi long cut length, 4 flute

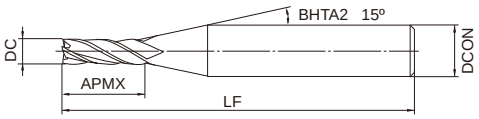
Product Information

UWC 30° VC Gash

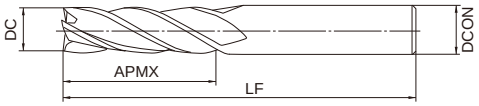
Work Material

P M S H F M

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668



Type1



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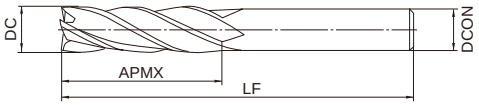


Type3

DC≦12	DC>12		
0 - 0.020	0 - 0.030		
DCON=6	8≦DCON≦10	12≦DCON≦16	20≦DCON≦25
0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013

●Inventory maintained in Japan. Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
VC4JCD0300	3	12	50	6	4	●	1
VC4JCD0350	3.5	15	50	6	4	●	1
VC4JCD0400	4	15	50	6	4	●	1
VC4JCD0450	4.5	15	50	6	4	●	1
VC4JCD0500	5	20	60	6	4	●	1
VC4JCD0550	5.5	20	60	6	4	●	1
VC4JCD0600	6	20	60	6	4	●	2
VC4JCD0650	6.5	25	70	8	4	●	1
VC4JCD0700	7	25	70	8	4	●	1
VC4JCD0750	7.5	25	70	8	4	●	1
VC4JCD0800	8	25	70	8	4	●	2
VC4JCD0850	8.5	25	90	10	4	●	1
VC4JCD0900	9	25	90	10	4	●	1
VC4JCD0950	9.5	25	90	10	4	●	1
VC4JCD1000	10	30	90	10	4	●	2
VC4JCD1050	10.5	30	90	12	4	●	1
VC4JCD1100	11	30	90	12	4	●	1
VC4JCD1150	11.5	30	90	12	4	●	1
VC4JCD1200	12	30	90	12	4	●	2
VC4JCD1300	13	35	90	12	4	●	3
VC4JCD1400	14	40	110	16	4	●	1
VC4JCD1500	15	40	110	16	4	●	1
VC4JCD1600	16	50	110	16	4	●	2

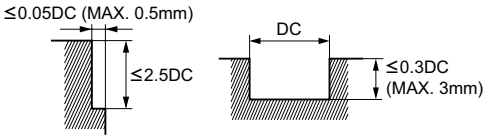
VC4JC

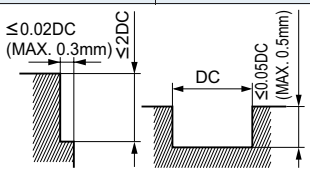
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
VC4JCD1700	17	50	110	20	4	●	1
VC4JCD1800	18	50	110	20	4	●	1
VC4JCD1900	19	55	110	20	4	●	1
VC4JCD2000	20	55	110	20	4	●	2
VC4JCD2200	22	65	140	25	4	●	1
VC4JCD2400	24	75	140	25	4	●	1
VC4JCD2500	25	75	140	25	4	●	2

VC4JC

RECOMMENDED CUTTING CONDITIONS

Work material	Carbon steel, Cast iron, Alloy steel (—30HRC) AISI 1050, AISI No 35 B, AISI P20		Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V		Hardened steel (45— 55HRC) AISI H13	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
3	4200	110	3400	95	2600	70	2100	50
4	3400	140	2700	110	2100	85	1700	60
5	2900	170	2300	140	1800	100	1500	70
6	2500	200	2000	170	1500	130	1300	85
8	1900	220	1500	170	1200	150	1000	85
10	1600	220	1300	170	950	130	800	85
12	1300	170	1100	150	800	100	670	70
16	1000	140	820	110	600	80	500	50
20	800	110	650	85	480	70	400	40
25	650	85	520	70	380	50	320	35





- When cutting austenitic stainless steel, the use of water-soluble cutting fluid is effective.
- If the depth of cut is shallow, the revolution and feed rate can be increased.
- The above table shows cutting conditions for standard side milling. For slotting, please reduce the feed rate only to 50% of the table figure. Please set the revolution rate at 60% and the feed rate at 40% when slotting austenitic stainless steels.
- When drilling, please set the feed rate at 1/3 or below of the values above.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

VCMDSC

MIRACLE END MILLS FOR HIGH HARDNESS STEEL

End mill, Medium cut length, 4—6 flute

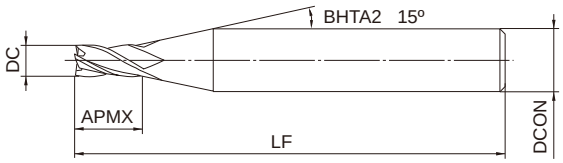
Product Information

UWC 30° VC Sharp DC<3 DC=3

Work Material

P H F M

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668



Type1

	0.5≦DC≦3
	0 - 0.020
h6	DCON=6
	0 - 0.008

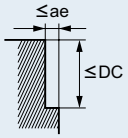
●Inventory maintained in Japan. Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
VCMDSCD0050	0.5	1	45	6	4	●	1
VCMDSCD0100	1	2.5	45	6	4	●	1
VCMDSCD0150	1.5	4	45	6	4	●	1
VCMDSCD0200	2	6	45	6	4	●	1
VCMDSCD0250	2.5	8	45	6	4	●	1
VCMDSCD0300	3	8	45	6	6	●	1

VCMDSC

RECOMMENDED CUTTING CONDITIONS

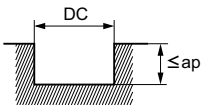
Work material	Hardened steel (45— 55HRC) AISI H13			Hardened steel (55— 62HRC) AISI D2		
Dia. DC(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ae(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ae(mm)
0.5	40000	2000	0.03	30000	600	0.02
1	40000	3000	0.05	20000	900	0.03
1.5	40000	5000	0.08	18000	1100	0.05
2	40000	5600	0.10	16000	1300	0.06
3	34000	5600	0.15	13000	1600	0.09



- If the depth of cut is shallow, the revolution and feed rate can be increased.
- The above condition are for shoulder milling. For slotting φ3 or larger diameters, set the revolution, feed rate and depth of cut at 20 — 40% of the table figures.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

·Slot milling with small diameter tools

Work material	Hardened steel (45— 55HRC) AISI H13			Hardened steel (55— 62HRC) AISI D2		
Dia. DC(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap(mm)
0.5	20000	200	0.05	15000	90	0.03
1	15000	300	0.1	11000	110	0.05
1.5	10000	280	0.15	7500	150	0.07
2	8000	320	0.2	6000	190	0.1



- Air blow or oil mist is recommended for good chip evacuation.

CRN4JC

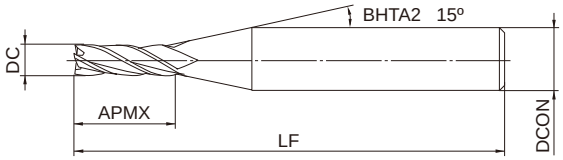
CRN END MILLS

End mill, Semi long cut length, 4 flute, For copper electrodes

Product Information

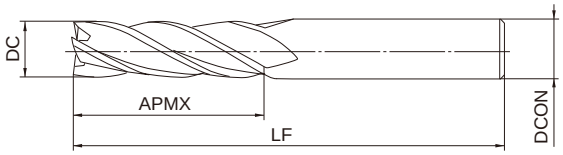
Work Material

Technical Info >> 1993
ISO13399 Property >> 1966
SYMBOL DESCRIPTIONS >> 664
END MILLS SELECTION CHART >> 668



Type1

3≦DC≦12		
0 - 0.02		
DCON=6	8≦DCON≦10	DCON=12
0 - 0.008	0 - 0.009	0 - 0.011



Type2

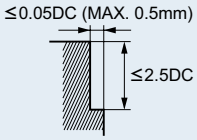
●Inventory maintained in Japan. Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
CRN4JCD0300	3	12	50	6	4	●	1
CRN4JCD0400	4	15	50	6	4	●	1
CRN4JCD0500	5	20	60	6	4	●	1
CRN4JCD0600	6	20	60	6	4	●	2
CRN4JCD0800	8	25	70	8	4	●	2
CRN4JCD1000	10	30	90	10	4	●	2
CRN4JCD1200	12	30	90	12	4	●	2

CRN4JC

RECOMMENDED CUTTING CONDITIONS

Work material	Copper, Copper alloys	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)
3	10600	280
4	8000	330
5	6400	380
6	5300	420
8	4000	460
10	3200	460
12	2700	460



- If the depth of cut is shallow, the revolution and feed rate can be increased.
- The use of water-soluble coolant is recommended.
- When drilling, please set the feed rate at 1/3 or below of the values above.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

C4MC

CARBIDE END MILLS

End mill, Medium cut length, 4 flute, Center cutting

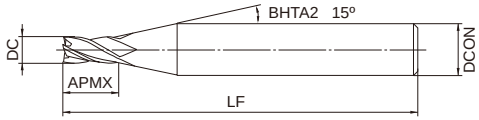
Product Information

UWC 30° Sharp

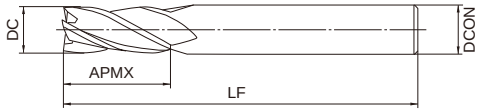
Work Material

P M N S F M

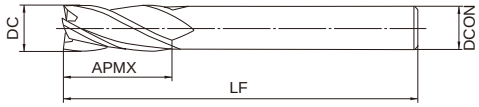
Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668



Type1



Type2



Type3

	DC≦12	DC>12		
	0 - 0.020	0 - 0.030		
h6	DCON=6	8≦DCON≦10	12≦DCON≦16	DCON=20
	0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013

●Inventory maintained in Japan. Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
C4MCD0300	3	8	45	6	4	●	1
C4MCD0350	3.5	10	45	6	4	●	1
C4MCD0400	4	11	45	6	4	●	1
C4MCD0450	4.5	11	45	6	4	●	1
C4MCD0500	5	13	50	6	4	●	1
C4MCD0550	5.5	13	50	6	4	●	1
C4MCD0600	6	13	50	6	4	●	2
C4MCD0650	6.5	16	60	8	4	●	1
C4MCD0700	7	16	60	8	4	●	1
C4MCD0750	7.5	16	60	8	4	●	1
C4MCD0800	8	19	60	8	4	●	2
C4MCD0850	8.5	19	70	10	4	●	1
C4MCD0900	9	19	70	10	4	●	1
C4MCD0950	9.5	19	70	10	4	●	1
C4MCD1000	10	22	70	10	4	●	2
C4MCD1050	10.5	22	75	12	4	●	1
C4MCD1100	11	22	75	12	4	●	1
C4MCD1150	11.5	22	75	12	4	●	1
C4MCD1200	12	26	75	12	4	●	2
C4MCD1250	12.5	26	75	12	4	●	3
C4MCD1300	13	26	75	12	4	●	3
C4MCD1400	14	26	75	12	4	●	3
C4MCD1500	15	30	80	16	4	●	1

C4MC

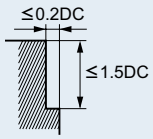
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
C4MCD1600	16	32	90	16	4	●	2
C4MCD1700	17	32	90	16	4	●	3
C4MCD1800	18	32	90	16	4	●	3
C4MCD1900	19	32	100	20	4	●	1
C4MCD2000	20	38	100	20	4	●	2

C4MC

RECOMMENDED CUTTING CONDITIONS

·Side milling

Work material	Structural steel, Cast iron, Carbon steel AISI 1045, AISI No 35 B, AISI 1050		Carbon steel, Alloy steel (20— 30HRC) AISI 1050, AISI P20		Alloy steel, Tool steel, Pre-hardened steel (30—45HRC) AISI P20, AISI H13, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304, AISI 316	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
3	4100	150	3500	130	2800	100	2300	90
4	3400	260	2900	210	2200	140	1900	120
5	2900	290	2400	230	1800	150	1500	135
6	2500	300	2100	260	1600	170	1300	140
8	1900	300	1600	260	1200	160	1000	150
10	1500	270	1250	230	950	140	800	135
12	1250	230	1050	200	800	120	660	110
16	940	170	800	140	600	90	500	80
20	750	140	640	120	480	75	400	70



- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

C4JC

CARBIDE END MILLS

End mill, Semi long cut length, 4 flute, Center cutting

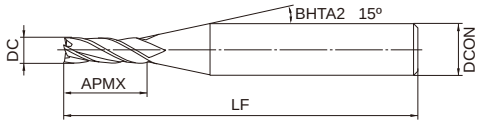
Product Information

UWC 30° Gash

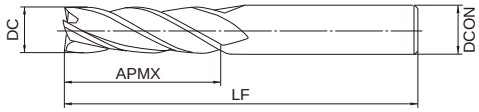
Work Material

P M N S F M

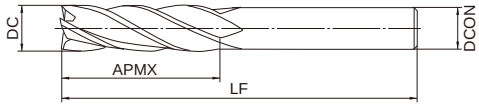
Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668



Type1



Type2



Type3

h6	DC≦12	DC>12		
	0 - 0.020	0 - 0.030		
	DCON=6	8≦DCON≦10	12≦DCON≦16	20≦DCON≦25
	0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013

●Inventory maintained in Japan. Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
C4JCD0300	3	12	50	6	4	●	1
C4JCD0350	3.5	15	50	6	4	●	1
C4JCD0400	4	15	50	6	4	●	1
C4JCD0450	4.5	15	50	6	4	●	1
C4JCD0500	5	20	60	6	4	●	1
C4JCD0550	5.5	20	60	6	4	●	1
C4JCD0600	6	20	60	6	4	●	2
C4JCD0650	6.5	25	70	8	4	●	1
C4JCD0700	7	25	70	8	4	●	1
C4JCD0750	7.5	25	70	8	4	●	1
C4JCD0800	8	25	70	8	4	●	2
C4JCD0850	8.5	25	90	10	4	●	1
C4JCD0900	9	25	90	10	4	●	1
C4JCD0950	9.5	25	90	10	4	●	1
C4JCD1000	10	30	90	10	4	●	2
C4JCD1050	10.5	30	90	12	4	●	1
C4JCD1100	11	30	90	12	4	●	1
C4JCD1150	11.5	30	90	12	4	●	1
C4JCD1200	12	30	90	12	4	●	2
C4JCD1300	13	35	90	12	4	●	3
C4JCD1400	14	40	110	16	4	●	1
C4JCD1500	15	40	110	16	4	●	1
C4JCD1600	16	50	110	16	4	●	2

C4JC

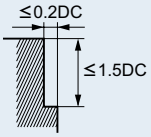
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
C4JCD1700	17	50	110	20	4	●	1
C4JCD1800	18	50	110	20	4	●	1
C4JCD1900	19	55	110	20	4	●	1
C4JCD2000	20	55	110	20	4	●	2
C4JCD2200	22	65	140	25	4	●	1
C4JCD2400	24	75	140	25	4	●	1
C4JCD2500	25	75	140	25	4	●	2

C4JC

RECOMMENDED CUTTING CONDITIONS

·Side milling

Work material	Structural steel, Cast iron, Carbon steel AISI 1045, AISI No 35 B, AISI 1050		Carbon steel, Alloy steel (20— 30HRC) AISI 1050, AISI P20		Alloy steel, Tool steel, Pre-hardened steel (30—45HRC) AISI P20, AISI H13, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304, AISI 316	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
3	4100	110	3500	100	2800	75	2300	70
4	3400	200	2900	160	2200	100	1900	90
5	2900	220	2400	170	1800	110	1500	100
6	2500	225	2100	200	1600	130	1300	100
8	1900	225	1600	200	1200	120	1000	110
10	1500	200	1300	170	950	100	800	100
12	1300	170	1100	150	800	90	660	80
16	940	130	800	100	600	70	500	60
20	750	100	640	90	480	60	400	50



- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

C4LC

CARBIDE END MILLS

End mill, Long cut length, 4 flute, Center cutting

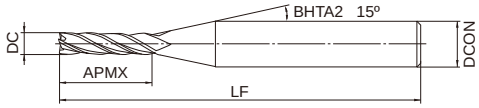
Product Information

UWC 30° Sharp

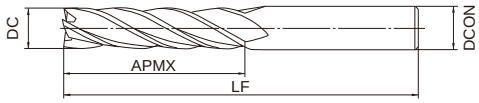
Work Material

P M N S F M

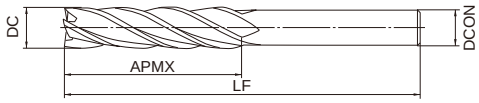
Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668



Type1



Type2



Type3

	DC≦12	DC>12		
	0 - 0.020	0 - 0.030		
h6	DCON=6	8≦DCON≦10	12≦DCON≦16	DCON=20
	0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013

●Inventory maintained in Japan. Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
C4LCD0300	3	20	60	6	4	●	1
C4LCD0350	3.5	22	60	6	4	●	1
C4LCD0400	4	25	60	6	4	●	1
C4LCD0450	4.5	25	60	6	4	●	1
C4LCD0500	5	30	70	6	4	●	1
C4LCD0550	5.5	30	70	6	4	●	1
C4LCD0600	6	30	70	6	4	●	2
C4LCD0650	6.5	30	90	8	4	●	1
C4LCD0700	7	40	90	8	4	●	1
C4LCD0750	7.5	40	90	8	4	●	1
C4LCD0800	8	40	90	8	4	●	2
C4LCD0850	8.5	40	100	10	4	●	1
C4LCD0900	9	40	100	10	4	●	1
C4LCD0950	9.5	40	100	10	4	●	1
C4LCD1000	10	50	100	10	4	●	2
C4LCD1050	10.5	50	110	12	4	●	1
C4LCD1100	11	50	110	12	4	●	1
C4LCD1150	11.5	50	110	12	4	●	1
C4LCD1200	12	50	110	12	4	●	2
C4LCD1250	12.5	50	120	12	4	●	3
C4LCD1300	13	50	120	12	4	●	3
C4LCD1400	14	70	130	16	4	●	1
C4LCD1500	15	70	130	16	4	●	1

C4LC

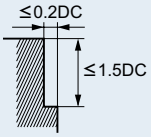
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
C4LCD1600	16	70	130	16	4	●	2
C4LCD1700	17	70	140	20	4	●	1
C4LCD1800	18	70	140	20	4	●	1
C4LCD1900	19	70	140	20	4	●	1
C4LCD2000	20	70	140	20	4	●	2

C4LC

RECOMMENDED CUTTING CONDITIONS

·Side milling

Work material	Structural steel, Cast iron, Carbon steel AISI 1045, AISI No 35 B, AISI 1050		Carbon steel, Alloy steel (20—30HRC) AISI 1050, AISI P20		Alloy steel, Tool steel, Pre-hardened steel (30—45HRC) AISI P20, AISI H13, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304, AISI 316	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
3	3100	80	2600	70	2100	60	1700	50
4	2600	150	2200	120	1700	80	1400	70
5	2200	160	1800	130	1400	80	1100	70
6	1900	170	1600	140	1200	100	980	80
8	1400	170	1200	140	900	90	750	80
10	1100	150	940	130	710	80	600	70
12	940	130	790	110	600	70	500	60
16	710	100	600	80	450	50	380	40
20	560	80	480	70	360	40	300	40



- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

SEE4L

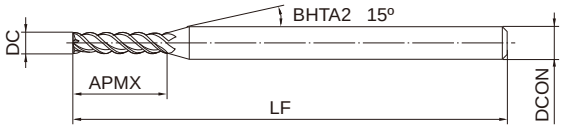
CARBIDE END MILLS

End mill, Long cut length, 4 flute

Product Information

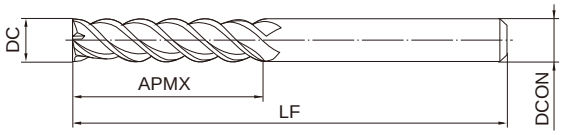
Work Material

Technical Info >> 1993
ISO13399 Property >> 1966
SYMBOL DESCRIPTIONS >> 664
END MILLS SELECTION CHART >> 668



Type1

	DC≦12	DC>12		
	0 - 0.020	0 - 0.030		
h6	DCON=6	8≦DCON≦10	12≦DCON≦16	20≦DCON≦25
	0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013



Type2

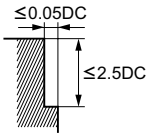
●Inventory maintained in Japan. Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
SEE4030L	3	15	55	6	4	●	1
SEE4040L	4	20	60	6	4	●	1
SEE4050L	5	25	65	6	4	●	1
SEE4060L	6	25	65	6	4	●	2
SEE4070L	7	35	80	8	4	●	1
SEE4080L	8	35	80	8	4	●	2
SEE4090L	9	45	90	10	4	●	1
SEE4100L	10	45	95	10	4	●	2
SEE4110L	11	55	105	12	4	●	1
SEE4120L	12	55	105	12	4	●	2
SEE4140L	14	70	125	16	4	●	1
SEE4150L	15	70	125	16	4	●	1
SEE4160L	16	70	125	16	4	●	2
SEE4180L	18	70	125	20	4	●	1
SEE4200L	20	75	140	20	4	●	2
SEE4250L	25	85	160	25	4	●	2

SEE4L

RECOMMENDED CUTTING CONDITIONS

Work material	Carbon steel, Alloy steel (180—280HB) AISI 1045, AISI P20		Carbon steel, Alloy steel (280—380HB) AISI 1045, AISI P20		Pre-hardened steel (35—45HRC) NAK55		stainless steel (270HB>) AISI 420		Cast iron (Tensile Strength 350MPa>) AISI No 35 B	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
3	3400	150	3000	60	2100	30	2600	60	5500	240
4	2400	170	2200	90	1600	50	1900	80	4200	270
5	2000	180	1800	90	1300	60	1500	80	3300	300
6	1600	180	1500	90	1000	60	1300	80	2800	320
8	1200	170	1100	90	800	60	960	80	2100	320
10	1000	150	880	90	640	60	760	80	1600	320
12	800	150	760	110	520	60	640	90	1400	320
14	720	150	640	110	480	60	560	110	1200	320
16	600	140	560	110	400	60	480	110	1000	330
18	560	140	480	120	360	60	440	110	960	330
20	480	120	440	120	320	60	400	110	840	350
25	400	120	360	110	240	50	320	90	680	330



- The cutting conditions above are a guide only to milling within the standard depth of cut.
- Ductile cast iron milling has the same cutting conditions as carbon steel and alloy steel. (180— 280HB)
- When drilling, please set the feed rate at 1/3 or below of the values above.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

SEG4SA

CARBIDE END MILLS

End mill, Medium cut length, 4 flute, Irregular spiral helix angle, For aluminium alloy

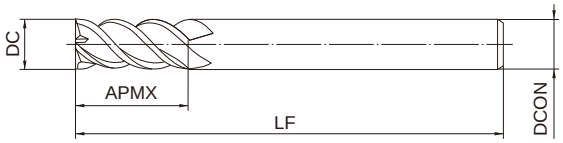
Product Information

UWC 38° 41° Sharp

Work Material

N F M

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668



Type1

DC≦12	DC>12		
0 - 0.020	0 - 0.030		
DCON=6	8≦DCON≦10	12≦DCON≦16	20≦DCON≦25
0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013

●Inventory maintained in Japan. Unit : mm

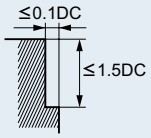
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
SEG4060SA	6	14	50	6	4	●	1
SEG4080SA	8	19	60	8	4	●	1
SEG4100SA	10	24	70	10	4	●	1
SEG4120SA	12	29	75	12	4	●	1
SEG4160SA	16	38	90	16	4	●	1
SEG4200SA	20	48	110	20	4	●	1
SEG4250SA	25	59	125	25	4	●	1

SEG4SA

RECOMMENDED CUTTING CONDITIONS

·Side milling

Work material	Aluminium alloy Plastics		Pure copper	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
6	9600	1700	4800	840
8	7200	1800	3600	900
10	5800	1800	2900	910
12	4800	2000	2400	980
16	3600	2000	1800	980
20	2900	2400	1400	1100
25	2300	2400	1100	1100



- The cutting conditions above are a guide only to milling within the standard depth of cut.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

VQSVR

SMART MIRACLE END MILLS

Roughing end mill, Short cut length, 3-4 flute, Irregular helix flutes

Product Information

UWC 43° 44° 45° 43° 45° VQ

DC<8 DC≧8 DC<8 DC≧8

Technical Info >> 1993

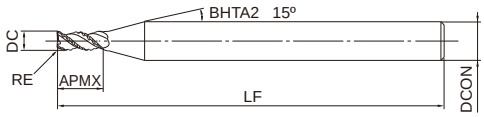
ISO13399 Property >> 1966

Work Material

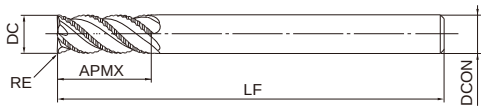
P M S R

SYMBOL DESCRIPTIONS >> 664

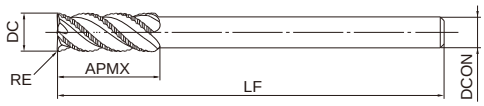
END MILLS SELECTION CHART >> 668



Type1



Type2



Type3

h6

DCON=6	8≦DCON≦10	12≦DCON≦16	DCON=20
0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013

●Inventory maintained in Japan. Unit : mm

Order Number	DC	RE	APMX	LF	DCON	No. of Flutes	Stock	type
VQSVRD0300	3	0.2	6	60	6	3	●	1
VQSVRD0400	4	0.2	8	60	6	3	●	1
VQSVRD0500	5	0.3	10	60	6	3	●	1
VQSVRD0600	6	0.3	12	70	6	3	●	2
VQSVRD0700	7	0.3	17	80	8	3	●	1
VQSVRD0800	8	0.5	17	80	8	4	●	2
VQSVRD0900	9	0.5	22	90	10	4	●	1
VQSVRD1000	10	0.5	22	90	10	4	●	2
VQSVRD1000S08	10	0.5	22	90	8	4	●	3
VQSVRD1200	12	0.5	27	100	12	4	●	2
VQSVRD1200S10	12	0.5	27	100	10	4	●	3
VQSVRD1400	14	0.5	27	130	12	4	●	3
VQSVRD1600	16	0.5	33	125	16	4	●	2
VQSVRD1800	18	0.5	33	150	16	4	●	3
VQSVRD2000	20	0.5	38	140	20	4	●	2

VQSVR

RECOMMENDED CUTTING CONDITIONS

·Side milling

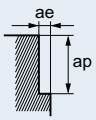
The rigidity of the machine or workpiece and chip discharge are sufficient at high efficiency conditions.

The rigidity of the machine or workpiece or chip discharge is insufficient at general-purpose conditions.

High efficiency conditions

Work material	Carbon steel, Alloy steel, Mild steel AISI 1045, AISI 4140, ASTM A36, AISI 1010					Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT					Austenitic stainless steel, Ferritic and Martensitic Stainless steels, Titanium alloys AISI 304, AISI 316, Ti-6Al-4V				
Dia. DC(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)
3	150	16000	960	4.5	1.5	120	13000	640	4.5	1.5	100	11000	450	4.5	1.5
4	150	12000	960	6	2	120	9500	640	6	2	100	8000	430	6	2
5	150	9500	960	7.5	2.5	120	7600	640	7.5	2.5	100	6400	440	7.5	2.5
6	150	8000	960	9	3	120	6400	680	9	3	100	5300	480	9	3
7	150	6800	950	10.5	3.5	120	5500	700	10.5	3.5	100	4500	500	10.5	3.5
8	150	6000	1100	12	4	120	4800	800	12	4	100	4000	570	12	4
9	150	5300	1100	13.5	4.5	120	4200	760	13.5	4.5	100	3500	570	13.5	4.5
10	150	4800	1100	15	5	120	3800	760	15	5	100	3200	570	15	5
12	150	4000	960	18	6	120	3200	700	18	6	100	2700	540	18	6
14	150	3400	880	21	7	120	2700	650	21	7	100	2300	510	21	7
16	150	3000	840	24	8	120	2400	620	24	8	100	2000	500	24	8
18	150	2700	810	27	9	120	2100	590	27	9	100	1800	500	27	9
20	150	2400	760	30	10	120	1900	560	30	10	100	1600	500	30	10

Work material	Precipitation hardening stainless steel, Cobalt chromium alloy AISI 630, AISI 631, 15-5PH, 17-4PH					Copper, Copper alloys				
Dia. DC(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)
3	75	8000	330	4.5	0.9	180	19000	1100	4.5	1.5
4	75	6000	330	6	1.2	180	14000	1100	6	2
5	75	4800	330	7.5	1.5	180	11000	1100	7.5	2.5
6	75	4000	360	9	1.8	180	9500	1100	9	3
7	75	3400	380	10.5	2.1	180	8200	1100	10.5	3.5
8	75	3000	430	12	2.4	180	7200	1300	12	4
9	75	2700	430	13.5	2.7	180	6400	1300	13.5	4.5
10	75	2400	430	15	3	180	5700	1200	15	5
12	75	2000	400	18	3.6	180	4800	1200	18	6
14	75	1700	380	21	4.2	180	4100	1100	21	7
16	75	1500	380	24	4.8	180	3600	1000	24	8
18	75	1300	360	27	5.4	180	3200	960	27	9
20	75	1200	360	30	6	180	2900	920	30	10

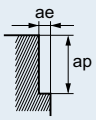


VQSVR

General purpose cutting conditions

Work material	Carbon steel, Alloy steel, Mild steel AISI 1045, AISI 4140, ASTM A36, AISI 1010					Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT					Austenitic stainless steel, Ferritic and Martensitic Stainless steels, Titanium alloys AISI 304, AISI 316, Ti-6Al-4V				
Dia. DC(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)
3	120	13000	610	4.5	1.5	100	11000	430	4.5	1.5	80	8500	280	4.5	1.5
4	120	9500	610	6	2	100	8000	430	6	2	80	6400	280	6	2
5	120	7600	610	7.5	2.5	100	6400	430	7.5	2.5	80	5100	280	7.5	2.5
6	120	6400	610	9	3	100	5300	450	9	3	80	4200	300	9	3
7	120	5500	620	10.5	3.5	100	4500	480	10.5	3.5	80	3600	320	10.5	3.5
8	120	4800	720	12	4	100	4000	570	12	4	80	3200	380	12	4
9	120	4200	670	13.5	4.5	100	3500	510	13.5	4.5	80	2800	360	13.5	4.5
10	120	3800	670	15	5	100	3200	510	15	5	80	2500	360	15	5
12	120	3200	610	18	6	100	2700	470	18	6	80	2100	340	18	6
14	120	2700	560	21	7	100	2300	440	21	7	80	1800	320	21	7
16	120	2400	540	24	8	100	2000	410	24	8	80	1600	320	24	8
18	120	2100	500	27	9	100	1800	400	27	9	80	1400	310	27	9
20	120	1900	480	30	10	100	1600	380	30	10	80	1300	310	30	10

Work material	Precipitation hardening stainless steel, Cobalt chromium alloy AISI 630, AISI 631, 15-5PH, 17-4PH					Copper, Copper alloys				
Dia. DC(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)
3	70	7400	240	4.5	0.9	140	15000	700	4.5	1.5
4	70	5600	240	6	1.2	140	11000	700	6	2
5	70	4500	250	7.5	1.5	140	8900	720	7.5	2.5
6	70	3700	270	9	1.8	140	7400	720	9	3
7	70	3200	290	10.5	2.1	140	6400	720	10.5	3.5
8	70	2800	340	12	2.4	140	5600	840	12	4
9	70	2500	320	13.5	2.7	140	5000	800	13.5	4.5
10	70	2200	310	15	3	140	4500	790	15	5
12	70	1900	300	18	3.6	140	3700	710	18	6
14	70	1600	280	21	4.2	140	3200	670	21	7
16	70	1400	280	24	4.8	140	2800	630	24	8
18	70	1200	270	27	5.4	140	2500	600	27	9
20	70	1100	270	30	6	140	2200	560	30	10



- SMART MIRACLE Coating is not energized because of its nature. Therefore, an external contact (voltaic type) tool setter cannot be used. An internal contact (non-voltaic) type or laser type tool setter is recommended to measure the length of the tool.
- For stainless steel, titanium alloy and heat resistant alloy, the use of water-soluble coolant is effective.
- The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abnormal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.
- If the depth of cut is shallow, the revolution and feed rate can be increased.

VQSVR

·Slotting

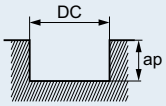
The rigidity of the machine or workpiece and chip discharge are sufficient at high efficiency conditions.

The rigidity of the machine or workpiece or chip discharge is insufficient at general-purpose conditions.

High efficiency conditions

Work material	Carbon steel, Alloy steel, Mild steel AISI 1045, AISI 4140, ASTM A36, AISI 1010				Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT				Austenitic stainless steel, Ferritic and Martensitic Stainless steels, Titanium alloys AISI 304, AISI 316, Ti-6Al-4V			
Dia. DC(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)
3	120	13000	720	3	100	11000	440	3	80	8500	340	3
4	120	9500	720	4	100	8000	450	4	80	6400	340	4
5	120	7600	720	5	100	6400	460	5	80	5100	300	5
6	120	6400	720	6	100	5300	460	6	80	4200	310	6
7	120	5500	730	7	100	4500	470	7	80	3600	330	7
8	120	4800	840	8	100	4000	560	8	80	3200	400	8
9	120	4200	810	9	100	3500	540	9	80	2800	350	9
10	120	3800	800	10	100	3200	520	10	80	2500	340	10
12	120	3200	750	12	100	2700	480	12	80	2100	340	12
14	120	2700	670	14	100	2300	420	14	80	1800	300	14
16	120	2400	620	16	100	2000	380	16	80	1600	290	16
18	120	2100	570	18	100	1800	380	18	80	1400	260	18
20	120	1900	540	20	100	1600	350	20	80	1300	260	20

Work material	Precipitation hardening stainless steel, Cobalt chromium alloy AISI 630, AISI 631, 15-5PH,17-4PH				Copper, Copper alloys			
Dia. DC(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)
3	60	6400	250	1.5	150	16000	890	3
4	60	4800	250	2	150	12000	900	4
5	60	3800	230	2.5	150	9500	900	5
6	60	3200	240	3	150	8000	900	6
7	60	2700	250	3.5	150	6800	950	7
8	60	2400	300	4	150	6000	1100	8
9	60	2100	260	4.5	150	5300	1000	9
10	60	1900	260	5	150	4800	1000	10
12	60	1600	260	6	150	4000	940	12
14	60	1400	240	7	150	3400	840	14
16	60	1200	220	8	150	3000	780	16
18	60	1100	210	9	150	2700	730	18
20	60	950	190	10	150	2400	680	20

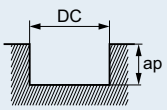


VQSVR

General purpose cutting conditions

Work material	Carbon steel, Alloy steel, Mild steel AISI 1045, AISI 4140, ASTM A36, AISI 1010				Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT				Austenitic stainless steel, Ferritic and Martensitic Stainless steels, Titanium alloys AISI 304, AISI 316, Ti-6Al-4V			
Dia. DC(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)
3	100	11000	490	3	80	8500	300	3	60	6400	200	3
4	100	8000	490	4	80	6400	310	4	60	4800	200	4
5	100	6400	490	5	80	5100	310	5	60	3800	200	5
6	100	5300	490	6	80	4200	310	6	60	3200	200	6
7	100	4500	500	7	80	3600	320	7	60	2700	200	7
8	100	4000	600	8	80	3200	380	8	60	2400	240	8
9	100	3500	540	9	80	2800	330	9	60	2100	210	9
10	100	3200	540	10	80	2500	330	10	60	1900	210	10
12	100	2700	510	12	80	2100	320	12	60	1600	210	12
14	100	2300	460	14	80	1800	300	14	60	1400	190	14
16	100	2000	410	16	80	1600	290	16	60	1200	170	16
18	100	1800	390	18	80	1400	260	18	60	1100	170	18
20	100	1600	360	20	80	1300	260	20	60	950	150	20

Work material	Precipitation hardening stainless steel, Cobalt chromium alloy AISI 630, AISI 631, 15-5PH, 17-4PH				Copper, Copper alloys			
Dia. DC(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)
3	50	5300	170	1.5	120	13000	580	3
4	50	4000	170	2	120	9500	580	4
5	50	3200	170	2.5	120	7600	580	5
6	50	2700	170	3	120	6400	580	6
7	50	2300	170	3.5	120	5500	620	7
8	50	2000	200	4	120	4800	720	8
9	50	1800	180	4.5	120	4200	650	9
10	50	1600	180	5	120	3800	640	10
12	50	1300	170	6	120	3200	600	12
14	50	1100	150	7	120	2700	540	14
16	50	990	140	8	120	2400	500	16
18	50	880	130	9	120	2100	460	18
20	50	800	130	10	120	1900	430	20



- SMART MIRACLE Coating is not energized because of its nature. Therefore, an external contact (voltaic type) tool setter cannot be used. An internal contact (non-voltaic) type or laser type tool setter is recommended to measure the length of the tool.
- For stainless steel, titanium alloy and heat resistant alloy, the use of water-soluble coolant is effective.
- The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abnormal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.
- If the depth of cut is shallow, the revolution and feed rate can be increased.

VF6MHV

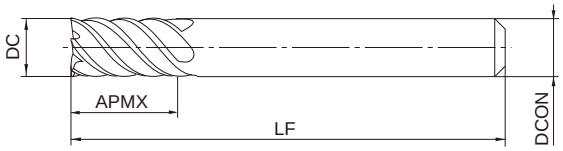
IMPACT MIRACLE END MILLS

End mill, Medium cut length, 6 flute, Irregular helix flutes

Product Information

Work Material

Technical Info >> 1993
ISO13399 Property >> 1966
SYMBOL DESCRIPTIONS >> 664
END MILLS SELECTION CHART >> 668



Type1

DC≦12	DC>12		
0 - 0.020	0 - 0.030		
DCON=6	8≦DCON≦10	12≦DCON≦16	DCON=20
0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013

●Inventory maintained in Japan. Unit : mm

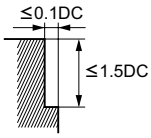
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
VF6MHVD0600	6	13	50	6	6	●	1
VF6MHVD0800	8	19	60	8	6	●	1
VF6MHVD1000	10	22	70	10	6	●	1
VF6MHVD1200	12	26	75	12	6	●	1
VF6MHVD1600	16	32	90	16	6	●	1
VF6MHVD2000	20	38	100	20	6	●	1

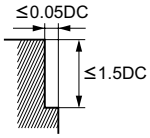
VF6MHV

RECOMMENDED CUTTING CONDITIONS

·Side milling

Work material	Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V		Heat resistant alloys Inconel718	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
6	10600	2900	8000	2000	2100	320
8	8000	2900	6000	2000	1600	300
10	6400	2700	4800	2000	1300	260
12	5300	2700	4000	2000	1100	230
16	4000	2200	3000	1600	800	180
20	3200	1900	2400	1400	640	150





- When cutting austenitic stainless steel, the use of water-soluble cutting fluid is effective.
- If the depth of cut is shallow, the revolution and feed rate can be increased.
- The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abnormal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.

VFSD

IMPACT MIRACLE END MILLS

End mill, Short cut length, For hardened materials

Product Information

UWC 30° 45° VF Gash

DC<3 DC≧3 DC<3 DC≧3

Technical Info >> 1993

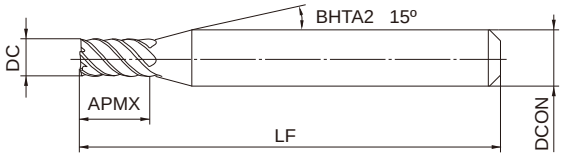
ISO13399 Property >> 1966

Work Material

P H F M

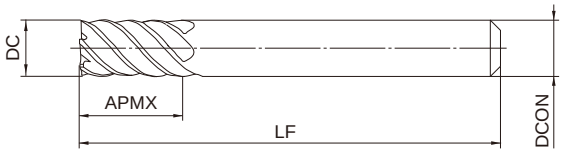
SYMBOL DESCRIPTIONS >> 664

END MILLS SELECTION CHART >> 668



Type1

1≦DC≦12		
0 - 0.02		
DCON=6	8≦DCON≦10	DCON=12
0 - 0.008	0 - 0.009	0 - 0.011



Type2

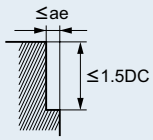
●Inventory maintained in Japan. Unit : mm

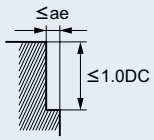
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
VFSDD0100	1	2	45	6	4	●	1
VFSDD0150	1.5	3	45	6	4	●	1
VFSDD0200	2	4	45	6	4	●	1
VFSDD0250	2.5	5	45	6	4	●	1
VFSDD0300	3	6	45	6	6	●	1
VFSDD0350	3.5	7	45	6	6	●	1
VFSDD0400	4	8	45	6	6	●	1
VFSDD0500	5	10	50	6	6	●	1
VFSDD0600	6	12	50	6	6	●	2
VFSDD0800	8	16	60	8	6	●	2
VFSDD1000	10	20	70	10	6	●	2
VFSDD1200	12	24	75	12	6	●	2

VFSD

RECOMMENDED CUTTING CONDITIONS

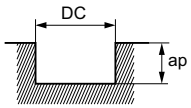
Work material	Hardened steel (45— 55HRC) AISI H13			Hardened steel (55— 62HRC) AISI D2			Hardened steel (62— 70HRC) AISI W1, AISI M2		
Dia. DC(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ae(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ae(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ae(mm)
1	40000	1200	0.05	40000	800	0.03	32000	500	0.02
2	40000	2000	0.1	24000	1000	0.05	16000	600	0.05
3	32000	3800	0.2	16000	1900	0.1	11000	1200	0.05
4	24000	4400	0.2	12000	2200	0.1	8000	1300	0.05
6	16000	5800	0.3	8000	2900	0.2	5300	1800	0.1
8	12000	5800	0.4	6000	2900	0.2	4000	1800	0.1
10	9600	5800	0.5	4800	2900	0.3	3200	1800	0.2
12	8000	4800	0.6	4000	2400	0.3	2700	1500	0.2
16	6000	3600	0.8	3000	1800	0.5	2000	1100	0.3
20	4800	2900	1.0	2400	1400	0.5	1600	880	0.3
25	3800	2300	1.0	1900	1100	0.5	1300	720	0.3





·Slot milling with small diameter tools

Work material	Hardened steel (45— 55HRC) AISI H13			Hardened steel (55— 62HRC) AISI D2		
Dia. DC(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap(mm)
1	15000	300	0.1	9500	110	0.05
2	8000	320	0.2	4800	190	0.1



- If the depth of cut is shallow, the revolution and feed rate can be increased.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

VFMD

IMPACT MIRACLE END MILLS

End mill, Medium cut length, For hardened materials

Product Information

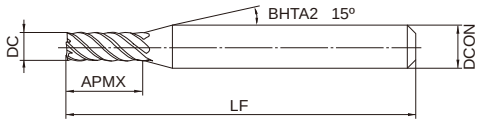
UWC 30° 45° VF Gash

DC<3 DC≧3 DC<3 DC≧3

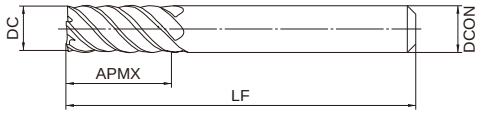
Work Material

P H F M

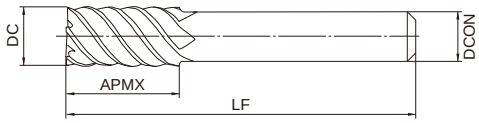
Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668



Type1



Type2



Type3

DC≦12	DC>12		
0 - 0.02	0 - 0.03		
DCON=6	8≦DCON≦10	12≦DCON≦16	20≦DCON≦25
0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013

h6

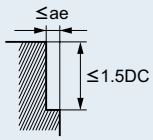
●Inventory maintained in Japan. Unit : mm

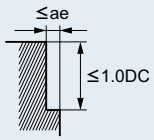
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
VFMDD0100	1	3.5	60	6	4	●	1
VFMDD0150	1.5	5	60	6	4	●	1
VFMDD0200	2	7	60	6	4	●	1
VFMDD0250	2.5	8	60	6	4	●	1
VFMDD0300	3	10	60	6	6	●	1
VFMDD0400	4	12	60	6	6	●	1
VFMDD0500	5	15	60	6	6	●	1
VFMDD0600	6	15	60	6	6	●	2
VFMDD0800	8	20	75	8	6	●	2
VFMDD1000	10	25	80	10	6	●	2
VFMDD1200	12	30	100	12	6	●	2
VFMDD1400	14	35	105	12	6	●	3
VFMDD1500	15	40	110	16	6	●	1
VFMDD1600	16	40	110	16	6	●	2
VFMDD1800	18	40	120	16	6	●	3
VFMDD2000	20	45	125	20	6	●	2
VFMDD2200	22	45	135	20	6	●	3
VFMDD2500	25	60	160	25	6	●	2

VFMD

RECOMMENDED CUTTING CONDITIONS

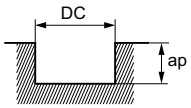
Work material	Hardened steel (45— 55HRC) AISI H13			Hardened steel (55— 62HRC) AISI D2			Hardened steel (62— 70HRC) AISI W1, AISI M2		
Dia. DC(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ae(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ae(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ae(mm)
1	40000	1200	0.05	40000	800	0.03	32000	500	0.02
2	40000	2000	0.1	24000	1000	0.05	16000	600	0.05
3	32000	3800	0.2	16000	1900	0.1	11000	1200	0.05
4	24000	4400	0.2	12000	2200	0.1	8000	1300	0.05
6	16000	5800	0.3	8000	2900	0.2	5300	1800	0.1
8	12000	5800	0.4	6000	2900	0.2	4000	1800	0.1
10	9600	5800	0.5	4800	2900	0.3	3200	1800	0.2
12	8000	4800	0.6	4000	2400	0.3	2700	1500	0.2
16	6000	3600	0.8	3000	1800	0.5	2000	1100	0.3
20	4800	2900	1.0	2400	1400	0.5	1600	880	0.3
25	3800	2300	1.0	1900	1100	0.5	1300	720	0.3





·Slot milling with small diameter tools

Work material	Hardened steel (45— 55HRC) AISI H13			Hardened steel (55— 62HRC) AISI D2		
Dia. DC(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap(mm)
1	15000	300	0.1	9500	110	0.05
2	8000	320	0.2	4800	190	0.1



- If the depth of cut is shallow, the revolution and feed rate can be increased.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

VF6MHVCH

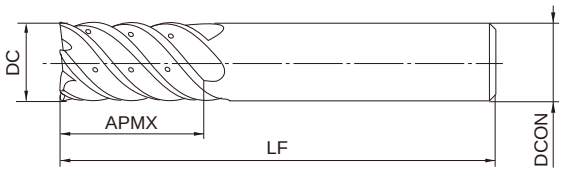
COOL STAR END MILLS

End mill, Medium cut length, 6 flute, Irregular helix flutes, with multiple internal through coolant holes

Product Information

Work Material

Technical Info >> 1993
ISO13399 Property >> 1966
SYMBOL DESCRIPTIONS >> 664
END MILLS SELECTION CHART >> 668



Type1

DC≦12	DC>12		
0 - 0.020	0 - 0.030		
DCON=10	DCON=12	DCON=16	DCON=20
0 - 0.009	0 - 0.011	0 - 0.011	0 - 0.013

●Inventory maintained in Japan. Unit : mm

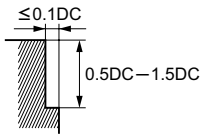
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
VF6MHVCHD1000	10	22	70	10	6	●	1
VF6MHVCHD1200	12	26	75	12	6	●	1
VF6MHVCHD1600	16	32	90	16	6	●	1
VF6MHVCHD2000	20	38	100	20	6	●	1

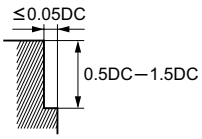
VF6MHVCH

RECOMMENDED CUTTING CONDITIONS

·Side milling

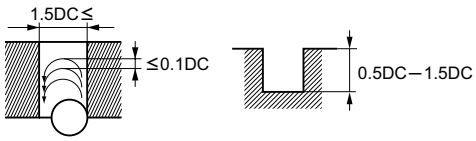
Work material	Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V		Heat resistant alloys Inconel718	
Dia. DC(mm)	Revolution (min⁻¹)	Feed rate (mm/min)	Revolution (min⁻¹)	Feed rate (mm/min)
10	4800	2000	1300	260
12	4000	2000	1100	230
16	3000	1600	800	180
20	2400	1400	640	150





·Trochoidal slotting

Work material	Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V	
Dia. DC(mm)	Revolution (min⁻¹)	Feed rate (mm/min)
10	4800	1400
12	4000	1200
16	3000	1100
20	2400	900



- If the depth of cut is shallow, the revolution and feed rate can be increased.
- The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abnormal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.

VCLD

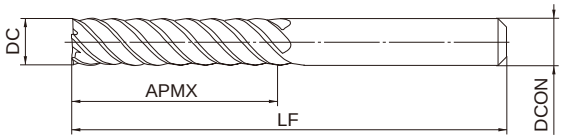
MIRACLE END MILLS FOR HIGH HARDNESS STEEL

End mill, Long cut length, 6 flute

Product Information

Work Material

Technical Info >> 1993
ISO13399 Property >> 1966
SYMBOL DESCRIPTIONS >> 664
END MILLS SELECTION CHART >> 668



Type1

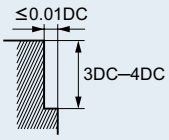
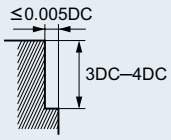
DC≦12	DC>12		
0 - 0.020	0 - 0.030		
DCON=6	8≦DCON≦10	12≦DCON≦16	20≦DCON≦25
0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013

●Inventory maintained in Japan. Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
VCLDD0600	6	26	70	6	6	●	1
VCLDD0800	8	36	90	8	6	●	1
VCLDD1000	10	46	100	10	6	●	1
VCLDD1200	12	56	110	12	6	●	1
VCLDD1600	16	66	130	16	6	●	1
VCLDD2000	20	76	140	20	6	●	1
VCLDD2500	25	92	180	25	6	●	1

VCLD

RECOMMENDED CUTTING CONDITIONS

Work material	Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Hardened steel (45— 55HRC) AISI H13		Hardened steel (55— 62HRC) AISI D2		Hardened steel (62— 70HRC) AISI W1, AISI M2	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
6	2100	450	1600	330	1300	240	1100	190
8	1600	430	1200	310	1000	230	800	170
10	1300	420	960	290	800	220	640	150
12	1100	380	800	260	660	200	530	140
16	800	310	600	220	500	160	400	120
20	640	270	480	190	400	140	320	110
25	510	230	380	160	320	120	260	90
								

- If the depth of cut is shallow, the revolution and feed rate can be increased.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

VC6MH

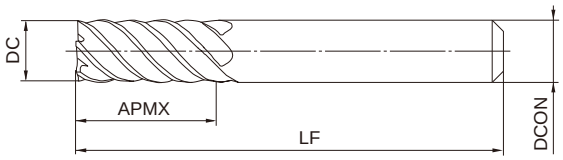
MIRACLE END MILLS

End mill, Medium cut length, 6 flute, High helix angle

Product Information

Work Material

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668



Type1

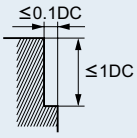
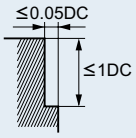
DC≦12	DC>12		
0 - 0.02	0 - 0.03		
DCON=6	8≦DCON≦10	12≦DCON≦16	20≦DCON≦25
0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013

●Inventory maintained in Japan. Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
VC6MHD0600	6	13	50	6	6	●	1
VC6MHD0800	8	19	60	8	6	●	1
VC6MHD1000	10	22	70	10	6	●	1
VC6MHD1200	12	26	75	12	6	●	1
VC6MHD1600	16	32	90	16	6	●	1
VC6MHD2000	20	38	100	20	6	●	1
VC6MHD2500	25	45	120	25	6	●	1

VC6MH

RECOMMENDED CUTTING CONDITIONS

Work material	Carbon steel, Cast iron, Alloy steel (—30HRC) AISI 1050, AISI No 35 B, AISI P20		Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V		Heat resistant alloys Inconel718	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
6	10600	2900	8000	2000	4200	900	2100	320
8	8000	2900	6000	2000	3200	900	1600	300
10	6400	2700	4800	2000	2500	870	1300	260
12	5300	2700	4000	2000	2100	830	1100	230
16	4000	2200	3000	1600	1600	740	800	180
20	3200	1900	2400	1400	1300	710	640	150
25	2500	1600	1900	1200	1000	560	510	120
								

- When cutting austenitic stainless steel, the use of water-soluble cutting fluid is effective.
- If the depth of cut is shallow, the revolution and feed rate can be increased.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

VF8MHVCH

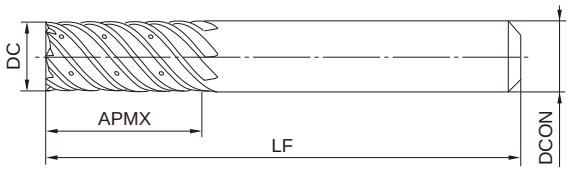
COOL STAR END MILLS

End mill, Medium cut length, Irregular helix flutes, with multiple internal through coolant holes

Product Information

Work Material

Technical Info >> 1993
ISO13399 Property >> 1966
SYMBOL DESCRIPTIONS >> 664
END MILLS SELECTION CHART >> 668



Type1

	16≦DC≦20	
	0 - 0.03	
h6	DCON=16	DCON=20
	0 - 0.011	0 - 0.013

●Inventory maintained in Japan. Unit : mm

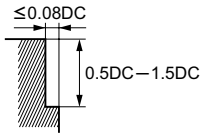
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
VF8MHVCHD1600	16	32	90	16	8	●	1
VF8MHVCHD2000	20	38	100	20	8	●	1

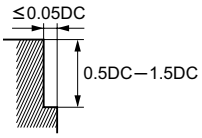
VF8MHVCH

RECOMMENDED CUTTING CONDITIONS

·Side milling

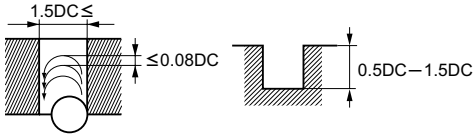
Work material	Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V		Heat resistant alloys Inconel718	
Dia. DC(mm)	Revolution (min⁻¹)	Feed rate (mm/min)	Revolution (min⁻¹)	Feed rate (mm/min)
16	3000	2100	800	240
20	2400	1900	640	200





·Trochoidal slotting

Work material	Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V	
Dia. DC(mm)	Revolution (min⁻¹)	Feed rate (mm/min)
16	3000	1400
20	2400	1200



- If the depth of cut is shallow, the revolution and feed rate can be increased.
- The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abnormal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.

VC8MH

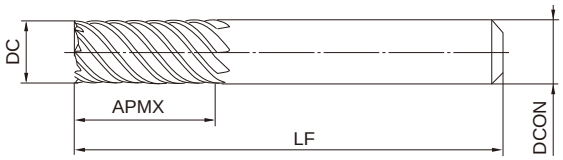
MIRACLE END MILLS

End mill, Medium cut length, 8 flute, High helix angle

Product Information

Work Material

Technical Info >> 1993
ISO13399 Property >> 1966
SYMBOL DESCRIPTIONS >> 664
END MILLS SELECTION CHART >> 668



Type1

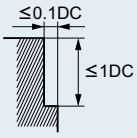
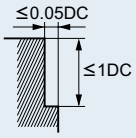
	20≦DC≦25
	0 - 0.03
h6	20≦DCON≦25
	0 - 0.013

●Inventory maintained in Japan. Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
VC8MHD2000	20	38	100	20	8	●	1
VC8MHD2500	25	45	120	25	8	●	1

VC8MH

RECOMMENDED CUTTING CONDITIONS

Work material	Carbon steel, Cast iron, Alloy steel (—30HRC) AISI 1050, AISI No 35 B, AISI P20		Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V		Heat resistant alloys Inconel718	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
6	10600	2900	8000	2000	4200	900	2100	320
8	8000	2900	6000	2000	3200	900	1600	300
10	6400	2700	4800	2000	2500	870	1300	260
12	5300	2700	4000	2000	2100	830	1100	230
16	4000	2200	3000	1600	1600	740	800	180
20	3200	1900	2400	1400	1300	710	640	150
25	2500	1600	1900	1200	1000	560	510	120
								

- When cutting austenitic stainless steel, the use of water-soluble cutting fluid is effective.
- If the depth of cut is shallow, the revolution and feed rate can be increased.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

CSRA

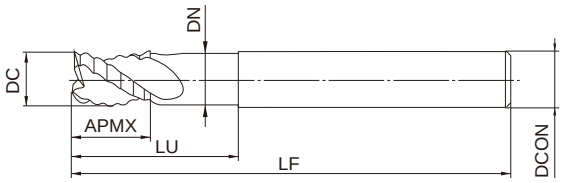
ALIMASTER END MILLS

Roughing end mill, Short cut length, 3 flute,
For aluminium alloy

Product Information

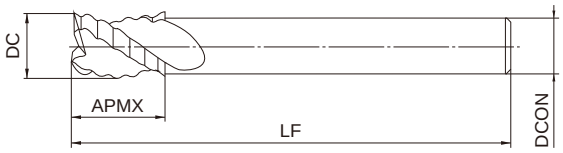
Work Material

Technical Info >> 1993
ISO13399 Property >> 1966
SYMBOL DESCRIPTIONS >> 664
END MILLS SELECTION CHART >> 668



Type1

h6	DCON=10	12≦DCON≦16	20≦DCON≦25
	0 - 0.009	0 - 0.011	0 - 0.013



Type2

●Inventory maintained in Japan. Unit : mm

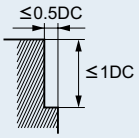
Order Number	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	type
CSRAD1000	10	12	25	9.4	75	10	3	●	1
CSRAD1200	12	15	30	11.4	75	12	3	●	1
CSRAD1600	16	18	35	15.4	100	16	3	●	1
CSRAD1800	18	22			100	16	3	●	2
CSRAD2000	20	25	50	18	125	20	3	●	1
CSRAD2200	22	25			125	20	3	●	2
CSRAD2500	25	30	60	23	125	25	3	●	1

CSRA

RECOMMENDED CUTTING CONDITIONS

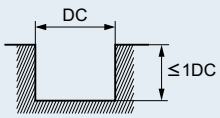
·Side milling

Work material	Aluminium alloy A7075		Aluminium cast AC4B	
Dia. DC(mm)	Revolution (min⁻¹)	Feed rate (mm/min)	Revolution (min⁻¹)	Feed rate (mm/min)
10	19000	8600	9500	3400
12	16000	8200	8000	3200
16	12000	7600	6000	3100
18	10500	7200	5300	2900
20	9500	7100	4800	2900
22	8500	6900	4300	2800
25	7500	6800	3800	2700



·Slotting

Work material	Aluminium alloy A7075		Aluminium cast AC4B	
Dia. DC(mm)	Revolution (min⁻¹)	Feed rate (mm/min)	Revolution (min⁻¹)	Feed rate (mm/min)
10	19000	6800	9500	2700
12	16000	6500	8000	2600
16	12000	6100	6000	2400
18	10500	5800	5300	2400
20	9500	5700	4800	2300
22	8500	5500	4300	2200
25	7500	5400	3800	2200



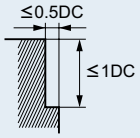
- The use of water-soluble coolant is recommended.
- If the depth of cut is shallow, the revolution and feed rate can be increased.
- Climb cutting is recommended for side milling.
- These end mills do not have a centre cutting edge, therefore when entering a workpiece use a ramping process rather than vertical feed.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately, or set the depth of cut smaller.

CSRA

·Side milling

Using a high-speed and high-rigidity machining center

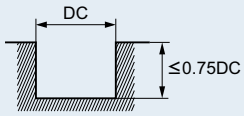
Work material	Aluminium alloy A7075		Aluminium cast AC4B	
Dia. DC(mm)	Revolution (min⁻¹)	Feed rate (mm/min)	Revolution (min⁻¹)	Feed rate (mm/min)
10	30000	11000	19000	5400
12	30000	12000	16000	5300
16	24000	12000	12000	4900
18	21000	12000	10500	4700
20	19000	11000	9500	4600
22	17000	11000	8500	4300
25	15000	11000	7500	4300



·Slotting

Using a high-speed and high-rigidity machining center

Work material	Aluminium alloy A7075		Aluminium cast AC4B	
Dia. DC(mm)	Revolution (min⁻¹)	Feed rate (mm/min)	Revolution (min⁻¹)	Feed rate (mm/min)
10	30000	8600	19000	4300
12	30000	9900	16000	4300
16	24000	9700	12000	4000
18	21000	9500	10500	3800
20	19000	9100	9500	3700
22	17000	8700	8500	3400
25	15000	8600	7500	3400



- The use of water-soluble coolant is recommended.
- If the depth of cut is shallow, the revolution and feed rate can be increased.
- Climb cutting is recommended for side milling.
- These end mills do not have a centre cutting edge, therefore when entering a workpiece use a ramping process rather than vertical feed.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately, or set the depth of cut smaller.

CMRA

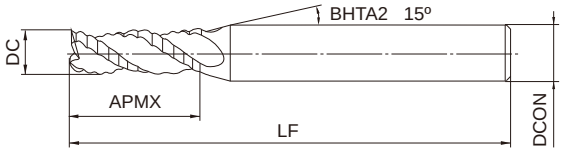
ALIMASTER END MILLS

Roughing end mill, Medium cut length, 3 flute, For aluminium alloy

Product Information

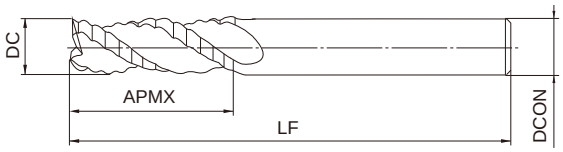
Work Material

Technical Info >> 1993
ISO13399 Property >> 1966
SYMBOL DESCRIPTIONS >> 664
END MILLS SELECTION CHART >> 668



Type1

h6	DCON=6	8≦DCO N≦10	12≦DCO N≦16	20≦DCO N≦25
	0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013



Type2

●Inventory maintained in Japan. Unit : mm

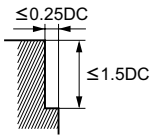
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
CMRAD0300	3	8	50	6	3	●	1
CMRAD0400	4	11	50	6	3	●	1
CMRAD0500	5	13	50	6	3	●	1
CMRAD0600	6	13	50	6	3	●	2
CMRAD0800	8	19	60	8	3	●	2
CMRAD1000	10	22	75	10	3	●	2
CMRAD1200	12	26	75	12	3	●	2
CMRAD1600	16	32	100	16	3	●	2
CMRAD2000	20	38	125	20	3	●	2
CMRAD2500	25	45	125	25	3	●	2

CMRA

RECOMMENDED CUTTING CONDITIONS

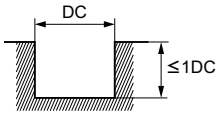
·Side milling

Work material	Aluminium alloy A7075		Aluminium cast AC4B	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
3	40000	2700	25000	1100
4	36000	2700	20000	1100
5	30000	5400	16000	2200
6	27000	6100	13000	2300
8	20000	6000	10000	2400
10	16000	5800	8000	2300
12	13000	5300	6500	2100
16	10000	5100	5000	2000
20	8000	4800	4000	1900
25	6400	4600	3200	1800



·Slotting

Work material	Aluminium alloy A7075		Aluminium cast AC4B	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
3	30000	1800	16000	700
4	24000	2200	12000	900
5	19000	2300	10000	900
6	16000	2400	8000	1000
8	12000	2500	6000	1000
10	9500	2600	5000	1100
12	8000	2300	4000	900
16	6000	2100	3000	800
20	4800	2000	2400	800
25	3800	2000	1900	700



- The use of water-soluble coolant is recommended.
- If the depth of cut is shallow, the revolution and feed rate can be increased.
- Climb cutting is recommended for side milling.
- These end mills do not have a centre cutting edge, therefore when entering a workpiece use a ramping process rather than vertical feed.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately, or set the depth of cut smaller.

VFSFPR

IMPACT MIRACLE END MILLS

Roughing end mill, Short cut length, 3—4 flute

Product Information

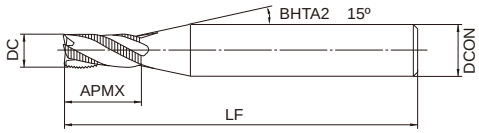
UWC 30° VF

DC<8 DC≧8

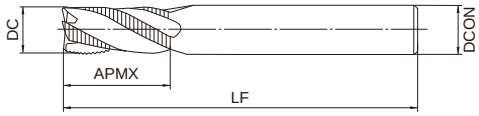
Work Material

P M S H R

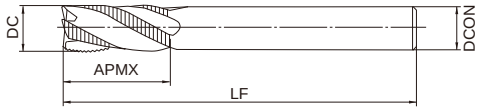
Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668



Type1



Type2



Type3

h6

DCON=6	8≦DCON≦10	12≦DCON≦16	DCON=20
0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013

●Inventory maintained in Japan. Unit : mm

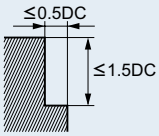
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
VFSFPRD0300	3	6	50	6	3	●	1
VFSFPRD0400	4	8	50	6	3	●	1
VFSFPRD0500	5	10	50	6	3	●	1
VFSFPRD0600	6	12	50	6	3	●	2
VFSFPRD0700	7	17	60	8	3	●	1
VFSFPRD0800	8	17	60	8	4	●	2
VFSFPRD0900	9	22	70	10	4	●	1
VFSFPRD1000	10	22	70	10	4	●	2
VFSFPRD1000S08	10	22	90	8	4	●	3
VFSFPRD1200	12	27	75	12	4	●	2
VFSFPRD1200S10	12	27	100	10	4	●	3
VFSFPRD1400	14	27	75	12	4	●	3
VFSFPRD1600	16	33	90	16	4	●	2
VFSFPRD1800	18	33	90	16	4	●	3
VFSFPRD2000	20	38	100	20	4	●	2

VFSFPR

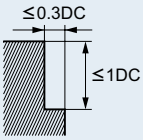
RECOMMENDED CUTTING CONDITIONS

·Side milling

Work material	Carbon steel, Cast iron, Alloy steel (—30HRC) AISI 1050, AISI No 35 B, AISI P20		Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
3	16000	960	13000	640	6400	260
4	12000	960	9500	640	4800	260
5	9500	960	7600	640	3800	260
6	8000	960	6400	680	3200	290
8	6000	1050	4800	760	2400	340
10	4800	1050	3800	760	1900	340
12	4000	960	3200	700	1600	320
16	3000	840	2400	620	1200	300
20	2400	760	1900	560	1000	300



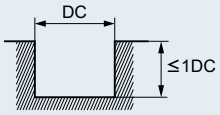
Work material	Hardened steel (45— 55HRC) AISI H13		Heat resistant alloys Inconel718	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
3	5300	320	4200	70
4	4000	320	3200	70
5	3200	320	2500	70
6	2700	340	2100	75
8	2000	400	1600	95
10	1600	400	1300	105
12	1300	400	1100	110
16	1000	360	800	110
20	800	320	600	100



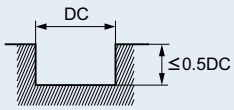
VFSFPR

·Slotting

Work material	Carbon steel, Cast iron, Alloy steel (—30HRC) AISI 1050, AISI No 35 B, AISI P20		Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
3	13000	720	11000	480	4800	190
4	9500	720	8000	480	3600	190
5	7600	720	6400	480	3200	190
6	6400	720	5300	480	2700	200
8	4800	800	4000	520	2000	220
10	3800	800	3200	520	1600	220
12	3200	750	2700	520	1300	210
16	2400	620	2000	450	1000	180
20	1900	540	1600	400	800	160



Work material	Hardened steel (45— 55HRC) AISI H13		Heat resistant alloys Inconel718	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
3	3200	190	2100	25
4	2400	190	1600	25
5	1900	190	1300	25
6	1600	200	1100	30
8	1200	220	800	35
10	1000	220	600	35
12	800	210	500	40
16	600	180	400	45
20	500	160	300	40



- When cutting austenitic stainless steel, the use of water-soluble cutting fluid is effective.
- If the depth of cut is shallow, the revolution and feed rate can be increased.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

VFMFPR

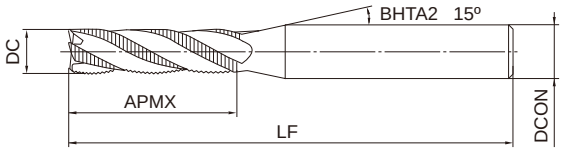
IMPACT MIRACLE END MILLS

Roughing end mill, Medium cut length, 4 flute

Product Information

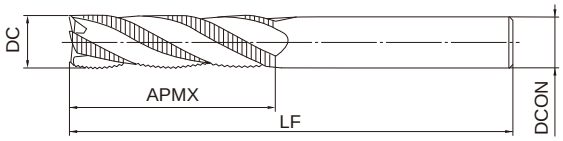
Work Material

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668



Type1

h6	DCON=6	8≦DCON≦10	12≦DCON≦16	DCON=20
	0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013



Type2

●Inventory maintained in Japan. Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
VFMFPRD0500	5	15	60	6	4	●	1
VFMFPRD0600	6	17	60	6	4	●	2
VFMFPRD0700	7	22	75	8	4	●	1
VFMFPRD0800	8	28	75	8	4	●	2
VFMFPRD0900	9	28	100	10	4	●	1
VFMFPRD1000	10	34	100	10	4	●	2
VFMFPRD1200	12	40	110	12	4	●	2
VFMFPRD1600	16	48	125	16	4	●	2
VFMFPRD2000	20	57	140	20	4	●	2

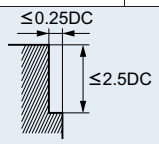
VFMFPR

RECOMMENDED CUTTING CONDITIONS

·Side milling

Work material	Carbon steel, Cast iron, Alloy steel (—30HRC) AISI 1050, AISI No 35 B, AISI P20		Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
5	3800	360	3200	290	2500	150
6	3200	360	2700	290	2100	160
8	2400	450	2000	360	1600	160
10	1900	450	1600	360	1300	180
12	1600	400	1300	320	1100	180
16	1200	360	1000	290	800	160
20	1000	340	800	270	600	150

Work material	Hardened steel (45— 55HRC) AISI H13		Heat resistant alloys Inconel718	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
5	2500	150	1900	50
6	2100	160	1600	60
8	1600	160	1200	70
10	1300	180	1000	75
12	1100	180	800	80
16	800	160	600	80
20	600	150	500	80



- When cutting austenitic stainless steel, the use of water-soluble cutting fluid is effective.
- If the depth of cut is shallow, the revolution and feed rate can be increased.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

VFSFPRCH

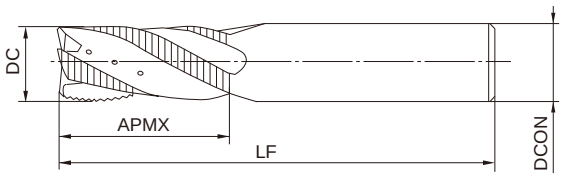
COOL STAR END MILLS

Roughing end mill, Short cut length, 4 flute, with multiple internal through coolant holes

Product Information

Work Material

Technical Info >> 1993
ISO13399 Property >> 1966
SYMBOL DESCRIPTIONS >> 664
END MILLS SELECTION CHART >> 668



Type1

h6	DCON=16	DCON=20
	0 - 0.011	0 - 0.013

●Inventory maintained in Japan. Unit : mm

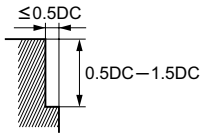
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
VFSFPRCHD1600	16	33	90	16	4	●	1
VFSFPRCHD2000	20	38	100	20	4	●	1

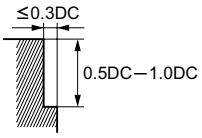
VFSFPRCH

RECOMMENDED CUTTING CONDITIONS

·Side milling

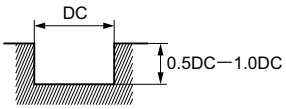
Work material	Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V		Heat resistant alloys Inconel718	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
16	1200	300	800	110
20	1000	300	600	100





·Slotting

Work material	Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)
16	800	100
20	600	80



- If the depth of cut is shallow, the revolution and feed rate can be increased.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

VCSFPR

MIRACLE END MILLS

Roughing end mill, Short cut length, 3—4 flute

Product Information

UWC 20° VC

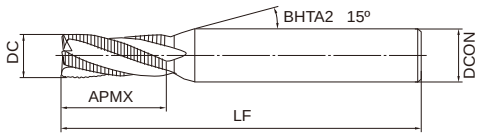
DC<8 DC≧8

Technical Info >> 1993 ISO13399 Property >> 1966

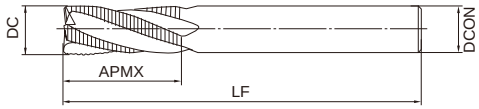
Work Material

P M S H R

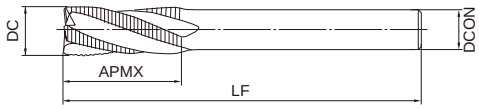
SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668



Type1



Type2



Type3

h6

DCON=6	8≦DCON≦10	12≦DCON≦16	DCON=20
0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013

●Inventory maintained in Japan. Unit : mm

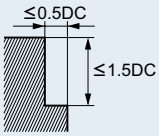
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
VCSFPRD0300	3	6	50	6	3	●	1
VCSFPRD0400	4	8	50	6	3	●	1
VCSFPRD0500	5	10	50	6	3	●	1
VCSFPRD0600	6	12	50	6	3	●	2
VCSFPRD0700	7	17	60	8	3	●	1
VCSFPRD0800	8	17	60	8	4	●	2
VCSFPRD0900	9	22	70	10	4	●	1
VCSFPRD1000	10	22	70	10	4	●	2
VCSFPRD1000S08	10	22	90	8	4	●	3
VCSFPRD1200	12	27	75	12	4	●	2
VCSFPRD1200S10	12	27	100	10	4	●	3
VCSFPRD1400	14	27	75	12	4	●	3
VCSFPRD1600	16	33	90	16	4	●	2
VCSFPRD1800	18	33	90	16	4	●	3
VCSFPRD2000	20	38	100	20	4	●	2

VCSFPR

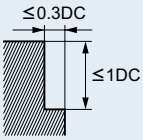
RECOMMENDED CUTTING CONDITIONS

·Side milling

Work material	Carbon steel, Cast iron, Alloy steel (—30HRC) AISI 1050, AISI No 35 B, AISI P20		Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304, AISI 316, Ti-6Al-4V	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
3	16000	960	13000	640	6400	260
4	12000	960	9500	640	4800	260
5	9500	960	7600	640	3800	260
6	8000	960	6400	680	3200	290
8	6000	1050	4800	760	2400	340
10	4800	1050	3800	760	1900	340
12	4000	960	3200	700	1600	320
16	3000	840	2400	620	1200	300
20	2400	760	1900	560	1000	300



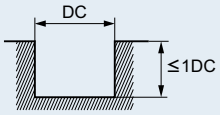
Work material	Hardened steel (45— 55HRC) AISI H13		Heat resistant alloys Inconel718	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
3	5300	100	4200	70
4	4000	100	3200	70
5	3200	100	2500	70
6	2700	110	2100	75
8	2000	140	1600	95
10	1600	150	1300	105
12	1300	150	1100	110
16	1000	150	800	110
20	800	140	600	100



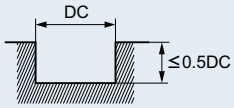
VCSFPR

·Slotting

Work material	Carbon steel, Cast iron, Alloy steel (—30HRC) AISI 1050, AISI No 35 B, AISI P20		Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304, AISI 316, Ti-6Al-4V	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
3	13000	720	11000	480	4800	190
4	9500	720	8000	480	3600	190
5	7600	720	6400	480	3200	190
6	6400	720	5300	480	2700	200
8	4800	800	4000	520	2000	220
10	3800	800	3200	520	1600	220
12	3200	750	2700	520	1300	210
16	2400	620	2000	450	1000	180
20	1900	540	1600	400	800	160



Work material	Hardened steel (45— 55HRC) AISI H13		Heat resistant alloys Inconel718	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
3	3200	50	2100	25
4	2400	50	1600	25
5	1900	50	1300	25
6	1600	55	1100	30
8	1200	70	800	35
10	1000	70	600	35
12	800	75	500	40
16	600	75	400	45
20	500	70	300	40



- When cutting austenitic stainless steel, the use of water-soluble cutting fluid is effective.
- If the depth of cut is shallow, the revolution and feed rate can be increased.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

VF6SVRCH

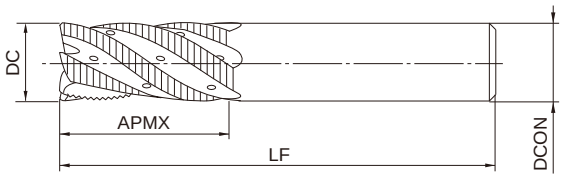
COOL STAR END MILLS

Roughing end mill, Short cut length, 6 flute, Irregular helix flutes, with multiple internal through coolant holes

Product Information

Work Material

Technical Info >> 1993
ISO13399 Property >> 1966
SYMBOL DESCRIPTIONS >> 664
END MILLS SELECTION CHART >> 668



Type1

h6	DCON=16	DCON=20
	0 - 0.011	0 - 0.013

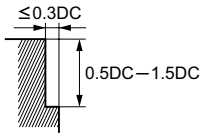
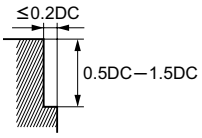
●Inventory maintained in Japan. Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
VF6SVRCHD1600	16	33	90	16	6	●	1
VF6SVRCHD2000	20	38	100	20	6	●	1

VF6SVRCH

RECOMMENDED CUTTING CONDITIONS

·Side milling

Work material	Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V		Heat resistant alloys Inconel718	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
16	2400	1200	800	160
20	2000	1000	640	140
				

- If the depth of cut is shallow, the revolution and feed rate can be increased.
- The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abnormal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.

MP2SSB

MS PLUS END MILLS

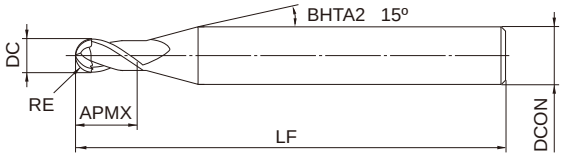
Ball nose, Short cut length, 2 flute

Product Information

Work Material

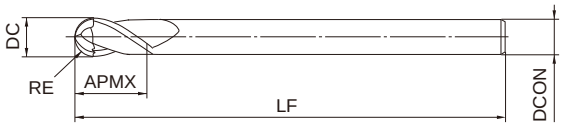
P M S H F M

Technical Info >> 1993
ISO13399 Property >> 1966
SYMBOL DESCRIPTIONS >> 664
END MILLS SELECTION CHART >> 668



Type1

R	0.1≦RE≦6		
	±0.005		
h5	4≦DCON≦6	8≦DCON≦10	DCON=12
	0 - 0.005	0 - 0.006	0 - 0.008



Type2

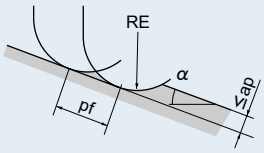
●Inventory maintained in Japan. Unit : mm

Order Number	RE	DC	APMX	LF	DCON	No. of Flutes	Stock	type
MP2SSBR0010	0.1	0.2	0.2	40	4	2	●	1
MP2SSBR0020	0.2	0.4	0.4	40	4	2	●	1
MP2SSBR0030	0.3	0.6	0.6	40	4	2	●	1
MP2SSBR0040	0.4	0.8	0.8	40	4	2	●	1
MP2SSBR0050	0.5	1	1	40	4	2	●	1
MP2SSBR0050S06	0.5	1	1	40	6	2	●	1
MP2SSBR0075	0.75	1.5	1.5	40	4	2	●	1
MP2SSBR0075S06	0.75	1.5	1.5	40	6	2	●	1
MP2SSBR0100	1	2	2	45	6	2	●	1
MP2SSBR0150	1.5	3	3	45	6	2	●	1
MP2SSBR0200	2	4	4	45	6	2	●	1
MP2SSBR0250	2.5	5	5	50	6	2	●	1
MP2SSBR0300	3	6	6	50	6	2	●	2
MP2SSBR0400	4	8	8	60	8	2	●	2
MP2SSBR0500	5	10	10	70	10	2	●	2
MP2SSBR0600	6	12	12	75	12	2	●	2

MP2SSB

RECOMMENDED CUTTING CONDITIONS

Work material	Mild Steel, Carbon steel, Alloy steel, Prehardened steel, Hardened steel (— 45HRC) AISI 1050, AISI P21, AISI H13						Hardened steel (45— 55HRC) AISI 420, AISI H13						Copper, Copper alloys					
RE (mm)	α≦15°		α>15°		Depth of cut ap (mm)	Pick feed pf (mm)	α≦15°		α>15°		Depth of cut ap (mm)	Pick feed pf (mm)	α≦15°		α>15°		Depth of cut ap (mm)	Pick feed pf (mm)
	Revolution (min-1)	Feed rate (mm/min)	Revolution (min-1)	Feed rate (mm/min)			Revolution (min-1)	Feed rate (mm/min)	Revolution (min-1)	Feed rate (mm/min)			Revolution (min-1)	Feed rate (mm/min)	Revolution (min-1)	Feed rate (mm/min)		
R0.1	40000	300	40000	250	0.003	0.02	40000	300	40000	250	0.003	0.02	40000	300	40000	250	0.003	0.02
R0.15	40000	500	40000	350	0.007	0.03	40000	500	40000	350	0.007	0.03	40000	500	40000	350	0.007	0.03
R0.2	40000	1600	40000	1200	0.02	0.04	40000	1300	40000	950	0.015	0.04	40000	1300	40000	950	0.015	0.04
R0.25	40000	2400	40000	1400	0.025	0.05	40000	1900	40000	1100	0.02	0.05	40000	1900	40000	1100	0.02	0.05
R0.3	40000	3200	40000	1600	0.03	0.06	40000	2500	40000	1300	0.025	0.06	40000	2500	40000	1300	0.025	0.06
R0.4	40000	4800	40000	2400	0.05	0.08	40000	4000	40000	1900	0.04	0.08	40000	4000	40000	1900	0.04	0.08
R0.5	40000	5600	40000	3200	0.06	0.1	40000	5600	40000	3000	0.05	0.1	40000	5600	40000	3000	0.05	0.1
R0.75	40000	6500	40000	4000	0.09	0.15	40000	6500	32000	3200	0.08	0.15	40000	6500	32000	3200	0.08	0.15
R1	40000	6500	39000	4700	0.11	0.2	40000	6500	31000	3500	0.11	0.2	40000	6500	31000	3500	0.11	0.2
R1.25	40000	7000	33000	4500	0.12	0.25	36000	6500	26000	3500	0.12	0.25	36000	6500	26000	3500	0.12	0.25
R1.5	40000	7500	27000	4300	0.13	0.3	32000	6000	22000	3400	0.13	0.3	32000	6000	22000	3400	0.13	0.3
R2	32000	7500	20000	3600	0.15	0.4	25000	6000	16000	2700	0.15	0.4	25000	6000	16000	2700	0.15	0.6
R2.5	25000	6000	16000	2900	0.2	0.5	20000	5400	13000	2300	0.2	0.5	20000	5400	13000	2300	0.2	0.75
R3	21000	5800	13000	2600	0.25	0.6	17000	4700	10000	2000	0.25	0.6	17000	4700	10000	2000	0.25	0.9
R4	16000	4500	10000	2000	0.3	0.8	13000	3600	8000	1500	0.3	0.8	13000	3600	8000	1500	0.3	1.6
R5	13000	3600	8000	1700	0.5	1.0	10000	2900	6400	1200	0.5	1.0	10000	2900	6400	1200	0.5	2.0
R6	9000	2500	6000	1300	0.5	1.2	7200	2000	4800	1000	0.5	1.2	8500	2300	5300	1100	0.5	2.4



- α is the inclination angle of the machined surface.
- If the depth of cut is shallow, the revolution and feed rate can be increased.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.
- Standard cutting conditions of austenitic stainless steel, and titanium alloy, please reduce to 60% revolution and 45% feed rate. (Hardened steel (45 — 55HRC) table above)

MP2SB

MS PLUS END MILLS

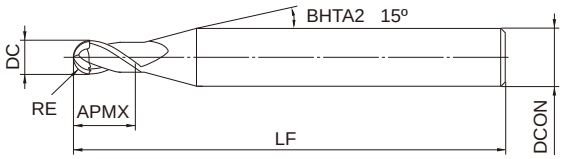
Ball nose, Short cut length, 2 flute, Short shank

Product Information

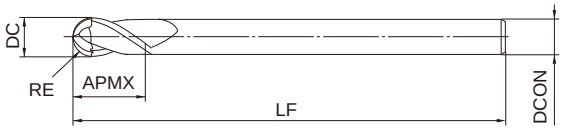
Work Material

P M S H F M

Technical Info >> 1993
ISO13399 Property >> 1966
SYMBOL DESCRIPTIONS >> 664
END MILLS SELECTION CHART >> 668



Type1



Type2

R	0.1≦RE≦6		
	±0.005		
h5	4≦DCON≦6	8≦DCON≦10	DCON=12
	0 - 0.005	0 - 0.006	0 - 0.008

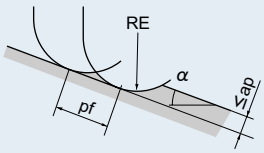
●Inventory maintained in Japan. Unit : mm

Order Number	RE	DC	APMX	LF	DCON	No. of Flutes	Stock	type
MP2SBR0010	0.1	0.2	0.3	45	4	2	●	1
MP2SBR0015	0.15	0.3	0.5	45	4	2	●	1
MP2SBR0020	0.2	0.4	0.6	45	4	2	●	1
MP2SBR0020S06	0.2	0.4	0.6	50	6	2	●	1
MP2SBR0025	0.25	0.5	0.8	45	4	2	●	1
MP2SBR0030	0.3	0.6	0.9	45	4	2	●	1
MP2SBR0030S06	0.3	0.6	0.9	50	6	2	●	1
MP2SBR0035	0.35	0.7	1.1	45	4	2	●	1
MP2SBR0040	0.4	0.8	1.2	45	4	2	●	1
MP2SBR0040S06	0.4	0.8	1.2	50	6	2	●	1
MP2SBR0045	0.45	0.9	1.4	45	4	2	●	1
MP2SBR0050	0.5	1	1.5	45	4	2	●	1
MP2SBR0050S06	0.5	1	1.5	50	6	2	●	1
MP2SBR0060	0.6	1.2	1.8	45	4	2	●	1
MP2SBR0070	0.7	1.4	2.1	45	4	2	●	1
MP2SBR0075	0.75	1.5	2.3	45	4	2	●	1
MP2SBR0075S06	0.75	1.5	2.3	50	6	2	●	1
MP2SBR0080	0.8	1.6	2.4	45	4	2	●	1
MP2SBR0090	0.9	1.8	2.7	45	4	2	●	1
MP2SBR0100	1	2	3	50	4	2	●	1
MP2SBR0100S06	1	2	3	50	6	2	●	1
MP2SBR0125	1.25	2.5	3.8	50	4	2	●	1
MP2SBR0150	1.5	3	4.5	70	6	2	●	1
MP2SBR0200	2	4	6	70	6	2	●	1
MP2SBR0250	2.5	5	7.5	80	6	2	●	1
MP2SBR0300	3	6	9	80	6	2	●	2
MP2SBR0400	4	8	12	90	8	2	●	2
MP2SBR0500	5	10	15	100	10	2	●	2
MP2SBR0600	6	12	18	110	12	2	●	2

MP2SB

RECOMMENDED CUTTING CONDITIONS

Work material	Mild Steel, Carbon steel, Alloy steel, Prehardened steel, Hardened steel (— 45HRC) AISI 1050, AISI P21, AISI H13						Hardened steel (45— 55HRC) AISI 420, AISI H13						Copper, Copper alloys					
R 半径 RE (mm)	α≦15°		α>15°		Depth of cut ap (mm)	Pick feed pf (mm)	α≦15°		α>15°		Depth of cut ap (mm)	Pick feed pf (mm)	α≦15°		α>15°		Depth of cut ap (mm)	Pick feed pf (mm)
	Revolution (min-1)	Feed rate (mm/min)	Revolution (min-1)	Feed rate (mm/min)			Revolution (min-1)	Feed rate (mm/min)	Revolution (min-1)	Feed rate (mm/min)			Revolution (min-1)	Feed rate (mm/min)	Revolution (min-1)	Feed rate (mm/min)		
R0.1	40000	300	40000	250	0.003	0.02	40000	300	40000	250	0.003	0.02	40000	300	40000	250	0.003	0.02
R0.15	40000	500	40000	350	0.007	0.03	40000	500	40000	350	0.007	0.03	40000	500	40000	350	0.007	0.03
R0.2	40000	1600	40000	1200	0.02	0.04	40000	1300	40000	950	0.015	0.04	40000	1300	40000	950	0.015	0.04
R0.25	40000	2400	40000	1400	0.025	0.05	40000	1900	40000	1100	0.02	0.05	40000	1900	40000	1100	0.02	0.05
R0.3	40000	3200	40000	1600	0.03	0.06	40000	2500	40000	1300	0.025	0.06	40000	2500	40000	1300	0.025	0.06
R0.4	40000	4800	40000	2400	0.05	0.08	40000	4000	40000	1900	0.04	0.08	40000	4000	40000	1900	0.04	0.08
R0.5	40000	5600	40000	3200	0.06	0.1	40000	5600	40000	3000	0.05	0.1	40000	5600	40000	3000	0.05	0.1
R0.75	40000	6500	40000	4000	0.09	0.15	40000	6500	32000	3200	0.08	0.15	40000	6500	32000	3200	0.08	0.15
R1	40000	6500	39000	4700	0.11	0.2	40000	6500	31000	3500	0.11	0.2	40000	6500	31000	3500	0.11	0.2
R1.25	40000	7000	33000	4500	0.12	0.25	36000	6500	26000	3500	0.12	0.25	36000	6500	26000	3500	0.12	0.25
R1.5	40000	7500	27000	4300	0.13	0.3	32000	6000	22000	3400	0.13	0.3	32000	6000	22000	3400	0.13	0.3
R2	32000	7500	20000	3600	0.15	0.4	25000	6000	16000	2700	0.15	0.4	25000	6000	16000	2700	0.15	0.6
R2.5	25000	6000	16000	2900	0.2	0.5	20000	5400	13000	2300	0.2	0.5	20000	5400	13000	2300	0.2	0.75
R3	21000	5800	13000	2600	0.25	0.6	17000	4700	10000	2000	0.25	0.6	17000	4700	10000	2000	0.25	0.9
R4	16000	4500	10000	2000	0.3	0.8	13000	3600	8000	1500	0.3	0.8	13000	3600	8000	1500	0.3	1.6
R5	13000	3600	8000	1700	0.5	1.0	10000	2900	6400	1200	0.5	1.0	10000	2900	6400	1200	0.5	2.0
R6	9000	2500	6000	1300	0.5	1.2	7200	2000	4800	1000	0.5	1.2	8500	2300	5300	1100	0.5	2.4



- α is the inclination angle of the machined surface.
- If the depth of cut is shallow, the revolution and feed rate can be increased.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.
- Standard cutting conditions of austenitic stainless steel, and titanium alloy, please reduce to 60% revolution and 45% feed rate. (Hardened steel (45 — 55HRC) table above)

MP2MB

MS PLUS END MILLS

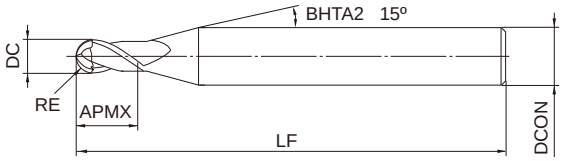
Ball nose, Medium cut length, 2 flute

Product Information

Work Material

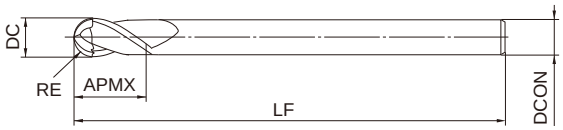
P M S H F M

Technical Info >> 1993
ISO13399 Property >> 1966
SYMBOL DESCRIPTIONS >> 664
END MILLS SELECTION CHART >> 668



Type1

R	0.25≦RE≦6		
	±0.005		
h5	4≦DCON≦6	8≦DCON≦10	DCON=12
	0 - 0.005	0 - 0.006	0 - 0.008



Type2

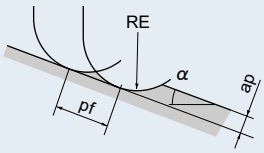
●Inventory maintained in Japan. Unit : mm

Order Number	RE	DC	APMX	LF	DCON	No. of Flutes	Stock	type
MP2MBR0025	0.25	0.5	1	45	4	2	●	1
MP2MBR0030	0.3	0.6	1.2	45	4	2	●	1
MP2MBR0040	0.4	0.8	1.6	45	4	2	●	1
MP2MBR0050	0.5	1	2.5	45	4	2	●	1
MP2MBR0060	0.6	1.2	2.5	45	4	2	●	1
MP2MBR0070	0.7	1.4	3	45	4	2	●	1
MP2MBR0075	0.75	1.5	4	45	4	2	●	1
MP2MBR0080	0.8	1.6	4	45	4	2	●	1
MP2MBR0090	0.9	1.8	5	45	4	2	●	1
MP2MBR0100	1	2	6	50	4	2	●	1
MP2MBR0125	1.25	2.5	6	50	4	2	●	1
MP2MBR0150	1.5	3	8	70	6	2	●	1
MP2MBR0150S03	1.5	3	8	70	3	2	●	2
MP2MBR0175	1.75	3.5	8	70	6	2	●	1
MP2MBR0200	2	4	8	70	6	2	●	1
MP2MBR0200S04	2	4	8	70	4	2	●	2
MP2MBR0250	2.5	5	12	80	6	2	●	1
MP2MBR0300	3	6	12	80	6	2	●	2
MP2MBR0400	4	8	14	90	8	2	●	2
MP2MBR0500	5	10	18	100	10	2	●	2
MP2MBR0600	6	12	22	110	12	2	●	2

MP2MB

RECOMMENDED CUTTING CONDITIONS

Work material	Mild Steel, Carbon steel, Alloy steel, Prehardened steel, Hardened steel (— 45HRC) AISI 1050, AISI P21, AISI H13						Hardened steel (45— 55HRC) AISI 420, AISI H13						Copper, Copper alloys					
R 半径 RE (mm)	α≦15°		α>15°		Depth of cut ap (mm)	Pick feed pf (mm)	α≦15°		α>15°		Depth of cut ap (mm)	Pick feed pf (mm)	α≦15°		α>15°		Depth of cut ap (mm)	Pick feed pf (mm)
	Revolution (min-1)	Feed rate (mm/min)	Revolution (min-1)	Feed rate (mm/min)			Revolution (min-1)	Feed rate (mm/min)	Revolution (min-1)	Feed rate (mm/min)			Revolution (min-1)	Feed rate (mm/min)	Revolution (min-1)	Feed rate (mm/min)		
R0.1	40000	300	40000	250	0.003	0.02	40000	300	40000	250	0.003	0.02	40000	300	40000	250	0.003	0.02
R0.15	40000	500	40000	350	0.007	0.03	40000	500	40000	350	0.007	0.03	40000	500	40000	350	0.007	0.03
R0.2	40000	1600	40000	1200	0.02	0.04	40000	1300	40000	950	0.015	0.04	40000	1300	40000	950	0.015	0.04
R0.25	40000	2400	40000	1400	0.025	0.05	40000	1900	40000	1100	0.02	0.05	40000	1900	40000	1100	0.02	0.05
R0.3	40000	3200	40000	1600	0.03	0.06	40000	2500	40000	1300	0.025	0.06	40000	2500	40000	1300	0.025	0.06
R0.4	40000	4800	40000	2400	0.05	0.08	40000	4000	40000	1900	0.04	0.08	40000	4000	40000	1900	0.04	0.08
R0.5	40000	5600	40000	3200	0.06	0.1	40000	5600	40000	3000	0.05	0.1	40000	5600	40000	3000	0.05	0.1
R0.75	40000	6500	40000	4000	0.09	0.15	40000	6500	32000	3200	0.08	0.15	40000	6500	32000	3200	0.08	0.15
R1	40000	6500	39000	4700	0.11	0.2	40000	6500	31000	3500	0.11	0.2	40000	6500	31000	3500	0.11	0.2
R1.25	40000	7000	33000	4500	0.12	0.25	36000	6500	26000	3500	0.12	0.25	36000	6500	26000	3500	0.12	0.25
R1.5	40000	7500	27000	4300	0.13	0.3	32000	6000	22000	3400	0.13	0.3	32000	6000	22000	3400	0.13	0.3
R2	32000	7500	20000	3600	0.15	0.4	25000	6000	16000	2700	0.15	0.4	25000	6000	16000	2700	0.15	0.6
R2.5	25000	6000	16000	2900	0.2	0.5	20000	5400	13000	2300	0.2	0.5	20000	5400	13000	2300	0.2	0.75
R3	21000	5800	13000	2600	0.25	0.6	17000	4700	10000	2000	0.25	0.6	17000	4700	10000	2000	0.25	0.9
R4	16000	4500	10000	2000	0.3	0.8	13000	3600	8000	1500	0.3	0.8	13000	3600	8000	1500	0.3	1.6
R5	13000	3600	8000	1700	0.5	1.0	10000	2900	6400	1200	0.5	1.0	10000	2900	6400	1200	0.5	2.0
R6	9000	2500	6000	1300	0.5	1.2	7200	2000	4800	1000	0.5	1.2	8500	2300	5300	1100	0.5	2.4



- α is the inclination angle of the machined surface.
- If the depth of cut is shallow, the revolution and feed rate can be increased.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.
- Standard cutting conditions of austenitic stainless steel, and titanium alloy, please reduce to 60% revolution and 45% feed rate. (Hardened steel (45 — 55HRC) table above)

MP2SDB

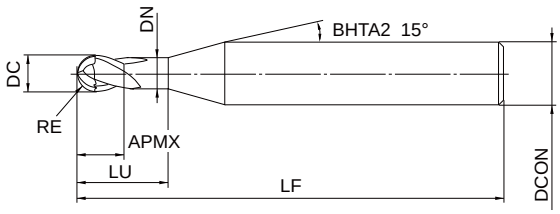
MS PLUS END MILLS

Ball nose, Short cut length, 2 flute, High strength

Product Information

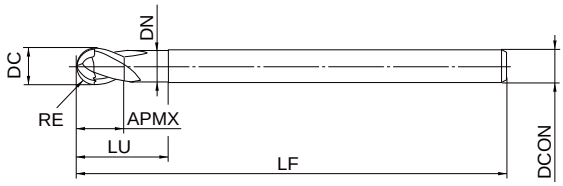
Work Material

Technical Info >> 1993
ISO13399 Property >> 1966
SYMBOL DESCRIPTIONS >> 664
END MILLS SELECTION CHART >> 668



Type1

R	0.5≦RE≦6	
	±0.01	
h5	4≦DCON≦6	DCON=8
	0 - 0.005	0 - 0.006
h6	DCON=10	DCON=12
	0 - 0.009	0 - 0.011



Type2

●Inventory maintained in Japan. Unit : mm

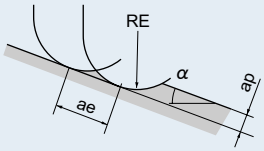
Order Number	RE	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	type
MP2SDBR0050	0.5	1	1	2	0.96	45	4	2	●	1
MP2SDBR0075S06	0.75	1.5	1.5	3	1.44	50	6	2	●	1
MP2SDBR0100	1	2	2	4	1.9	50	4	2	●	1
MP2SDBR0100S06	1	2	2	4	1.9	60	6	2	●	1
MP2SDBR0150	1.5	3	3	6	2.9	70	6	2	●	1
MP2SDBR0200	2	4	4	8	3.9	60	4	2	●	2
MP2SDBR0200S06	2	4	4	8	3.9	70	6	2	●	1
MP2SDBR0250	2.5	5	5	10	4.9	80	6	2	●	1
MP2SDBR0300	3	6	12	18	5.85	80	6	2	●	2
MP2SDBR0300A120	3	6	12	18	5.85	120	6	2	●	2
MP2SDBR0400	4	8	14	24	7.85	90	8	2	●	2
MP2SDBR0400A130	4	8	14	24	7.85	130	8	2	●	2
MP2SDBR0500	5	10	18	30	9.7	100	10	2	●	2
MP2SDBR0500A140	5	10	18	30	9.7	140	10	2	●	2
MP2SDBR0600	6	12	22	36	11.7	110	12	2	●	2
MP2SDBR0600A140	6	12	22	36	11.7	140	12	2	●	2

MP2SDB

RECOMMENDED CUTTING CONDITIONS

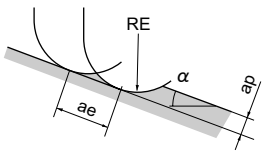
·Overhang Below DC x 5 (DC : Dia.)

Work material	Carbon steel, Alloy steel (180—280HB) Alloy tool steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21						Hardened steel (45— 55HRC) AISI H13, AISI L6					
R RE (mm)	α≦15°		α>15°		Depth of cut ap (mm)	Depth of cut ae (mm)	α≦15°		α>15°		Depth of cut ap (mm)	Depth of cut ae (mm)
	Revolution (min-1)	Feed rate (mm/min)	Revolution (min-1)	Feed rate (mm/min)			Revolution (min-1)	Feed rate (mm/min)	Revolution (min-1)	Feed rate (mm/min)		
R0.5	40000	3900	36000	2100	0.1	0.25	40000	4300	36000	2200	0.1	0.25
R0.75	40000	4200	36000	2600	0.15	0.35	40000	4700	36000	2700	0.15	0.35
R1	40000	4500	36000	3100	0.2	0.5	40000	5000	36000	3300	0.2	0.5
R1.5	37000	5300	24000	2700	0.3	0.75	37000	5800	24000	2800	0.3	0.75
R2X4	24000	3200	15000	2000	0.25	0.7	19000	2800	13000	1600	0.25	0.7
R2	30000	4900	19000	2500	0.4	1	28000	5000	19000	2400	0.4	1
R2.5	25000	4500	16000	2300	0.5	1.3	22000	4200	16000	2200	0.5	1.25
R3	22000	4300	14000	2200	0.6	1.8	18000	3800	12000	1800	0.6	1.5
R4	19000	3900	12000	2000	0.8	2.4	15000	3200	9500	1600	0.8	2
R5	15000	3300	9500	1800	1	3	11000	2500	7000	1400	1	2.5
R6	12000	2550	8000	1600	1.2	3.6	9000	2000	6000	1300	1.2	3



·Overhang Below DC x 7 (DC : Dia.)

Work material	Carbon steel, Alloy steel (180—280HB) Alloy tool steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21						Hardened steel (45— 55HRC) AISI H13, AISI L6					
R RE (mm)	α≦15°		α>15°		Depth of cut ap (mm)	Depth of cut ae (mm)	α≦15°		α>15°		Depth of cut ap (mm)	Depth of cut ae (mm)
	Revolution (min-1)	Feed rate (mm/min)	Revolution (min-1)	Feed rate (mm/min)			Revolution (min-1)	Feed rate (mm/min)	Revolution (min-1)	Feed rate (mm/min)		
R3	10000	1500	6900	1000	0.2	1	8000	1400	5300	770	0.2	0.8
R4	8000	1400	5600	900	0.3	1.5	6400	1300	4000	650	0.3	1.2
R5	6000	1200	4100	740	0.4	2	4800	1100	3200	580	0.4	1.6
R6	5000	1000	3400	600	0.45	2.4	4000	900	2700	490	0.45	2



- α is the inclination angle of the machined surface.
- If the depth of cut is shallow, the revolution and feed rate can be increased.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

MP2XLB

MS PLUS END MILLS

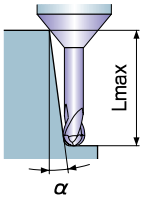
Ball nose, Short cut length, 2 flute, Long neck

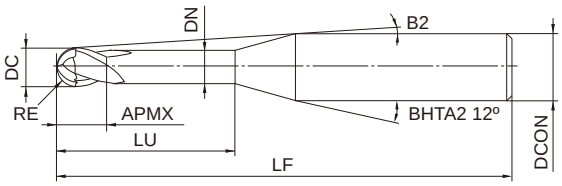
Product Information

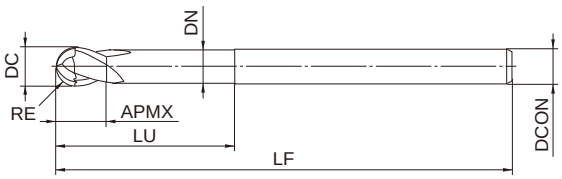
Work Material

P M S H F M

Technical Info >> 1993
ISO13399 Property >> 1966
SYMBOL DESCRIPTIONS >> 664
END MILLS SELECTION CHART >> 668







R	0.05≦RE≦3
	±0.005
h5	4≦DCON≦6
	0 - 0.005

- α: Inclined angle Lmax: Effective length
- Lmax indicates "0: Not available, blank: No interference".

●Inventory maintained in Japan. Unit : mm

Order Number	RE	DC	APMX	LU	DN	B2	LF	DCON	No. of Flutes	Stock	type	Effective length for inclined angle			
												0.5°	1°	2°	3°
MP2XLBR0005N003	0.05	0.1	0.08	0.3	0.085	11.6°	50	4	2	●	1	0.3	0.3	0.4	0.4
MP2XLBR0005N005	0.05	0.1	0.08	0.5	0.085	11.4°	50	4	2	●	1	0.5	0.5	0.6	0.7
MP2XLBR0010N005	0.1	0.2	0.15	0.5	0.18	11.5°	50	4	2	●	1	0.5	0.5	0.6	0.7
MP2XLBR0010N008	0.1	0.2	0.15	0.75	0.18	11.2°	50	4	2	●	1	0.8	0.8	0.9	1
MP2XLBR0010N010	0.1	0.2	0.15	1	0.18	10.9°	50	4	2	●	1	1	1.1	1.2	1.3
MP2XLBR0010N013	0.1	0.2	0.15	1.25	0.18	10.6°	50	4	2	●	1	1.3	1.4	1.5	1.7
MP2XLBR0010N015	0.1	0.2	0.15	1.5	0.18	10.4°	50	4	2	●	1	1.6	1.6	1.8	2
MP2XLBR0010N018	0.1	0.2	0.15	1.75	0.18	10.2°	50	4	2	●	1	1.8	1.9	2.1	2.3
MP2XLBR0010N020	0.1	0.2	0.15	2	0.18	9.9°	50	4	2	●	1	2.1	2.2	2.4	2.6
MP2XLBR0010N025	0.1	0.2	0.15	2.5	0.18	9.5°	50	4	2	●	1	2.6	2.7	3	3.3
MP2XLBR0015N005	0.15	0.3	0.24	0.5	0.28	11.5°	50	4	2	●	1	0.5	0.5	0.6	0.6
MP2XLBR0015N008	0.15	0.3	0.24	0.75	0.28	11.2°	50	4	2	●	1	0.8	0.8	0.9	1
MP2XLBR0015N010	0.15	0.3	0.24	1	0.28	10.9°	50	4	2	●	1	1	1.1	1.2	1.3
MP2XLBR0015N010S06	0.15	0.3	0.24	1	0.28	11.3°	50	6	2	●	1	1	1.1	1.2	1.3
MP2XLBR0015N013	0.15	0.3	0.24	1.25	0.28	10.7°	50	4	2	●	1	1.3	1.4	1.5	1.6
MP2XLBR0015N013S06	0.15	0.3	0.24	1.25	0.28	11.1°	50	6	2	●	1	1.3	1.4	1.5	1.6
MP2XLBR0015N015	0.15	0.3	0.24	1.5	0.28	10.4°	50	4	2	●	1	1.6	1.6	1.8	2
MP2XLBR0015N015S06	0.15	0.3	0.24	1.5	0.28	10.9°	50	6	2	●	1	1.6	1.6	1.8	2
MP2XLBR0015N018	0.15	0.3	0.24	1.75	0.28	10.2°	50	4	2	●	1	1.8	1.9	2.1	2.3
MP2XLBR0015N020	0.15	0.3	0.24	2	0.28	9.9°	50	4	2	●	1	2.1	2.2	2.4	2.6
MP2XLBR0015N025	0.15	0.3	0.24	2.5	0.28	9.5°	50	4	2	●	1	2.6	2.7	3	3.3
MP2XLBR0015N030	0.15	0.3	0.24	3	0.28	9.1°	50	4	2	●	1	3.1	3.3	3.6	4
MP2XLBR0015N035	0.15	0.3	0.24	3.5	0.28	8.7°	50	4	2	●	1	3.7	3.8	4.2	4.6
MP2XLBR0015N040	0.15	0.3	0.24	4	0.28	8.4°	50	4	2	●	1	4.2	4.4	4.8	5.3

MP2XLB

Order Number	RE	DC	APMX	LU	DN	B2	LF	DCON	No. of Flutes	Stock	type	Effective length for inclined angle			
												0.5°	1°	2°	3°
MP2XLBR0020N005	0.2	0.4	0.3	0.5	0.37	11.6°	50	4	2	●	1	0.5	0.5	0.5	0.6
MP2XLBR0020N008	0.2	0.4	0.3	0.75	0.37	11.3°	50	4	2	●	1	0.7	0.8	0.9	0.9
MP2XLBR0020N010	0.2	0.4	0.3	1	0.37	11°	50	4	2	●	1	1	1.1	1.2	1.3
MP2XLBR0020N010S06	0.2	0.4	0.3	1	0.37	11.3°	50	6	2	●	1	1	1.1	1.2	1.3
MP2XLBR0020N015	0.2	0.4	0.3	1.5	0.37	10.4°	50	4	2	●	1	1.5	1.6	1.7	1.9
MP2XLBR0020N020	0.2	0.4	0.3	2	0.37	9.9°	50	4	2	●	1	2.1	2.2	2.3	2.6
MP2XLBR0020N020S06	0.2	0.4	0.3	2	0.37	10.6°	50	6	2	●	1	2.1	2.2	2.3	2.6
MP2XLBR0020N025	0.2	0.4	0.3	2.5	0.37	9.5°	50	4	2	●	1	2.6	2.7	2.9	3.3
MP2XLBR0020N030	0.2	0.4	0.3	3	0.37	9.1°	50	4	2	●	1	3.1	3.2	3.5	3.9
MP2XLBR0020N035	0.2	0.4	0.3	3.5	0.37	8.7°	50	4	2	●	1	3.6	3.8	4.1	4.6
MP2XLBR0020N040	0.2	0.4	0.3	4	0.37	8.4°	50	4	2	●	1	4.2	4.3	4.7	5.2
MP2XLBR0020N045	0.2	0.4	0.3	4.5	0.37	8°	50	4	2	●	1	4.7	4.9	5.3	5.9
MP2XLBR0020N050	0.2	0.4	0.3	5	0.37	7.7°	50	4	2	●	1	5.2	5.4	5.9	6.6
MP2XLBR0020N055	0.2	0.4	0.3	5.5	0.37	7.5°	50	4	2	●	1	5.7	6	6.5	7.2
MP2XLBR0020N060	0.2	0.4	0.3	6	0.37	7.2°	50	4	2	●	1	6.2	6.5	7.1	7.9
MP2XLBR0025N010	0.25	0.5	0.37	1	0.47	11°	50	4	2	●	1	1	1	1.1	1.2
MP2XLBR0025N015	0.25	0.5	0.37	1.5	0.47	10.4°	50	4	2	●	1	1.5	1.6	1.7	1.9
MP2XLBR0025N015S06	0.25	0.5	0.37	1.5	0.47	11°	50	6	2	●	1	1.5	1.6	1.7	1.9
MP2XLBR0025N020	0.25	0.5	0.37	2	0.47	9.9°	50	4	2	●	1	2.1	2.1	2.3	2.6
MP2XLBR0025N020S06	0.25	0.5	0.37	2	0.47	10.6°	50	6	2	●	1	2.1	2.1	2.3	2.6
MP2XLBR0025N025	0.25	0.5	0.37	2.5	0.47	9.5°	50	4	2	●	1	2.6	2.7	2.9	3.2
MP2XLBR0025N025S06	0.25	0.5	0.37	2.5	0.47	10.3°	50	6	2	●	1	2.6	2.7	2.9	3.2
MP2XLBR0025N030	0.25	0.5	0.37	3	0.47	9.1°	50	4	2	●	1	3.1	3.2	3.5	3.9
MP2XLBR0025N030S06	0.25	0.5	0.37	3	0.47	10°	50	6	2	●	1	3.1	3.2	3.5	3.9
MP2XLBR0025N035	0.25	0.5	0.37	3.5	0.47	8.7°	50	4	2	●	1	3.6	3.8	4.1	4.6
MP2XLBR0025N040	0.25	0.5	0.37	4	0.47	8.3°	50	4	2	●	1	4.1	4.3	4.7	5.2
MP2XLBR0025N045	0.25	0.5	0.37	4.5	0.47	8°	50	4	2	●	1	4.7	4.9	5.3	5.9
MP2XLBR0025N050	0.25	0.5	0.37	5	0.47	7.7°	50	4	2	●	1	5.2	5.4	5.9	6.6
MP2XLBR0025N055	0.25	0.5	0.37	5.5	0.47	7.4°	50	4	2	●	1	5.7	6	6.5	7.2
MP2XLBR0025N060	0.25	0.5	0.37	6	0.47	7.2°	50	4	2	●	1	6.2	6.5	7.1	7.9
MP2XLBR0025N070	0.25	0.5	0.37	7	0.47	6.7°	50	4	2	●	1	7.3	7.6	8.3	9.2
MP2XLBR0025N080	0.25	0.5	0.37	8	0.47	6.3°	50	4	2	●	1	8.3	8.7	9.5	10.5
MP2XLBR0025N090	0.25	0.5	0.37	9	0.47	5.9°	50	4	2	●	1	9.4	9.8	10.7	11.9
MP2XLBR0025N100	0.25	0.5	0.37	10	0.47	5.6°	50	4	2	●	1	10.4	10.9	11.9	13.2
MP2XLBR0030N015	0.3	0.6	0.45	1.5	0.57	10.4°	50	4	2	●	1	1.5	1.6	1.8	2
MP2XLBR0030N015S06	0.3	0.6	0.45	1.5	0.57	11°	50	6	2	●	1	1.5	1.6	1.8	2
MP2XLBR0030N020	0.3	0.6	0.45	2	0.57	9.9°	50	4	2	●	1	2.1	2.2	2.4	2.6
MP2XLBR0030N020S06	0.3	0.6	0.45	2	0.57	10.6°	50	6	2	●	1	2.1	2.2	2.4	2.6
MP2XLBR0030N025	0.3	0.6	0.45	2.5	0.57	9.4°	50	4	2	●	1	2.6	2.7	3	3.3
MP2XLBR0030N030	0.3	0.6	0.45	3	0.57	9°	50	4	2	●	1	3.1	3.3	3.6	4
MP2XLBR0030N030S06	0.3	0.6	0.45	3	0.57	9.9°	50	6	2	●	1	3.1	3.3	3.6	4
MP2XLBR0030N035	0.3	0.6	0.45	3.5	0.57	8.6°	50	4	2	●	1	3.7	3.8	4.2	4.6
MP2XLBR0030N040	0.3	0.6	0.45	4	0.57	8.2°	50	4	2	●	1	4.2	4.4	4.8	5.3
MP2XLBR0030N040S06	0.3	0.6	0.45	4	0.57	9.3°	50	6	2	●	1	4.2	4.4	4.8	5.3
MP2XLBR0030N045	0.3	0.6	0.45	4.5	0.57	7.9°	50	4	2	●	1	4.7	4.9	5.4	5.9
MP2XLBR0030N050	0.3	0.6	0.45	5	0.57	7.6°	50	4	2	●	1	5.2	5.5	6	6.6
MP2XLBR0030N050S06	0.3	0.6	0.45	5	0.57	8.8°	50	6	2	●	1	5.2	5.5	6	6.6
MP2XLBR0030N055	0.3	0.6	0.45	5.5	0.57	7.3°	50	4	2	●	1	5.8	6	6.6	7.3
MP2XLBR0030N060	0.3	0.6	0.45	6	0.57	7.1°	50	4	2	●	1	6.3	6.6	7.2	7.9
MP2XLBR0030N060S06	0.3	0.6	0.45	6	0.57	8.3°	50	6	2	●	1	6.3	6.6	7.2	7.9
MP2XLBR0030N065	0.3	0.6	0.45	6.5	0.57	6.8°	50	4	2	●	1	6.8	7.1	7.8	8.6
MP2XLBR0030N070	0.3	0.6	0.45	7	0.57	6.6°	50	4	2	●	1	7.3	7.6	8.4	9.3
MP2XLBR0030N080	0.3	0.6	0.45	8	0.57	6.2°	50	4	2	●	1	8.4	8.7	9.6	10.6
MP2XLBR0030N080S06	0.3	0.6	0.45	8	0.57	7.6°	50	6	2	●	1	8.4	8.7	9.6	10.6

MP2XLB

Order Number	RE	DC	APMX	LU	DN	B2	LF	DCON	No. of Flutes	Stock	type	Effective length for inclined angle			
												0.5°	1°	2°	3°
MP2XLBR0030N085	0.3	0.6	0.45	8.5	0.57	6°	50	4	2	●	1	8.9	9.3	10.2	11.3
MP2XLBR0030N090	0.3	0.6	0.45	9	0.57	5.8°	50	4	2	●	1	9.4	9.8	10.8	11.9
MP2XLBR0030N095	0.3	0.6	0.45	9.5	0.57	5.7°	50	4	2	●	1	9.9	10.4	11.4	12.6
MP2XLBR0030N100	0.3	0.6	0.45	10	0.57	5.5°	50	4	2	●	1	10.5	10.9	12	13.2
MP2XLBR0030N110	0.3	0.6	0.45	11	0.57	5.2°	50	4	2	●	1	11.5	12	13.2	14.6
MP2XLBR0030N120	0.3	0.6	0.45	12	0.57	5°	50	4	2	●	1	12.5	13.1	14.4	15.9
MP2XLBR0040N020	0.4	0.8	0.6	2	0.77	9.9°	50	4	2	●	1	2.1	2.2	2.4	2.6
MP2XLBR0040N020S06	0.4	0.8	0.6	2	0.77	10.6°	50	6	2	●	1	2.1	2.2	2.4	2.6
MP2XLBR0040N024S06	0.4	0.8	0.6	2.4	0.77	10.3°	50	6	2	●	1	2.5	2.6	2.8	3.1
MP2XLBR0040N030	0.4	0.8	0.6	3	0.77	8.9°	50	4	2	●	1	3.1	3.3	3.6	3.9
MP2XLBR0040N030S06	0.4	0.8	0.6	3	0.77	9.9°	50	6	2	●	1	3.1	3.3	3.6	3.9
MP2XLBR0040N040	0.4	0.8	0.6	4	0.77	8.2°	50	4	2	●	1	4.2	4.4	4.8	5.2
MP2XLBR0040N040S06	0.4	0.8	0.6	4	0.77	9.3°	50	6	2	●	1	4.2	4.4	4.8	5.2
MP2XLBR0040N050	0.4	0.8	0.6	5	0.77	7.5°	50	4	2	●	1	5.2	5.5	6	6.6
MP2XLBR0040N060	0.4	0.8	0.6	6	0.77	6.9°	50	4	2	●	1	6.3	6.5	7.2	7.9
MP2XLBR0040N070	0.4	0.8	0.6	7	0.77	6.5°	50	4	2	●	1	7.3	7.6	8.4	9.2
MP2XLBR0040N080	0.4	0.8	0.6	8	0.77	6°	50	4	2	●	1	8.4	8.7	9.5	10.6
MP2XLBR0040N090	0.4	0.8	0.6	9	0.77	5.7°	50	4	2	●	1	9.4	9.8	10.7	11.9
MP2XLBR0040N100	0.4	0.8	0.6	10	0.77	5.4°	50	4	2	●	1	10.5	10.9	11.9	13.2
MP2XLBR0040N120	0.4	0.8	0.6	12	0.77	4.8°	50	4	2	●	1	12.5	13.1	14.3	15.9
MP2XLBR0050N030	0.5	1	0.75	3	0.96	8.7°	50	4	2	●	1	3.2	3.4	3.7	4.1
MP2XLBR0050N030S06	0.5	1	0.75	3	0.96	9.8°	50	6	2	●	1	3.2	3.4	3.7	4.1
MP2XLBR0050N040	0.5	1	0.75	4	0.96	7.9°	50	4	2	●	1	4.3	4.5	4.9	5.4
MP2XLBR0050N040S06	0.5	1	0.75	4	0.96	9.2°	50	6	2	●	1	4.3	4.5	4.9	5.4
MP2XLBR0050N050	0.5	1	0.75	5	0.96	7.3°	50	4	2	●	1	5.3	5.6	6.1	6.7
MP2XLBR0050N050S06	0.5	1	0.75	5	0.96	8.6°	50	6	2	●	1	5.3	5.6	6.1	6.7
MP2XLBR0050N060	0.5	1	0.75	6	0.96	6.7°	50	4	2	●	1	6.4	6.7	7.3	8.1
MP2XLBR0050N060S06	0.5	1	0.75	6	0.96	8.2°	50	6	2	●	1	6.4	6.7	7.3	8.1
MP2XLBR0050N070	0.5	1	0.75	7	0.96	6.2°	50	4	2	●	1	7.4	7.8	8.5	9.4
MP2XLBR0050N080	0.5	1	0.75	8	0.96	5.8°	50	4	2	●	1	8.5	8.9	9.7	10.7
MP2XLBR0050N080S06	0.5	1	0.75	8	0.96	7.3°	50	6	2	●	1	8.5	8.9	9.7	10.7
MP2XLBR0050N090	0.5	1	0.75	9	0.96	5.5°	50	4	2	●	1	9.5	10	10.9	12
MP2XLBR0050N100	0.5	1	0.75	10	0.96	5.1°	50	4	2	●	1	10.6	11.1	12.1	13.4
MP2XLBR0050N100S06	0.5	1	0.75	10	0.96	6.7°	60	6	2	●	1	10.6	11.1	12.1	13.4
MP2XLBR0050N120	0.5	1	0.75	12	0.96	4.6°	50	4	2	●	1	12.7	13.2	14.5	16
MP2XLBR0050N120S06	0.5	1	0.75	12	0.96	6.1°	60	6	2	●	1	12.7	13.2	14.5	16
MP2XLBR0050N140	0.5	1	0.75	14	0.96	4.2°	55	4	2	●	1	14.8	15.4	16.9	18.7
MP2XLBR0050N160	0.5	1	0.75	16	0.96	3.8°	55	4	2	●	1	16.9	17.6	19.3	21.3
MP2XLBR0050N160S06	0.5	1	0.75	16	0.96	5.2°	65	6	2	●	1	16.9	17.6	19.3	21.3
MP2XLBR0050N180	0.5	1	0.75	18	0.96	3.5°	55	4	2	●	1	18.9	19.8	21.7	24
MP2XLBR0050N200	0.5	1	0.75	20	0.96	3.3°	55	4	2	●	1	21	22	24.1	26.6
MP2XLBR0050N200S06	0.5	1	0.75	20	0.96	4.6°	65	6	2	●	1	21	22	24.1	26.6
MP2XLBR0060N060	0.6	1.2	0.9	6	1.16	6.6°	50	4	2	●	1	6.4	6.7	7.3	8
MP2XLBR0060N060S06	0.6	1.2	0.9	6	1.16	8.1°	55	6	2	●	1	6.4	6.7	7.3	8
MP2XLBR0060N080	0.6	1.2	0.9	8	1.16	5.7°	50	4	2	●	1	8.5	8.9	9.7	10.7
MP2XLBR0060N080S06	0.6	1.2	0.9	8	1.16	7.3°	55	6	2	●	1	8.5	8.9	9.7	10.7
MP2XLBR0060N100	0.6	1.2	0.9	10	1.16	5°	50	4	2	●	1	10.6	11	12.1	13.3
MP2XLBR0060N100S06	0.6	1.2	0.9	10	1.16	6.6°	55	6	2	●	1	10.6	11	12.1	13.3
MP2XLBR0060N120	0.6	1.2	0.9	12	1.16	4.4°	50	4	2	●	1	12.7	13.2	14.5	16
MP2XLBR0060N120S06	0.6	1.2	0.9	12	1.16	6°	65	6	2	●	1	12.7	13.2	14.5	16
MP2XLBR0060N140	0.6	1.2	0.9	14	1.16	4°	55	4	2	●	1	14.8	15.4	16.9	18.7
MP2XLBR0060N160	0.6	1.2	0.9	16	1.16	3.7°	55	4	2	●	1	16.9	17.6	19.3	21.3
MP2XLBR0060N160S06	0.6	1.2	0.9	16	1.16	5.1°	65	6	2	●	1	16.9	17.6	19.3	21.3
MP2XLBR0060N180	0.6	1.2	0.9	18	1.16	3.4°	60	4	2	●	1	18.9	19.8	21.7	24

MP2XLB

Order Number	RE	DC	APMX	LU	DN	B2	LF	DCON	No. of Flutes	Stock	type	Effective length for inclined angle			
												0.5°	1°	2°	3°
MP2XLBR0060N200	0.6	1.2	0.9	20	1.16	3.1°	60	4	2	●	1	21	21.9	24	26.6
MP2XLBR0060N240	0.6	1.2	0.9	24	1.16	2.7°	60	4	2	●	1	25.2	26.3	28.8	
MP2XLBR0070N080	0.7	1.4	1.05	8	1.34	5.5°	50	4	2	●	1	8.4	8.8	9.6	10.6
MP2XLBR0070N120	0.7	1.4	1.05	12	1.34	4.3°	50	4	2	●	1	12.6	13.1	14.4	15.9
MP2XLBR0070N160	0.7	1.4	1.05	16	1.34	3.5°	50	4	2	●	1	16.8	17.5	19.2	21.2
MP2XLBR0075N030	0.75	1.5	1.1	3	1.44	8.6°	50	4	2	●	1	3.1	3.3	3.6	3.9
MP2XLBR0075N040	0.75	1.5	1.1	4	1.44	7.7°	50	4	2	●	1	4.2	4.4	4.8	5.2
MP2XLBR0075N060	0.75	1.5	1.1	6	1.44	6.3°	50	4	2	●	1	6.3	6.6	7.2	7.9
MP2XLBR0075N060S06	0.75	1.5	1.1	6	1.44	8°	50	6	2	●	1	6.3	6.6	7.2	7.9
MP2XLBR0075N080	0.75	1.5	1.1	8	1.44	5.4°	50	4	2	●	1	8.4	8.8	9.6	10.6
MP2XLBR0075N080S06	0.75	1.5	1.1	8	1.44	7.2°	60	6	2	●	1	8.4	8.8	9.6	10.6
MP2XLBR0075N100	0.75	1.5	1.1	10	1.44	4.7°	50	4	2	●	1	10.5	11	12	13.2
MP2XLBR0075N100S06	0.75	1.5	1.1	10	1.44	6.5°	60	6	2	●	1	10.5	11	12	13.2
MP2XLBR0075N120	0.75	1.5	1.1	12	1.44	4.2°	50	4	2	●	1	12.6	13.1	14.4	15.9
MP2XLBR0075N120S06	0.75	1.5	1.1	12	1.44	5.9°	60	6	2	●	1	12.6	13.1	14.4	15.9
MP2XLBR0075N140	0.75	1.5	1.1	14	1.44	3.8°	55	4	2	●	1	14.7	15.3	16.8	18.5
MP2XLBR0075N160	0.75	1.5	1.1	16	1.44	3.4°	55	4	2	●	1	16.8	17.5	19.2	21.2
MP2XLBR0075N160S06	0.75	1.5	1.1	16	1.44	5°	60	6	2	●	1	16.8	17.5	19.2	21.2
MP2XLBR0075N180	0.75	1.5	1.1	18	1.44	3.1°	60	4	2	●	1	18.9	19.7	21.6	23.8
MP2XLBR0075N200	0.75	1.5	1.1	20	1.44	2.9°	60	4	2	●	1	21	21.9	23.9	
MP2XLBR0075N220	0.75	1.5	1.1	22	1.44	2.7°	60	4	2	●	1	23	24	26.3	
MP2XLBR0080N080	0.8	1.6	1.2	8	1.54	5.3°	55	4	2	●	1	8.4	8.8	9.6	10.5
MP2XLBR0080N120	0.8	1.6	1.2	12	1.54	4.1°	55	4	2	●	1	12.6	13.1	14.4	15.9
MP2XLBR0080N160	0.8	1.6	1.2	16	1.54	3.3°	55	4	2	●	1	16.8	17.5	19.1	21.2
MP2XLBR0080N200	0.8	1.6	1.2	20	1.54	2.8°	55	4	2	●	1	21	21.9	23.9	
MP2XLBR0090N080	0.9	1.8	1.4	8	1.74	5.1°	55	4	2	●	1	8.4	8.8	9.6	10.5
MP2XLBR0090N120	0.9	1.8	1.4	12	1.74	3.9°	55	4	2	●	1	12.6	13.1	14.3	15.8
MP2XLBR0090N160	0.9	1.8	1.4	16	1.74	3.1°	55	4	2	●	1	16.8	17.5	19.1	21.1
MP2XLBR0090N200	0.9	1.8	1.4	20	1.74	2.6°	55	4	2	●	1	20.9	21.8	23.9	
MP2XLBR0100N040	1	2	1.5	4	1.94	7.2°	50	4	2	●	1	4.2	4.4	4.7	5.2
MP2XLBR0100N040S06	1	2	1.5	4	1.94	9°	50	6	2	●	1	4.2	4.4	4.7	5.2
MP2XLBR0100N060	1	2	1.5	6	1.94	5.8°	50	4	2	●	1	6.3	6.6	7.1	7.8
MP2XLBR0100N060S06	1	2	1.5	6	1.94	7.8°	50	6	2	●	1	6.3	6.6	7.1	7.8
MP2XLBR0100N080	1	2	1.5	8	1.94	4.8°	50	4	2	●	1	8.4	8.8	9.5	10.5
MP2XLBR0100N080S06	1	2	1.5	8	1.94	6.9°	50	6	2	●	1	8.4	8.8	9.5	10.5
MP2XLBR0100N100	1	2	1.5	10	1.94	4.2°	50	4	2	●	1	10.5	10.9	11.9	13.1
MP2XLBR0100N100S06	1	2	1.5	10	1.94	6.2°	50	6	2	●	1	10.5	10.9	11.9	13.1
MP2XLBR0100N120	1	2	1.5	12	1.94	3.6°	50	4	2	●	1	12.6	13.1	14.3	15.8
MP2XLBR0100N120S06	1	2	1.5	12	1.94	5.6°	60	6	2	●	1	12.6	13.1	14.3	15.8
MP2XLBR0100N140	1	2	1.5	14	1.94	3.2°	55	4	2	●	1	14.7	15.3	16.7	18.4
MP2XLBR0100N140S06	1	2	1.5	14	1.94	5.1°	60	6	2	●	1	14.7	15.3	16.7	18.4
MP2XLBR0100N160	1	2	1.5	16	1.94	2.9°	55	4	2	●	1	16.8	17.5	19.1	
MP2XLBR0100N160S06	1	2	1.5	16	1.94	4.7°	65	6	2	●	1	16.8	17.5	19.1	21.1
MP2XLBR0100N180	1	2	1.5	18	1.94	2.7°	55	4	2	●	1	18.9	19.7	21.5	
MP2XLBR0100N180S06	1	2	1.5	18	1.94	4.3°	65	6	2	●	1	18.9	19.7	21.5	23.8
MP2XLBR0100N200	1	2	1.5	20	1.94	2.4°	65	4	2	●	1	20.9	21.8	23.9	
MP2XLBR0100N200S06	1	2	1.5	20	1.94	4°	65	6	2	●	1	20.9	21.8	23.9	26.4
MP2XLBR0100N220	1	2	1.5	22	1.94	2.3°	65	4	2	●	1	23	24	26.3	
MP2XLBR0100N250	1	2	1.5	25	1.94	2°	65	4	2	●	1	26.2	27.3		
MP2XLBR0100N250S06	1	2	1.5	25	1.94	3.5°	90	6	2	●	1	26.2	27.3	29.9	33
MP2XLBR0100N300	1	2	1.5	30	1.94	1.7°	80	4	2	●	1	31.4	32.7		
MP2XLBR0100N300S06	1	2	1.5	30	1.94	3°	90	6	2	●	1	31.4	32.7	35.9	
MP2XLBR0100N350	1	2	1.5	35	1.94	1.5°	80	4	2	●	1	36.6	38.2		
MP2XLBR0100N350S06	1	2	1.5	35	1.94	2.7°	90	6	2	●	1	36.6	38.2	41.8	

MP2XLB

Order Number	RE	DC	APMX	LU	DN	B2	LF	DCON	No. of Flutes	Stock	type	Effective length for inclined angle			
												0.5°	1°	2°	3°
MP2XLBR0100N400	1	2	1.5	40	1.94	1.4°	80	4	2	●	1	41.8	43.6		
MP2XLBR0100N400S06	1	2	1.5	40	1.94	2.4°	90	6	2	●	1	41.8	43.6	47.8	
MP2XLBR0125N100	1.25	2.5	1.9	10	2.4	3.5°	55	4	2	●	1	10.4	10.8	11.8	12.9
MP2XLBR0125N150	1.25	2.5	1.9	15	2.4	2.5°	55	4	2	●	1	15.6	16.3	17.8	
MP2XLBR0125N200	1.25	2.5	1.9	20	2.4	2°	55	4	2	●	1	20.8	21.7		
MP2XLBR0125N250	1.25	2.5	1.9	25	2.4	1.6°	70	4	2	●	1	26.1	27.2		
MP2XLBR0125N300	1.25	2.5	1.9	30	2.4	1.4°	70	4	2	●	1	31.3	32.6		
MP2XLBR0125N350	1.25	2.5	1.9	35	2.4	1.2°	70	4	2	●	1	36.5	38.1		
MP2XLBR0150N060S03	1.5	3	2.3	6	2.9		60	3	2	●	1				
MP2XLBR0150N080	1.5	3	2.3	8	2.9	6.3°	60	6	2	●	1	8.3	8.6	9.3	10.2
MP2XLBR0150N100	1.5	3	2.3	10	2.9	5.5°	60	6	2	●	1	10.4	10.8	11.7	12.9
MP2XLBR0150N120	1.5	3	2.3	12	2.9	4.9°	60	6	2	●	1	12.5	13	14.1	15.5
MP2XLBR0150N140	1.5	3	2.3	14	2.9	4.4°	60	6	2	●	1	14.6	15.2	16.5	18.2
MP2XLBR0150N160	1.5	3	2.3	16	2.9	4°	70	6	2	●	1	16.7	17.3	18.9	20.8
MP2XLBR0150N200	1.5	3	2.3	20	2.9	3.4°	70	6	2	●	1	20.8	21.7	23.7	26.1
MP2XLBR0150N250	1.5	3	2.3	25	2.9	2.8°	70	6	2	●	1	26.1	27.2	29.7	
MP2XLBR0150N300	1.5	3	2.3	30	2.9	2.5°	70	6	2	●	1	31.3	32.6	35.7	
MP2XLBR0150N350	1.5	3	2.3	35	2.9	2.2°	90	6	2	●	1	36.5	38	41.7	
MP2XLBR0150N400	1.5	3	2.3	40	2.9	1.9°	90	6	2	●	1	41.7	43.5		
MP2XLBR0175N150	1.75	3.5	2.6	15	3.4	3.8°	65	6	2	●	1	15.6	16.2	17.7	19.4
MP2XLBR0175N250	1.75	3.5	2.6	25	3.4	2.5°	65	6	2	●	1	26	27.1	29.6	
MP2XLBR0175N350	1.75	3.5	2.6	35	3.4	1.9°	90	6	2	●	1	36.5	38		
MP2XLBR0175N450	1.75	3.5	2.6	45	3.4	1.5°	90	6	2	●	1	46.9	48.9		
MP2XLBR0200N080S04	2	4	3	8	3.9		65	4	2	●	1				
MP2XLBR0200N100	2	4	3	10	3.9	4.5°	65	6	2	●	1	10.4	10.8	11.6	12.7
MP2XLBR0200N120	2	4	3	12	3.9	3.9°	65	6	2	●	1	12.5	12.9	14	15.4
MP2XLBR0200N140	2	4	3	14	3.9	3.4°	65	6	2	●	1	14.6	15.1	16.4	18
MP2XLBR0200N160	2	4	3	16	3.9	3.1°	70	6	2	●	1	16.6	17.3	18.8	20.7
MP2XLBR0200N200	2	4	3	20	3.9	2.6°	70	6	2	●	1	20.8	21.7	23.6	
MP2XLBR0200N250	2	4	3	25	3.9	2.1°	70	6	2	●	1	26	27.1	29.6	
MP2XLBR0200N300	2	4	3	30	3.9	1.8°	80	6	2	●	1	31.2	32.6		
MP2XLBR0200N350	2	4	3	35	3.9	1.6°	80	6	2	●	1	36.5	38		
MP2XLBR0200N400	2	4	3	40	3.9	1.4°	90	6	2	●	1	41.7	43.5		
MP2XLBR0200N450	2	4	3	45	3.9	1.2°	90	6	2	●	1	46.9	48.9		
MP2XLBR0200N500	2	4	3	50	3.9	1.1°	100	6	2	●	1	52.1	54.3		
MP2XLBR0250N150	2.5	5	3.8	15	4.9	2°	70	6	2	●	1	15.6	16.2		
MP2XLBR0250N200	2.5	5	3.8	20	4.9	1.5°	70	6	2	●	1	20.8	21.6		
MP2XLBR0250N250	2.5	5	3.8	25	4.9	1.2°	70	6	2	●	1	26	27.1		
MP2XLBR0250N300	2.5	5	3.8	30	4.9	1°	80	6	2	●	1	31.2			
MP2XLBR0250N350	2.5	5	3.8	35	4.9	0.9°	80	6	2	●	1	36.4			
MP2XLBR0250N400	2.5	5	3.8	40	4.9	0.8°	90	6	2	●	1	41.7			
MP2XLBR0300N200	3	6	6	20	5.85		70	6	2	●	2				
MP2XLBR0300N250	3	6	6	25	5.85		70	6	2	●	2				
MP2XLBR0300N300	3	6	6	30	5.85		80	6	2	●	2				
MP2XLBR0300N400	3	6	6	40	5.85		90	6	2	●	2				
MP2XLBR0300N500	3	6	6	50	5.85		100	6	2	●	2				

MP2XLB

RECOMMENDED CUTTING CONDITIONS

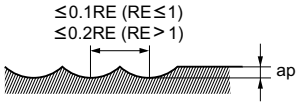
Work material		Carbon steel, Alloy steel, Alloy tool steel Pre-hardened steel, Precipitation hardening stainless steel AISI 1055, AISI P21, HPM, AISI 630			Hardened steel (45— 55HRC)			Copper, Copper alloys		
R RE (mm)	Neck length LU(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap(mm)
R0.05	0.3	50000	200	0.002	50000	200	0.002	50000	200	0.004
	0.5	50000	200	0.001	50000	200	0.002	50000	200	0.002
R0.1	0.5	50000	400	0.003	50000	320	0.003	50000	320	0.006
	1	50000	400	0.002	50000	320	0.002	50000	320	0.004
	1.5	40000	300	0.001	40000	240	0.001	40000	240	0.002
	2	40000	200	0.001	40000	160	0.001	40000	160	0.002
	2.5	40000	100	0.001	40000	80	0.001	40000	80	0.002
R0.15	1	50000	600	0.007	50000	480	0.007	50000	480	0.014
	1.5	50000	600	0.005	50000	480	0.005	50000	480	0.01
	2	50000	600	0.003	50000	480	0.003	50000	480	0.006
	2.5	40000	400	0.003	40000	320	0.003	40000	320	0.006
	3	40000	300	0.002	40000	240	0.002	40000	240	0.004
	3.5	30000	250	0.002	30000	200	0.002	30000	200	0.004
	4	30000	200	0.002	30000	160	0.002	30000	160	0.004
R0.2	1	50000	1800	0.015	50000	1400	0.015	50000	1400	0.03
	2	50000	1300	0.01	50000	1000	0.01	50000	1000	0.02
	3	50000	900	0.005	50000	700	0.005	50000	700	0.01
	4	40000	600	0.004	40000	480	0.004	40000	480	0.008
	5	40000	400	0.003	40000	320	0.003	40000	320	0.006
	6	30000	200	0.002	30000	160	0.002	30000	160	0.004
R0.25	2	50000	2500	0.02	50000	2000	0.02	50000	2000	0.04
	3	50000	1500	0.015	50000	1200	0.015	50000	1200	0.03
	4	45000	1200	0.01	45000	950	0.01	45000	950	0.02
	5	45000	900	0.007	45000	700	0.007	45000	700	0.014
	6	36000	600	0.006	36000	480	0.006	36000	480	0.012
	7	32000	400	0.005	32000	320	0.005	32000	320	0.01
	8	32000	300	0.003	32000	240	0.003	32000	240	0.006
	10	26000	200	0.002	26000	160	0.002	26000	160	0.004
R0.3	2	50000	3500	0.03	50000	2800	0.03	50000	2800	0.06
	3	50000	3500	0.03	50000	2800	0.03	50000	2800	0.06
	4	44000	2500	0.02	44000	2000	0.02	44000	2000	0.04
	5	37000	1200	0.01	37000	950	0.01	37000	950	0.02
	6	37000	1000	0.008	37000	800	0.008	37000	800	0.016
	7	35000	750	0.008	35000	600	0.008	35000	600	0.016
	8	35000	600	0.006	35000	480	0.006	35000	480	0.012
	9	30000	500	0.004	30000	400	0.004	30000	400	0.008
	10	30000	500	0.003	30000	400	0.003	30000	400	0.006
	11	22000	300	0.002	22000	240	0.002	22000	240	0.004
	12	22000	200	0.002	22000	160	0.002	22000	160	0.004
R0.4	2	50000	4400	0.04	50000	3500	0.04	50000	3500	0.08
	3	50000	4000	0.04	50000	3200	0.04	50000	3200	0.08
	4	50000	4000	0.02	50000	3200	0.02	50000	3200	0.04
	5	35000	2400	0.02	35000	1900	0.02	35000	1900	0.04
	6	35000	2400	0.02	35000	1900	0.02	35000	1900	0.04
	7	30000	1500	0.015	30000	1200	0.015	30000	1200	0.03
	8	30000	1500	0.01	30000	1200	0.01	30000	1200	0.02
	10	30000	700	0.008	30000	560	0.008	30000	560	0.016
	12	22000	500	0.006	22000	400	0.006	22000	400	0.012
R0.5	3	40000	4000	0.05	40000	3200	0.05	40000	3200	0.1
	4	40000	4000	0.05	40000	3200	0.05	40000	3200	0.1
	6	35000	3000	0.03	35000	2400	0.03	35000	2400	0.06
	8	30000	2000	0.02	30000	1600	0.02	30000	1600	0.04
	10	20000	1000	0.01	20000	800	0.01	20000	800	0.02
	12	20000	1000	0.01	20000	800	0.01	20000	800	0.02
	14	18000	600	0.008	18000	480	0.008	18000	480	0.016

MP2XLB

Work material		Carbon steel, Alloy steel, Alloy tool steel Pre-hardened steel, Precipitation hardening stainless steel AISI 1055, AISI P21, HPM, AISI 630			Hardened steel (45— 55HRC)			Copper, Copper alloys		
R RE (mm)	Neck length LU(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap(mm)
	16	18000	500	0.008	18000	400	0.008	18000	400	0.016
	18	13000	300	0.005	13000	240	0.005	13000	240	0.01
	20	13000	250	0.005	13000	200	0.005	13000	200	0.01
R0.6	6	40000	4400	0.04	40000	3500	0.04	40000	3500	0.08
	8	40000	4000	0.04	40000	3200	0.04	40000	3200	0.08
	10	27000	1900	0.02	27000	1500	0.02	27000	1500	0.04
	12	16000	1400	0.02	16000	1100	0.02	16000	1100	0.04
	18	15000	700	0.008	15000	560	0.008	15000	560	0.016
	24	11000	300	0.006	11000	240	0.006	11000	240	0.012
R0.7	8	40000	4000	0.05	40000	3200	0.05	40000	2560	0.1
	12	26000	2000	0.04	26000	1600	0.04	26000	1280	0.08
	16	17000	1400	0.03	17000	1120	0.03	17000	896	0.06
R0.75	6	40000	6000	0.07	36000	4300	0.07	36000	4300	0.14
	8	40000	6000	0.07	36000	4300	0.07	36000	4300	0.14
	10	40000	5000	0.06	36000	3600	0.06	36000	3600	0.12
	12	32000	3400	0.04	29000	2400	0.04	29000	2400	0.08
	16	15000	1400	0.03	15000	1100	0.03	15000	1100	0.06
	20	12000	900	0.02	12000	720	0.02	12000	720	0.04
	22	9000	400	0.01	9000	320	0.01	9000	320	0.02
R0.8	8	40000	6000	0.08	32000	3800	0.08	32000	3800	0.16
	12	36000	4500	0.06	29000	2800	0.06	29000	2800	0.12
	16	14000	1400	0.04	14000	1100	0.04	14000	1100	0.08
	20	12000	1000	0.03	12000	800	0.03	12000	800	0.06
R0.9	8	40000	6600	0.09	32000	4200	0.09	32000	4200	0.18
	12	40000	5000	0.07	32000	3200	0.07	32000	3200	0.14
	16	28000	2800	0.04	22000	1800	0.04	22000	1800	0.08
	20	10000	800	0.03	10000	640	0.03	10000	640	0.06
R1	4	40000	8000	0.1	32000	5000	0.1	32000	5000	0.2
	6	40000	8000	0.1	32000	5000	0.1	32000	5000	0.2
	8	40000	6000	0.1	32000	3800	0.1	32000	3800	0.2
	10	40000	5000	0.08	32000	3200	0.08	32000	3200	0.16
	12	40000	5000	0.08	32000	3200	0.08	32000	3200	0.16
	16	32000	3500	0.05	26000	2200	0.05	26000	2200	0.1
	20	10000	1000	0.04	10000	800	0.04	10000	800	0.08
	25	10000	1000	0.04	10000	800	0.04	10000	800	0.08
	30	10000	800	0.02	10000	640	0.02	10000	640	0.04
	35	10000	600	0.02	10000	480	0.02	10000	480	0.04
	40	8000	400	0.01	8000	320	0.01	8000	320	0.02
R1.25	10	36000	6000	0.12	29000	3800	0.12	29000	3800	0.24
	15	32000	4500	0.1	26000	2900	0.1	26000	2900	0.2
	20	26000	3200	0.07	21000	2000	0.07	21000	2000	0.14
	25	12000	1400	0.06	8000	720	0.06	8000	720	0.12
	30	8000	900	0.04	8000	700	0.04	8000	700	0.08
	35	8000	800	0.02	8000	640	0.02	8000	510	0.04
R1.5	6	32000	7000	0.15	26000	4500	0.15	22000	3800	0.3
	10	32000	7000	0.15	26000	4500	0.15	22000	3800	0.3
	16	32000	5000	0.1	26000	3200	0.1	22000	2700	0.2
	20	27000	3800	0.1	22000	2400	0.1	22000	2400	0.2
	25	21000	2700	0.08	17000	1700	0.08	17000	1700	0.16
	30	10000	700	0.08	6000	560	0.08	6000	560	0.16
	35	6000	700	0.06	6000	560	0.06	6000	560	0.12
	40	6000	600	0.04	6000	480	0.04	6000	480	0.08
R1.75	15	27500	4400	0.13	22000	2800	0.13	18000	2300	0.26
	25	23000	3600	0.1	18000	2200	0.1	18000	2200	0.2
	35	10000	1400	0.08	10000	1100	0.08	10000	1100	0.16
	45	7500	900	0.04	7500	720	0.04	7500	720	0.08
R2	10	24000	6000	0.2	19000	3800	0.2	16000	3200	0.4
	20	24000	3800	0.15	19000	2400	0.15	16000	2000	0.3

MP2XLB

Work material		Carbon steel, Alloy steel, Alloy tool steel Pre-hardened steel, Precipitation hardening stainless steel AISI 1055, AISI P21, HPM, AISI 630			Hardened steel (45— 55HRC)			Copper, Copper alloys		
R RE (mm)	Neck length LU(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)
	30	20000	3000	0.1	16000	1900	0.1	16000	1900	0.2
	40	12000	1700	0.1	12000	1400	0.1	12000	1400	0.2
	50	8000	1000	0.05	8000	800	0.05	8000	800	0.1
R2.5	20	22000	6000	0.2	18000	3800	0.2	13000	2800	0.4
	25	22000	4400	0.2	18000	2800	0.2	13000	2000	0.4
	30	22000	3800	0.15	18000	2400	0.15	13000	1700	0.3
	40	22000	3600	0.1	18000	2300	0.1	13000	1600	0.2
R3	20	20000	6000	0.2	16000	3800	0.2	11000	2600	0.4
	30	20000	6000	0.2	16000	3800	0.2	11000	2600	0.4
	40	20000	4500	0.15	16000	2800	0.15	11000	2000	0.3
	50	20000	3000	0.15	16000	1900	0.15	11000	1300	0.3



- When the inclination angle of machined surface is large, or machining with large cutting load such as corner area, reduce the revolution and feed rate.
- The use of oil mist is recommended when machining with small diameter.
- The revolution and feed rate can increase for the small depth of cut (ap).
- Cutting condition may be considerably different due to the overhang (milling depth), depth of cut, and machine tools. Please see the above table as a standard.
- For hardened steel over 55HRC, use VF2XLB.
- Standard cutting conditions of austenitic stainless steel and titanium alloy, please reduce to 60% revolution and 45% feedrate. (Hardened steel (45 — 55HRC) table above)

MS2SB

MSTAR END MILLS

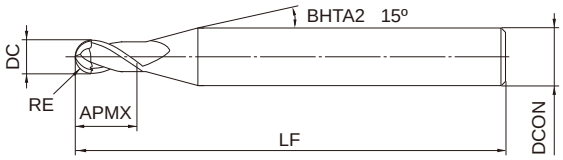
Ball nose, Short cut length, 2 flute

Product Information

Work Material

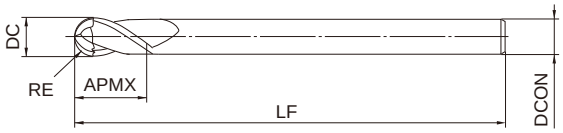
P M S H F M

Technical Info >> 1993
ISO13399 Property >> 1966
SYMBOL DESCRIPTIONS >> 664
END MILLS SELECTION CHART >> 668



Type1

R	0.1≦RE≦3	4≦RE≦6	
	±0.005	±0.007	
	0.2≦DC≦12		
	0 - 0.020		
h5	4≦DCON≦6	8≦DCON≦10	DCON=12
	0 - 0.005	0 - 0.006	0 - 0.008



Type2

●Inventory maintained in Japan. Unit : mm

Order Number	RE	DC	APMX	LF	DCON	No. of Flutes	Stock	type
MS2SBR0010S04	0.1	0.2	0.3	45	4	2	●	1
MS2SBR0010S06	0.1	0.2	0.3	50	6	2	●	1
MS2SBR0015S04	0.15	0.3	0.5	45	4	2	●	1
MS2SBR0015S06	0.15	0.3	0.5	50	6	2	●	1
MS2SBR0020S04	0.2	0.4	0.6	45	4	2	●	1
MS2SBR0020S06	0.2	0.4	0.6	50	6	2	●	1
MS2SBR0025S04	0.25	0.5	0.8	45	4	2	●	1
MS2SBR0025S06	0.25	0.5	0.8	50	6	2	●	1
MS2SBR0030S04	0.3	0.6	0.9	45	4	2	●	1
MS2SBR0030S06	0.3	0.6	0.9	50	6	2	●	1
MS2SBR0035S04	0.35	0.7	1.1	45	4	2	●	1
MS2SBR0040S04	0.4	0.8	1.2	45	4	2	●	1
MS2SBR0040S06	0.4	0.8	1.2	50	6	2	●	1
MS2SBR0045S04	0.45	0.9	1.4	45	4	2	●	1
MS2SBR0050S04	0.5	1	1.5	45	4	2	●	1
MS2SBR0050S06	0.5	1	1.5	50	6	2	●	1
MS2SBR0060S04	0.6	1.2	1.8	45	4	2	●	1
MS2SBR0060S06	0.6	1.2	1.8	50	6	2	●	1
MS2SBR0070S04	0.7	1.4	2.1	45	4	2	●	1
MS2SBR0070S06	0.7	1.4	2.1	50	6	2	●	1
MS2SBR0075S04	0.75	1.5	2.3	45	4	2	●	1
MS2SBR0075S06	0.75	1.5	2.3	50	6	2	●	1
MS2SBR0080S04	0.8	1.6	2.4	45	4	2	●	1
MS2SBR0080S06	0.8	1.6	2.4	50	6	2	●	1
MS2SBR0090S04	0.9	1.8	2.7	45	4	2	●	1
MS2SBR0090S06	0.9	1.8	2.7	50	6	2	●	1
MS2SBR0100S04	1	2	3	50	4	2	●	1
MS2SBR0100S06	1	2	3	50	6	2	●	1

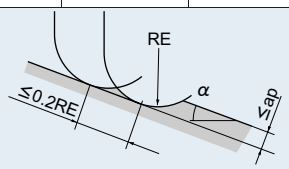
MS2SB

Order Number	RE	DC	APMX	LF	DCON	No. of Flutes	Stock	type
MS2SBR0125S04	1.25	2.5	3.8	50	4	2	●	1
MS2SBR0125S06	1.25	2.5	3.8	50	6	2	●	1
MS2SBR0150S06	1.5	3	4.5	70	6	2	●	1
MS2SBR0200S06	2	4	6	70	6	2	●	1
MS2SBR0250S06	2.5	5	7.5	80	6	2	●	1
MS2SBR0300S06	3	6	9	80	6	2	●	2
MS2SBR0400S08	4	8	12	90	8	2	●	2
MS2SBR0500S10	5	10	15	100	10	2	●	2
MS2SBR0600S12	6	12	18	110	12	2	●	2

MS2SB

RECOMMENDED CUTTING CONDITIONS

Work material	Carbon steel, Cast iron, Alloy steel, Pre-hardened steel AISI 1050, AISI No 35 B, AISI P20, AISI P21					Hardened steel (45— 55HRC) AISI H13				
R RE (mm)	α≦15°		α>15°		Depth of cut ap (mm)	α≦15°		α>15°		Depth of cut ap (mm)
	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)		Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	
R0.1	40000	300	40000	250	0.003	40000	300	40000	250	0.003
R0.15	40000	500	40000	350	0.007	40000	500	40000	350	0.007
R0.2	40000	1600	40000	1200	0.02	40000	1300	40000	950	0.015
R0.25	40000	2400	40000	1400	0.025	40000	1900	40000	1100	0.020
R0.3	40000	3200	40000	1600	0.03	40000	2500	40000	1300	0.025
R0.4	40000	4800	40000	2400	0.05	40000	4000	40000	1900	0.04
R0.5	40000	5600	40000	3200	0.06	40000	5600	40000	3000	0.05
R0.75	40000	6500	40000	4000	0.09	40000	6500	32000	3200	0.08
R1	40000	6500	39000	4700	0.11	40000	6500	31000	3500	0.11
R1.25	40000	7000	33000	4500	0.12	36000	6500	26000	3500	0.12
R1.5	40000	7500	27000	4300	0.13	32000	6000	22000	3400	0.13
R2	32000	7500	20000	3600	0.15	25000	6000	16000	2700	0.15
R2.5	25000	6000	16000	2900	0.20	20000	5400	13000	2300	0.20
R3	21000	5800	13000	2600	0.25	17000	4700	10000	2000	0.25
R4	16000	4500	10000	2000	0.30	13000	3600	8000	1500	0.30
R5	13000	3600	8000	1700	0.50	10000	2900	6400	1200	0.50
R6	9000	2500	6000	1300	0.50	7200	2000	4800	1000	0.50



- α is the inclination angle of the machined surface.
- If the depth of cut is shallow, the revolution and feed rate can be increased.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

MS2MB

MSTAR END MILLS

Ball nose, Medium cut length, 2 flute

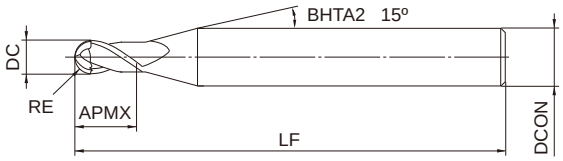
Product Information

UWC 30° MS

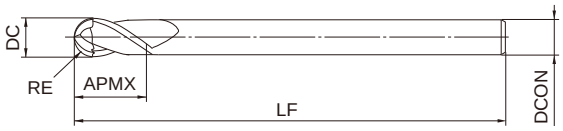
Work Material

P M S H F M

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668



Type1



Type2

R	0.25≦RE≦3	4≦RE≦6	
	±0.005	±0.007	
	0.5≦DC≦12		
	0 - 0.020		
h5	4≦DCON≦6	8≦DCON≦10	DCON=12
	0 - 0.005	0 - 0.006	0 - 0.008

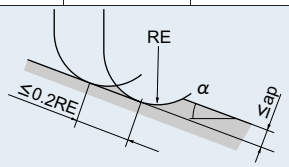
●Inventory maintained in Japan. Unit : mm

Order Number	RE	DC	APMX	LF	DCON	No. of Flutes	Stock	type
MS2MBR0025	0.25	0.5	1	45	4	2	●	1
MS2MBR0030	0.3	0.6	1.2	45	4	2	●	1
MS2MBR0040	0.4	0.8	1.6	45	4	2	●	1
MS2MBR0050	0.5	1	2.5	45	4	2	●	1
MS2MBR0060	0.6	1.2	2.5	45	4	2	●	1
MS2MBR0070	0.7	1.4	3	45	4	2	●	1
MS2MBR0075	0.75	1.5	4	45	4	2	●	1
MS2MBR0080	0.8	1.6	4	45	4	2	●	1
MS2MBR0090	0.9	1.8	5	45	4	2	●	1
MS2MBR0100	1	2	6	50	4	2	●	1
MS2MBR0125	1.25	2.5	6	50	4	2	●	1
MS2MBR0150	1.5	3	8	70	6	2	●	1
MS2MBR0150S03	1.5	3	8	70	3	2	●	2
MS2MBR0175	1.75	3.5	8	70	6	2	●	1
MS2MBR0200	2	4	8	70	6	2	●	1
MS2MBR0200S04	2	4	8	70	4	2	●	2
MS2MBR0250	2.5	5	12	80	6	2	●	1
MS2MBR0300	3	6	12	80	6	2	●	2
MS2MBR0400	4	8	14	90	8	2	●	2
MS2MBR0500	5	10	18	100	10	2	●	2
MS2MBR0600	6	12	22	110	12	2	●	2

MS2MB

RECOMMENDED CUTTING CONDITIONS

Work material	Carbon steel, Cast iron, Alloy steel, Pre-hardened steel AISI 1050, AISI No 35 B, AISI P20, AISI P21					Hardened steel (45— 55HRC) AISI H13				
R RE (mm)	α≦15°		α>15°		Depth of cut ap (mm)	α≦15°		α>15°		Depth of cut ap (mm)
	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)		Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	
R0.1	40000	300	40000	250	0.003	40000	300	40000	250	0.003
R0.15	40000	500	40000	350	0.007	40000	500	40000	350	0.007
R0.2	40000	1600	40000	1200	0.02	40000	1300	40000	950	0.015
R0.25	40000	2400	40000	1400	0.025	40000	1900	40000	1100	0.020
R0.3	40000	3200	40000	1600	0.03	40000	2500	40000	1300	0.025
R0.4	40000	4800	40000	2400	0.05	40000	4000	40000	1900	0.04
R0.5	40000	5600	40000	3200	0.06	40000	5600	40000	3000	0.05
R0.75	40000	6500	40000	4000	0.09	40000	6500	32000	3200	0.08
R1	40000	6500	39000	4700	0.11	40000	6500	31000	3500	0.11
R1.25	40000	7000	33000	4500	0.12	36000	6500	26000	3500	0.12
R1.5	40000	7500	27000	4300	0.13	32000	6000	22000	3400	0.13
R2	32000	7500	20000	3600	0.15	25000	6000	16000	2700	0.15
R2.5	25000	6000	16000	2900	0.20	20000	5400	13000	2300	0.20
R3	21000	5800	13000	2600	0.25	17000	4700	10000	2000	0.25
R4	16000	4500	10000	2000	0.30	13000	3600	8000	1500	0.30
R5	13000	3600	8000	1700	0.50	10000	2900	6400	1200	0.50
R6	9000	2500	6000	1300	0.50	7200	2000	4800	1000	0.50



- α is the inclination angle of the machined surface.
- If the depth of cut is shallow, the revolution and feed rate can be increased.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

MS2XLB

MSTAR END MILLS

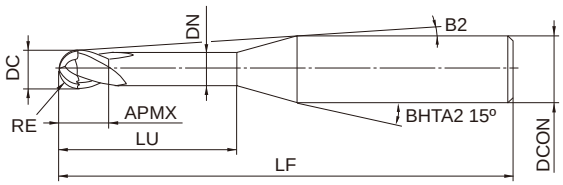
Ball nose, Short cut length, 2 flute, Long neck

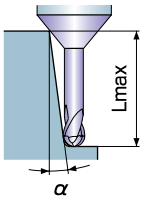
Product Information

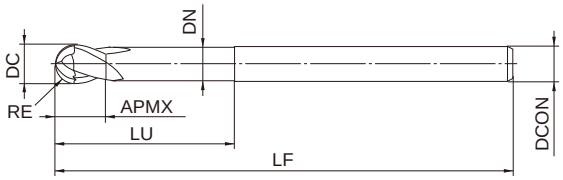
Work Material

P M S H F M

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668







R	0.1≦RE≦3
	±0.005
	0.2≦DC≦6
	0 - 0.020
h5	4≦DCON≦6
	0 - 0.005

- α: Inclined angle Lmax: Effective length
- Lmax indicates "0: Not available, blank: No interference".

●Inventory maintained in Japan. Unit : mm

Order Number	RE	DC	APMX	LU	DN	B2	LF	DCON	No. of Flutes	Stock	type	Effective length for inclined angle			
												0.5°	1°	2°	3°
MS2XLBR0010N005	0.1	0.2	0.2	0.5	0.17	14.1°	50	4	2	●	1	0.5	0.5	0.6	0.6
MS2XLBR0010N005S06	0.1	0.2	0.2	0.5	0.17	14.4°	50	6	2	●	1	0.5	0.5	0.6	0.6
MS2XLBR0010N008S06	0.1	0.2	0.2	0.8	0.17	14.1°	50	6	2	●	1	0.8	0.8	0.9	1.0
MS2XLBR0010N010	0.1	0.2	0.2	1	0.17	13.3°	50	4	2	●	1	1.0	1.1	1.2	1.3
MS2XLBR0010N010S06	0.1	0.2	0.2	1	0.17	13.8°	50	6	2	●	1	1.0	1.1	1.2	1.3
MS2XLBR0010N013	0.1	0.2	0.2	1.25	0.17	12.9°	50	4	2	●	1	1.3	1.3	1.5	1.6
MS2XLBR0010N013S06	0.1	0.2	0.2	1.25	0.17	13.6°	50	6	2	●	1	1.3	1.3	1.5	1.6
MS2XLBR0010N015	0.1	0.2	0.2	1.5	0.17	12.5°	50	4	2	●	1	1.5	1.6	1.7	1.9
MS2XLBR0010N015S06	0.1	0.2	0.2	1.5	0.17	13.3°	50	6	2	●	1	1.5	1.6	1.7	1.9
MS2XLBR0010N018	0.1	0.2	0.2	1.75	0.17	12.2°	50	4	2	●	1	1.8	1.9	2.0	2.2
MS2XLBR0010N018S06	0.1	0.2	0.2	1.75	0.17	13.1°	50	6	2	●	1	1.8	1.9	2.0	2.2
MS2XLBR0010N020	0.1	0.2	0.2	2	0.17	11.9°	50	4	2	●	1	2.1	2.2	2.3	2.5
MS2XLBR0010N020S06	0.1	0.2	0.2	2	0.17	12.8°	50	6	2	●	1	2.1	2.2	2.3	2.5
MS2XLBR0010N025	0.1	0.2	0.2	2.5	0.17	11.3°	50	4	2	●	1	2.6	2.7	2.9	3.1
MS2XLBR0010N030	0.1	0.2	0.2	3	0.17	10.7°	50	4	2	●	1	3.1	3.2	3.5	3.7
MS2XLBR0015N008S06	0.15	0.3	0.3	0.8	0.27	14.1°	50	6	2	●	1	0.8	0.8	0.9	1.0
MS2XLBR0015N010	0.15	0.3	0.3	1	0.27	13.3°	50	4	2	●	1	1.0	1.1	1.2	1.3
MS2XLBR0015N010S06	0.15	0.3	0.3	1	0.27	13.9°	50	6	2	●	1	1.0	1.1	1.2	1.3
MS2XLBR0015N012S06	0.15	0.3	0.3	1.2	0.27	13.7°	50	6	2	●	1	1.2	1.3	1.4	1.5
MS2XLBR0015N015	0.15	0.3	0.3	1.5	0.27	12.5°	50	4	2	●	1	1.5	1.6	1.7	1.9
MS2XLBR0015N015S06	0.15	0.3	0.3	1.5	0.27	13.3°	50	6	2	●	1	1.5	1.6	1.7	1.9

MS2XLB

Order Number	RE	DC	APMX	LU	DN	B2	LF	DCON	No. of Flutes	Stock	type	Effective length for inclined angle			
												0.5°	1°	2°	3°
MS2XLBR0015N020	0.15	0.3	0.3	2	0.27	11.9°	50	4	2	●	1	2.1	2.2	2.3	2.5
MS2XLBR0015N020S06	0.15	0.3	0.3	2	0.27	12.8°	50	6	2	●	1	2.1	2.2	2.3	2.5
MS2XLBR0015N025	0.15	0.3	0.3	2.5	0.27	11.2°	50	4	2	●	1	2.6	2.7	2.9	3.1
MS2XLBR0015N030	0.15	0.3	0.3	3	0.27	10.7°	50	4	2	●	1	3.1	3.2	3.5	3.7
MS2XLBR0015N040	0.15	0.3	0.3	4	0.27	9.7°	50	4	2	●	1	4.2	4.3	4.6	5.0
MS2XLBR0020N010	0.2	0.4	0.4	1	0.36	13.4°	50	4	2	●	1	1.0	1.0	1.1	1.2
MS2XLBR0020N010S06	0.2	0.4	0.4	1	0.36	13.9°	50	6	2	●	1	1.0	1.0	1.1	1.2
MS2XLBR0020N012S06	0.2	0.4	0.4	1.2	0.36	13.7°	50	6	2	●	1	1.2	1.3	1.4	1.5
MS2XLBR0020N015	0.2	0.4	0.4	1.5	0.36	12.6°	50	4	2	●	1	1.5	1.6	1.7	1.8
MS2XLBR0020N015S06	0.2	0.4	0.4	1.5	0.36	13.4°	50	6	2	●	1	1.5	1.6	1.7	1.8
MS2XLBR0020N020	0.2	0.4	0.4	2	0.36	11.9°	50	4	2	●	1	2.0	2.1	2.3	2.5
MS2XLBR0020N020S06	0.2	0.4	0.4	2	0.36	12.8°	50	6	2	●	1	2.0	2.1	2.3	2.5
MS2XLBR0020N025	0.2	0.4	0.4	2.5	0.36	11.2°	50	4	2	●	1	2.6	2.7	2.9	3.1
MS2XLBR0020N025S06	0.2	0.4	0.4	2.5	0.36	12.4°	50	6	2	●	1	2.6	2.7	2.9	3.1
MS2XLBR0020N030	0.2	0.4	0.4	3	0.36	10.7°	50	4	2	●	1	3.1	3.2	3.4	3.7
MS2XLBR0020N030S06	0.2	0.4	0.4	3	0.36	11.9°	50	6	2	●	1	3.1	3.2	3.4	3.7
MS2XLBR0020N035	0.2	0.4	0.4	3.5	0.36	10.2°	50	4	2	●	1	3.6	3.7	4.0	4.3
MS2XLBR0020N040	0.2	0.4	0.4	4	0.36	9.7°	50	4	2	●	1	4.1	4.3	4.6	4.9
MS2XLBR0020N045	0.2	0.4	0.4	4.5	0.36	9.3°	50	4	2	●	1	4.7	4.8	5.2	5.6
MS2XLBR0020N050	0.2	0.4	0.4	5	0.36	8.9°	50	4	2	●	1	5.2	5.3	5.7	6.2
MS2XLBR0020N055	0.2	0.4	0.4	5.5	0.36	8.5°	50	4	2	●	1	5.7	5.9	6.3	6.8
MS2XLBR0020N060	0.2	0.4	0.4	6	0.36	8.2°	50	4	2	●	1	6.2	6.4	6.9	7.4
MS2XLBR0025N015	0.25	0.5	0.5	1.5	0.46	12.6°	50	4	2	●	1	1.5	1.6	1.7	1.8
MS2XLBR0025N015S06	0.25	0.5	0.5	1.5	0.46	13.4°	50	6	2	●	1	1.5	1.6	1.7	1.8
MS2XLBR0025N020	0.25	0.5	0.5	2	0.46	11.9°	50	4	2	●	1	2.0	2.1	2.3	2.4
MS2XLBR0025N020S06	0.25	0.5	0.5	2	0.46	12.9°	50	6	2	●	1	2.0	2.1	2.3	2.4
MS2XLBR0025N025	0.25	0.5	0.5	2.5	0.46	11.2°	50	4	2	●	1	2.6	2.7	2.9	3.1
MS2XLBR0025N025S06	0.25	0.5	0.5	2.5	0.46	12.4°	50	6	2	●	1	2.6	2.7	2.9	3.1
MS2XLBR0025N030	0.25	0.5	0.5	3	0.46	10.6°	50	4	2	●	1	3.1	3.2	3.4	3.7
MS2XLBR0025N030S06	0.25	0.5	0.5	3	0.46	11.9°	50	6	2	●	1	3.1	3.2	3.4	3.7
MS2XLBR0025N035	0.25	0.5	0.5	3.5	0.46	10.1°	50	4	2	●	1	3.6	3.7	4.0	4.3
MS2XLBR0025N035S06	0.25	0.5	0.5	3.5	0.46	11.5°	50	6	2	●	1	3.6	3.7	4.0	4.3
MS2XLBR0025N040	0.25	0.5	0.5	4	0.46	9.6°	50	4	2	●	1	4.1	4.3	4.6	4.9
MS2XLBR0025N040S06	0.25	0.5	0.5	4	0.46	11.1°	50	6	2	●	1	4.1	4.3	4.6	4.9
MS2XLBR0025N045	0.25	0.5	0.5	4.5	0.46	9.2°	50	4	2	●	1	4.6	4.8	5.2	5.6
MS2XLBR0025N045S06	0.25	0.5	0.5	4.5	0.46	10.7°	50	6	2	●	1	4.6	4.8	5.2	5.6
MS2XLBR0025N050	0.25	0.5	0.5	5	0.46	8.8°	50	4	2	●	1	5.2	5.3	5.7	6.2
MS2XLBR0025N050S06	0.25	0.5	0.5	5	0.46	10.4°	50	6	2	●	1	5.2	5.3	5.7	6.2
MS2XLBR0025N055	0.25	0.5	0.5	5.5	0.46	8.4°	50	4	2	●	1	5.7	5.9	6.3	6.8
MS2XLBR0025N055S06	0.25	0.5	0.5	5.5	0.46	10.1°	50	6	2	●	1	5.7	5.9	6.3	6.8
MS2XLBR0025N060	0.25	0.5	0.5	6	0.46	8.1°	50	4	2	●	1	6.2	6.4	6.9	7.4
MS2XLBR0025N060S06	0.25	0.5	0.5	6	0.46	9.7°	50	6	2	●	1	6.2	6.4	6.9	7.4
MS2XLBR0025N070	0.25	0.5	0.5	7	0.46	7.5°	50	4	2	●	1	7.2	7.5	8.0	8.7
MS2XLBR0025N070S06	0.25	0.5	0.5	7	0.46	9.2°	50	6	2	●	1	7.2	7.5	8.0	8.7
MS2XLBR0025N080	0.25	0.5	0.5	8	0.46	7°	50	4	2	●	1	8.3	8.5	9.2	9.9
MS2XLBR0025N080S06	0.25	0.5	0.5	8	0.46	8.7°	50	6	2	●	1	8.3	8.5	9.2	9.9
MS2XLBR0025N100	0.25	0.5	0.5	10	0.46	6.2°	50	4	2	●	1	10.3	10.7	11.5	12.4
MS2XLBR0025N100S06	0.25	0.5	0.5	10	0.46	7.8°	50	6	2	●	1	10.3	10.7	11.5	12.4
MS2XLBR0030N018S06	0.3	0.6	0.6	1.8	0.56	13°	50	6	2	●	1	1.9	1.9	2.1	2.3
MS2XLBR0030N020	0.3	0.6	0.6	2	0.56	11.8°	50	4	2	●	1	2.1	2.2	2.3	2.5
MS2XLBR0030N020S06	0.3	0.6	0.6	2	0.56	12.8°	50	6	2	●	1	2.1	2.2	2.3	2.5
MS2XLBR0030N025	0.3	0.6	0.6	2.5	0.56	11.1°	50	4	2	●	1	2.6	2.7	2.9	3.1
MS2XLBR0030N025S06	0.3	0.6	0.6	2.5	0.56	12.3°	50	6	2	●	1	2.6	2.7	2.9	3.1
MS2XLBR0030N030	0.3	0.6	0.6	3	0.56	10.5°	50	4	2	●	1	3.1	3.3	3.5	3.8

MS2XLB

Order Number	RE	DC	APMX	LU	DN	B2	LF	DCON	No. of Flutes	Stock	type	Effective length for inclined angle			
												0.5°	1°	2°	3°
MS2XLBR0030N030S06	0.3	0.6	0.6	3	0.56	11.8°	50	6	2	●	1	3.1	3.3	3.5	3.8
MS2XLBR0030N035	0.3	0.6	0.6	3.5	0.56	10°	50	4	2	●	1	3.6	3.8	4.1	4.4
MS2XLBR0030N035S06	0.3	0.6	0.6	3.5	0.56	11.4°	50	6	2	●	1	3.6	3.8	4.1	4.4
MS2XLBR0030N040	0.3	0.6	0.6	4	0.56	9.5°	50	4	2	●	1	4.2	4.3	4.6	5.0
MS2XLBR0030N040S06	0.3	0.6	0.6	4	0.56	11°	50	6	2	●	1	4.2	4.3	4.6	5.0
MS2XLBR0030N045	0.3	0.6	0.6	4.5	0.56	9.1°	50	4	2	●	1	4.7	4.9	5.2	5.6
MS2XLBR0030N045S06	0.3	0.6	0.6	4.5	0.56	10.6°	50	6	2	●	1	4.7	4.9	5.2	5.6
MS2XLBR0030N050	0.3	0.6	0.6	5	0.56	8.7°	50	4	2	●	1	5.2	5.4	5.8	6.2
MS2XLBR0030N050S06	0.3	0.6	0.6	5	0.56	10.3°	50	6	2	●	1	5.2	5.4	5.8	6.2
MS2XLBR0030N060	0.3	0.6	0.6	6	0.56	8°	50	4	2	●	1	6.3	6.5	6.9	7.5
MS2XLBR0030N060S06	0.3	0.6	0.6	6	0.56	9.7°	50	6	2	●	1	6.3	6.5	6.9	7.5
MS2XLBR0030N070	0.3	0.6	0.6	7	0.56	7.4°	50	4	2	●	1	7.3	7.5	8.1	8.7
MS2XLBR0030N080	0.3	0.6	0.6	8	0.56	6.9°	50	4	2	●	1	8.3	8.6	9.2	10.0
MS2XLBR0030N080S06	0.3	0.6	0.6	8	0.56	8.6°	50	6	2	●	1	8.3	8.6	9.2	10.0
MS2XLBR0030N090	0.3	0.6	0.6	9	0.56	6.4°	50	4	2	●	1	9.4	9.7	10.4	11.2
MS2XLBR0030N100	0.3	0.6	0.6	10	0.56	6°	50	4	2	●	1	10.4	10.8	11.5	12.5
MS2XLBR0030N100S06	0.3	0.6	0.6	10	0.56	7.8°	50	6	2	●	1	10.4	10.8	11.5	12.5
MS2XLBR0030N110	0.3	0.6	0.6	11	0.56	5.7°	50	4	2	●	1	11.4	11.8	12.7	13.7
MS2XLBR0030N120	0.3	0.6	0.6	12	0.56	5.4°	50	4	2	●	1	12.5	12.9	13.8	15.0
MS2XLBR0040N020	0.4	0.8	0.8	2	0.76	11.7°	50	4	2	●	1	2.1	2.2	2.3	2.5
MS2XLBR0040N020S06	0.4	0.8	0.8	2	0.76	12.8°	50	6	2	●	1	2.1	2.2	2.3	2.5
MS2XLBR0040N024S06	0.4	0.8	0.8	2.4	0.76	12.4°	50	6	2	●	1	2.5	2.6	2.8	3.0
MS2XLBR0040N030	0.4	0.8	0.8	3	0.76	10.4°	50	4	2	●	1	3.1	3.3	3.5	3.7
MS2XLBR0040N030S06	0.4	0.8	0.8	3	0.76	11.8°	50	6	2	●	1	3.1	3.3	3.5	3.7
MS2XLBR0040N040	0.4	0.8	0.8	4	0.76	9.4°	50	4	2	●	1	4.2	4.3	4.6	5.0
MS2XLBR0040N040S06	0.4	0.8	0.8	4	0.76	11°	50	6	2	●	1	4.2	4.3	4.6	5.0
MS2XLBR0040N050	0.4	0.8	0.8	5	0.76	8.5°	50	4	2	●	1	5.2	5.4	5.8	6.2
MS2XLBR0040N060	0.4	0.8	0.8	6	0.76	7.8°	50	4	2	●	1	6.3	6.5	6.9	7.5
MS2XLBR0040N060S06	0.4	0.8	0.8	6	0.76	9.6°	50	6	2	●	1	6.3	6.5	6.9	7.5
MS2XLBR0040N070	0.4	0.8	0.8	7	0.76	7.2°	50	4	2	●	1	7.3	7.5	8.1	8.7
MS2XLBR0040N080	0.4	0.8	0.8	8	0.76	6.7°	50	4	2	●	1	8.3	8.6	9.2	10.0
MS2XLBR0040N080S06	0.4	0.8	0.8	8	0.76	8.5°	50	6	2	●	1	8.3	8.6	9.2	10.0
MS2XLBR0040N100	0.4	0.8	0.8	10	0.76	5.9°	50	4	2	●	1	10.4	10.8	11.5	12.4
MS2XLBR0040N100S06	0.4	0.8	0.8	10	0.76	7.7°	50	6	2	●	1	10.4	10.8	11.5	12.4
MS2XLBR0040N120	0.4	0.8	0.8	12	0.76	5.2°	50	4	2	●	1	12.5	12.9	13.8	14.9
MS2XLBR0050N030	0.5	1	1	3	0.94	10.1°	50	4	2	●	1	3.2	3.3	3.6	3.9
MS2XLBR0050N030S06	0.5	1	1	3	0.94	11.6°	50	6	2	●	1	3.2	3.3	3.6	3.9
MS2XLBR0050N040	0.5	1	1	4	0.94	9.1°	50	4	2	●	1	4.2	4.4	4.8	5.2
MS2XLBR0050N040S06	0.5	1	1	4	0.94	10.8°	50	6	2	●	1	4.2	4.4	4.8	5.2
MS2XLBR0050N050	0.5	1	1	5	0.94	8.2°	50	4	2	●	1	5.3	5.5	6.0	6.4
MS2XLBR0050N050S06	0.5	1	1	5	0.94	10.1°	50	6	2	●	1	5.3	5.5	6.0	6.4
MS2XLBR0050N060	0.5	1	1	6	0.94	7.5°	50	4	2	●	1	6.3	6.6	7.1	7.7
MS2XLBR0050N060S06	0.5	1	1	6	0.94	9.4°	50	6	2	●	1	6.3	6.6	7.1	7.7
MS2XLBR0050N070	0.5	1	1	7	0.94	6.9°	50	4	2	●	1	7.4	7.7	8.3	8.9
MS2XLBR0050N080	0.5	1	1	8	0.94	6.4°	50	4	2	●	1	8.4	8.8	9.4	10.2
MS2XLBR0050N080S06	0.5	1	1	8	0.94	8.3°	50	6	2	●	1	8.4	8.8	9.4	10.2
MS2XLBR0050N090	0.5	1	1	9	0.94	6°	50	4	2	●	1	9.5	9.9	10.6	11.4
MS2XLBR0050N100	0.5	1	1	10	0.94	5.6°	50	4	2	●	1	10.5	10.9	11.7	12.6
MS2XLBR0050N100S06	0.5	1	1	10	0.94	7.5°	50	6	2	●	1	10.5	10.9	11.7	12.6
MS2XLBR0050N120	0.5	1	1	12	0.94	5°	50	4	2	●	1	12.6	13.1	14.0	15.1
MS2XLBR0050N120S06	0.5	1	1	12	0.94	6.8°	55	6	2	●	1	12.6	13.1	14.0	15.1
MS2XLBR0050N140	0.5	1	1	14	0.94	4.5°	50	4	2	●	1	14.7	15.2	16.3	17.6
MS2XLBR0050N160	0.5	1	1	16	0.94	4.1°	55	4	2	●	1	16.8	17.4	18.6	20.1
MS2XLBR0050N160S06	0.5	1	1	16	0.94	5.7°	60	6	2	●	1	16.8	17.4	18.6	20.1

MS2XLB

Order Number	RE	DC	APMX	LU	DN	B2	LF	DCON	No. of Flutes	Stock	type	Effective length for inclined angle			
												0.5°	1°	2°	3°
MS2XLBR0050N180	0.5	1	1	18	0.94	3.7°	55	4	2	●	1	18.9	19.5	20.9	22.6
MS2XLBR0050N200	0.5	1	1	20	0.94	3.4°	55	4	2	●	1	20.9	21.6	23.2	25.1
MS2XLBR0050N200S06	0.5	1	1	20	0.94	5°	60	6	2	●	1	20.9	21.6	23.2	25.1
MS2XLBR0060N036S06	0.6	1.2	1.2	3.6	1.14	11.1°	50	6	2	●	1	3.8	4.0	4.3	4.7
MS2XLBR0060N060	0.6	1.2	1.2	6	1.14	7.3°	50	4	2	●	1	6.3	6.6	7.1	7.6
MS2XLBR0060N060S06	0.6	1.2	1.2	6	1.14	9.3°	50	6	2	●	1	6.3	6.6	7.1	7.6
MS2XLBR0060N080	0.6	1.2	1.2	8	1.14	6.2°	50	4	2	●	1	8.4	8.8	9.4	10.1
MS2XLBR0060N080S06	0.6	1.2	1.2	8	1.14	8.2°	50	6	2	●	1	8.4	8.8	9.4	10.1
MS2XLBR0060N100	0.6	1.2	1.2	10	1.14	5.4°	50	4	2	●	1	10.5	10.9	11.7	12.6
MS2XLBR0060N100S06	0.6	1.2	1.2	10	1.14	7.4°	50	6	2	●	1	10.5	10.9	11.7	12.6
MS2XLBR0060N120	0.6	1.2	1.2	12	1.14	4.8°	50	4	2	●	1	12.6	13.1	14.0	15.1
MS2XLBR0060N120S06	0.6	1.2	1.2	12	1.14	6.7°	55	6	2	●	1	12.6	13.1	14.0	15.1
MS2XLBR0060N140	0.6	1.2	1.2	14	1.14	4.3°	50	4	2	●	1	14.7	15.2	16.3	17.6
MS2XLBR0060N160	0.6	1.2	1.2	16	1.14	3.9°	55	4	2	●	1	16.8	17.3	18.6	20.1
MS2XLBR0060N160S06	0.6	1.2	1.2	16	1.14	5.6°	60	6	2	●	1	16.8	17.3	18.6	20.1
MS2XLBR0060N180	0.6	1.2	1.2	18	1.14	3.5°	55	4	2	●	1	18.8	19.5	20.9	22.6
MS2XLBR0060N240	0.6	1.2	1.2	24	1.14	2.8°	65	4	2	●	1	25.1	25.9	27.8	
MS2XLBR0070N080	0.7	1.4	1.4	8	1.34	6°	50	4	2	●	1	8.4	8.8	9.4	10.1
MS2XLBR0070N120	0.7	1.4	1.4	12	1.34	4.6°	50	4	2	●	1	12.6	13.1	14.0	15.1
MS2XLBR0070N160	0.7	1.4	1.4	16	1.34	3.7°	55	4	2	●	1	16.8	17.3	18.6	20.1
MS2XLBR0075N045S06	0.75	1.5	1.5	4.5	1.44	10.2°	50	6	2	●	1	4.7	5.0	5.4	5.7
MS2XLBR0075N060	0.75	1.5	1.5	6	1.44	7°	50	4	2	●	1	6.3	6.6	7.1	7.6
MS2XLBR0075N060S06	0.75	1.5	1.5	6	1.44	9.2°	50	6	2	●	1	6.3	6.6	7.1	7.6
MS2XLBR0075N075S06	0.75	1.5	1.5	7.5	1.44	8.3°	50	6	2	●	1	7.9	8.2	8.8	9.5
MS2XLBR0075N080	0.75	1.5	1.5	8	1.44	5.9°	50	4	2	●	1	8.4	8.8	9.4	10.1
MS2XLBR0075N080S06	0.75	1.5	1.5	8	1.44	8.1°	50	6	2	●	1	8.4	8.8	9.4	10.1
MS2XLBR0075N100	0.75	1.5	1.5	10	1.44	5.1°	50	4	2	●	1	10.5	10.9	11.7	12.6
MS2XLBR0075N100S06	0.75	1.5	1.5	10	1.44	7.2°	50	6	2	●	1	10.5	10.9	11.7	12.6
MS2XLBR0075N120	0.75	1.5	1.5	12	1.44	4.4°	50	4	2	●	1	12.6	13.1	14.0	15.1
MS2XLBR0075N120S06	0.75	1.5	1.5	12	1.44	6.5°	55	6	2	●	1	12.6	13.1	14.0	15.1
MS2XLBR0075N140	0.75	1.5	1.5	14	1.44	4°	50	4	2	●	1	14.7	15.2	16.3	17.6
MS2XLBR0075N140S06	0.75	1.5	1.5	14	1.44	5.9°	55	6	2	●	1	14.7	15.2	16.3	17.6
MS2XLBR0075N160	0.75	1.5	1.5	16	1.44	3.6°	55	4	2	●	1	16.8	17.3	18.6	20.0
MS2XLBR0075N160S06	0.75	1.5	1.5	16	1.44	5.4°	60	6	2	●	1	16.8	17.3	18.6	20.0
MS2XLBR0075N180	0.75	1.5	1.5	18	1.44	3.3°	55	4	2	●	1	18.8	19.5	20.9	22.5
MS2XLBR0075N200	0.75	1.5	1.5	20	1.44	3°	55	4	2	●	1	20.9	21.6	23.2	
MS2XLBR0075N200S06	0.75	1.5	1.5	20	1.44	4.6°	60	6	2	●	1	20.9	21.6	23.2	25.0
MS2XLBR0075N220	0.75	1.5	1.5	22	1.44	2.8°	60	4	2	●	1	23.0	23.8	25.5	
MS2XLBR0075N300	0.75	1.5	1.5	30	1.44	2.1°	70	4	2	●	1	31.2	32.3	34.7	
MS2XLBR0080N080	0.8	1.6	1.6	8	1.54	5.8°	50	4	2	●	1	8.4	8.8	9.4	10.1
MS2XLBR0080N120	0.8	1.6	1.6	12	1.54	4.3°	50	4	2	●	1	12.6	13.1	14.0	15.1
MS2XLBR0080N160	0.8	1.6	1.6	16	1.54	3.5°	55	4	2	●	1	16.8	17.3	18.6	20.0
MS2XLBR0080N200	0.8	1.6	1.6	20	1.54	2.9°	55	4	2	●	1	20.9	21.6	23.2	
MS2XLBR0090N080	0.9	1.8	1.8	8	1.74	5.5°	50	4	2	●	1	8.4	8.8	9.4	10.1
MS2XLBR0090N120	0.9	1.8	1.8	12	1.74	4.1°	50	4	2	●	1	12.6	13.0	14.0	15.0
MS2XLBR0090N160	0.9	1.8	1.8	16	1.74	3.3°	55	4	2	●	1	16.8	17.3	18.6	20.0
MS2XLBR0090N200	0.9	1.8	1.8	20	1.74	2.7°	55	4	2	●	1	20.9	21.6	23.2	
MS2XLBR0100N040	1	2	2	4	1.9	8.2°	50	4	2	●	1	4.1	4.3	4.6	4.9
MS2XLBR0100N040S06	1	2	2	4	1.9	10.6°	50	6	2	●	1	4.1	4.3	4.6	4.9
MS2XLBR0100N060	1	2	2	6	1.9	6.4°	50	4	2	●	1	6.2	6.5	6.9	7.4
MS2XLBR0100N060S06	1	2	2	6	1.9	9°	50	6	2	●	1	6.2	6.5	6.9	7.4
MS2XLBR0100N080	1	2	2	8	1.9	5.3°	50	4	2	●	1	8.3	8.7	9.2	9.9
MS2XLBR0100N080S06	1	2	2	8	1.9	7.8°	50	6	2	●	1	8.3	8.7	9.2	9.9
MS2XLBR0100N100	1	2	2	10	1.9	4.5°	50	4	2	●	1	10.4	10.8	11.5	12.4

MS2XLB

Order Number	RE	DC	APMX	LU	DN	B2	LF	DCON	No. of Flutes	Stock	type	Effective length for inclined angle			
												0.5°	1°	2°	3°
MS2XLBR0100N100S06	1	2	2	10	1.9	6.9°	50	6	2	●	1	10.4	10.8	11.5	12.4
MS2XLBR0100N120	1	2	2	12	1.9	3.9°	50	4	2	●	1	12.5	12.9	13.8	14.9
MS2XLBR0100N120S06	1	2	2	12	1.9	6.1°	55	6	2	●	1	12.5	12.9	13.8	14.9
MS2XLBR0100N140	1	2	2	14	1.9	3.4°	50	4	2	●	1	14.6	15.1	16.1	17.4
MS2XLBR0100N140S06	1	2	2	14	1.9	5.6°	55	6	2	●	1	14.6	15.1	16.1	17.4
MS2XLBR0100N160	1	2	2	16	1.9	3.1°	55	4	2	●	1	16.7	17.2	18.4	19.9
MS2XLBR0100N160S06	1	2	2	16	1.9	5.1°	60	6	2	●	1	16.7	17.2	18.4	19.9
MS2XLBR0100N180	1	2	2	18	1.9	2.8°	55	4	2	●	1	18.7	19.4	20.7	
MS2XLBR0100N180S06	1	2	2	18	1.9	4.7°	60	6	2	●	1	18.7	19.4	20.7	22.3
MS2XLBR0100N200	1	2	2	20	1.9	2.5°	60	4	2	●	1	20.8	21.5	23.0	
MS2XLBR0100N200S06	1	2	2	20	1.9	4.3°	60	6	2	●	1	20.8	21.5	23.0	24.8
MS2XLBR0100N220	1	2	2	22	1.9	2.3°	60	4	2	●	1	22.9	23.6	25.3	
MS2XLBR0100N250	1	2	2	25	1.9	2.1°	65	4	2	●	1	26.0	26.8	28.8	
MS2XLBR0100N250S06	1	2	2	25	1.9	3.7°	65	6	2	●	1	26.0	26.8	28.8	31.0
MS2XLBR0100N300	1	2	2	30	1.9	1.8°	70	4	2	●	1	31.1	32.2		
MS2XLBR0100N300S06	1	2	2	30	1.9	3.2°	70	6	2	●	1	31.1	32.2	34.5	37.3
MS2XLBR0100N350	1	2	2	35	1.9	1.6°	70	4	2	●	1	36.3	37.5		
MS2XLBR0100N350S06	1	2	2	35	1.9	2.8°	80	6	2	●	1	36.3	37.5	40.3	
MS2XLBR0125N060S06	1.25	2.5	2.5	6	2.4	8.6°	50	6	2	●	1	6.2	6.5	6.9	7.4
MS2XLBR0125N075S06	1.25	2.5	2.5	7.5	2.4	7.7°	50	6	2	●	1	7.8	8.1	8.6	9.2
MS2XLBR0125N100S06	1.25	2.5	2.5	10	2.4	6.5°	50	6	2	●	1	10.4	10.8	11.5	12.3
MS2XLBR0125N125S06	1.25	2.5	2.5	12.5	2.4	5.6°	50	6	2	●	1	13.0	13.5	14.4	15.4
MS2XLBR0125N160S06	1.25	2.5	2.5	16	2.4	4.7°	60	6	2	●	1	16.7	17.2	18.4	19.8
MS2XLBR0125N200S06	1.25	2.5	2.5	20	2.4	4°	60	6	2	●	1	20.8	21.5	23.0	24.8
MS2XLBR0125N250S06	1.25	2.5	2.5	25	2.4	3.3°	65	6	2	●	1	26.0	26.8	28.7	31.0
MS2XLBR0125N300S06	1.25	2.5	2.5	30	2.4	2.9°	70	6	2	●	1	31.1	32.2	34.5	
MS2XLBR0125N350S06	1.25	2.5	2.5	35	2.4	2.5°	80	6	2	●	1	36.3	37.5	40.2	
MS2XLBR0150N080	1.5	3	3	8	2.9	7°	60	6	2	●	1	8.3	8.6	9.2	9.8
MS2XLBR0150N100	1.5	3	3	10	2.9	6°	60	6	2	●	1	10.4	10.8	11.5	12.3
MS2XLBR0150N120	1.5	3	3	12	2.9	5.3°	60	6	2	●	1	12.5	12.9	13.8	14.8
MS2XLBR0150N140	1.5	3	3	14	2.9	4.7°	60	6	2	●	1	14.6	15.0	16.1	17.3
MS2XLBR0150N160	1.5	3	3	16	2.9	4.3°	60	6	2	●	1	16.6	17.2	18.4	19.7
MS2XLBR0150N200	1.5	3	3	20	2.9	3.6°	70	6	2	●	1	20.8	21.5	23.0	24.7
MS2XLBR0150N250	1.5	3	3	25	2.9	3°	70	6	2	●	1	26.0	26.8	28.7	
MS2XLBR0150N300	1.5	3	3	30	2.9	2.6°	70	6	2	●	1	31.1	32.2	34.5	
MS2XLBR0150N350	1.5	3	3	35	2.9	2.2°	80	6	2	●	1	36.3	37.5	40.2	
MS2XLBR0150N400	1.5	3	3	40	2.9	2°	90	6	2	●	1	41.5	42.9		
MS2XLBR0200N100	2	4	4	10	3.9	4.8°	70	6	2	●	1	10.4	10.7	11.4	12.2
MS2XLBR0200N120	2	4	4	12	3.9	4.1°	70	6	2	●	1	12.5	12.9	13.7	14.6
MS2XLBR0200N140	2	4	4	14	3.9	3.6°	70	6	2	●	1	14.6	15.0	16.0	17.1
MS2XLBR0200N160	2	4	4	16	3.9	3.2°	70	6	2	●	1	16.6	17.1	18.3	19.6
MS2XLBR0200N200	2	4	4	20	3.9	2.7°	70	6	2	●	1	20.8	21.4	22.9	
MS2XLBR0200N250	2	4	4	25	3.9	2.2°	70	6	2	●	1	25.9	26.8	28.6	
MS2XLBR0200N300	2	4	4	30	3.9	1.8°	70	6	2	●	1	31.1	32.1		
MS2XLBR0200N350	2	4	4	35	3.9	1.6°	80	6	2	●	1	36.3	37.5		
MS2XLBR0200N400	2	4	4	40	3.9	1.4°	90	6	2	●	1	41.4	42.8		
MS2XLBR0200N450	2	4	4	45	3.9	1.3°	90	6	2	●	1	46.6	48.2		
MS2XLBR0200N500	2	4	4	50	3.9	1.2°	100	6	2	●	1	51.8	53.5		
MS2XLBR0250N200	2.5	5	5	20	4.9	1.5°	70	6	2	●	1	20.7	21.4		
MS2XLBR0250N250	2.5	5	5	25	4.9	1.2°	70	6	2	●	1	25.9	26.7		
MS2XLBR0250N300	2.5	5	5	30	4.9	1°	80	6	2	●	1	31.1			
MS2XLBR0250N350	2.5	5	5	35	4.9	0.9°	80	6	2	●	1	36.3			
MS2XLBR0300N300	3	6	6	30	5.85		80	6	2	●	2				
MS2XLBR0300N500	3	6	6	50	5.85		120	6	2	●	2				

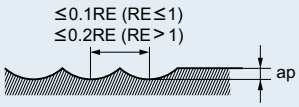
MS2XLB

RECOMMENDED CUTTING CONDITIONS

Work material		Carbon steel, Cast iron, Alloy steel, Pre-hardened steel AISI 1050, AISI No 35 B, AISI P20, AISI P21			Hardened steel (45— 55HRC) AISI H13		
R RE (mm)	Neck length LU(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap(mm)
R0.1	0.5	50000	400	0.003	50000	320	0.003
	1	50000	400	0.002	50000	320	0.002
	1.5	40000	300	0.001	40000	240	0.001
	2	40000	200	0.001	40000	160	0.001
	2.5	40000	100	0.001	40000	80	0.001
	3	30000	50	0.001	30000	40	0.001
R0.15	1	50000	600	0.007	50000	480	0.007
	1.5	50000	600	0.005	50000	480	0.005
	2	50000	600	0.003	50000	480	0.003
	2.5	40000	400	0.003	40000	320	0.003
	3	40000	300	0.002	40000	240	0.002
	4	30000	200	0.002	30000	160	0.002
R0.2	1	50000	1800	0.015	50000	1400	0.015
	2	50000	1300	0.01	50000	1000	0.01
	3	50000	900	0.005	50000	700	0.005
	4	40000	600	0.004	40000	480	0.004
	5	40000	400	0.003	40000	320	0.003
	6	30000	200	0.002	30000	160	0.002
R0.25	2	50000	2500	0.02	50000	2000	0.02
	3	50000	1500	0.015	50000	1200	0.015
	4	45000	1200	0.01	45000	950	0.01
	5	45000	900	0.007	45000	700	0.007
	6	36000	600	0.006	36000	480	0.006
	7	32000	400	0.005	32000	320	0.005
	8	32000	300	0.003	32000	240	0.003
	10	26000	200	0.002	26000	160	0.002
R0.3	2	50000	3500	0.03	50000	2800	0.03
	3	50000	3500	0.03	50000	2800	0.03
	4	44000	2500	0.02	44000	2000	0.02
	5	37000	1200	0.01	37000	950	0.01
	6	37000	1000	0.008	37000	800	0.008
	7	35000	750	0.008	35000	600	0.008
	8	35000	600	0.006	35000	480	0.006
	9	30000	500	0.004	30000	400	0.004
	10	30000	500	0.003	30000	400	0.003
	11	22000	300	0.002	22000	240	0.002
	12	22000	200	0.002	22000	160	0.002
R0.4	2	50000	4400	0.04	50000	3500	0.04
	3	50000	4000	0.04	50000	3200	0.04
	4	50000	4000	0.02	50000	3200	0.02
	5	35000	2400	0.02	35000	1900	0.02
	6	35000	2400	0.02	35000	1900	0.02
	7	30000	1500	0.015	30000	1200	0.015
	8	30000	1500	0.01	30000	1200	0.01
	10	30000	700	0.008	30000	560	0.008
	12	22000	500	0.006	22000	400	0.006
R0.5	3	40000	4000	0.05	40000	3200	0.05
	4	40000	4000	0.05	40000	3200	0.05
	6	35000	3000	0.03	35000	2400	0.03
	8	30000	2000	0.02	30000	1600	0.02
	10	20000	1000	0.01	20000	800	0.01
	12	20000	1000	0.01	20000	800	0.01
	14	18000	600	0.008	18000	480	0.008
	16	18000	500	0.008	18000	400	0.008

MS2XLB

Work material		Carbon steel, Cast iron, Alloy steel, Pre-hardened steel AISI 1050, AISI No 35 B, AISI P20, AISI P21			Hardened steel (45— 55HRC) AISI H13		
R RE (mm)	Neck length LU(mm)	Revolution (min⁻¹)	Feed rate (mm/min)	Depth of cut ap(mm)	Revolution (min⁻¹)	Feed rate (mm/min)	Depth of cut ap(mm)
	18	13000	300	0.005	13000	240	0.005
	20	13000	250	0.005	13000	200	0.005
R0.6	3.6	40000	4400	0.06	40000	3500	0.06
	6	40000	4400	0.04	40000	3500	0.04
	8	40000	4000	0.04	40000	3200	0.04
	10	27000	1900	0.02	27000	1500	0.02
	12	16000	1400	0.02	16000	1100	0.02
	18	15000	700	0.008	15000	560	0.008
	24	11000	300	0.006	11000	240	0.006
R0.75	6	40000	6000	0.07	36000	4300	0.07
	8	40000	6000	0.07	36000	4300	0.07
	10	40000	5000	0.06	36000	3600	0.06
	12	32000	3400	0.04	29000	2400	0.04
	16	15000	1400	0.03	15000	1100	0.03
	20	12000	900	0.02	12000	720	0.02
	30	9000	400	0.01	9000	320	0.01
R1	4	40000	8000	0.1	32000	5000	0.1
	6	40000	8000	0.1	32000	5000	0.1
	8	40000	6000	0.1	32000	3800	0.1
	10	40000	5000	0.08	32000	3200	0.08
	12	40000	5000	0.08	32000	3200	0.08
	16	32000	3500	0.05	26000	2200	0.05
	20	10000	1000	0.04	10000	800	0.04
	25	10000	1000	0.04	10000	800	0.04
	30	10000	800	0.02	10000	640	0.02
	35	10000	600	0.02	10000	480	0.02
R1.5	8	32000	7000	0.15	26000	4500	0.15
	10	32000	7000	0.15	26000	4500	0.15
	16	32000	5000	0.1	26000	3200	0.1
	20	27000	3800	0.1	22000	2400	0.1
	25	21000	2700	0.08	17000	1700	0.08
	30	6000	700	0.08	6000	560	0.08
	35	6000	700	0.06	6000	560	0.06
	40	6000	600	0.04	6000	480	0.04
R2	10	24000	6000	0.2	19000	3800	0.2
	20	24000	3800	0.15	19000	2400	0.15
	30	20000	3000	0.1	16000	1900	0.1
	40	12000	1700	0.1	12000	1400	0.1
	50	8000	1000	0.05	8000	800	0.05
R2.5	20	22000	6000	0.2	18000	3800	0.2
	25	22000	4400	0.2	18000	2800	0.2
	30	22000	3800	0.15	18000	2400	0.15
	35	22000	3600	0.1	18000	2300	0.1
R3	30	20000	6000	0.2	16000	3800	0.2
	50	20000	3000	0.15	16000	1900	0.15



- If the depth of cut is shallow, the revolution and feed rate can be increased.
- Cutting condition may be considerably different due to the overhang (milling depth), depth of cut, and machine tools. Please see the above table as a standard.

VFR2SB

IMPACT MIRACLE REVOLUTION

Ball nose, Short cut length, 2 flute

Product Information

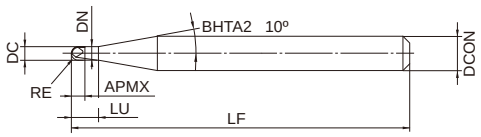
UWC 0° 20° VFR

RE<0.3 RE≧0.3

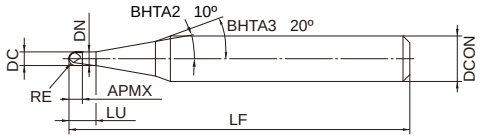
Work Material

P H F

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668



Type1



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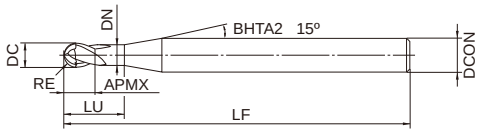


Type3

Type4

R	RE≦6	RE>6			
	±0.005	±0.010			
h5	DCON=3	4≦DCON≦6	8≦DCON≦10	DCON=12	DCON=20
	0 - 0.004	0 - 0.005	0 - 0.006	0 - 0.008	0 - 0.009

●Inventory maintained in Japan. Unit : mm

Order Number	RE	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	type
VFR2SBR0010	0.1	0.2	0.2	0.4	0.17	45	4	2	●	1
VFR2SBR0010S06	0.1	0.2	0.2	0.4	0.17	50	6	2	●	2
VFR2SBR0015	0.15	0.3	0.3	0.6	0.27	45	4	2	●	1
VFR2SBR0015S06	0.15	0.3	0.3	0.6	0.27	50	6	2	●	2
VFR2SBR0020	0.2	0.4	0.4	0.8	0.36	45	4	2	●	1
VFR2SBR0020S06	0.2	0.4	0.4	0.8	0.36	50	6	2	●	2
VFR2SBR0030	0.3	0.6	0.6	1.2	0.56	45	4	2	●	3
VFR2SBR0030S06	0.3	0.6	0.6	1.2	0.56	50	6	2	●	3
VFR2SBR0040	0.4	0.8	0.8	1.6	0.76	45	4	2	●	3
VFR2SBR0040S06	0.4	0.8	0.8	1.6	0.76	50	6	2	●	3
VFR2SBR0050	0.5	1	1	2	0.94	45	4	2	●	3
VFR2SBR0050S06	0.5	1	1	2	0.94	50	6	2	●	3
VFR2SBR0060	0.6	1.2	1.2	2.4	1.14	45	4	2	●	3
VFR2SBR0060S06	0.6	1.2	1.2	2.4	1.14	50	6	2	●	3

VFR2SB

Order Number	RE	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	type
VFR2SBR0070	0.7	1.4	1.4	2.8	1.34	45	4	2	●	3
VFR2SBR0070S06	0.7	1.4	1.4	2.8	1.34	50	6	2	●	3
VFR2SBR0075	0.75	1.5	1.5	3	1.44	45	4	2	●	3
VFR2SBR0075S06	0.75	1.5	1.5	3	1.44	50	6	2	●	3
VFR2SBR0080	0.8	1.6	1.6	3.2	1.54	45	4	2	●	3
VFR2SBR0080S06	0.8	1.6	1.6	3.2	1.54	50	6	2	●	3
VFR2SBR0090	0.9	1.8	1.8	3.6	1.74	45	4	2	●	3
VFR2SBR0090S06	0.9	1.8	1.8	3.6	1.74	50	6	2	●	3
VFR2SBR0100	1	2	2	4	1.9	50	4	2	●	3
VFR2SBR0100S06	1	2	2	4	1.9	60	6	2	●	3
VFR2SBR0125S06	1.25	2.5	2.5	5	2.4	60	6	2	●	3
VFR2SBR0150	1.5	3	3	6	2.9	70	6	2	●	3
VFR2SBR0150S03	1.5	3	3			60	3	2	●	4
VFR2SBR0200	2	4	4	8	3.9	70	6	2	●	3
VFR2SBR0200S04	2	4	4			60	4	2	●	4
VFR2SBR0250	2.5	5	5	10	4.9	80	6	2	●	3
VFR2SBR0300	3	6	12			80	6	2	●	4
VFR2SBR0400	4	8	14			90	8	2	●	4
VFR2SBR0500	5	10	18			100	10	2	●	4
VFR2SBR0600	6	12	22			110	12	2	●	4
VFR2SBR0800	8	16	30			140	16	2	●	4
VFR2SBR1000	10	20	38			160	20	2	●	4

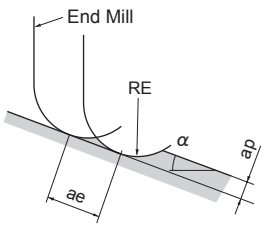
VFR2SB

RECOMMENDED CUTTING CONDITIONS

(mm)

Work material	Hardened steel (45—52HRC) AISI H13						Hardened steel (55—62HRC) AISI D2						Hardened steel (62—70HRC) AISI W1, AISI M2					
RE	α≤15°		α>15°		ap	ae	α≤15°		α>15°		ap	ae	α≤15°		α>15°		ap	ae
	n (min^{-1})	vf (mm/min)	n (min^{-1})	vf (mm/min)			n (min^{-1})	vf (mm/min)	n (min^{-1})	vf (mm/min)			n (min^{-1})	vf (mm/min)	n (min^{-1})	vf (mm/min)		
R 0.1	40000	320	40000	240	0.003	0.02	40000	320	40000	160	0.003	0.02	40000	320	40000	160	0.002	0.02
R 0.15	40000	640	40000	560	0.01	0.03	40000	640	40000	400	0.007	0.03	40000	640	40000	400	0.005	0.03
R 0.2	40000	1600	40000	1200	0.02	0.04	40000	1400	40000	1000	0.015	0.04	40000	1200	40000	1000	0.01	0.04
R 0.3	40000	3200	40000	1600	0.03	0.06	40000	2800	40000	1200	0.025	0.06	40000	2000	40000	1200	0.02	0.06
R 0.4	40000	6400	40000	2400	0.05	0.08	40000	4000	40000	1600	0.04	0.08	40000	2800	40000	1600	0.03	0.08
R 0.5	40000	8000	40000	3200	0.06	0.10	40000	5600	40000	2400	0.05	0.10	40000	3600	32000	1300	0.04	0.10
R 0.75	40000	9600	40000	4000	0.09	0.15	40000	7200	32000	2500	0.075	0.15	32000	4500	21000	1200	0.05	0.15
R 1	40000	9600	39000	4700	0.11	0.20	40000	8000	24000	2400	0.1	0.20	24000	3800	16000	1000	0.07	0.20
R 1.25	40000	10400	32000	4500	0.12	0.25	37000	8100	19000	2300	0.11	0.25	19000	3400	13000	1000	0.08	0.25
R 1.5	40000	12000	27000	4300	0.13	0.30	32000	7700	16000	2200	0.12	0.30	16000	3200	11000	880	0.09	0.30
R 2	32000	10880	20000	3600	0.15	0.40	24000	6200	12000	1900	0.13	0.40	12000	2400	8000	800	0.1	0.40
R 2.5	25000	9000	16000	2900	0.20	0.50	19000	5300	9600	1700	0.15	0.50	9600	2100	6000	600	0.1	0.50
R 3	21000	8400	13000	2600	0.25	0.60	16000	4800	8000	1600	0.2	0.60	8000	1700	5000	600	0.11	0.60
R 4	16000	6400	10000	2000	0.30	0.80	12000	3600	6000	1200	0.2	0.80	6000	1400	4000	480	0.11	0.80
R 5	13000	5200	8000	1700	0.50	1.00	10000	3200	4800	960	0.2	1.00	4800	1100	3000	420	0.12	1.00
R 6	9000	3600	6000	1300	0.50	1.20	7000	2200	3600	720	0.3	1.20	3600	860	2200	310	0.12	1.20
R 8	6000	2400	4000	1000	0.50	1.60	5000	1600	2500	500	0.3	1.60	2500	650	1500	240	0.15	1.60
R10	4500	1800	3000	780	0.50	2.00	4000	1300	1800	360	0.3	2.00	1800	470	1000	160	0.15	2.00
Depth of cut	≤0.2RE ≤Please refer to the list above for depth of cut. RE : Radius																	

1) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.
2) If the depth of cut is shallow, the revolution and feed rate can be increased. Please reduce the feed rate when the surface finish is important.
3) α is the inclination angle of the machined surface.



VFR2SBF

IMPACT MIRACLE REVOLUTION

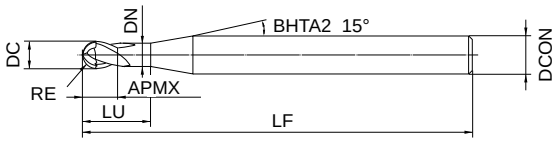
Ball nose, Short cut length, 2 flute, For Mirror finish cutting

Product Information

Work Material

P H

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668



Type1

R	RE≦3
	±0.010

h5	4≦DCON≦6
	0 - 0.005

Type2

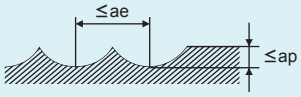
●Inventory maintained in Japan. Unit : mm

Order Number	RE	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	type
VFR2SBFR0050	0.5	1	1	2	0.94	45	4	2	●	1
VFR2SBFR0075	0.75	1.5	1.5	3	1.44	45	4	2	●	1
VFR2SBFR0100	1	2	2	4	1.9	60	6	2	●	1
VFR2SBFR0125	1.25	2.5	2.5	5	2.4	60	6	2	●	1
VFR2SBFR0150	1.5	3	3	6	2.9	70	6	2	●	1
VFR2SBFR0200	2	4	4	8	3.9	70	6	2	●	1
VFR2SBFR0250	2.5	5	5	10	4.9	80	6	2	●	1
VFR2SBFR0300	3	6	6			80	6	2	●	2

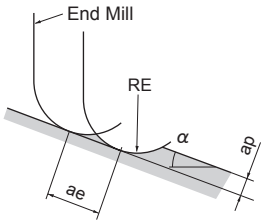
VFR2SBF

RECOMMENDED CUTTING CONDITIONS

(mm)

Work material	Carbon steel, Alloy steel (180—280HB) Alloy tool steel (≤350HB), Pre-hardened steel (35—45HRC) Hardened steel (45—52HRC), Hardened steel (55—62HRC) AISI 1045, AISI 4140, AISI P21, AISI P20, SKD, SKT, AISI H13, AISI L6, AISI D2						Hardened steel (62—70HRC) AISI W1, AISI M2					
RE	α≤15°		α>15°		ap	ae	α≤15°		α>15°		ap	ae
	n (min^{-1})	vf (mm/min)	n (min^{-1})	vf (mm/min)			n (min^{-1})	vf (mm/min)	n (min^{-1})	vf (mm/min)		
R 0.5	40000	800	40000	800	0.007	0.007	40000	560	40000	560	0.005	0.005
R 0.75	40000	800	40000	800	0.009	0.009	40000	560	40000	560	0.007	0.007
R 1.0	35000	1050	35000	1050	0.011	0.011	35000	700	35000	700	0.009	0.009
R 1.25	35000	1050	35000	1050	0.013	0.013	35000	700	35000	700	0.011	0.011
R 1.5	35000	1050	35000	1050	0.015	0.015	35000	700	35000	700	0.013	0.013
R 2.0	25000	1000	25000	1000	0.017	0.017	25000	750	25000	750	0.015	0.015
R 2.5	25000	1000	25000	1000	0.020	0.020	25000	750	25000	750	0.015	0.015
R 3.0	25000	1000	25000	1000	0.020	0.020	25000	750	25000	750	0.015	0.015
Depth of cut												

1) The tools are recommended for use only in finish machining.
2) Air blowing and oil mist are recommended as coolants.
3) Note the following points when using the tools.
   - Avoid using equipment abruptly without proper preparation. After sufficiently energizing equipment, ensure that there will be no changes to the depth of cut such as due to elongation of the main axis during machining.
   - If the tools are used immediately after rough machining of a surface, large uneven areas (cusp heights) will cause deflection of the tools and waviness of the machined surface. Therefore, it is recommended to add a medium finish machining process which uses the same value of ae as indicated in the table above.
4) α is the inclination angle of the machined surface.



VF2WB

IMPACT MIRACLE END MILLS

Wide ball nose, Medium cut length, 2 flute

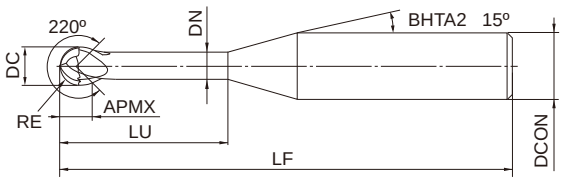
Product Information

UWC VF

Work Material

P M S H F M

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668



Type1

R	1≦RE≦3
	±0.01
h6	DCON=6
	0 - 0.008

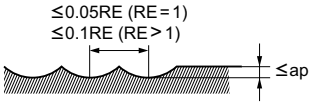
●Inventory maintained in Japan. Unit : mm

Order Number	RE	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	type
VF2WBR0100N060	1	2	1.5	6	1.6	60	6	2	●	1
VF2WBR0150N080	1.5	3	2	8	2.4	60	6	2	●	1
VF2WBR0200N100	2	4	3	10	3.2	60	6	2	●	1
VF2WBR0300N120	3	6	1	12	4.8	80	6	2	●	1

VF2WB

RECOMMENDED CUTTING CONDITIONS

Work material	Carbon steel, Cast iron, Alloy steel (—30HRC) AISI 1050, AISI No 35 B, AISI P20			Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21			Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V			Hardened steel (45— 55HRC) AISI H13		
R RE (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)
R1	40000	5000	0.07	40000	5000	0.06	32000	2500	0.05	32000	3000	0.03
R1.5	32000	5000	0.12	32000	5000	0.11	26000	2500	0.10	26000	3000	0.07
R2	24000	3800	0.15	24000	3800	0.13	20000	2000	0.12	20000	2800	0.10
R3	16000	2800	0.20	16000	2800	0.18	13000	1500	0.15	13000	2100	0.12



- When cutting austenitic stainless steel, the use of water-soluble cutting fluid is effective.
- If the depth of cut is shallow, the revolution and feed rate can be increased.

VF2SSB

IMPACT MIRACLE END MILLS

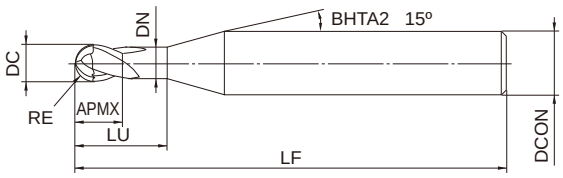
Ball nose, Short cut length, 2 flute, Short shank

Product Information

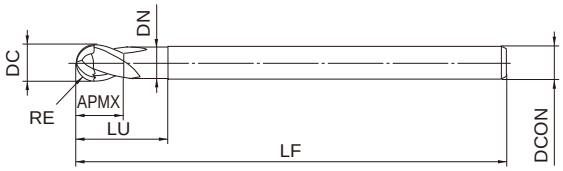
Work Material

P M S H F M

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668



Type1



Type2

R	0.5≦RE≦6		
	±0.005		
	1≦DC≦12		
	0 - 0.01		
h5	4≦DCON≦6	8≦DCON≦10	DCON=12
	0 - 0.005	0 - 0.006	0 - 0.008

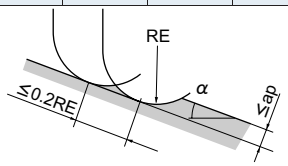
●Inventory maintained in Japan. Unit : mm

Order Number	RE	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	type
VF2SSBR0050	0.5	1	1	2	0.94	40	6	2	●	1
VF2SSBR0050S04	0.5	1	1	2	0.94	40	4	2	●	1
VF2SSBR0075	0.75	1.5	1.5	3	1.44	40	6	2	●	1
VF2SSBR0075S04	0.75	1.5	1.5	3	1.44	40	4	2	●	1
VF2SSBR0100	1	2	2	4	1.9	45	6	2	●	1
VF2SSBR0150	1.5	3	3	6	2.9	45	6	2	●	1
VF2SSBR0200	2	4	4	8	3.9	45	6	2	●	1
VF2SSBR0250	2.5	5	5	10	4.9	50	6	2	●	1
VF2SSBR0300	3	6	6	12	5.85	50	6	2	●	2
VF2SSBR0400	4	8	8	14	7.85	60	8	2	●	2
VF2SSBR0500	5	10	10	18	9.7	70	10	2	●	2
VF2SSBR0600	6	12	12	22	11.7	75	12	2	●	2

VF2SSB

RECOMMENDED CUTTING CONDITIONS

Work material	Hardened steel (45— 55HRC) AISI H13					Hardened steel (55— 62HRC) AISI D2					Hardened steel (62— 70HRC) AISI W1, AISI M2				
R RE (mm)	α≦15°		α>15°		Depth of cut ap(mm)	α≦15°		α>15°		Depth of cut ap(mm)	α≦15°		α>15°		Depth of cut ap(mm)
	Revolution (min-1)	Feed rate (mm/min)	Revolution (min-1)	Feed rate (mm/min)		Revolution (min-1)	Feed rate (mm/min)	Revolution (min-1)	Feed rate (mm/min)		Revolution (min-1)	Feed rate (mm/min)	Revolution (min-1)	Feed rate (mm/min)	
R0.1	40000	320	40000	240	0.003	40000	320	40000	160	0.003	40000	320	40000	160	0.002
R0.15	40000	640	40000	560	0.01	40000	640	40000	400	0.007	40000	640	40000	400	0.005
R0.2	40000	1600	40000	1200	0.02	40000	1400	40000	1000	0.015	40000	1200	40000	1000	0.01
R0.3	40000	3200	40000	1600	0.03	40000	2800	40000	1200	0.025	40000	2000	40000	1200	0.02
R0.4	40000	6400	40000	2400	0.05	40000	4000	40000	1600	0.04	40000	2800	40000	1600	0.03
R0.5	40000	8000	40000	3200	0.06	40000	5600	40000	2400	0.05	40000	3600	32000	1300	0.04
R0.75	40000	9600	40000	4000	0.09	40000	7200	32000	2500	0.075	32000	4500	21000	1200	0.05
R1	40000	9600	39000	4700	0.11	40000	8000	24000	2400	0.1	24000	3800	16000	1000	0.07
R1.25	40000	10400	32000	4500	0.12	37000	8100	19000	2300	0.11	19000	3400	13000	1000	0.08
R1.5	40000	12000	27000	4300	0.13	32000	7700	16000	2200	0.12	16000	3200	11000	880	0.09
R2	32000	10880	20000	3600	0.15	24000	6200	12000	1900	0.13	12000	2400	8000	800	0.1
R2.5	25000	9000	16000	2900	0.2	19000	5300	9600	1700	0.15	9600	2100	6000	600	0.1
R3	21000	8400	13000	2600	0.25	16000	4800	8000	1600	0.2	8000	1700	5000	600	0.11
R4	16000	6400	10000	2000	0.3	12000	3600	6000	1200	0.2	6000	1400	4000	480	0.11
R5	13000	5200	8000	1700	0.5	10000	3200	4800	960	0.2	4800	1100	3000	420	0.12
R6	9000	3600	6000	1300	0.5	7000	2200	3600	720	0.3	3600	860	2200	310	0.12
R8	6000	2400	4000	1000	0.5	5000	1600	2500	500	0.3	2500	650	1500	240	0.15
R10	4500	1800	3000	780	0.5	4000	1300	1800	360	0.3	1800	470	1000	160	0.15



- α is the inclination angle of the machined surface.
- If the depth of cut is shallow, the revolution and feed rate can be increased.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

VF2SB

IMPACT MIRACLE END MILLS

Ball nose, Short cut length, 2 flute, For hardened materials

Product Information

UWC 0° 30° VF

RE<0.3 RE≧0.3 RE<0.3 RE≧0.3

Technical Info >> 1993

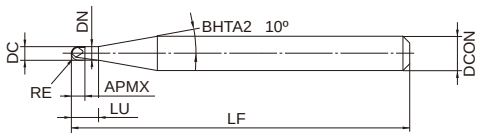
ISO13399 Property >> 1966

Work Material

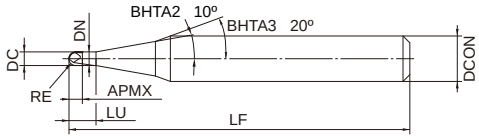
P M S H F M

SYMBOL DESCRIPTIONS >> 664

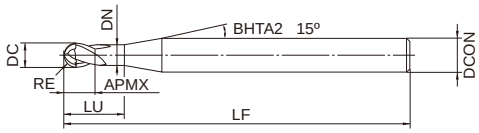
END MILLS SELECTION CHART >> 668



Type1



Type2



Type3

Type4

R	RE≦6	RE>6		
	±0.005	±0.010		
	DC≦12	DC>12		
	0 - 0.01	0 - 0.02		
h5	DCON=3	4≦DCON≦6	8≦DCON≦10	DCON=12
	0 - 0.004	0 - 0.005	0 - 0.006	0 - 0.008
h6	DCON=16	DCON=20		
	0 - 0.011	0 - 0.013		

●Inventory maintained in Japan. Unit : mm

Order Number	RE	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	type
VF2SBR0010S04	0.1	0.2	0.2	0.4	0.17	45	4	2	●	1
VF2SBR0010S06	0.1	0.2	0.2	0.4	0.17	50	6	2	●	2
VF2SBR0015S04	0.15	0.3	0.3	0.6	0.27	45	4	2	●	1
VF2SBR0015S06	0.15	0.3	0.3	0.6	0.27	50	6	2	●	2
VF2SBR0020S04	0.2	0.4	0.4	0.8	0.36	45	4	2	●	1
VF2SBR0020S06	0.2	0.4	0.4	0.8	0.36	50	6	2	●	2
VF2SBR0030S04	0.3	0.6	0.6	1.2	0.56	45	4	2	●	3
VF2SBR0030S06	0.3	0.6	0.6	1.2	0.56	50	6	2	●	3
VF2SBR0040S04	0.4	0.8	0.8	1.6	0.76	45	4	2	●	3
VF2SBR0040S06	0.4	0.8	0.8	1.6	0.76	50	6	2	●	3
VF2SBR0050S04	0.5	1	1	2	0.94	45	4	2	●	3
VF2SBR0050S06	0.5	1	1	2	0.94	50	6	2	●	3
VF2SBR0060S04	0.6	1.2	1.2	2.4	1.14	45	4	2	●	3

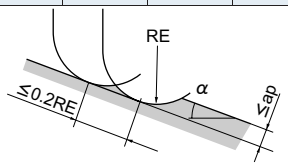
VF2SB

Order Number	RE	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	type
VF2SBR0060S06	0.6	1.2	1.2	2.4	1.14	50	6	2	●	3
VF2SBR0070S04	0.7	1.4	1.4	2.8	1.34	45	4	2	●	3
VF2SBR0070S06	0.7	1.4	1.4	2.8	1.34	50	6	2	●	3
VF2SBR0075S04	0.75	1.5	1.5	3	1.44	45	4	2	●	3
VF2SBR0075S06	0.75	1.5	1.5	3	1.44	50	6	2	●	3
VF2SBR0080S04	0.8	1.6	1.6	3.2	1.54	45	4	2	●	3
VF2SBR0080S06	0.8	1.6	1.6	3.2	1.54	50	6	2	●	3
VF2SBR0090S04	0.9	1.8	1.8	3.6	1.74	45	4	2	●	3
VF2SBR0090S06	0.9	1.8	1.8	3.6	1.74	50	6	2	●	3
VF2SBR0100S04	1	2	2	4	1.9	50	4	2	●	3
VF2SBR0100S06	1	2	2	4	1.9	60	6	2	●	3
VF2SBR0125S06	1.25	2.5	2.5	5	2.4	60	6	2	●	3
VF2SBR0150S03	1.5	3	3			60	3	2	●	4
VF2SBR0150S06	1.5	3	3	6	2.9	70	6	2	●	3
VF2SBR0200S04	2	4	4			60	4	2	●	4
VF2SBR0200S06	2	4	4	8	3.9	70	6	2	●	3
VF2SBR0250S06	2.5	5	5	10	4.9	80	6	2	●	3
VF2SBR0300S06	3	6	12			80	6	2	●	4
VF2SBR0400S08	4	8	14			90	8	2	●	4
VF2SBR0500S10	5	10	18			100	10	2	●	4
VF2SBR0600S12	6	12	22			110	12	2	●	4
VF2SBR0800S16	8	16	30			140	16	2	●	4
VF2SBR1000S20	10	20	38			160	20	2	●	4

VF2SB

RECOMMENDED CUTTING CONDITIONS

Work material	Hardened steel (45— 55HRC) AISI H13					Hardened steel (55— 62HRC) AISI D2					Hardened steel (62— 70HRC) AISI W1, AISI M2				
R RE (mm)	α≦15°		α>15°		Depth of cut ap(mm)	α≦15°		α>15°		Depth of cut ap(mm)	α≦15°		α>15°		Depth of cut ap(mm)
	Revolution (min-1)	Feed rate (mm/min)	Revolution (min-1)	Feed rate (mm/min)		Revolution (min-1)	Feed rate (mm/min)	Revolution (min-1)	Feed rate (mm/min)		Revolution (min-1)	Feed rate (mm/min)	Revolution (min-1)	Feed rate (mm/min)	
R0.1	40000	320	40000	240	0.003	40000	320	40000	160	0.003	40000	320	40000	160	0.002
R0.15	40000	640	40000	560	0.01	40000	640	40000	400	0.007	40000	640	40000	400	0.005
R0.2	40000	1600	40000	1200	0.02	40000	1400	40000	1000	0.015	40000	1200	40000	1000	0.01
R0.3	40000	3200	40000	1600	0.03	40000	2800	40000	1200	0.025	40000	2000	40000	1200	0.02
R0.4	40000	6400	40000	2400	0.05	40000	4000	40000	1600	0.04	40000	2800	40000	1600	0.03
R0.5	40000	8000	40000	3200	0.06	40000	5600	40000	2400	0.05	40000	3600	32000	1300	0.04
R0.75	40000	9600	40000	4000	0.09	40000	7200	32000	2500	0.075	32000	4500	21000	1200	0.05
R1	40000	9600	39000	4700	0.11	40000	8000	24000	2400	0.1	24000	3800	16000	1000	0.07
R1.25	40000	10400	32000	4500	0.12	37000	8100	19000	2300	0.11	19000	3400	13000	1000	0.08
R1.5	40000	12000	27000	4300	0.13	32000	7700	16000	2200	0.12	16000	3200	11000	880	0.09
R2	32000	10880	20000	3600	0.15	24000	6200	12000	1900	0.13	12000	2400	8000	800	0.1
R2.5	25000	9000	16000	2900	0.2	19000	5300	9600	1700	0.15	9600	2100	6000	600	0.1
R3	21000	8400	13000	2600	0.25	16000	4800	8000	1600	0.2	8000	1700	5000	600	0.11
R4	16000	6400	10000	2000	0.3	12000	3600	6000	1200	0.2	6000	1400	4000	480	0.11
R5	13000	5200	8000	1700	0.5	10000	3200	4800	960	0.2	4800	1100	3000	420	0.12
R6	9000	3600	6000	1300	0.5	7000	2200	3600	720	0.3	3600	860	2200	310	0.12
R8	6000	2400	4000	1000	0.5	5000	1600	2500	500	0.3	2500	650	1500	240	0.15
R10	4500	1800	3000	780	0.5	4000	1300	1800	360	0.3	1800	470	1000	160	0.15



- α is the inclination angle of the machined surface.
- If the depth of cut is shallow, the revolution and feed rate can be increased.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

VF2SDB

IMPACT MIRACLE END MILLS

Ball nose, Short cut length, 2 flute, Strong geometry

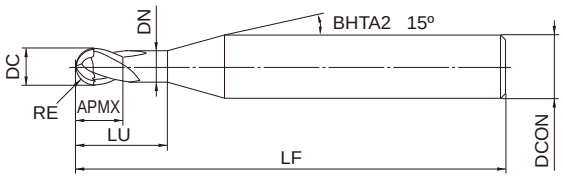
Product Information

UWC 30° VF

Work Material

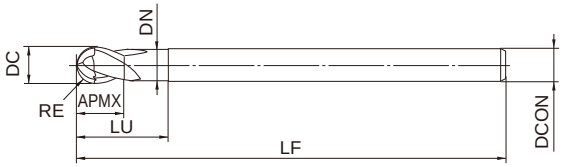
P H F M

Technical Info >> 1993
ISO13399 Property >> 1966
SYMBOL DESCRIPTIONS >> 664
END MILLS SELECTION CHART >> 668



Type1

R	RE≦6.5	RE>6.5			
	±0.01	±0.02			
	DC≦12	DC>12			
	0 - 0.02	0 - 0.03			
h6	DCON=3	4≦DCON≦6	8≦DCON≦10	12≦DCO N≦16	DCON=20
	0 -0.006	0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013



Type2

●Inventory maintained in Japan. Unit : mm

Order Number	RE	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	type
VF2SDBR0050	0.5	1	1	2	0.94	45	4	2	●	1
VF2SDBR0100	1	2	2	4	1.9	60	6	2	●	1
VF2SDBR0100S04	1	2	2	4	1.9	50	4	2	●	1
VF2SDBR0150	1.5	3	3	6	2.9	70	6	2	●	1
VF2SDBR0150S03	1.5	3	3	6	2.9	60	3	2	●	2
VF2SDBR0200	2	4	4	8	3.9	70	6	2	●	1
VF2SDBR0200S04	2	4	4	8	3.9	60	4	2	●	2
VF2SDBR0250	2.5	5	5	10	4.9	80	6	2	●	1
VF2SDBR0300	3	6	12	22	5.85	80	6	2	●	2
VF2SDBR0400	4	8	14	27	7.85	90	8	2	●	2
VF2SDBR0500	5	10	18	31	9.7	100	10	2	●	2
VF2SDBR0600	6	12	22	35	11.7	110	12	2	●	2
VF2SDBR0800	8	16	30	50	15.5	140	16	2	●	2
VF2SDBR1000	10	20	38	58	19.5	160	20	2	●	2

VF2SDBL

IMPACT MIRACLE END MILLS

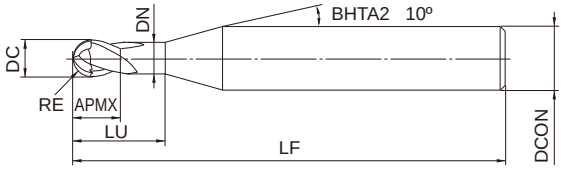
Ball nose, Short cut length, 2 flute, Strong geometry, Long shank

Product Information

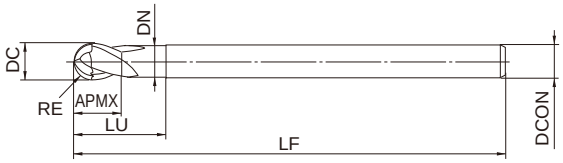
Work Material

P H F M

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668



Type1



Type2

R	RE≦6.5	RE>6.5		
	±0.01	±0.02		
	DC≦12	DC>12		
	0 - 0.02	0 - 0.03		
h6	DCON=6	8≦DCON≦10	12≦DCON≦16	DCON=20
	0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013

●Inventory maintained in Japan. Unit : mm

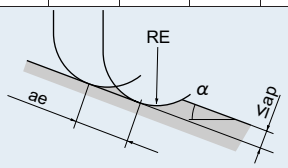
Order Number	RE	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	type
VF2SDBLR0050	0.5	1	1	2	0.94	60	6	2	●	1
VF2SDBLR0100	1	2	2	4	1.9	80	6	2	●	1
VF2SDBLR0150	1.5	3	3	6	2.9	90	6	2	●	1
VF2SDBLR0200	2	4	4	8	3.9	90	6	2	●	1
VF2SDBLR0250	2.5	5	5	10	4.9	110	8	2	●	1
VF2SDBLR0300	3	6	12	22	5.85	120	6	2	●	2
VF2SDBLR0400	4	8	14	27	7.85	130	8	2	●	2
VF2SDBLR0500	5	10	18	31	9.7	140	10	2	●	2
VF2SDBLR0600	6	12	22	35	11.7	140	12	2	●	2
VF2SDBLR0800	8	16	30	50	15.5	200	16	2	●	2
VF2SDBLR1000	10	20	38	58	19.5	200	20	2	●	2

VF2SDBL

RECOMMENDED CUTTING CONDITIONS_VF2SDB/L

·Overhang Below 5DC (DC : Dia.)

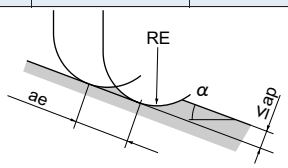
Work material	Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21						Hardened steel (45— 55HRC) AISI H13						Hardened steel (55— 62HRC) AISI D2					
R RE (mm)	α≦15°		α>15°		Depth of cut ap (mm)	Depth of cut ae (mm)	α≦15°		α>15°		Depth of cut ap (mm)	Depth of cut ae (mm)	α≦15°		α>15°		Depth of cut ap (mm)	Depth of cut ae (mm)
	Revolution (min-1)	Feed rate (mm/min)	Revolution (min-1)	Feed rate (mm/min)			Revolution (min-1)	Feed rate (mm/min)	Revolution (min-1)	Feed rate (mm/min)			Revolution (min-1)	Feed rate (mm/min)	Revolution (min-1)	Feed rate (mm/min)		
R0.5	40000	5200	36000	2300	0.10	0.25	40000	5200	36000	2300	0.10	0.25	40000	5000	40000	2400	0.05	0.10
R1	40000	6000	36000	3500	0.20	0.50	40000	6000	36000	3500	0.20	0.50	36000	5000	24000	2400	0.10	0.20
R1.5x3	29000	4600	19000	2400	0.20	0.50	25000	4000	16000	2000	0.20	0.50	17000	2400	11000	1000	0.12	0.30
R1.5	37000	7000	24000	3000	0.30	0.75	37000	7000	24000	3000	0.30	0.75	25000	6000	16000	2200	0.12	0.30
R2x4	24000	4300	15000	2200	0.25	0.70	19000	3400	13000	1700	0.25	0.70	12000	1900	8200	900	0.13	0.40
R2	30000	6500	19000	2800	0.40	1.00	28000	6000	19000	2600	0.40	1.00	18000	4800	12000	2000	0.13	0.40
R2.5	25000	6000	16000	2600	0.50	1.30	22000	5000	16000	2300	0.50	1.25	15000	4200	9500	1700	0.15	0.50
R3	22000	6000	14000	2400	0.60	1.80	18000	4500	12000	1900	0.60	1.50	12000	3500	8000	1600	0.20	0.60
R4	19000	5200	12000	2200	0.80	2.40	15000	3800	9500	1700	0.80	2.00	9800	3000	6500	1300	0.20	0.80
R5	15000	4300	9500	2000	1.00	3.00	11000	3000	7000	1500	1.00	2.50	7500	2400	5000	1000	0.20	1.00
R6	12000	3400	8000	1800	1.20	3.60	9000	2400	6000	1400	1.20	3.00	6000	1900	4000	800	0.30	1.20
R8	9000	2600	6000	1500	1.60	4.80	7000	1900	4500	1100	1.60	4.00	4500	1500	3000	600	0.30	1.60
R10	7500	2200	4800	1200	2.00	6.00	5500	1500	3600	900	2.00	5.00	3600	1200	2500	500	0.30	2.00



- α is the inclination angle of the machined surface.
- If the depth of cut is shallow, the revolution and feed rate can be increased.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

·Overhang 7DC (DC : Dia.)

Work material	Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21				Hardened steel (45— 55HRC) AISI H13			
R RE (mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)
R1.5x3	16000	2000	0.10	0.30	13000	1500	0.10	0.30
R2x4	13000	2000	0.15	0.50	10000	1500	0.15	0.50
R3	10000	2000	0.20	1.00	8000	1600	0.20	0.80
R4	8000	1800	0.30	1.50	6400	1400	0.40	1.20
R5	6000	1600	0.40	2.00	4800	1200	0.40	1.60
R6	5000	1300	0.45	2.40	4000	1000	0.45	2.00
R8	3800	1000	0.60	3.00	3100	800	0.60	2.50
R10	3000	800	0.80	4.00	2500	650	0.80	3.00



- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

VF2XLBS

IMPACT MIRACLE END MILLS

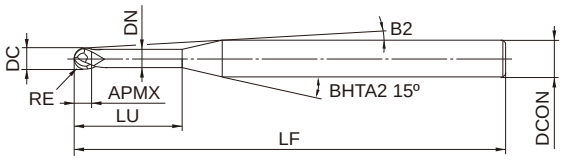
Ball nose, Short cut length, 2 flute, Long neck

Product Information

Work Material

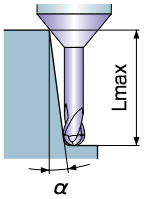
P S H F M

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668



Type1

R	0.2≦RE≦1
	±0.007
	0.4≦DC≦2
	0 - 0.02
h6	DCON=4
	0 - 0.008



- α: Inclined angle Lmax: Effective length
- Lmax indicates "0: Not available, blank: No interference".

●Inventory maintained in Japan. Unit : mm

Order Number	RE	DC	APMX	LU	DN	B2	LF	DCON	No. of Flutes	Stock	type	Effective length for inclined angle			
												0.5°	1°	2°	3°
VF2XLBSR0020N010	0.2	0.4	0.32	1	0.36	13.4°	40	4	2	●	1	1.0	1.0	1.1	1.2
VF2XLBSR0020N020	0.2	0.4	0.32	2	0.36	11.9°	40	4	2	●	1	2.0	2.1	2.3	2.5
VF2XLBSR0020N030	0.2	0.4	0.32	3	0.36	10.7°	40	4	2	●	1	3.1	3.2	3.4	3.7
VF2XLBSR0020N040	0.2	0.4	0.32	4	0.36	9.7°	40	4	2	●	1	4.1	4.3	4.6	4.9
VF2XLBSR0025N040	0.25	0.5	0.4	4	0.46	9.6°	40	4	2	●	1	4.1	4.3	4.6	4.9
VF2XLBSR0025N060	0.25	0.5	0.4	6	0.46	8.1°	40	4	2	●	1	6.2	6.4	6.9	7.4
VF2XLBSR0030N020	0.3	0.6	0.48	2	0.56	11.8°	40	4	2	●	1	2.1	2.2	2.3	2.5
VF2XLBSR0030N030	0.3	0.6	0.48	3	0.56	10.5°	40	4	2	●	1	3.1	3.3	3.5	3.8
VF2XLBSR0030N040	0.3	0.6	0.48	4	0.56	9.5°	40	4	2	●	1	4.2	4.3	4.6	5.0
VF2XLBSR0030N060	0.3	0.6	0.48	6	0.56	8°	40	4	2	●	1	6.3	6.5	6.9	7.5
VF2XLBSR0040N040	0.4	0.8	0.64	4	0.76	9.4°	40	4	2	●	1	4.2	4.3	4.6	5.0
VF2XLBSR0040N060	0.4	0.8	0.64	6	0.76	7.8°	40	4	2	●	1	6.3	6.5	6.9	7.5
VF2XLBSR0050N030	0.5	1	0.8	3	0.94	10.1°	40	4	2	●	1	3.2	3.3	3.6	3.9
VF2XLBSR0050N040	0.5	1	0.8	4	0.94	9.1°	40	4	2	●	1	4.2	4.4	4.8	5.2
VF2XLBSR0050N060	0.5	1	0.8	6	0.94	7.5°	40	4	2	●	1	6.3	6.6	7.1	7.7
VF2XLBSR0050N080	0.5	1	0.8	8	0.94	6.4°	40	4	2	●	1	8.4	8.8	9.4	10.2
VF2XLBSR0100N060	1	2	1.6	6	1.9	6.4°	40	4	2	●	1	6.2	6.5	6.9	7.4
VF2XLBSR0100N080	1	2	1.6	8	1.9	5.3°	40	4	2	●	1	8.3	8.7	9.2	9.9
VF2XLBSR0100N100	1	2	1.6	10	1.9	4.5°	40	4	2	●	1	10.4	10.8	11.5	12.4

VF2XLBS

RECOMMENDED CUTTING CONDITIONS

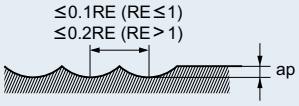
Work material		Hardened steel (45— 55HRC) AISI H13			Hardened steel (55— 62HRC) AISI D2		
R RE (mm)	Neck length LU(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap (mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap (mm)
R0.1	0.5	40000	300	0.003	40000	300	0.002
	1	40000	300	0.002	40000	300	0.002
	1.5	40000	300	0.001	40000	200	0.001
	2	40000	200	0.001	40000	100	0.001
	2.5	40000	100	0.001	40000	60	0.001
R0.15	1	40000	500	0.007	40000	500	0.005
	1.5	40000	500	0.005	40000	500	0.003
	2	40000	500	0.003	40000	500	0.002
	2.5	40000	400	0.003	40000	400	0.002
	3	40000	300	0.002	40000	300	0.001
	4	30000	200	0.002	30000	200	0.001
R0.2	1	40000	1400	0.015	40000	1400	0.01
	1.5	40000	1000	0.01	40000	1000	0.006
	2	40000	1000	0.01	40000	1000	0.006
	2.5	40000	700	0.005	40000	700	0.003
	3	40000	700	0.005	40000	700	0.003
	4	40000	600	0.004	40000	500	0.003
	5	40000	400	0.003	40000	300	0.002
R0.25	1.5	40000	2000	0.02	40000	2000	0.015
	2	40000	2000	0.02	40000	2000	0.015
	3	40000	1200	0.015	40000	1200	0.01
	4	36000	900	0.01	36000	900	0.007
	5	36000	700	0.007	36000	600	0.005
	6	36000	600	0.006	36000	500	0.004
R0.3	2	40000	2800	0.03	40000	2800	0.02
	3	40000	2800	0.03	40000	2800	0.02
	4	35000	2000	0.02	35000	2000	0.015
	5	30000	1000	0.01	30000	1000	0.007
	6	30000	800	0.008	30000	800	0.005
	7	30000	600	0.008	30000	600	0.005
	8	25000	400	0.006	25000	400	0.004
R0.4	2	40000	3500	0.04	40000	3500	0.03
	3	40000	3000	0.04	40000	3000	0.03
	4	40000	3000	0.02	40000	3000	0.015
	6	30000	1600	0.02	30000	1600	0.01
	8	25000	1000	0.01	25000	1000	0.007
	10	25000	600	0.008	25000	600	0.005
R0.5	3	40000	4000	0.05	40000	4000	0.04
	4	40000	4000	0.05	40000	4000	0.04
	5	40000	3000	0.03	40000	3000	0.02
	6	35000	2000	0.03	35000	2000	0.02
	8	30000	1600	0.02	30000	1600	0.01
	10	20000	1000	0.01	20000	1000	0.01
	12	20000	1000	0.01	18000	800	0.008
	14	18000	600	0.008	18000	480	0.008
	16	18000	500	0.008	18000	400	0.006
	18	13000	300	0.005	13000	240	0.004
	20	13000	250	0.005	13000	200	0.004
R0.6	6	40000	4000	0.05	35000	3500	0.04
	8	40000	3000	0.05	27000	2000	0.04
	10	27000	1900	0.03	24000	1700	0.02
	12	16000	1100	0.02	16000	1000	0.01
	14	16000	850	0.01	16000	780	0.01
	16	15000	500	0.01	14000	400	0.006

VF2XLBS

Work material		Hardened steel (45— 55HRC) AISI H13			Hardened steel (55— 62HRC) AISI D2		
R RE (mm)	Neck length LU(mm)	Revolution (min⁻¹)	Feed rate (mm/min)	Depth of cut ap (mm)	Revolution (min⁻¹)	Feed rate (mm/min)	Depth of cut ap (mm)
R0.7	8	40000	4500	0.06	28000	3200	0.05
	12	32000	3000	0.03	19000	1800	0.02
	16	15000	1000	0.02	14000	800	0.01
R0.75	6	40000	5000	0.07	32000	4000	0.06
	8	40000	5000	0.07	28000	3500	0.06
	10	40000	4500	0.06	21000	2400	0.04
	12	32000	3400	0.04	19000	2000	0.03
	14	16000	1500	0.04	13000	1200	0.03
	16	13000	1200	0.03	13000	1200	0.02
	18	13000	1100	0.02	10000	800	0.02
	20	12000	900	0.02	9000	700	0.01
R0.8	8	40000	5000	0.08	26000	3200	0.07
	12	35000	3800	0.05	20000	2100	0.03
	16	13000	1200	0.04	12000	1100	0.02
	20	10000	750	0.02	8000	600	0.01
R0.9	8	40000	5000	0.09	25000	3100	0.08
	12	36000	3800	0.06	18000	1900	0.04
	16	25000	2500	0.04	14000	1300	0.025
	20	10000	1000	0.03	8000	800	0.02
R1	6	40000	6000	0.1	24000	3400	0.1
	8	40000	5000	0.1	24000	3000	0.1
	10	40000	5000	0.08	24000	3000	0.07
	12	40000	5000	0.08	24000	2600	0.05
	14	40000	5000	0.06	21000	2300	0.05
	16	32000	3500	0.05	16000	1700	0.03
	18	24000	2400	0.04	13000	1300	0.03
	20	10000	1000	0.04	10000	1000	0.03
	22	10000	1000	0.04	10000	1000	0.02
	25	10000	1000	0.04	8000	800	0.02
	30	10000	800	0.02	8000	800	0.015
	35	10000	500	0.02	8000	400	0.01
R1.25	10	36000	5000	0.12	20000	2600	0.11
	15	36000	4600	0.08	18000	2000	0.075
	20	26000	3000	0.07	13000	1400	0.05
	25	10000	1100	0.06	8000	800	0.04
	30	8000	800	0.05	7000	700	0.03
	35	8000	500	0.03	5000	400	0.03
R1.5	8	32000	6400	0.15	16000	3000	0.15
	10	32000	5100	0.15	16000	2200	0.15
	12	32000	5100	0.13	16000	2200	0.13
	14	32000	4500	0.13	16000	2200	0.1
	16	32000	4500	0.1	16000	1800	0.1
	20	27000	3800	0.1	14000	1600	0.06
	25	21000	2700	0.08	11000	1200	0.06
	30	9000	1000	0.08	7000	700	0.05
	35	6000	700	0.06	6000	600	0.04
	40	6000	600	0.04	5000	400	0.03
R1.75	16	28000	4200	0.13	14000	1600	0.13
	20	26000	3800	0.13	13000	1600	0.11
	25	23000	3300	0.12	11000	1200	0.08
	30	13000	1900	0.09	9000	1000	0.07
	35	9000	1200	0.08	6000	600	0.06
	40	8500	1100	0.07	5500	500	0.04
R2	10	24000	4800	0.2	12000	2200	0.2
	12	24000	4800	0.2	12000	2200	0.2
	14	24000	3800	0.15	12000	1500	0.15

VF2XLBS

Work material		Hardened steel (45— 55HRC) AISI H13			Hardened steel (55— 62HRC) AISI D2		
R RE (mm)	Neck length LU(mm)	Revolution (min⁻¹)	Feed rate (mm/min)	Depth of cut ap (mm)	Revolution (min⁻¹)	Feed rate (mm/min)	Depth of cut ap (mm)
	16	24000	3800	0.15	12000	1500	0.15
	20	24000	3800	0.15	12000	1500	0.15
	25	24000	3800	0.15	10000	1100	0.1
	30	20000	3000	0.1	10000	1100	0.08
	35	12000	1700	0.1	8000	900	0.08
	40	11000	1500	0.1	5000	500	0.06
	45	10000	1300	0.08	5000	500	0.05
	50	8000	1000	0.05	4000	400	0.04
R2.5	20	19000	3400	0.2	10000	1400	0.2
	25	19000	3400	0.2	10000	1400	0.2
	30	19000	3200	0.15	8000	1000	0.15
	35	16000	2700	0.1	8000	900	0.1
R3	30	16000	3500	0.2	8000	1000	0.2
	40	16000	3000	0.15	8000	800	0.15
	50	16000	2700	0.15	6000	500	0.15



- If the depth of cut is shallow, the revolution and feed rate can be increased.
- Cutting condition may be considerably different due to the overhang (milling depth), depth of cut, and machine tools. Please see the above table as a standard.

VF2XLB

IMPACT MIRACLE END MILLS

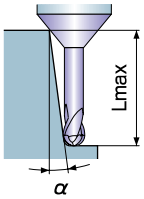
Ball nose, 2 flute, Long neck

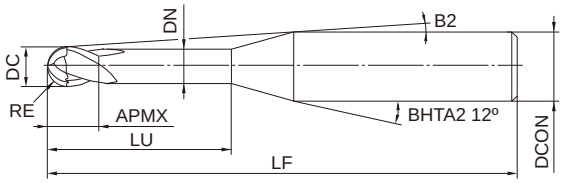
Product Information

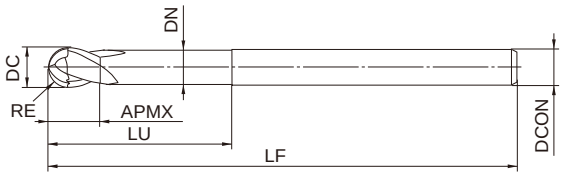
Work Material

P S H F M

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668







	RE≦1	RE>1
R	±0.007	±0.010
	0.2≦DC≦6	
	0 - 0.02	
h6	4≦DCON≦6	
	0 - 0.008	

- α: Inclined angle Lmax: Effective length
- Lmax indicates "0: Not available, blank: No interference".

●Inventory maintained in Japan. Unit : mm

Order Number	RE	DC	APMX	LU	DN	B2	LF	DCON	No. of Flutes	Stock	type	Effective length for inclined angle			
												0.5°	1°	2°	3°
VF2XLBR0010N005S04	0.1	0.2	0.16	0.5	0.17	11.5°	50	4	2	●	1	0.5	0.5	0.6	0.6
VF2XLBR0010N005S06	0.1	0.2	0.16	0.5	0.17	11.7°	50	6	2	●	1	0.5	0.5	0.6	0.6
VF2XLBR0010N008S04	0.1	0.2	0.16	0.75	0.17	11.2°	50	4	2	●	1	0.7	0.8	0.9	1
VF2XLBR0010N010S04	0.1	0.2	0.16	1	0.17	10.9°	50	4	2	●	1	1.0	1.1	1.2	1.3
VF2XLBR0010N010S06	0.1	0.2	0.16	1	0.17	11.3°	50	6	2	●	1	1.0	1.1	1.2	1.3
VF2XLBR0010N013S04	0.1	0.2	0.16	1.25	0.17	10.7°	50	4	2	●	1	1.3	1.3	1.5	1.6
VF2XLBR0010N015S04	0.1	0.2	0.16	1.5	0.17	10.4°	50	4	2	●	1	1.5	1.6	1.8	2.0
VF2XLBR0010N015S06	0.1	0.2	0.16	1.5	0.17	10.9°	50	6	2	●	1	1.5	1.6	1.8	2.0
VF2XLBR0010N018S04	0.1	0.2	0.16	1.75	0.17	10.2°	50	4	2	●	1	1.8	1.9	2.1	2.3
VF2XLBR0010N020S04	0.1	0.2	0.16	2	0.17	10°	50	4	2	●	1	2.1	2.2	2.4	2.6
VF2XLBR0010N025S04	0.1	0.2	0.16	2.5	0.17	9.5°	50	4	2	●	1	2.6	2.7	3	3.3
VF2XLBR0015N010S04	0.15	0.3	0.24	1	0.27	11°	50	4	2	●	1	1.0	1.1	1.2	1.3
VF2XLBR0015N010S06	0.15	0.3	0.24	1	0.27	11.3°	50	6	2	●	1	1.0	1.1	1.2	1.3
VF2XLBR0015N013S04	0.15	0.3	0.24	1.25	0.27	10.7°	50	4	2	●	1	1.3	1.3	1.5	1.6
VF2XLBR0015N015S04	0.15	0.3	0.24	1.5	0.27	10.4°	50	4	2	●	1	1.5	1.6	1.8	1.9
VF2XLBR0015N015S06	0.15	0.3	0.24	1.5	0.27	10.9°	50	6	2	●	1	1.5	1.6	1.8	1.9
VF2XLBR0015N018S04	0.15	0.3	0.24	1.75	0.27	10.2°	50	4	2	●	1	1.8	1.9	2.1	2.3
VF2XLBR0015N020S04	0.15	0.3	0.24	2	0.27	9.9°	50	4	2	●	1	2.1	2.2	2.4	2.6
VF2XLBR0015N020S06	0.15	0.3	0.24	2	0.27	10.6°	50	6	2	●	1	2.1	2.2	2.4	2.6
VF2XLBR0015N025S04	0.15	0.3	0.24	2.5	0.27	9.5°	50	4	2	●	1	2.6	2.7	3	3.3
VF2XLBR0015N030S04	0.15	0.3	0.24	3	0.27	9.1°	50	4	2	●	1	3.1	3.2	3.6	3.9
VF2XLBR0015N040S04	0.15	0.3	0.24	4	0.27	8.4°	50	4	2	●	1	4.2	4.3	4.8	5.3

VF2XLB

Order Number	RE	DC	APMX	LU	DN	B2	LF	DCON	No. of Flutes	Stock	type	Effective length for inclined angle			
												0.5°	1°	2°	3°
VF2XLBR0020N010S04	0.2	0.4	0.32	1	0.36	11°	50	4	2	●	1	1.0	1.0	1.1	1.2
VF2XLBR0020N010S06	0.2	0.4	0.32	1	0.36	11.3°	50	6	2	●	1	1.0	1.0	1.1	1.2
VF2XLBR0020N015S04	0.2	0.4	0.32	1.5	0.36	10.4°	50	4	2	●	1	1.5	1.6	1.7	1.9
VF2XLBR0020N015S06	0.2	0.4	0.32	1.5	0.36	11°	50	6	2	●	1	1.5	1.6	1.7	1.9
VF2XLBR0020N020S04	0.2	0.4	0.32	2	0.36	10°	50	4	2	●	1	2.0	2.1	2.3	2.6
VF2XLBR0020N020S06	0.2	0.4	0.32	2	0.36	10.6°	50	6	2	●	1	2.0	2.1	2.3	2.6
VF2XLBR0020N025S04	0.2	0.4	0.32	2.5	0.36	9.5°	50	4	2	●	1	2.6	2.7	2.9	3.2
VF2XLBR0020N025S06	0.2	0.4	0.32	2.5	0.36	10.3°	50	6	2	●	1	2.6	2.7	2.9	3.2
VF2XLBR0020N030S04	0.2	0.4	0.32	3	0.36	9.1°	50	4	2	●	1	3.1	3.2	3.5	3.9
VF2XLBR0020N030S06	0.2	0.4	0.32	3	0.36	10°	50	6	2	●	1	3.1	3.2	3.5	3.9
VF2XLBR0020N040S04	0.2	0.4	0.32	4	0.36	8.4°	50	4	2	●	1	4.1	4.3	4.7	5.2
VF2XLBR0020N050S04	0.2	0.4	0.32	5	0.36	7.8°	50	4	2	●	1	5.2	5.4	5.9	6.6
VF2XLBR0025N015S04	0.25	0.5	0.4	1.5	0.46	10.5°	50	4	2	●	1	1.5	1.6	1.7	1.9
VF2XLBR0025N015S06	0.25	0.5	0.4	1.5	0.46	11°	50	6	2	●	1	1.5	1.6	1.7	1.9
VF2XLBR0025N020S04	0.25	0.5	0.4	2	0.46	10°	50	4	2	●	1	2.0	2.1	2.3	2.6
VF2XLBR0025N020S06	0.25	0.5	0.4	2	0.46	10.6°	50	6	2	●	1	2.0	2.1	2.3	2.6
VF2XLBR0025N025S04	0.25	0.5	0.4	2.5	0.46	9.5°	50	4	2	●	1	2.6	2.7	2.9	3.2
VF2XLBR0025N030S04	0.25	0.5	0.4	3	0.46	9.1°	50	4	2	●	1	3.1	3.2	3.5	3.9
VF2XLBR0025N030S06	0.25	0.5	0.4	3	0.46	10°	50	6	2	●	1	3.1	3.2	3.5	3.9
VF2XLBR0025N035S04	0.25	0.5	0.4	3.5	0.46	8.7°	50	4	2	●	1	3.6	3.8	4.1	4.5
VF2XLBR0025N040S04	0.25	0.5	0.4	4	0.46	8.3°	50	4	2	●	1	4.1	4.3	4.7	5.2
VF2XLBR0025N040S06	0.25	0.5	0.4	4	0.46	9.4°	50	6	2	●	1	4.1	4.3	4.7	5.2
VF2XLBR0025N050S04	0.25	0.5	0.4	5	0.46	7.7°	50	4	2	●	1	5.2	5.4	5.9	6.5
VF2XLBR0025N050S06	0.25	0.5	0.4	5	0.46	8.9°	50	6	2	●	1	5.2	5.4	5.9	6.5
VF2XLBR0025N060S04	0.25	0.5	0.4	6	0.46	7.2°	50	4	2	●	1	6.2	6.5	7.1	7.9
VF2XLBR0025N060S06	0.25	0.5	0.4	6	0.46	8.4°	60	6	2	●	1	6.2	6.5	7.1	7.9
VF2XLBR0030N020S04	0.3	0.6	0.48	2	0.56	9.9°	50	4	2	●	1	2.1	2.2	2.4	2.6
VF2XLBR0030N020S06	0.3	0.6	0.48	2	0.56	10.6°	50	6	2	●	1	2.1	2.2	2.4	2.6
VF2XLBR0030N025S04	0.3	0.6	0.48	2.5	0.56	9.4°	50	4	2	●	1	2.6	2.7	3	3.3
VF2XLBR0030N030S04	0.3	0.6	0.48	3	0.56	9°	50	4	2	●	1	3.1	3.3	3.6	3.9
VF2XLBR0030N030S06	0.3	0.6	0.48	3	0.56	9.9°	50	6	2	●	1	3.1	3.3	3.6	3.9
VF2XLBR0030N035S04	0.3	0.6	0.48	3.5	0.56	8.6°	50	4	2	●	1	3.6	3.8	4.2	4.6
VF2XLBR0030N040S04	0.3	0.6	0.48	4	0.56	8.3°	50	4	2	●	1	4.2	4.4	4.8	5.2
VF2XLBR0030N040S06	0.3	0.6	0.48	4	0.56	9.3°	50	6	2	●	1	4.2	4.4	4.8	5.2
VF2XLBR0030N050S04	0.3	0.6	0.48	5	0.56	7.6°	50	4	2	●	1	5.2	5.4	6.0	6.6
VF2XLBR0030N050S06	0.3	0.6	0.48	5	0.56	8.8°	50	6	2	●	1	5.2	5.4	6.0	6.6
VF2XLBR0030N060S04	0.3	0.6	0.48	6	0.56	7.1°	50	4	2	●	1	6.3	6.5	7.1	7.9
VF2XLBR0030N060S06	0.3	0.6	0.48	6	0.56	8.4°	50	6	2	●	1	6.3	6.5	7.1	7.9
VF2XLBR0030N070S04	0.3	0.6	0.48	7	0.56	6.6°	50	4	2	●	1	7.3	7.6	8.3	9.2
VF2XLBR0030N080S04	0.3	0.6	0.48	8	0.56	6.2°	50	4	2	●	1	8.3	8.7	9.5	10.6
VF2XLBR0030N080S06	0.3	0.6	0.48	8	0.56	7.6°	60	6	2	●	1	8.3	8.7	9.5	10.6
VF2XLBR0040N020S04	0.4	0.8	0.64	2	0.76	9.9°	50	4	2	●	1	2.1	2.2	2.3	2.6
VF2XLBR0040N020S06	0.4	0.8	0.64	2	0.76	10.6°	50	6	2	●	1	2.1	2.2	2.3	2.6
VF2XLBR0040N030S04	0.4	0.8	0.64	3	0.76	8.9°	50	4	2	●	1	3.1	3.3	3.5	3.9
VF2XLBR0040N030S06	0.4	0.8	0.64	3	0.76	9.9°	50	6	2	●	1	3.1	3.3	3.5	3.9
VF2XLBR0040N040S04	0.4	0.8	0.64	4	0.76	8.2°	50	4	2	●	1	4.2	4.3	4.7	5.2
VF2XLBR0040N040S06	0.4	0.8	0.64	4	0.76	9.3°	50	6	2	●	1	4.2	4.3	4.7	5.2
VF2XLBR0040N050S04	0.4	0.8	0.64	5	0.76	7.5°	50	4	2	●	1	5.2	5.4	5.9	6.5
VF2XLBR0040N060S04	0.4	0.8	0.64	6	0.76	7°	50	4	2	●	1	6.3	6.5	7.1	7.9
VF2XLBR0040N060S06	0.4	0.8	0.64	6	0.76	8.3°	50	6	2	●	1	6.3	6.5	7.1	7.9
VF2XLBR0040N070S04	0.4	0.8	0.64	7	0.76	6.5°	50	4	2	●	1	7.3	7.6	8.3	9.2
VF2XLBR0040N080S04	0.4	0.8	0.64	8	0.76	6.1°	50	4	2	●	1	8.3	8.7	9.5	10.5
VF2XLBR0040N080S06	0.4	0.8	0.64	8	0.76	7.5°	50	6	2	●	1	8.3	8.7	9.5	10.5
VF2XLBR0040N100S04	0.4	0.8	0.64	10	0.76	5.4°	50	4	2	●	1	10.4	10.9	11.9	13.2

VF2XLB

Order Number	RE	DC	APMX	LU	DN	B2	LF	DCON	No. of Flutes	Stock	type	Effective length for inclined angle			
												0.5°	1°	2°	3°
VF2XLBR0040N100S06	0.4	0.8	0.64	10	0.76	6.8°	60	6	2	●	1	10.4	10.9	11.9	13.2
VF2XLBR0050N030S04	0.5	1	0.8	3	0.94	8.8°	50	4	2	●	1	3.2	3.3	3.6	4.0
VF2XLBR0050N030S06	0.5	1	0.8	3	0.94	9.8°	50	6	2	●	1	3.2	3.3	3.6	4.0
VF2XLBR0050N040S04	0.5	1	0.8	4	0.94	8°	50	4	2	●	1	4.2	4.4	4.8	5.3
VF2XLBR0050N040S06	0.5	1	0.8	4	0.94	9.2°	50	6	2	●	1	4.2	4.4	4.8	5.3
VF2XLBR0050N050S04	0.5	1	0.8	5	0.94	7.3°	50	4	2	●	1	5.3	5.5	6.0	6.7
VF2XLBR0050N050S06	0.5	1	0.8	5	0.94	8.7°	50	6	2	●	1	5.3	5.5	6.0	6.7
VF2XLBR0050N060S04	0.5	1	0.8	6	0.94	6.8°	50	4	2	●	1	6.3	6.6	7.2	8.0
VF2XLBR0050N060S06	0.5	1	0.8	6	0.94	8.2°	50	6	2	●	1	6.3	6.6	7.2	8.0
VF2XLBR0050N070S04	0.5	1	0.8	7	0.94	6.3°	50	4	2	●	1	7.4	7.7	8.4	9.3
VF2XLBR0050N080S04	0.5	1	0.8	8	0.94	5.9°	50	4	2	●	1	8.4	8.8	9.6	10.6
VF2XLBR0050N080S06	0.5	1	0.8	8	0.94	7.4°	50	6	2	●	1	8.4	8.8	9.6	10.6
VF2XLBR0050N090S04	0.5	1	0.8	9	0.94	5.5°	50	4	2	●	1	9.5	9.9	10.8	12
VF2XLBR0050N100S04	0.5	1	0.8	10	0.94	5.2°	50	4	2	●	1	10.5	11.0	12.0	13.3
VF2XLBR0050N100S06	0.5	1	0.8	10	0.94	6.7°	50	6	2	●	1	10.5	11.0	12.0	13.3
VF2XLBR0050N120S04	0.5	1	0.8	12	0.94	4.6°	50	4	2	●	1	12.6	13.2	14.4	15.9
VF2XLBR0050N120S06	0.5	1	0.8	12	0.94	6.1°	60	6	2	●	1	12.6	13.2	14.4	15.9
VF2XLBR0050N140S04	0.5	1	0.8	14	0.94	4.2°	60	4	2	●	1	14.7	15.3	16.8	18.6
VF2XLBR0050N160S04	0.5	1	0.8	16	0.94	3.8°	60	4	2	●	1	16.8	17.5	19.2	21.3
VF2XLBR0050N160S06	0.5	1	0.8	16	0.94	5.3°	70	6	2	●	1	16.8	17.5	19.2	21.3
VF2XLBR0050N180S04	0.5	1	0.8	18	0.94	3.5°	60	4	2	●	1	18.9	19.7	21.6	23.9
VF2XLBR0050N200S04	0.5	1	0.8	20	0.94	3.3°	60	4	2	●	1	21.0	21.9	24	26.6
VF2XLBR0050N200S06	0.5	1	0.8	20	0.94	4.6°	70	6	2	●	1	21.0	21.9	24	26.6
VF2XLBR0060N060S04	0.6	1.2	0.96	6	1.14	6.6°	50	4	2	●	1	6.3	6.6	7.2	8.0
VF2XLBR0060N060S06	0.6	1.2	0.96	6	1.14	8.1°	50	6	2	●	1	6.3	6.6	7.2	8.0
VF2XLBR0060N080S04	0.6	1.2	0.96	8	1.14	5.7°	50	4	2	●	1	8.4	8.8	9.6	10.6
VF2XLBR0060N080S06	0.6	1.2	0.96	8	1.14	7.3°	50	6	2	●	1	8.4	8.8	9.6	10.6
VF2XLBR0060N100S04	0.6	1.2	0.96	10	1.14	5°	50	4	2	●	1	10.5	11.0	12.0	13.3
VF2XLBR0060N100S06	0.6	1.2	0.96	10	1.14	6.6°	50	6	2	●	1	10.5	11.0	12.0	13.3
VF2XLBR0060N120S04	0.6	1.2	0.96	12	1.14	4.5°	50	4	2	●	1	12.6	13.2	14.4	15.9
VF2XLBR0060N120S06	0.6	1.2	0.96	12	1.14	6°	50	6	2	●	1	12.6	13.2	14.4	15.9
VF2XLBR0060N140S04	0.6	1.2	0.96	14	1.14	4°	60	4	2	●	1	14.7	15.3	16.8	18.6
VF2XLBR0060N160S04	0.6	1.2	0.96	16	1.14	3.7°	60	4	2	●	1	16.8	17.5	19.2	21.2
VF2XLBR0060N160S06	0.6	1.2	0.96	16	1.14	5.2°	70	6	2	●	1	16.8	17.5	19.2	21.2
VF2XLBR0070N080S04	0.7	1.4	1.12	8	1.34	5.5°	50	4	2	●	1	8.4	8.8	9.6	10.6
VF2XLBR0070N120S04	0.7	1.4	1.12	12	1.34	4.3°	50	4	2	●	1	12.6	13.1	14.4	15.9
VF2XLBR0070N160S04	0.7	1.4	1.12	16	1.34	3.5°	60	4	2	●	1	16.8	17.5	19.2	21.2
VF2XLBR0075N060S04	0.75	1.5	1.2	6	1.44	6.3°	50	4	2	●	1	6.3	6.6	7.2	7.9
VF2XLBR0075N060S06	0.75	1.5	1.2	6	1.44	8°	50	6	2	●	1	6.3	6.6	7.2	7.9
VF2XLBR0075N080S04	0.75	1.5	1.2	8	1.44	5.4°	50	4	2	●	1	8.4	8.8	9.6	10.6
VF2XLBR0075N080S06	0.75	1.5	1.2	8	1.44	7.2°	50	6	2	●	1	8.4	8.8	9.6	10.6
VF2XLBR0075N100S04	0.75	1.5	1.2	10	1.44	4.7°	50	4	2	●	1	10.5	11.0	12.0	13.2
VF2XLBR0075N100S06	0.75	1.5	1.2	10	1.44	6.5°	50	6	2	●	1	10.5	11.0	12.0	13.2
VF2XLBR0075N120S04	0.75	1.5	1.2	12	1.44	4.2°	50	4	2	●	1	12.6	13.1	14.4	15.9
VF2XLBR0075N120S06	0.75	1.5	1.2	12	1.44	5.9°	50	6	2	●	1	12.6	13.1	14.4	15.9
VF2XLBR0075N140S04	0.75	1.5	1.2	14	1.44	3.8°	50	4	2	●	1	14.7	15.3	16.8	18.5
VF2XLBR0075N140S06	0.75	1.5	1.2	14	1.44	5.4°	50	6	2	●	1	14.7	15.3	16.8	18.5
VF2XLBR0075N160S04	0.75	1.5	1.2	16	1.44	3.4°	60	4	2	●	1	16.8	17.5	19.2	21.2
VF2XLBR0075N160S06	0.75	1.5	1.2	16	1.44	5°	60	6	2	●	1	16.8	17.5	19.2	21.2
VF2XLBR0075N180S04	0.75	1.5	1.2	18	1.44	3.1°	60	4	2	●	1	18.9	19.7	21.6	23.8
VF2XLBR0075N200S04	0.75	1.5	1.2	20	1.44	2.9°	60	4	2	●	1	21.0	21.9	23.9	
VF2XLBR0075N200S06	0.75	1.5	1.2	20	1.44	4.3°	70	6	2	●	1	21.0	21.9	23.9	26.5
VF2XLBR0080N080S04	0.8	1.6	1.28	8	1.54	5.3°	50	4	2	●	1	8.4	8.8	9.6	10.5
VF2XLBR0080N120S04	0.8	1.6	1.28	12	1.54	4.1°	50	4	2	●	1	12.6	13.1	14.4	15.9

VF2XLB

Order Number	RE	DC	APMX	LU	DN	B2	LF	DCON	No. of Flutes	Stock	type	Effective length for inclined angle			
												0.5°	1°	2°	3°
VF2XLBR0080N160S04	0.8	1.6	1.28	16	1.54	3.3°	60	4	2	●	1	16.8	17.5	19.1	21.2
VF2XLBR0080N200S04	0.8	1.6	1.28	20	1.54	2.8°	60	4	2	●	1	21.0	21.9	23.9	
VF2XLBR0090N080S04	0.9	1.8	1.44	8	1.74	5.1°	50	4	2	●	1	8.4	8.8	9.6	10.5
VF2XLBR0090N120S04	0.9	1.8	1.44	12	1.74	3.9°	50	4	2	●	1	12.6	13.1	14.3	15.8
VF2XLBR0090N160S04	0.9	1.8	1.44	16	1.74	3.1°	60	4	2	●	1	16.8	17.5	19.1	21.1
VF2XLBR0090N200S04	0.9	1.8	1.44	20	1.74	2.6°	60	4	2	●	1	20.9	21.8	23.9	
VF2XLBR0100N060S04	1	2	1.6	6	1.9	5.8°	50	4	2	●	1	6.2	6.5	7.0	7.7
VF2XLBR0100N060S06	1	2	1.6	6	1.9	7.9°	50	6	2	●	1	6.2	6.5	7.0	7.7
VF2XLBR0100N080S04	1	2	1.6	8	1.9	4.9°	50	4	2	●	1	8.3	8.7	9.4	10.4
VF2XLBR0100N080S06	1	2	1.6	8	1.9	6.9°	50	6	2	●	1	8.3	8.7	9.4	10.4
VF2XLBR0100N100S04	1	2	1.6	10	1.9	4.2°	50	4	2	●	1	10.4	10.9	11.8	13.0
VF2XLBR0100N100S06	1	2	1.6	10	1.9	6.2°	50	6	2	●	1	10.4	10.9	11.8	13.0
VF2XLBR0100N120S04	1	2	1.6	12	1.9	3.7°	50	4	2	●	1	12.5	13.0	14.2	15.7
VF2XLBR0100N120S06	1	2	1.6	12	1.9	5.6°	50	6	2	●	1	12.5	13.0	14.2	15.7
VF2XLBR0100N140S04	1	2	1.6	14	1.9	3.3°	50	4	2	●	1	14.6	15.2	16.6	18.3
VF2XLBR0100N140S06	1	2	1.6	14	1.9	5.1°	50	6	2	●	1	14.6	15.2	16.6	18.3
VF2XLBR0100N160S04	1	2	1.6	16	1.9	2.9°	60	4	2	●	1	16.7	17.4	19.0	
VF2XLBR0100N160S06	1	2	1.6	16	1.9	4.7°	60	6	2	●	1	16.7	17.4	19.0	21.0
VF2XLBR0100N180S04	1	2	1.6	18	1.9	2.7°	60	4	2	●	1	18.8	19.6	21.4	
VF2XLBR0100N180S06	1	2	1.6	18	1.9	4.4°	60	6	2	●	1	18.8	19.6	21.4	23.6
VF2XLBR0100N200S04	1	2	1.6	20	1.9	2.5°	60	4	2	●	1	20.9	21.8	23.8	
VF2XLBR0100N200S06	1	2	1.6	20	1.9	4.1°	60	6	2	●	1	20.9	21.8	23.8	26.3
VF2XLBR0100N220S04	1	2	1.6	22	1.9	2.3°	60	4	2	●	1	22.9	23.9	26.2	
VF2XLBR0100N250S04	1	2	1.6	25	1.9	2°	70	4	2	●	1	26.1	27.2		
VF2XLBR0100N250S06	1	2	1.6	25	1.9	3.5°	70	6	2	●	1	26.1	27.2	29.8	32.9
VF2XLBR0100N300S04	1	2	1.6	30	1.9	1.7°	70	4	2	●	1	31.3	32.6		
VF2XLBR0100N300S06	1	2	1.6	30	1.9	3°	80	6	2	●	1	31.3	32.6	35.8	
VF2XLBR0100N350S04	1	2	1.6	35	1.9	1.5°	80	4	2	●	1	36.5	38.1		
VF2XLBR0125N100S06	1.25	2.5	2	10	2.4	5.9°	60	6	2	●	1	10.4	10.8	11.8	12.9
VF2XLBR0125N150S06	1.25	2.5	2	15	2.4	4.6°	60	6	2	●	1	15.6	16.3	17.8	19.6
VF2XLBR0125N200S06	1.25	2.5	2	20	2.4	3.7°	70	6	2	●	1	20.8	21.7	23.8	26.2
VF2XLBR0125N250S06	1.25	2.5	2	25	2.4	3.2°	70	6	2	●	1	26.1	27.2	29.7	32.9
VF2XLBR0125N300S06	1.25	2.5	2	30	2.4	2.8°	80	6	2	●	1	31.3	32.6	35.7	
VF2XLBR0125N350S06	1.25	2.5	2	35	2.4	2.4°	80	6	2	●	1	36.5	38.1	41.7	
VF2XLBR0150N080S06	1.5	3	2.4	8	2.9	6.3°	60	6	2	●	1	8.3	8.6	9.3	10.2
VF2XLBR0150N100S06	1.5	3	2.4	10	2.9	5.5°	60	6	2	●	1	10.4	10.8	11.7	12.9
VF2XLBR0150N120S06	1.5	3	2.4	12	2.9	4.9°	60	6	2	●	1	12.5	13.0	14.1	15.5
VF2XLBR0150N140S06	1.5	3	2.4	14	2.9	4.4°	60	6	2	●	1	14.6	15.2	16.5	18.2
VF2XLBR0150N160S06	1.5	3	2.4	16	2.9	4°	60	6	2	●	1	16.7	17.3	18.9	20.8
VF2XLBR0150N200S06	1.5	3	2.4	20	2.9	3.4°	70	6	2	●	1	20.8	21.7	23.7	26.1
VF2XLBR0150N250S06	1.5	3	2.4	25	2.9	2.8°	70	6	2	●	1	26.1	27.2	29.7	
VF2XLBR0150N300S06	1.5	3	2.4	30	2.9	2.5°	70	6	2	●	1	31.3	32.6	35.7	
VF2XLBR0150N350S06	1.5	3	2.4	35	2.9	2.2°	80	6	2	●	1	36.5	38.0	41.7	
VF2XLBR0150N400S06	1.5	3	2.4	40	2.9	1.9°	90	6	2	●	1	41.7	43.5		
VF2XLBR0175N160S06	1.75	3.5	2.8	16	3.4	3.6°	60	6	2	●	1	16.7	17.3	18.9	20.8
VF2XLBR0175N200S06	1.75	3.5	2.8	20	3.4	3°	70	6	2	●	1	20.8	21.7	23.7	
VF2XLBR0175N250S06	1.75	3.5	2.8	25	3.4	2.5°	70	6	2	●	1	26.0	27.1	29.6	
VF2XLBR0175N300S06	1.75	3.5	2.8	30	3.4	2.1°	80	6	2	●	1	31.3	32.6	35.6	
VF2XLBR0175N350S06	1.75	3.5	2.8	35	3.4	1.9°	80	6	2	●	1	36.5	38.0		
VF2XLBR0175N400S06	1.75	3.5	2.8	40	3.4	1.7°	90	6	2	●	1	41.7	43.5		
VF2XLBR0200N100S06	2	4	3.2	10	3.9	4.5°	70	6	2	●	1	10.4	10.8	11.6	12.7
VF2XLBR0200N120S06	2	4	3.2	12	3.9	3.9°	70	6	2	●	1	12.5	12.9	14.0	15.4
VF2XLBR0200N140S06	2	4	3.2	14	3.9	3.4°	70	6	2	●	1	14.6	15.1	16.4	18.0
VF2XLBR0200N160S06	2	4	3.2	16	3.9	3.1°	70	6	2	●	1	16.6	17.3	18.8	20.7

VF2XLB

Order Number	RE	DC	APMX	LU	DN	B2	LF	DCON	No. of Flutes	Stock	type	Effective length for inclined angle			
												0.5°	1°	2°	3°
VF2XLBR0200N200S06	2	4	3.2	20	3.9	2.6°	70	6	2	●	1	20.8	21.7	23.6	
VF2XLBR0200N250S06	2	4	3.2	25	3.9	2.1°	70	6	2	●	1	26.0	27.1	29.6	
VF2XLBR0200N300S06	2	4	3.2	30	3.9	1.8°	70	6	2	●	1	31.2	32.6		
VF2XLBR0200N350S06	2	4	3.2	35	3.9	1.6°	80	6	2	●	1	36.5	38.0		
VF2XLBR0200N400S06	2	4	3.2	40	3.9	1.4°	90	6	2	●	1	41.7	43.5		
VF2XLBR0200N450S06	2	4	3.2	45	3.9	1.2°	90	6	2	●	1	46.9	48.9		
VF2XLBR0200N500S06	2	4	3.2	50	3.9	1.1°	100	6	2	●	1	52.1	54.3		
VF2XLBR0250N200S06	2.5	5	4	20	4.9	1.5°	70	6	2	●	1	20.8	21.6		
VF2XLBR0250N250S06	2.5	5	4	25	4.9	1.2°	70	6	2	●	1	26.0	27.1		
VF2XLBR0250N300S06	2.5	5	4	30	4.9	1°	80	6	2	●	1	31.2			
VF2XLBR0250N350S06	2.5	5	4	35	4.9	0.9°	80	6	2	●	1	36.4			
VF2XLBR0300N300S06	3	6	4.8	30	5.85		80	6	2	●	2				
VF2XLBR0300N400S06	3	6	4.8	40	5.85		90	6	2	●	2				
VF2XLBR0300N500S06	3	6	4.8	50	5.85		100	6	2	●	2				

VF2XLB

RECOMMENDED CUTTING CONDITIONS

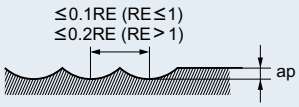
Work material		Hardened steel (45— 55HRC) AISI H13			Hardened steel (55— 62HRC) AISI D2		
R RE (mm)	Neck length LU(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap (mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap (mm)
R0.1	0.5	40000	300	0.003	40000	300	0.002
	1	40000	300	0.002	40000	300	0.002
	1.5	40000	300	0.001	40000	200	0.001
	2	40000	200	0.001	40000	100	0.001
	2.5	40000	100	0.001	40000	60	0.001
R0.15	1	40000	500	0.007	40000	500	0.005
	1.5	40000	500	0.005	40000	500	0.003
	2	40000	500	0.003	40000	500	0.002
	2.5	40000	400	0.003	40000	400	0.002
	3	40000	300	0.002	40000	300	0.001
	4	30000	200	0.002	30000	200	0.001
R0.2	1	40000	1400	0.015	40000	1400	0.01
	1.5	40000	1000	0.01	40000	1000	0.006
	2	40000	1000	0.01	40000	1000	0.006
	2.5	40000	700	0.005	40000	700	0.003
	3	40000	700	0.005	40000	700	0.003
	4	40000	600	0.004	40000	500	0.003
	5	40000	400	0.003	40000	300	0.002
R0.25	1.5	40000	2000	0.02	40000	2000	0.015
	2	40000	2000	0.02	40000	2000	0.015
	3	40000	1200	0.015	40000	1200	0.01
	4	36000	900	0.01	36000	900	0.007
	5	36000	700	0.007	36000	600	0.005
	6	36000	600	0.006	36000	500	0.004
R0.3	2	40000	2800	0.03	40000	2800	0.02
	3	40000	2800	0.03	40000	2800	0.02
	4	35000	2000	0.02	35000	2000	0.015
	5	30000	1000	0.01	30000	1000	0.007
	6	30000	800	0.008	30000	800	0.005
	7	30000	600	0.008	30000	600	0.005
	8	25000	400	0.006	25000	400	0.004
R0.4	2	40000	3500	0.04	40000	3500	0.03
	3	40000	3000	0.04	40000	3000	0.03
	4	40000	3000	0.02	40000	3000	0.015
	6	30000	1600	0.02	30000	1600	0.01
	8	25000	1000	0.01	25000	1000	0.007
	10	25000	600	0.008	25000	600	0.005
R0.5	3	40000	4000	0.05	40000	4000	0.04
	4	40000	4000	0.05	40000	4000	0.04
	5	40000	3000	0.03	40000	3000	0.02
	6	35000	2000	0.03	35000	2000	0.02
	8	30000	1600	0.02	30000	1600	0.01
	10	20000	1000	0.01	20000	1000	0.01
	12	20000	1000	0.01	18000	800	0.008
	14	18000	600	0.008	18000	480	0.008
	16	18000	500	0.008	18000	400	0.006
	18	13000	300	0.005	13000	240	0.004
	20	13000	250	0.005	13000	200	0.004
R0.6	6	40000	4000	0.05	35000	3500	0.04
	8	40000	3000	0.05	27000	2000	0.04
	10	27000	1900	0.03	24000	1700	0.02
	12	16000	1100	0.02	16000	1000	0.01
	14	16000	850	0.01	16000	780	0.01
	16	15000	500	0.01	14000	400	0.006
R0.7	8	40000	4500	0.06	28000	3200	0.05

VF2XLB

Work material		Hardened steel (45— 55HRC) AISI H13			Hardened steel (55— 62HRC) AISI D2		
R RE (mm)	Neck length LU(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap (mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap (mm)
	12	32000	3000	0.03	19000	1800	0.02
	16	15000	1000	0.02	14000	800	0.01
R0.75	6	40000	5000	0.07	32000	4000	0.06
	8	40000	5000	0.07	28000	3500	0.06
	10	40000	4500	0.06	21000	2400	0.04
	12	32000	3400	0.04	19000	2000	0.03
	14	16000	1500	0.04	13000	1200	0.03
	16	13000	1200	0.03	13000	1200	0.02
	18	13000	1100	0.02	10000	800	0.02
	20	12000	900	0.02	9000	700	0.01
R0.8	8	40000	5000	0.08	26000	3200	0.07
	12	35000	3800	0.05	20000	2100	0.03
	16	13000	1200	0.04	12000	1100	0.02
	20	10000	750	0.02	8000	600	0.01
R0.9	8	40000	5000	0.09	25000	3100	0.08
	12	36000	3800	0.06	18000	1900	0.04
	16	25000	2500	0.04	14000	1300	0.025
	20	10000	1000	0.03	8000	800	0.02
R1	6	40000	6000	0.1	24000	3400	0.1
	8	40000	5000	0.1	24000	3000	0.1
	10	40000	5000	0.08	24000	3000	0.07
	12	40000	5000	0.08	24000	2600	0.05
	14	40000	5000	0.06	21000	2300	0.05
	16	32000	3500	0.05	16000	1700	0.03
	18	24000	2400	0.04	13000	1300	0.03
	20	10000	1000	0.04	10000	1000	0.03
	22	10000	1000	0.04	10000	1000	0.02
	25	10000	1000	0.04	8000	800	0.02
	30	10000	800	0.02	8000	800	0.015
	35	10000	500	0.02	8000	400	0.01
R1.25	10	36000	5000	0.12	20000	2600	0.11
	15	36000	4600	0.08	18000	2000	0.075
	20	26000	3000	0.07	13000	1400	0.05
	25	10000	1100	0.06	8000	800	0.04
	30	8000	800	0.05	7000	700	0.03
	35	8000	500	0.03	5000	400	0.03
R1.5	8	32000	6400	0.15	16000	3000	0.15
	10	32000	5100	0.15	16000	2200	0.15
	12	32000	5100	0.13	16000	2200	0.13
	14	32000	4500	0.13	16000	2200	0.1
	16	32000	4500	0.1	16000	1800	0.1
	20	27000	3800	0.1	14000	1600	0.06
	25	21000	2700	0.08	11000	1200	0.06
	30	9000	1000	0.08	7000	700	0.05
	35	6000	700	0.06	6000	600	0.04
	40	6000	600	0.04	5000	400	0.03
R1.75	16	28000	4200	0.13	14000	1600	0.13
	20	26000	3800	0.13	13000	1600	0.11
	25	23000	3300	0.12	11000	1200	0.08
	30	13000	1900	0.09	9000	1000	0.07
	35	9000	1200	0.08	6000	600	0.06
	40	8500	1100	0.07	5500	500	0.04
R2	10	24000	4800	0.2	12000	2200	0.2
	12	24000	4800	0.2	12000	2200	0.2
	14	24000	3800	0.15	12000	1500	0.15
	16	24000	3800	0.15	12000	1500	0.15
	20	24000	3800	0.15	12000	1500	0.15
	25	24000	3800	0.15	10000	1100	0.1

VF2XLB

Work material		Hardened steel (45— 55HRC) AISI H13			Hardened steel (55— 62HRC) AISI D2		
R RE (mm)	Neck length LU(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)
	30	20000	3000	0.1	10000	1100	0.08
	35	12000	1700	0.1	8000	900	0.08
	40	11000	1500	0.1	5000	500	0.06
	45	10000	1300	0.08	5000	500	0.05
	50	8000	1000	0.05	4000	400	0.04
R2.5	20	19000	3400	0.2	10000	1400	0.2
	25	19000	3400	0.2	10000	1400	0.2
	30	19000	3200	0.15	8000	1000	0.15
	35	16000	2700	0.1	8000	900	0.1
R3	30	16000	3500	0.2	8000	1000	0.2
	40	16000	3000	0.15	8000	800	0.15
	50	16000	2700	0.15	6000	500	0.15



- If the depth of cut is shallow, the revolution and feed rate can be increased.
- Cutting condition may be considerably different due to the overhang (milling depth), depth of cut, and machine tools. Please see the above table as a standard.

VC2ESB

MIRACLE END MILLS

Ball nose, Extra short cut length, 2 flute, Short shank

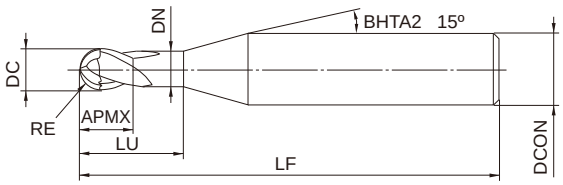
Product Information

UWC 30° VC

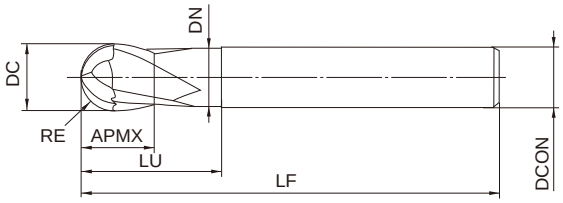
Work Material

P M S H F M

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668



Type1



Type2

R	0.15≦RE≦6		
	±0.01		
	0.3≦DC≦12		
	0 - 0.020		
h6	4≦DCON≦6	8≦DCON≦10	DCON=12
	0 - 0.008	0 - 0.009	0 - 0.011

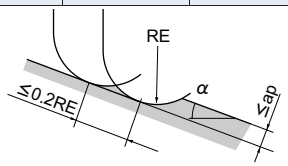
●Inventory maintained in Japan. Unit : mm

Order Number	RE	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	type
VC2ESBR0015N006	0.15	0.3	0.3	0.6	0.27	30	4	2	●	1
VC2ESBR0020N008	0.2	0.4	0.4	0.8	0.36	30	4	2	●	1
VC2ESBR0030N012	0.3	0.6	0.6	1.2	0.56	30	4	2	●	1
VC2ESBR0040N016	0.4	0.8	0.8	1.6	0.76	30	4	2	●	1
VC2ESBR0050	0.5	1	1			30	4	2	●	1
VC2ESBR0050N025	0.5	1	1	2.5	0.94	30	4	2	●	1
VC2ESBR0075	0.75	1.5	1.5			30	4	2	●	1
VC2ESBR0075N040	0.75	1.5	1.5	4	1.44	30	4	2	●	1
VC2ESBR0100	1	2	2			40	6	2	●	1
VC2ESBR0100N060	1	2	2	6	1.9	40	6	2	●	1
VC2ESBR0150	1.5	3	3			40	6	2	●	1
VC2ESBR0150N080	1.5	3	3	8	2.9	40	6	2	●	1
VC2ESBR0200	2	4	4			40	6	2	●	1
VC2ESBR0200N080	2	4	4	8	3.9	40	6	2	●	1
VC2ESBR0250	2.5	5	5			40	6	2	●	1
VC2ESBR0250N120	2.5	5	5	12	4.9	40	6	2	●	1
VC2ESBR0300	3	6	6			40	6	2	●	2
VC2ESBR0300N130	3	6	6	13	5.85	40	6	2	●	2
VC2ESBR0350	3.5	7	7			50	8	2	●	1
VC2ESBR0400	4	8	8			50	8	2	●	2
VC2ESBR0500	5	10	10			60	10	2	●	2
VC2ESBR0600	6	12	12			65	12	2	●	2

VC2ESB

RECOMMENDED CUTTING CONDITIONS

Work material	Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21					Hardened steel (45— 55HRC) AISI H13				
R RE (mm)	α≦15°		α>15°		Depth of cut ap (mm)	α≦15°		α>15°		Depth of cut ap (mm)
	Revolution (min⁻¹)	Feed rate (mm/min)	Revolution (min⁻¹)	Feed rate (mm/min)		Revolution (min⁻¹)	Feed rate (mm/min)	Revolution (min⁻¹)	Feed rate (mm/min)	
R0.5	40000	5600	40000	3200	0.06	40000	5600	40000	3000	0.06
R0.75	40000	6500	40000	3200	0.09	40000	6500	32000	3200	0.09
R1	40000	6500	39000	3800	0.11	40000	6500	31000	3500	0.11
R1.5	40000	7500	27000	4300	0.13	32000	6000	22000	3400	0.13
R2	32000	7500	20000	3600	0.15	25000	6000	16000	2700	0.15
R2.5	25000	6000	16000	2900	0.20	20000	5400	13000	2300	0.20
R3	21000	5800	13000	2600	0.25	17000	4700	10000	2000	0.25
R4	16000	4500	10000	2000	0.30	13000	3600	8000	1500	0.30
R5	13000	3600	8000	1700	0.50	10000	2900	6400	1200	0.50
R6	9000	2500	6000	1300	0.50	7200	2000	4800	1000	0.50



- α is the inclination angle of the machined surface.
- If the depth of cut is shallow, the revolution and feed rate can be increased.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

·Using general machining center or NC milling machine. (Large depth of cut ≦0.8RE)

Work material	Carbon steel, Cast iron, Alloy steel (—30HRC) AISI 1050, AISI No 35 B, AISI P20		Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21	
R RE (mm)	Revolution (min⁻¹)	Feed rate (mm/min)	Revolution (min⁻¹)	Feed rate (mm/min)
R0.5	—	—	—	—
R1	8800	150	7000	110
R2	5800	280	4400	230
R3	4200	340	3100	240
R4	3200	360	2400	280
R5	2500	340	1900	260
R6	2100	300	1600	220
R8	1500	210	1200	170
R10	1200	170	960	130
R12.5	950	130	770	110

VC2PSB

MIRACLE END MILLS

Ball nose end mill, Short cut length, 2 flute, High precision

Product Information

UWC 0° 30° VC

RE<0.5 RE≧0.5 RE<0.5 RE≧0.5

Technical Info >> 1993

ISO13399 Property >> 1966

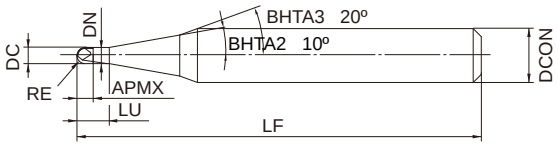
Work Material

P M S H F M

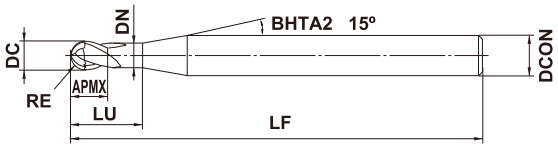
SYMBOL DESCRIPTIONS >> 664

END MILLS SELECTION CHART >> 668

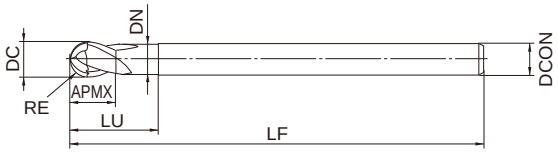
R	0.05≦RE≦6		
	±0.005		
	0.1≦DC≦12		
	0 - 0.01		
h5	DCON=6	8≦DCON≦10	DCON=12
	0 - 0.005	0 - 0.006	0 - 0.008



Type1



Type2



Type3

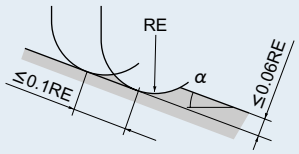
●Inventory maintained in Japan. Unit : mm

Order Number	RE	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	type
VC2PSBR0005	0.05	0.1	0.2			50	6	2	●	1
VC2PSBR0010	0.1	0.2	0.2	0.5	0.17	50	6	2	●	1
VC2PSBR0015	0.15	0.3	0.3	0.8	0.27	50	6	2	●	1
VC2PSBR0020	0.2	0.4	0.4	1	0.36	50	6	2	●	1
VC2PSBR0025	0.25	0.5	0.5	1.3	0.46	50	6	2	●	1
VC2PSBR0030	0.3	0.6	0.6	1.5	0.56	50	6	2	●	1
VC2PSBR0035	0.35	0.7	0.7	1.8	0.66	50	6	2	●	1
VC2PSBR0040	0.4	0.8	0.8	2	0.76	50	6	2	●	1
VC2PSBR0045	0.45	0.9	0.9	2.3	0.86	50	6	2	●	1
VC2PSBR0050	0.5	1	1.5	2.5	0.94	50	6	2	●	2
VC2PSBR0060	0.6	1.2	1.8	3	1.14	50	6	2	●	2
VC2PSBR0070	0.7	1.4	2.1	3.5	1.34	50	6	2	●	2
VC2PSBR0075	0.75	1.5	2.3	3.8	1.44	50	6	2	●	2
VC2PSBR0080	0.8	1.6	2.4	4	1.54	50	6	2	●	2
VC2PSBR0090	0.9	1.8	2.7	4.5	1.74	50	6	2	●	2
VC2PSBR0100	1	2	3	5	1.9	50	6	2	●	2
VC2PSBR0150	1.5	3	4.5	7.5	2.9	70	6	2	●	2
VC2PSBR0200	2	4	6	10	3.9	70	6	2	●	2
VC2PSBR0250	2.5	5	7.5	12.5	4.9	80	6	2	●	2
VC2PSBR0300	3	6	9	15	5.85	80	6	2	●	3
VC2PSBR0400	4	8	12	20	7.85	90	8	2	●	3
VC2PSBR0500	5	10	15	25	9.7	100	10	2	●	3
VC2PSBR0600	6	12	18	30	11.7	110	12	2	●	3

VC2PSB

RECOMMENDED CUTTING CONDITIONS

Work material	Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21				Hardened steel (45— 55HRC) AISI H13			
R RE (mm)	α≦15°		α>15°		α≦15°		α>15°	
	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
R0.05	40000	200	—	—	40000	170	—	—
R0.1	40000	600	40000	400	40000	600	40000	400
R0.15	40000	900	40000	600	40000	900	40000	600
R0.2	40000	1000	40000	700	40000	1000	40000	700
R0.25	40000	1500	40000	1000	40000	1500	40000	1000
R0.3	40000	2000	40000	1500	40000	2000	40000	1500
R0.35	40000	2800	40000	2100	40000	2800	37000	1800
R0.4	40000	2800	40000	2100	40000	2800	35000	1800
R0.45	40000	3200	38000	2200	38000	3000	32000	1800
R0.5	40000	3200	35000	2200	35000	3000	30000	1800
R0.75	40000	3600	30000	2300	32000	3000	25000	1800
R1	35000	3500	25000	2200	28000	2800	20000	1700
R1.5	30000	3400	23000	2200	24000	2600	16000	1500
R2	25000	3400	20000	2200	20000	2600	14000	1500
R2.5	23000	3400	17000	2200	18000	2600	12000	1500
R3	20000	3400	15000	2200	16000	2600	10000	1400
R4	15000	3000	12500	2000	10000	2000	7500	1200
R5	12000	3000	10000	2000	8000	2000	6000	1200
R6	10000	2600	8300	1800	6600	1700	5000	1100



- α is the inclination angle of the machined surface.
- If the depth of cut is shallow, the revolution and feed rate can be increased.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

VC2PSBP

MIRACLE END MILLS

Ball nose, Short cut length, 2 flute, Ultra high precision

Product Information

UWC 0° 30° VC

RE<0.5 RE≧0.5 RE<0.5 RE≧0.5

Technical Info >> 1993

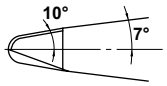
ISO13399 Property >> 1966

Work Material

P M S H F M

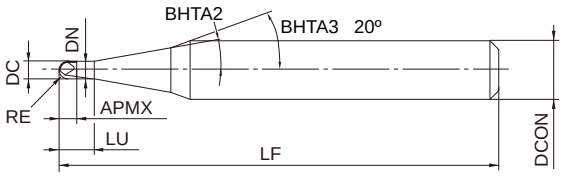
SYMBOL DESCRIPTIONS >> 664

END MILLS SELECTION CHART >> 668

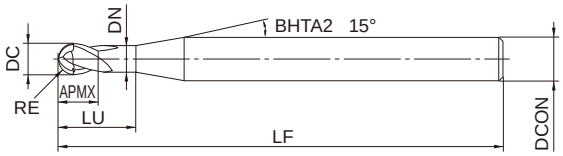


VC2PSBPR0002/3/4

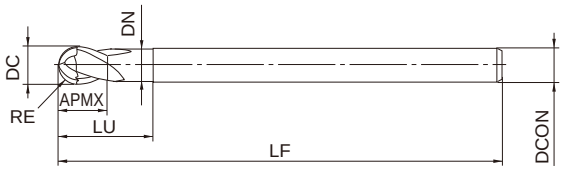
R	0.02≦RE≦6		
	±0.002		
	0.1≦DC≦12		
	0 - 0.01		
h5	DCON=6	8≦DCON≦10	DCON=12
	0 - 0.005	0 - 0.006	0 - 0.008



Type1



Type2



Type3

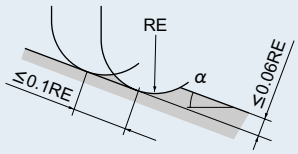
●Inventory maintained in Japan. Unit : mm

Order Number	RE	DC	BHTA2	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	type
VC2PSBPR0002	0.02	0.04	7°	0.06			50	6	2	□	1
VC2PSBPR0003	0.03	0.06	7°	0.09			50	6	2	□	1
VC2PSBPR0004	0.04	0.08	7°	0.12			50	6	2	□	1
VC2PSBPR0005	0.05	0.1	10°	0.2			50	6	2	●	1
VC2PSBPR0010	0.1	0.2	10°	0.2	0.5	0.17	50	6	2	●	1
VC2PSBPR0015	0.15	0.3	10°	0.3	0.8	0.27	50	6	2	●	1
VC2PSBPR0020	0.2	0.4	10°	0.4	1	0.36	50	6	2	●	1
VC2PSBPR0025	0.25	0.5	10°	0.5	1.3	0.46	50	6	2	●	1
VC2PSBPR0030	0.3	0.6	10°	0.6	1.5	0.56	50	6	2	●	1
VC2PSBPR0035	0.35	0.7	10°	0.7	1.8	0.66	50	6	2	●	1
VC2PSBPR0040	0.4	0.8	10°	0.8	2	0.76	50	6	2	●	1
VC2PSBPR0045	0.45	0.9	10°	0.9	2.3	0.86	50	6	2	●	1
VC2PSBPR0050	0.5	1	15°	1.5	2.5	0.94	50	6	2	●	2
VC2PSBPR0060	0.6	1.2	15°	1.8	3	1.14	50	6	2	●	2
VC2PSBPR0070	0.7	1.4	15°	2.1	3.5	1.34	50	6	2	●	2
VC2PSBPR0075	0.75	1.5	15°	2.3	3.8	1.44	50	6	2	●	2
VC2PSBPR0080	0.8	1.6	15°	2.4	4	1.54	50	6	2	●	2
VC2PSBPR0090	0.9	1.8	15°	2.7	4.5	1.74	50	6	2	●	2
VC2PSBPR0100	1	2	15°	3	5	1.9	50	6	2	●	2
VC2PSBPR0150	1.5	3	15°	4.5	7.5	2.9	70	6	2	●	2
VC2PSBPR0200	2	4	15°	6	10	3.9	70	6	2	●	2
VC2PSBPR0250	2.5	5	15°	7.5	12.5	4.9	80	6	2	●	2
VC2PSBPR0300	3	6	15°	9	15	5.85	80	6	2	●	3
VC2PSBPR0400	4	8	15°	12	20	7.85	90	8	2	●	3
VC2PSBPR0500	5	10	15°	15	25	9.7	100	10	2	●	3
VC2PSBPR0600	6	12	15°	18	30	11.7	110	12	2	●	3

VC2PSBP

RECOMMENDED CUTTING CONDITIONS

Work material	Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21				Hardened steel (45— 55HRC) AISI H13			
R RE (mm)	α≦15°		α>15°		α≦15°		α>15°	
	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
R0.05	40000	200	—	—	40000	170	—	—
R0.1	40000	600	40000	400	40000	600	40000	400
R0.15	40000	900	40000	600	40000	900	40000	600
R0.2	40000	1000	40000	700	40000	1000	40000	700
R0.25	40000	1500	40000	1000	40000	1500	40000	1000
R0.3	40000	2000	40000	1500	40000	2000	40000	1500
R0.35	40000	2800	40000	2100	40000	2800	37000	1800
R0.4	40000	2800	40000	2100	40000	2800	35000	1800
R0.45	40000	3200	38000	2200	38000	3000	32000	1800
R0.5	40000	3200	35000	2200	35000	3000	30000	1800
R0.75	40000	3600	30000	2300	32000	3000	25000	1800
R1	35000	3500	25000	2200	28000	2800	20000	1700
R1.5	30000	3400	23000	2200	24000	2600	16000	1500
R2	25000	3400	20000	2200	20000	2600	14000	1500
R2.5	23000	3400	17000	2200	18000	2600	12000	1500
R3	20000	3400	15000	2200	16000	2600	10000	1400
R4	15000	3000	12500	2000	10000	2000	7500	1200
R5	12000	3000	10000	2000	8000	2000	6000	1200
R6	10000	2600	8300	1800	6600	1700	5000	1100



- α is the inclination angle of the machined surface.
- If the depth of cut is shallow, the revolution and feed rate can be increased.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

VC2MB

MIRACLE END MILLS

Ball nose, Medium cut length, 2 flute

Product Information

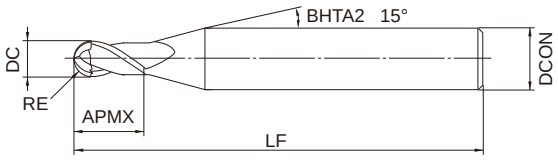
UWC 30° VC

Work Material

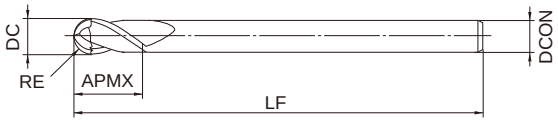
P M S H F M

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668

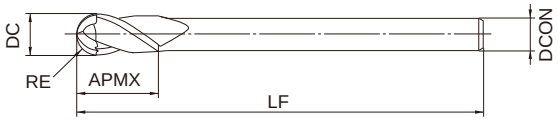
R	RE≦6.5	RE>6.5			
	±0.01	±0.02			
h6	DC≦12	DC>12			
	0 - 0.020	0 - 0.030			
	DCON=3	4≦DCON≦6	8≦DCON≦10	12≦DCO N≦16	20≦DCO N≦25
	0 - 0.006	0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013



Type1



Type2



Type3

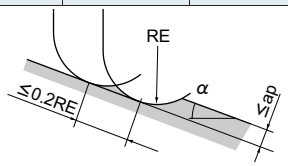
●Inventory maintained in Japan. Unit : mm

Order Number	RE	DC	APMX	LF	DCON	No. of Flutes	Stock	type
VC2MBR0020	0.2	0.4	0.8	38	3	2	●	1
VC2MBR0025	0.25	0.5	1	38	3	2	●	1
VC2MBR0030	0.3	0.6	1.2	38	3	2	●	1
VC2MBR0040	0.4	0.8	1.6	38	3	2	●	1
VC2MBR0050	0.5	1	2.5	40	4	2	●	1
VC2MBR0060	0.6	1.2	3	40	4	2	●	1
VC2MBR0070	0.7	1.4	3	40	4	2	●	1
VC2MBR0075	0.75	1.5	4	40	4	2	●	1
VC2MBR0080	0.8	1.6	4	40	4	2	●	1
VC2MBR0090	0.9	1.8	5	40	4	2	●	1
VC2MBR0100	1	2	6	60	6	2	●	1
VC2MBR0150	1.5	3	8	70	6	2	●	1
VC2MBR0200	2	4	8	70	6	2	●	1
VC2MBR0250	2.5	5	12	80	6	2	●	1
VC2MBR0300	3	6	12	80	6	2	●	2
VC2MBR0350	3.5	7	14	90	8	2	●	1
VC2MBR0400	4	8	14	90	8	2	●	2
VC2MBR0450	4.5	9	18	100	10	2	●	1
VC2MBR0500	5	10	18	100	10	2	●	2
VC2MBR0600	6	12	22	110	12	2	●	2
VC2MBR0700	7	14	26	120	12	2	●	3
VC2MBR0750	7.5	15	30	140	16	2	●	1
VC2MBR0800	8	16	30	140	16	2	●	2
VC2MBR0900	9	18	34	140	16	2	●	3
VC2MBR1000	10	20	38	160	20	2	●	2
VC2MBR1250	12.5	25	55	180	25	2	●	2

VC2MB

RECOMMENDED CUTTING CONDITIONS

Work material	Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21					Hardened steel (45— 55HRC) AISI H13				
R RE (mm)	α≦15°		α>15°		Depth of cut ap(mm)	α≦15°		α>15°		Depth of cut ap(mm)
	Revolution (min⁻¹)	Feed rate (mm/min)	Revolution (min⁻¹)	Feed rate (mm/min)		Revolution (min⁻¹)	Feed rate (mm/min)	Revolution (min⁻¹)	Feed rate (mm/min)	
R0.5	40000	5600	40000	3200	0.06	40000	5600	40000	3000	0.06
R0.75	40000	6500	40000	3200	0.09	40000	6500	32000	3200	0.09
R1	40000	6500	39000	3800	0.11	40000	6500	31000	3500	0.11
R1.5	40000	7500	27000	4300	0.13	32000	6000	22000	3400	0.13
R2	32000	7500	20000	3600	0.15	25000	6000	16000	2700	0.15
R2.5	25000	6000	16000	2900	0.20	20000	5400	13000	2300	0.20
R3	21000	5800	13000	2600	0.25	17000	4700	10000	2000	0.25
R4	16000	4500	10000	2000	0.30	13000	3600	8000	1500	0.30
R5	13000	3600	8000	1700	0.50	10000	2900	6400	1200	0.50
R6	9000	2500	6000	1300	0.50	7200	2000	4800	1000	0.50



- α is the inclination angle of the machined surface.
- If the depth of cut is shallow, the revolution and feed rate can be increased.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

·Using general machining center or NC milling machine. (Large depth of cut ≦0.8RE)

Work material	Carbon steel, Cast iron, Alloy steel (—30HRC) AISI 1050, AISI No 35 B, AISI P20		Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21	
R RE (mm)	Revolution (min⁻¹)	Feed rate (mm/min)	Revolution (min⁻¹)	Feed rate (mm/min)
R0.5	—	—	—	—
R1	8800	150	7000	110
R2	5800	280	4400	230
R3	4200	340	3100	240
R4	3200	360	2400	280
R5	2500	340	1900	260
R6	2100	300	1600	220
R8	1500	210	1200	170
R10	1200	170	960	130
R12.5	950	130	770	110

VCXB

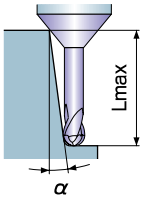
MIRACLE END MILLS

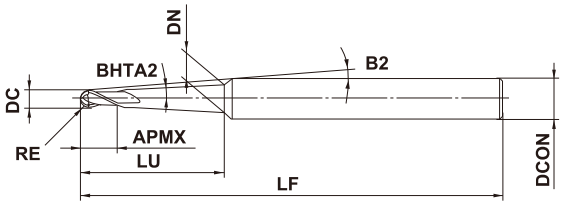
Ball nose taper end mill, Medium cut length, Taper neck, 2 flute

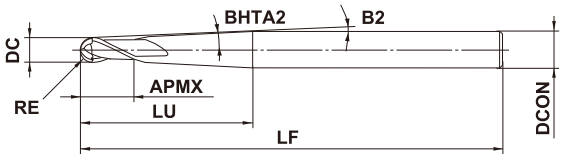
Product Information

Work Material

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668







R	0.5≦RE≦6		
	±0.01		
	1≦DC≦12		
	0 - 0.020		
h6	DCON=6	8≦DCON≦10	12≦DCON≦16
	0 - 0.008	0 - 0.009	0 - 0.011

- α: Inclined angle Lmax: Effective length
- Lmax indicates "0: Not available, blank: No interference".

●Inventory maintained in Japan. Unit : mm

Order Number	RE	DC	BHTA2	APMX	LU	B2	DN	LF	DCON	No. of Flutes	Stock	type	Effective length for inclined angle		
													1°	2°	3°
VCXBR0050T0100L016	0.5	1	1°	2	16	6.6°	1.38	50	6	2	●	1	16.2	17	18
VCXBR0050T0100L021	0.5	1	1°	2	21	5.4°	1.56	60	6	2	●	1	21.2	22.3	23.5
VCXBR0050T0100L026	0.5	1	1°	2	26	4.6°	1.73	70	6	2	●	1	26.2	27.6	29.1
VCXBR0050T0130	0.5	1	1.5°	2	23	5.1°	1.97	60	6	2	●	1	0	23.9	25.2
VCXBR0050T0300	0.5	1	3°	2	42	3.4°	5.08	80	6	2	●	1	0	0	42.4
VCXBR0050T0500	0.5	1	5°	2	23	5.8°	4.46	60	6	2	●	1	0	0	0
VCXBR0100T0100L021	1	2	1°	4	21	4.6°	2.43	50	6	2	●	1	21.3	22.4	23.6
VCXBR0100T0100L031	1	2	1°	4	31	3.4°	2.78	60	6	2	●	1	31.3	33	34.8
VCXBR0100T0100L041	1	2	1°	4	41	2.7°	3.13	70	6	2	●	1	41.3	43.5	
VCXBR0100T0130	1	2	1.5°	4	23	4.4°	2.8	60	6	2	●	1	0	24.1	25.4
VCXBR0100T0300	1	2	3°	4	41	2.9°	5.71	80	6	2	●	1	0	0	
VCXBR0100T0500	1	2	5°	4	23	4.9°	5.02	60	6	2	●	1	0	0	0
VCXBR0150T0100L031	1.5	3	1°	6	31	2.7°	3.71	60	6	2	●	1	31.4	33	
VCXBR0150T0100L041	1.5	3	1°	6	41	2.1°	4.06	70	6	2	●	1	41.4	43.5	
VCXBR0150T0100L051	1.5	3	1°	6	51	1.7°	4.41	80	6	2	●	1	51.4		
VCXBR0150T0130	1.5	3	1.5°	6	52	1.7°	5.21	90	6	2	●	1	0		
VCXBR0150T0300	1.5	3	3°	6	32	2.8°	5.56	70	6	2	●	1	0	0	
VCXBR0200T0100L036	2	4	1°	8	36	1.7°	4.81	70	6	2	●	1	36.5		
VCXBR0200T0100L046	2	4	1°	8	46	1.3°	5.16	80	6	2	●	1	46.5		
VCXBR0200T0100L060	2	4	1°	8	60	1°	5.65	90	6	2	●	1	60.5		
VCXBR0200T0130	2	4	1.5°	8	49	1.3°	5.95	90	6	2	●	1	0		

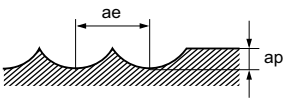
VCXB

Order Number	RE	DC	BHTA2	APMX	LU	B2	DN	LF	DCON	No. of Flutes	Stock	type	Effective length for inclined angle		
													1°	2°	3°
VCXBR0200T0300	2	4	3°	8	28	2.2°		70	6	2	●	2	0	0	
VCXBR0250T0100L036	2.5	5	1°	10	36	0.9°	5.71	80	6	2	●	1			
VCXBR0250T0100L065	2.5	5	1°	10	65	1.4°	6.72	110	8	2	●	1	65.6		
VCXBR0250T0130	2.5	5	1.5°	10	61	1.5°	7.42	110	8	2	●	1	0		
VCXBR0250T0300	2.5	5	3°	10	41	2.3°		90	8	2	●	2	0	0	
VCXBR0300T0100L051	3	6	1°	12	51	1.2°	7.11	90	8	2	●	1	51.8		
VCXBR0300T0100L065	3	6	1°	12	65	1°	7.6	110	8	2	●	1	65.8		
VCXBR0300T0100L092	3	6	1°	12	92	1.3°	8.54	140	10	2	●	1	92.8		
VCXBR0300T0130	3	6	1.5°	12	53	1.2°	7.85	110	8	2	●	1	0		
VCXBR0300T0300	3	6	3°	12	34	1.9°		90	8	2	●	2	0	0	
VCXBR0400T0100L068	4	8	1°	14	68	0.9°	9.64	110	10	2	●	1			
VCXBR0400T0100L092	4	8	1°	14	92	1.3°	10.47	140	12	2	●	1	92.8		
VCXBR0400T0130	4	8	1.5°	14	55	1.2°	9.85	120	10	2	●	1	0		
VCXBR0400T0300	4	8	3°	14	36	1.8°		100	10	2	●	2	0	0	
VCXBR0500T0100L070	5	10	1°	18	70	0.9°	11.76	130	12	2	●	1			
VCXBR0500T0100L100	5	10	1°	18	100	1.8°	12.8	160	16	2	●	1	100.7		
VCXBR0500T0130	5	10	1.5°	18	59	1.1°		130	12	2	●	2	0		
VCXBR0500T0300	5	10	3°	18	40	1.7°		110	12	2	●	2	0	0	
VCXBR0600T0100L070	6	12	1°	22	70	1.8°	13.62	140	16	2	●	1	70.9		
VCXBR0600T0100L100	6	12	1°	22	100	1.2°	14.66	160	16	2	●	1	100.9		
VCXBR0600T0130	6	12	1.5°	22	83	1.5°	15.08	160	16	2	●	1	0		
VCXBR0600T0300	6	12	3°	22	63	2.1°		140	16	2	●	2	0	0	

VCXB

RECOMMENDED CUTTING CONDITIONS

Work material					Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Hardened steel (45— 55HRC) AISI H13	
R RE (mm)	Taper angle one side BHTA2	Neck length LU (mm)	Depth of cut ap (mm)	Depth of cut ae (mm)	Revolution (min-1)	Feed rate (mm/min)	Revolution (min-1)	Feed rate (mm/min)
R0.5	1°	16	0.02	0.1	22000	530	12000	230
	1°	21	0.01					
	1°	26	0.01					
	1.5°	23	0.02					
	3°	42	0.05					
	5°	23	0.05					
R1	1°	21	0.05	0.2	18000	570	10000	260
	1°	31	0.04					
	1°	41	0.03					
	1.5°	23	0.1					
	3°	41	0.1					
	5°	23	0.1					
R2	1°	36	0.2	0.8	14000	670	6000	200
	1°	46	0.15					
	1°	60	0.1					
	1.5°	49	0.2					
	3°	28	0.2					
R3	1°	51	0.3	1.2	10000	840	5000	220
	1°	65	0.2					
	1°	92	0.1					
	1.5°	53	0.3					
	3°	34	0.3					
R4	1.5°	55	0.4	1.6	8000	840	4000	270
	3°	36	0.4					
R5	1°	70	0.4	2	6000	840	3000	310
	1°	100	0.3					
	1.5°	59	0.5					
	3°	40	0.5					
R6	1°	70	0.6	2.4	5000	900	2500	340
	1°	100	0.4					
	1.5°	83	0.6					
	3°	63	0.6					



- If the depth of cut is shallow, the revolution and feed rate can be increased.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

CRN2MB

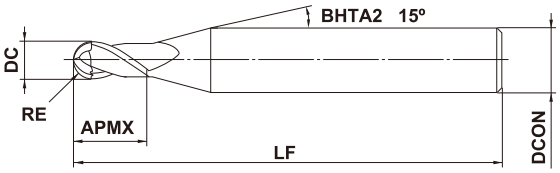
CRN END MILLS

Ball nose, Medium cut length, 2 flute, For copper electrodes

Product Information

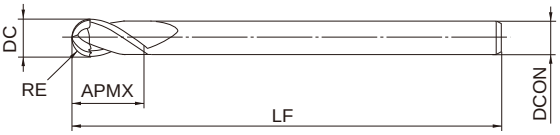
Work Material

Technical Info >> 1993
ISO13399 Property >> 1966
SYMBOL DESCRIPTIONS >> 664
END MILLS SELECTION CHART >> 668



Type1

R	0.2≦RE≦6			
	±0.01			
	0.4≦DC≦12			
	0 - 0.02			
h6	DCON=3	4≦DCON≦6	8≦DCON≦10	DCON=12
	0 - 0.006	0 - 0.008	0 - 0.009	0 - 0.011



Type2

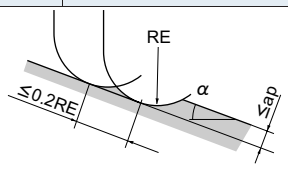
●Inventory maintained in Japan. Unit : mm

Order Number	RE	DC	APMX	LF	DCON	No. of Flutes	Stock	type
CRN2MBR0020S04	0.2	0.4	0.8	45	4	2	●	1
CRN2MBR0020S06	0.2	0.4	0.8	50	6	2	●	1
CRN2MBR0030S04	0.3	0.6	1.2	45	4	2	●	1
CRN2MBR0030S06	0.3	0.6	1.2	50	6	2	●	1
CRN2MBR0040S04	0.4	0.8	1.6	45	4	2	●	1
CRN2MBR0040S06	0.4	0.8	1.6	50	6	2	●	1
CRN2MBR0050S04	0.5	1	2.5	45	4	2	●	1
CRN2MBR0050S06	0.5	1	2.5	50	6	2	●	1
CRN2MBR0075S04	0.75	1.5	4	45	4	2	●	1
CRN2MBR0075S06	0.75	1.5	4	50	6	2	●	1
CRN2MBR0100S06	1	2	6	50	6	2	●	1
CRN2MBR0125S06	1.25	2.5	6	50	6	2	●	1
CRN2MBR0150S03	1.5	3	8	70	3	2	●	2
CRN2MBR0150S06	1.5	3	8	70	6	2	●	1
CRN2MBR0175S06	1.75	3.5	8	70	6	2	●	1
CRN2MBR0200S04	2	4	8	70	4	2	●	2
CRN2MBR0200S06	2	4	8	70	6	2	●	1
CRN2MBR0250S06	2.5	5	12	80	6	2	●	1
CRN2MBR0300S06	3	6	12	80	6	2	●	2
CRN2MBR0400S08	4	8	14	90	8	2	●	2
CRN2MBR0500S10	5	10	18	100	10	2	●	2
CRN2MBR0600S12	6	12	22	110	12	2	●	2

CRN2MB

RECOMMENDED CUTTING CONDITIONS

Work material	Copper, Copper alloys				
R RE (mm)	α≦15°		α>15°		Depth of cut ap(mm)
	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	
R0.2	40000	1600	40000	1200	0.02
R0.3	40000	3200	40000	1600	0.03
R0.4	40000	6400	40000	2400	0.05
R0.5	40000	8000	40000	3200	0.06
R0.75	40000	9600	40000	4000	0.09
R1	40000	9600	39000	4700	0.11
R1.25	40000	12000	30000	4500	0.12
R1.5	40000	12000	27000	4300	0.13
R2	32000	11000	20000	3600	0.15
R2.5	25000	9000	16000	2900	0.20
R3	21000	8400	13000	2600	0.25
R4	16000	6400	10000	2000	0.30
R5	13000	5200	8000	1700	0.50
R6	9000	3600	6000	1300	0.50



- α is the inclination angle of the machined surface.
- If the depth of cut is shallow, the revolution and feed rate can be increased.
- The use of water-soluble coolant is recommended.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

CRN2XLB

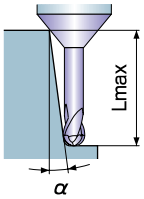
CRN END MILLS

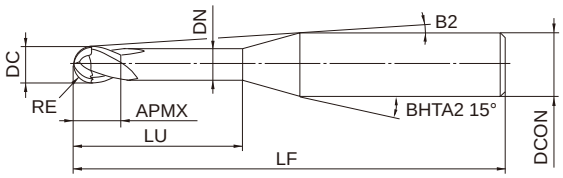
Ball nose, Medium cut length, 2 flute, Long neck, For copper electrodes

Product Information

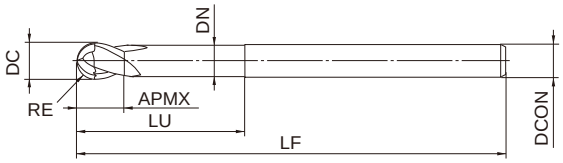
Work Material

Technical Info >> 1993
ISO13399 Property >> 1966
SYMBOL DESCRIPTIONS >> 664
END MILLS SELECTION CHART >> 668





Type1



Type2

R	0.1≦RE≦3
	±0.01
	0.2≦DC≦6
	0 / - 0.02
h6	4≦DCON≦6
	0 / - 0.008

- α: Inclined angle Lmax: Effective length
- Lmax indicates "0: Not available, blank: No interference".

●Inventory maintained in Japan. Unit : mm

Order Number	RE	DC	APMX	LU	DN	B2	LF	DCON	No. of Flutes	Stock	type	Effective length for inclined angle			
												0.5°	1°	2°	3°
CRN2XLBR0010N005S04	0.1	0.2	0.2	0.5	0.17	14.1°	50	4	2	●	1	0.5	0.5	0.6	0.6
CRN2XLBR0010N005S06	0.1	0.2	0.2	0.5	0.17	14.4°	50	6	2	●	1	0.5	0.5	0.6	0.6
CRN2XLBR0010N010S04	0.1	0.2	0.2	1	0.17	13.3°	50	4	2	●	1	1	1.1	1.2	1.3
CRN2XLBR0010N010S06	0.1	0.2	0.2	1	0.17	13.8°	50	6	2	●	1	1	1.1	1.2	1.3
CRN2XLBR0010N015S04	0.1	0.2	0.2	1.5	0.17	12.5°	50	4	2	●	1	1.5	1.6	1.7	1.9
CRN2XLBR0010N015S06	0.1	0.2	0.2	1.5	0.17	13.3°	50	6	2	●	1	1.5	1.6	1.7	1.9
CRN2XLBR0015N010S04	0.15	0.3	0.3	1	0.27	13.3°	50	4	2	●	1	1	1.1	1.2	1.3
CRN2XLBR0015N010S06	0.15	0.3	0.3	1	0.27	13.9°	50	6	2	●	1	1	1.1	1.2	1.3
CRN2XLBR0015N015S04	0.15	0.3	0.3	1.5	0.27	12.5°	50	4	2	●	1	1.5	1.6	1.7	1.9
CRN2XLBR0015N015S06	0.15	0.3	0.3	1.5	0.27	13.3°	50	6	2	●	1	1.5	1.6	1.7	1.9
CRN2XLBR0015N020S04	0.15	0.3	0.3	2	0.27	11.9°	50	4	2	●	1	2.1	2.2	2.3	2.5
CRN2XLBR0015N020S06	0.15	0.3	0.3	2	0.27	12.8°	50	6	2	●	1	2.1	2.2	2.3	2.5
CRN2XLBR0020N010S04	0.2	0.4	0.4	1	0.36	13.4°	50	4	2	●	1	1	1	1.1	1.2
CRN2XLBR0020N010S06	0.2	0.4	0.4	1	0.36	13.9°	50	6	2	●	1	1	1	1.1	1.2
CRN2XLBR0020N015S04	0.2	0.4	0.4	1.5	0.36	12.6°	50	4	2	●	1	1.5	1.6	1.7	1.8
CRN2XLBR0020N015S06	0.2	0.4	0.4	1.5	0.36	13.4°	50	6	2	●	1	1.5	1.6	1.7	1.8
CRN2XLBR0020N020S04	0.2	0.4	0.4	2	0.36	11.9°	50	4	2	●	1	2	2.1	2.3	2.5
CRN2XLBR0020N020S06	0.2	0.4	0.4	2	0.36	12.8°	50	6	2	●	1	2	2.1	2.3	2.5
CRN2XLBR0020N030S04	0.2	0.4	0.4	3	0.36	10.7°	50	4	2	●	1	3.1	3.2	3.4	3.7
CRN2XLBR0020N030S06	0.2	0.4	0.4	3	0.36	11.9°	50	6	2	●	1	3.1	3.2	3.4	3.7
CRN2XLBR0025N015S04	0.25	0.5	0.5	1.5	0.46	12.6°	50	4	2	●	1	1.5	1.6	1.7	1.8
CRN2XLBR0025N015S06	0.25	0.5	0.5	1.5	0.46	13.4°	50	6	2	●	1	1.5	1.6	1.7	1.8

CRN2XLB

Order Number	RE	DC	APMX	LU	DN	B2	LF	DCON	No. of Flutes	Stock	type	Effective length for inclined angle			
												0.5°	1°	2°	3°
CRN2XLBR0025N020S04	0.25	0.5	0.5	2	0.46	11.9°	50	4	2	●	1	2	2.1	2.3	2.4
CRN2XLBR0025N020S06	0.25	0.5	0.5	2	0.46	12.9°	50	6	2	●	1	2	2.1	2.3	2.4
CRN2XLBR0025N030S04	0.25	0.5	0.5	3	0.46	10.6°	50	4	2	●	1	3.1	3.2	3.4	3.7
CRN2XLBR0025N030S06	0.25	0.5	0.5	3	0.46	11.9°	50	6	2	●	1	3.1	3.2	3.4	3.7
CRN2XLBR0025N040S04	0.25	0.5	0.5	4	0.46	9.6°	50	4	2	●	1	4.1	4.3	4.6	4.9
CRN2XLBR0025N040S06	0.25	0.5	0.5	4	0.46	11.1°	50	6	2	●	1	4.1	4.3	4.6	4.9
CRN2XLBR0025N060S04	0.25	0.5	0.5	6	0.46	8.1°	50	4	2	●	1	6.2	6.4	6.9	7.4
CRN2XLBR0025N060S06	0.25	0.5	0.5	6	0.46	9.7°	50	6	2	●	1	6.2	6.4	6.9	7.4
CRN2XLBR0025N080S04	0.25	0.5	0.5	8	0.46	7°	50	4	2	●	1	8.3	8.5	9.2	9.9
CRN2XLBR0025N080S06	0.25	0.5	0.5	8	0.46	8.7°	50	6	2	●	1	8.3	8.5	9.2	9.9
CRN2XLBR0025N100S04	0.25	0.5	0.5	10	0.46	6.2°	50	4	2	●	1	10.3	10.7	11.5	12.4
CRN2XLBR0025N100S06	0.25	0.5	0.5	10	0.46	7.8°	50	6	2	●	1	10.3	10.7	11.5	12.4
CRN2XLBR0030N020S04	0.3	0.6	0.6	2	0.56	11.8°	50	4	2	●	1	2.1	2.2	2.3	2.5
CRN2XLBR0030N020S06	0.3	0.6	0.6	2	0.56	12.8°	50	6	2	●	1	2.1	2.2	2.3	2.5
CRN2XLBR0030N040S04	0.3	0.6	0.6	4	0.56	9.5°	50	4	2	●	1	4.2	4.3	4.6	5
CRN2XLBR0030N040S06	0.3	0.6	0.6	4	0.56	11°	50	6	2	●	1	4.2	4.3	4.6	5
CRN2XLBR0030N060S04	0.3	0.6	0.6	6	0.56	8°	50	4	2	●	1	6.3	6.5	6.9	7.5
CRN2XLBR0030N060S06	0.3	0.6	0.6	6	0.56	9.7°	50	6	2	●	1	6.3	6.5	6.9	7.5
CRN2XLBR0030N080S04	0.3	0.6	0.6	8	0.56	6.9°	50	4	2	●	1	8.3	8.6	9.2	10
CRN2XLBR0030N080S06	0.3	0.6	0.6	8	0.56	8.6°	50	6	2	●	1	8.3	8.6	9.2	10
CRN2XLBR0030N100S04	0.3	0.6	0.6	10	0.56	6°	50	4	2	●	1	10.4	10.8	11.5	12.5
CRN2XLBR0030N100S06	0.3	0.6	0.6	10	0.56	7.8°	50	6	2	●	1	10.4	10.8	11.5	12.5
CRN2XLBR0040N020S04	0.4	0.8	0.8	2	0.76	11.7°	50	4	2	●	1	2.1	2.2	2.3	2.5
CRN2XLBR0040N020S06	0.4	0.8	0.8	2	0.76	12.8°	50	6	2	●	1	2.1	2.2	2.3	2.5
CRN2XLBR0040N040S04	0.4	0.8	0.8	4	0.76	9.4°	50	4	2	●	1	4.2	4.3	4.6	5
CRN2XLBR0040N040S06	0.4	0.8	0.8	4	0.76	11°	50	6	2	●	1	4.2	4.3	4.6	5
CRN2XLBR0040N060S04	0.4	0.8	0.8	6	0.76	7.8°	50	4	2	●	1	6.3	6.5	6.9	7.5
CRN2XLBR0040N060S06	0.4	0.8	0.8	6	0.76	9.6°	50	6	2	●	1	6.3	6.5	6.9	7.5
CRN2XLBR0040N080S04	0.4	0.8	0.8	8	0.76	6.7°	50	4	2	●	1	8.3	8.6	9.2	10
CRN2XLBR0040N080S06	0.4	0.8	0.8	8	0.76	8.5°	50	6	2	●	1	8.3	8.6	9.2	10
CRN2XLBR0040N100S04	0.4	0.8	0.8	10	0.76	5.9°	50	4	2	●	1	10.4	10.8	11.5	12.4
CRN2XLBR0040N100S06	0.4	0.8	0.8	10	0.76	7.7°	50	6	2	●	1	10.4	10.8	11.5	12.4
CRN2XLBR0050N030S04	0.5	1	1	3	0.94	10.1°	50	4	2	●	1	3.2	3.3	3.6	3.9
CRN2XLBR0050N030S06	0.5	1	1	3	0.94	11.6°	50	6	2	●	1	3.2	3.3	3.6	3.9
CRN2XLBR0050N040S04	0.5	1	1	4	0.94	9.1°	50	4	2	●	1	4.2	4.4	4.8	5.2
CRN2XLBR0050N040S06	0.5	1	1	4	0.94	10.8°	50	6	2	●	1	4.2	4.4	4.8	5.2
CRN2XLBR0050N050S04	0.5	1	1	5	0.94	8.2°	50	4	2	●	1	5.3	5.5	6	6.4
CRN2XLBR0050N050S06	0.5	1	1	5	0.94	10.1°	50	6	2	●	1	5.3	5.5	6	6.4
CRN2XLBR0050N060S04	0.5	1	1	6	0.94	7.5°	50	4	2	●	1	6.3	6.6	7.1	7.7
CRN2XLBR0050N060S06	0.5	1	1	6	0.94	9.4°	50	6	2	●	1	6.3	6.6	7.1	7.7
CRN2XLBR0050N070S04	0.5	1	1	7	0.94	6.9°	50	4	2	●	1	7.4	7.7	8.3	8.9
CRN2XLBR0050N070S06	0.5	1	1	7	0.94	8.8°	50	6	2	●	1	7.4	7.7	8.3	8.9
CRN2XLBR0050N080S04	0.5	1	1	8	0.94	6.4°	50	4	2	●	1	8.4	8.8	9.4	10.2
CRN2XLBR0050N080S06	0.5	1	1	8	0.94	8.3°	50	6	2	●	1	8.4	8.8	9.4	10.2
CRN2XLBR0050N100S04	0.5	1	1	10	0.94	5.6°	50	4	2	●	1	10.5	10.9	11.7	12.6
CRN2XLBR0050N100S06	0.5	1	1	10	0.94	7.5°	50	6	2	●	1	10.5	10.9	11.7	12.6
CRN2XLBR0050N120S04	0.5	1	1	12	0.94	5°	50	4	2	●	1	12.6	13.1	14	15.1
CRN2XLBR0050N120S06	0.5	1	1	12	0.94	6.8°	50	6	2	●	1	12.6	13.1	14	15.1
CRN2XLBR0050N140S04	0.5	1	1	14	0.94	4.5°	50	4	2	●	1	14.7	15.2	16.3	17.6
CRN2XLBR0050N140S06	0.5	1	1	14	0.94	6.2°	55	6	2	●	1	14.7	15.2	16.3	17.6
CRN2XLBR0050N160S04	0.5	1	1	16	0.94	4.1°	55	4	2	●	1	16.8	17.4	18.6	20.1
CRN2XLBR0050N160S06	0.5	1	1	16	0.94	5.7°	55	6	2	●	1	16.8	17.4	18.6	20.1
CRN2XLBR0050N180S04	0.5	1	1	18	0.94	3.7°	55	4	2	●	1	18.9	19.5	20.9	22.6
CRN2XLBR0050N180S06	0.5	1	1	18	0.94	5.3°	60	6	2	●	1	18.9	19.5	20.9	22.6

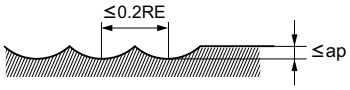
CRN2XLB

Order Number	RE	DC	APMX	LU	DN	B2	LF	DCON	No. of Flutes	Stock	type	Effective length for inclined angle			
												0.5°	1°	2°	3°
CRN2XLBR0050N200S04	0.5	1	1	20	0.94	3.4°	55	4	2	●	1	20.9	21.6	23.2	25.1
CRN2XLBR0050N200S06	0.5	1	1	20	0.94	5°	60	6	2	●	1	20.9	21.6	23.2	25.1
CRN2XLBR0075N080S04	0.75	1.5	1.5	8	1.44	5.9°	50	4	2	●	1	8.4	8.8	9.4	10.1
CRN2XLBR0075N080S06	0.75	1.5	1.5	8	1.44	8.1°	50	6	2	●	1	8.4	8.8	9.4	10.1
CRN2XLBR0075N100S04	0.75	1.5	1.5	10	1.44	5.1°	50	4	2	●	1	10.5	10.9	11.7	12.6
CRN2XLBR0075N100S06	0.75	1.5	1.5	10	1.44	7.2°	50	6	2	●	1	10.5	10.9	11.7	12.6
CRN2XLBR0075N120S04	0.75	1.5	1.5	12	1.44	4.4°	50	4	2	●	1	12.6	13.1	14	15.1
CRN2XLBR0075N120S06	0.75	1.5	1.5	12	1.44	6.5°	50	6	2	●	1	12.6	13.1	14	15.1
CRN2XLBR0075N140S04	0.75	1.5	1.5	14	1.44	4°	50	4	2	●	1	14.7	15.2	16.3	17.6
CRN2XLBR0075N140S06	0.75	1.5	1.5	14	1.44	5.9°	55	6	2	●	1	14.7	15.2	16.3	17.6
CRN2XLBR0075N160S04	0.75	1.5	1.5	16	1.44	3.6°	55	4	2	●	1	16.8	17.3	18.6	20
CRN2XLBR0075N160S06	0.75	1.5	1.5	16	1.44	5.4°	55	6	2	●	1	16.8	17.3	18.6	20
CRN2XLBR0075N180S04	0.75	1.5	1.5	18	1.44	3.3°	55	4	2	●	1	18.8	19.5	20.9	22.5
CRN2XLBR0075N180S06	0.75	1.5	1.5	18	1.44	5°	60	6	2	●	1	18.8	19.5	20.9	22.5
CRN2XLBR0075N200S04	0.75	1.5	1.5	20	1.44	3°	55	4	2	●	1	20.9	21.6	23.2	
CRN2XLBR0075N200S06	0.75	1.5	1.5	20	1.44	4.6°	60	6	2	●	1	20.9	21.6	23.2	25
CRN2XLBR0100N080S04	1	2	2	8	1.9	5.3°	50	4	2	●	1	8.3	8.7	9.2	9.9
CRN2XLBR0100N080S06	1	2	2	8	1.9	7.8°	50	6	2	●	1	8.3	8.7	9.2	9.9
CRN2XLBR0100N100S04	1	2	2	10	1.9	4.5°	50	4	2	●	1	10.4	10.8	11.5	12.4
CRN2XLBR0100N100S06	1	2	2	10	1.9	6.9°	50	6	2	●	1	10.4	10.8	11.5	12.4
CRN2XLBR0100N120S04	1	2	2	12	1.9	3.9°	50	4	2	●	1	12.5	12.9	13.8	14.9
CRN2XLBR0100N120S06	1	2	2	12	1.9	6.1°	50	6	2	●	1	12.5	12.9	13.8	14.9
CRN2XLBR0100N140S04	1	2	2	14	1.9	3.4°	50	4	2	●	1	14.6	15.1	16.1	17.4
CRN2XLBR0100N140S06	1	2	2	14	1.9	5.6°	55	6	2	●	1	14.6	15.1	16.1	17.4
CRN2XLBR0100N160S04	1	2	2	16	1.9	3.1°	55	4	2	●	1	16.7	17.2	18.4	19.9
CRN2XLBR0100N160S06	1	2	2	16	1.9	5.1°	55	6	2	●	1	16.7	17.2	18.4	19.9
CRN2XLBR0100N200S04	1	2	2	20	1.9	2.5°	60	4	2	●	1	20.8	21.5	23	
CRN2XLBR0100N200S06	1	2	2	20	1.9	4.3°	60	6	2	●	1	20.8	21.5	23	24.8
CRN2XLBR0100N250S06	1	2	2	25	1.9	3.7°	65	6	2	●	1	26	26.8	28.8	31
CRN2XLBR0100N300S06	1	2	2	30	1.9	3.2°	70	6	2	●	1	31.1	32.2	34.5	37.3
CRN2XLBR0150N160S06	1.5	3	3	16	2.9	4.3°	60	6	2	●	1	16.6	17.2	18.4	19.7
CRN2XLBR0150N250S06	1.5	3	3	25	2.9	3°	70	6	2	●	1	26	26.8	28.7	
CRN2XLBR0150N350S06	1.5	3	3	35	2.9	2.2°	80	6	2	●	1	36.3	37.5	40.2	
CRN2XLBR0200N160S06	2	4	4	16	3.9	3.2°	70	6	2	●	1	16.6	17.1	18.3	19.6
CRN2XLBR0200N200S06	2	4	4	20	3.9	2.7°	70	6	2	●	1	20.8	21.4	22.9	
CRN2XLBR0200N300S06	2	4	4	30	3.9	1.8°	70	6	2	●	1	31.1	32.1		
CRN2XLBR0200N400S06	2	4	4	40	3.9	1.4°	90	6	2	●	1	41.4	42.8		
CRN2XLBR0200N500S06	2	4	4	50	3.9	1.2°	100	6	2	●	1	51.8	53.5		
CRN2XLBR0250N200S06	2.5	5	5	20	4.9	1.5°	70	6	2	●	1	20.7	21.4		
CRN2XLBR0250N300S06	2.5	5	5	30	4.9	1°	80	6	2	●	1	31.1			
CRN2XLBR0300N300S06	3	6	6	30	5.85		80	6	2	●	2				
CRN2XLBR0300N500S06	3	6	6	50	5.85		100	6	2	●	2				

CRN2XLB

RECOMMENDED CUTTING CONDITIONS

Work material		Copper, Copper alloys		
R RE (mm)	Neck length LU(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap(mm)
R0.1	0.5	40000	800	0.003
	1	40000	600	0.002
	1.5	40000	400	0.001
R0.15	1	40000	1200	0.007
	2	40000	800	0.003
R0.2	1	40000	2000	0.015
	2	40000	1300	0.01
	3	40000	800	0.005
R0.25	2	40000	2000	0.02
	4	40000	1200	0.01
	6	36000	600	0.006
	10	26000	200	0.002
R0.3	2	40000	3200	0.03
	6	40000	1200	0.008
	10	30000	500	0.003
R0.4	4	40000	4000	0.02
	6	40000	2500	0.02
	10	30000	700	0.008
R0.5	4	40000	6400	0.05
	6	40000	4800	0.03
	8	40000	3000	0.02
	10	33000	2000	0.01
	16	18000	500	0.008
	20	13000	250	0.005
R0.75	8	40000	8000	0.07
	12	35000	4500	0.04
	16	20000	2000	0.03
	20	12000	900	0.02
R1	8	40000	9600	0.10
	10	40000	6400	0.08
	12	40000	6000	0.08
	16	30000	3000	0.05
	20	20000	2000	0.04
	30	10000	800	0.02
R1.5	16	40000	12000	0.10
	25	25000	6000	0.08
	35	6000	700	0.06
R2	16	32000	11000	0.15
	20	32000	9000	0.15
	30	20000	4500	0.10
	40	15000	3000	0.08
	50	8000	1000	0.05
R2.5	20	25000	9500	0.20
	30	20000	3300	0.15
R3	30	21000	8400	0.20
	50	20000	3000	0.15



- If the depth of cut is shallow, the revolution and feed rate can be increased.
- The use of water-soluble coolant is recommended.
- Cutting condition may be considerably different due to the overhang (milling depth), depth of cut, and machine tools. Please see the above table as a standard.

C2MB

CARBIDE END MILLS

Ball nose, Medium cut length, 2 flute

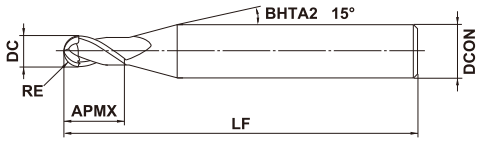
Product Information

UWC 30°

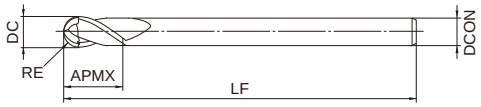
Work Material

P M N S

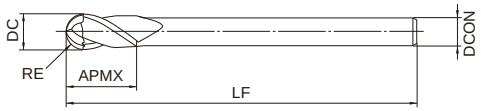
Technical Info >> 1993
ISO13399 Property >> 1966
SYMBOL DESCRIPTIONS >> 664
END MILLS SELECTION CHART >> 668



Type1



Type2



Type3

R	RE≦6.5	RE>6.5	
	±0.01	±0.02	
	DC≦12	DC>12	
	0 - 0.020	0 - 0.030	
h6	4≦DCON≦6	8≦DCON≦10	12≦DCON≦16
	0 - 0.008	0 - 0.009	0 - 0.011

●Inventory maintained in Japan. Unit : mm

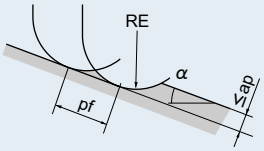
Order Number	RE	DC	APMX	LF	DCON	No. of Flutes	Stock	type
C2MBR0050	0.5	1	2.5	40	4	2	●	1
C2MBR0075	0.75	1.5	4	40	4	2	●	1
C2MBR0100	1	2	6	60	6	2	●	1
C2MBR0150	1.5	3	8	70	6	2	●	1
C2MBR0200	2	4	8	70	6	2	●	1
C2MBR0250	2.5	5	12	80	6	2	●	1
C2MBR0300	3	6	12	80	6	2	●	2
C2MBR0400	4	8	14	90	8	2	●	2
C2MBR0500	5	10	18	100	10	2	●	2
C2MBR0550	5.5	11	22	110	12	2	●	1
C2MBR0650	6.5	13	26	120	12	2	●	3
C2MBR0700	7	14	26	120	12	2	●	3
C2MBR0750	7.5	15	30	140	16	2	●	1

C2MB

RECOMMENDED CUTTING CONDITIONS

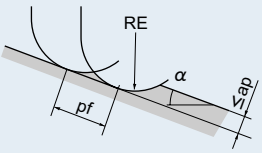
·Roughing (Large depth of cut <0.8RE)

Work material	Carbon steel, Alloy steel (— 30HRC) AISI 1055, AISI P20		Alloy steel, Tool steel Pre-hardened steel (30—45HRC) AISI H13, AISI P21	
R RE (mm)	Revolution (min-1)	Feed rate (mm/min)	Revolution (min-1)	Feed rate (mm/min)
R0.5	—	—	—	—
R1	4100	70	2800	40
R2	2600	120	1650	85
R3	1900	150	1200	95
R4	1400	160	900	105
R5	1100	140	710	95
R6	940	130	600	85
R8	700	100	450	60
R10	560	80	360	50



·Finishing (Depth of cut 0.05RE)

Work material	Carbon steel, Alloy steel (— 30HRC) AISI 1055, AISI P20				Alloy steel, Tool steel Pre-hardened steel (30—45HRC) AISI H13, AISI P21			
R RE (mm)	α≦15°		α>15°		α≦15°		α>15°	
	Revolution (min-1)	Feed rate (mm/min)	Revolution (min-1)	Feed rate (mm/min)	Revolution (min-1)	Feed rate (mm/min)	Revolution (min-1)	Feed rate (mm/min)
R0.5	14000	180	10000	120	12000	150	7000	80
R1	10500	350	7300	210	8400	220	5500	130
R2	7200	500	5100	300	5900	360	4300	210
R3	5200	560	3600	350	4200	410	2900	240
R4	4000	640	2700	380	3100	440	2200	240
R5	3200	700	2200	380	2500	460	1750	250
R6	2600	640	1750	350	2100	430	1450	250
R8	1900	620	1300	330	1550	430	1100	250
R10	1500	590	1000	310	1250	410	860	250



- α is the inclination angle of the machined surface.
- If the depth of cut is shallow, the revolution and feed rate can be increased.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

VF3XB

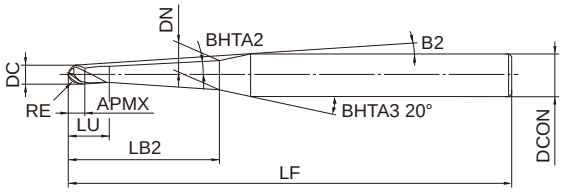
IMPACT MIRACLE END MILLS

Ball nose, 3 flute, Taper neck

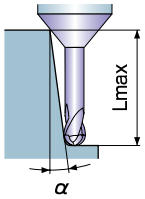
Product Information

Work Material

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668



R	0.4≦RE≦2.5	
	±0.01	
	0.8≦DC≦5	
	0 - 0.02	
h6	4≦DCON≦6	DCON=8
	0 - 0.008	0 - 0.009



- α: Inclined angle Lmax: Effective length
- Lmax indicates "0: Not available, blank: No interference".

●Inventory maintained in Japan. Unit : mm

Order Number	RE	DC	BHTA2	APMX	LB2	LU	B2	DN	LF	DCON	No. of Flutes	Stock	type	Effective length for inclined angle			
														0.5°	1°	2°	3°
VF3XBR0040T0024L006	0.4	0.8	0.4°	0.5	6	1.5	8.9°	0.82	60	4	3	●	1	6.3	6.6	6.9	7.3
VF3XBR0040T0024L008	0.4	0.8	0.4°	0.5	8	1.5	7.5°	0.85	60	4	3	●	1	8.4	8.6	9.1	9.5
VF3XBR0040T0024L012	0.4	0.8	0.4°	0.5	12	1.5	5.7°	0.91	60	4	3	●	1	12.4	12.7	13.4	14.1
VF3XBR0040T0054L008	0.4	0.8	0.9°	0.5	8	1.5	7.6°	0.96	60	4	3	●	1	0	8.4	8.9	9.3
VF3XBR0040T0054L012	0.4	0.8	0.9°	0.5	12	1.5	5.8°	1.09	60	4	3	●	1	0	12.4	13.1	13.8
VF3XBR0040T0054L016	0.4	0.8	0.9°	0.5	16	1.5	4.7°	1.22	60	4	3	●	1	0	16.5	17.3	18.3
VF3XBR0050T0024L008	0.5	1	0.4°	0.8	8	2.3	9.6°	1.02	60	6	3	●	1	8.5	8.8	9.3	9.8
VF3XBR0050T0024L010	0.5	1	0.4°	0.8	10	2.3	8.5°	1.05	60	6	3	●	1	10.5	10.9	11.4	12.1
VF3XBR0050T0024L012	0.5	1	0.4°	0.8	12	2.3	7.6°	1.08	60	6	3	●	1	12.6	13	13.6	14.4
VF3XBR0050T0024L016	0.5	1	0.4°	0.8	16	2.3	6.3°	1.13	70	6	3	●	1	16.6	17.1	18	18.9
VF3XBR0050T0024L020	0.5	1	0.4°	0.8	20	2.3	5.4°	1.19	70	6	3	●	1	20.6	21.2	22.3	23.5
VF3XBR0050T0024L025	0.5	1	0.4°	0.8	25	2.3	4.6°	1.26	70	6	3	●	1	25.7	26.3	27.7	29.3
VF3XBR0050T0024L030	0.5	1	0.4°	0.8	30	2.3	4°	1.33	80	6	3	●	1	30.7	31.5	33.1	35
VF3XBR0050T0024L035	0.5	1	0.4°	0.8	35	2.3	3.5°	1.4	80	6	3	●	1	35.7	36.6	38.6	40.7
VF3XBR0050T0054L008	0.5	1	0.9°	0.8	8	2.3	9.7°	1.12	60	6	3	●	1	0	8.6	9.1	9.6
VF3XBR0050T0054L012	0.5	1	0.9°	0.8	12	2.3	7.7°	1.24	60	6	3	●	1	0	12.6	13.3	14.1
VF3XBR0050T0054L016	0.5	1	0.9°	0.8	16	2.3	6.4°	1.37	70	6	3	●	1	0	16.7	17.6	18.5
VF3XBR0050T0054L020	0.5	1	0.9°	0.8	20	2.3	5.5°	1.5	70	6	3	●	1	0	20.7	21.8	23
VF3XBR0050T0054L025	0.5	1	0.9°	0.8	25	2.3	4.7°	1.65	70	6	3	●	1	0	25.7	27.1	28.6
VF3XBR0050T0054L030	0.5	1	0.9°	0.8	30	2.3	4°	1.81	80	6	3	●	1	0	30.8	32.4	34.2
VF3XBR0050T0054L035	0.5	1	0.9°	0.8	35	2.3	3.6°	1.97	80	6	3	●	1	0	35.8	37.7	39.8
VF3XBR0050T0054L040	0.5	1	0.9°	0.8	40	2.3	3.2°	2.12	80	6	3	●	1	0	40.8	43	45.4
VF3XBR0050T0054L050	0.5	1	0.9°	0.8	50	2.3	2.7°	2.44	110	6	3	●	1	0	50.9	53.6	
VF3XBR0050T0054L060	0.5	1	0.9°	0.8	60	2.3	2.3°	2.75	110	6	3	●	1	0	60.9	64.1	
VF3XBR0050T0054L070	0.5	1	0.9°	0.8	70	2.3	2°	3.07	110	6	3	●	1	0	71	74.7	
VF3XBR0050T0130L012	0.5	1	1.5°	0.8	12	2.3	7.9°	1.45	60	6	3	●	1	0	0	13	13.7
VF3XBR0050T0130L016	0.5	1	1.5°	0.8	16	2.3	6.5°	1.66	70	6	3	●	1	0	0	17.1	18
VF3XBR0050T0130L020	0.5	1	1.5°	0.8	20	2.3	5.6°	1.87	70	6	3	●	1	0	0	21.2	22.4

VF3XB

Order Number	RE	DC	BHTA2	APMX	LB2	LU	B2	DN	LF	DCON	No. of Flutes	Stock	type	Effective length for inclined angle			
														0.5°	1°	2°	3°
VF3XBR0050T0130L025	0.5	1	1.5°	0.8	25	2.3	4.8°	2.13	70	6	3	●	1	0	0	26.3	27.8
VF3XBR0050T0130L030	0.5	1	1.5°	0.8	30	2.3	4.1°	2.39	80	6	3	●	1	0	0	31.5	33.2
VF3XBR0050T0130L035	0.5	1	1.5°	0.8	35	2.3	3.7°	2.65	80	6	3	●	1	0	0	36.6	38.6
VF3XBR0075T0024L010	0.75	1.5	0.4°	1.3	10	2.8	8.1°	1.54	60	6	3	●	1	10.6	10.9	11.4	12
VF3XBR0075T0024L015	0.75	1.5	0.4°	1.3	15	2.8	6.2°	1.61	60	6	3	●	1	15.6	16	16.9	17.8
VF3XBR0075T0024L020	0.75	1.5	0.4°	1.3	20	2.8	5°	1.68	70	6	3	●	1	20.6	21.2	22.3	23.5
VF3XBR0075T0024L030	0.75	1.5	0.4°	1.3	30	2.8	3.7°	1.82	80	6	3	●	1	30.7	31.5	33.1	35
VF3XBR0075T0054L015	0.75	1.5	0.9°	1.3	15	2.8	6.3°	1.82	60	6	3	●	1	0	15.7	16.5	17.4
VF3XBR0075T0054L020	0.75	1.5	0.9°	1.3	20	2.8	5.1°	1.98	70	6	3	●	1	0	20.7	21.8	23
VF3XBR0075T0054L030	0.75	1.5	0.9°	1.3	30	2.8	3.7°	2.29	80	6	3	●	1	0	30.8	32.4	34.2
VF3XBR0075T0054L040	0.75	1.5	0.9°	1.3	40	2.8	3°	2.61	80	6	3	●	1	0	40.8	43	45.3
VF3XBR0075T0130L015	0.75	1.5	1.5°	1.3	15	2.8	6.4°	2.08	60	6	3	●	1	0		16.1	17
VF3XBR0075T0130L020	0.75	1.5	1.5°	1.3	20	2.8	5.2°	2.34	70	6	3	●	1	0		21.2	22.4
VF3XBR0075T0130L030	0.75	1.5	1.5°	1.3	30	2.8	3.8°	2.86	80	6	3	●	1	0		31.5	33.2
VF3XBR0100T0024L016	1	2	0.4°	1.6	16	3.6	5.5°	2.07	70	6	3	●	1	16.7	17.1	18	19
VF3XBR0100T0024L020	1	2	0.4°	1.6	20	3.6	4.6°	2.13	70	6	3	●	1	20.7	21.3	22.3	23.5
VF3XBR0100T0024L025	1	2	0.4°	1.6	25	3.6	3.9°	2.2	70	6	3	●	1	25.8	26.4	27.8	29.3
VF3XBR0100T0024L030	1	2	0.4°	1.6	30	3.6	3.4°	2.27	80	6	3	●	1	30.8	31.6	33.2	35
VF3XBR0100T0024L035	1	2	0.4°	1.6	35	3.6	2.9°	2.34	80	6	3	●	1	35.8	36.7	38.6	
VF3XBR0100T0024L040	1	2	0.4°	1.6	40	3.6	2.6°	2.41	80	6	3	●	1	40.8	41.9	44	
VF3XBR0100T0054L020	1	2	0.9°	1.6	20	3.6	4.7°	2.42	70	6	3	●	1	0	20.8	21.9	23
VF3XBR0100T0054L025	1	2	0.9°	1.6	25	3.6	4°	2.57	70	6	3	●	1	0	25.8	27.2	28.6
VF3XBR0100T0054L030	1	2	0.9°	1.6	30	3.6	3.4°	2.73	80	6	3	●	1	0	30.9	32.5	34.2
VF3XBR0100T0054L035	1	2	0.9°	1.6	35	3.6	3°	2.89	80	6	3	●	1	0	35.9	37.7	39.8
VF3XBR0100T0054L040	1	2	0.9°	1.6	40	3.6	2.7°	3.04	80	6	3	●	1	0	40.9	43	
VF3XBR0100T0054L050	1	2	0.9°	1.6	50	3.6	2.2°	3.36	110	6	3	●	1	0	51	53.6	
VF3XBR0100T0054L060	1	2	0.9°	1.6	60	3.6	1.9°	3.67	110	6	3	●	1	0	61		
VF3XBR0100T0054L070	1	2	0.9°	1.6	70	3.6	1.6°	3.99	110	6	3	●	1	0	71.1		
VF3XBR0100T0130L025	1	2	1.5°	1.6	25	3.6	4.1°	3.02	70	6	3	●	1	0	0	26.4	27.9
VF3XBR0100T0130L030	1	2	1.5°	1.6	30	3.6	3.5°	3.28	80	6	3	●	1	0	0	31.6	33.3
VF3XBR0100T0130L035	1	2	1.5°	1.6	35	3.6	3.1°	3.54	80	6	3	●	1	0	0	36.7	38.7
VF3XBR0100T0130L040	1	2	1.5°	1.6	40	3.6	2.7°	3.81	80	6	3	●	1	0	0	41.8	
VF3XBR0125T0054L020	1.25	2.5	0.9°	2	20	4.5	4.3°	2.89	60	6	3	●	1	0	20.8	21.9	23.1
VF3XBR0125T0054L030	1.25	2.5	0.9°	2	30	4.5	3.1°	3.2	80	6	3	●	1	0	30.9	32.5	34.2
VF3XBR0125T0054L040	1.25	2.5	0.9°	2	40	4.5	2.4°	3.52	80	6	3	●	1	0	40.9	43.1	
VF3XBR0125T0130L020	1.25	2.5	1.5°	2	20	4.5	4.4°	3.21	60	6	3	●	1	0	0	21.4	22.5
VF3XBR0125T0130L030	1.25	2.5	1.5°	2	30	4.5	3.1°	3.74	80	6	3	●	1	0	0	31.6	33.3
VF3XBR0125T0130L040	1.25	2.5	1.5°	2	40	4.5	2.5°	4.26	80	6	3	●	1	0	0	41.9	
VF3XBR0150T0024L020	1.5	3	0.4°	2	20	5	3.8°	3.11	60	6	3	●	1	20.7	21.3	22.3	23.5
VF3XBR0150T0024L025	1.5	3	0.4°	2	25	5	3.1°	3.18	80	6	3	●	1	25.8	26.4	27.7	29.2
VF3XBR0150T0024L030	1.5	3	0.4°	2	30	5	2.7°	3.25	80	6	3	●	1	30.8	31.6	33.2	
VF3XBR0150T0024L040	1.5	3	0.4°	2	40	5	2.1°	3.39	80	6	3	●	1	40.9	41.9	44	
VF3XBR0150T0024L050	1.5	3	0.4°	2	50	5	1.7°	3.53	100	6	3	●	1	50.9	52.2		
VF3XBR0150T0054L020	1.5	3	0.9°	2	20	5	3.8°	3.37	60	6	3	●	1	0	20.9	21.9	23
VF3XBR0150T0054L030	1.5	3	0.9°	2	30	5	2.7°	3.69	80	6	3	●	1	0	30.9	32.5	
VF3XBR0150T0054L040	1.5	3	0.9°	2	40	5	2.1°	4	80	6	3	●	1	0	41	43.1	
VF3XBR0150T0054L050	1.5	3	0.9°	2	50	5	1.7°	4.31	100	6	3	●	1	0	51		
VF3XBR0150T0054L060	1.5	3	0.9°	2	60	5	2.3°	4.63	110	8	3	●	1	0	61.1	64.2	
VF3XBR0150T0054L070	1.5	3	0.9°	2	70	5	2°	4.94	120	8	3	●	1	0	71.1	74.8	
VF3XBR0150T0130L040	1.5	3	1.5°	2	40	5	2.2°	4.73	80	6	3	●	1	0	0	41.9	
VF3XBR0150T0130L050	1.5	3	1.5°	2	50	5	2.8°	5.26	110	8	3	●	1	0	0	52.2	
VF3XBR0150T0130L060	1.5	3	1.5°	2	60	5	2.4°	5.78	110	8	3	●	1	0	0	62.4	
VF3XBR0150T0130L070	1.5	3	1.5°	2	70	5	2.1°	6.3	120	8	3	●	1	0	0	72.7	
VF3XBR0200T0054L030	2	4	0.9°	3	30	6	3.5°	4.65	90	8	3	●	1	0	30.9	32.5	34.2

VF3XB

Order Number	RE	DC	BHTA2	APMX	LB2	LU	B2	DN	LF	DCON	No. of Flutes	Stock	type	Effective length for inclined angle			
														0.5°	1°	2°	3°
VF3XBR0200T0054L040	2	4	0.9°	3	40	6	2.7°	4.97	90	8	3	●	1	0	41	43	
VF3XBR0200T0054L050	2	4	0.9°	3	50	6	2.2°	5.28	110	8	3	●	1	0	51	53.6	
VF3XBR0200T0054L060	2	4	0.9°	3	60	6	1.9°	5.6	110	8	3	●	1	0	61.1		
VF3XBR0250T0054L035	2.5	5	0.9°	3.5	35	6.5	2.4°	5.8	90	8	3	●	1	0	35.9	37.7	
VF3XBR0250T0054L040	2.5	5	0.9°	3.5	40	6.5	2.2°	5.95	90	8	3	●	1	0	41	43	
VF3XBR0250T0054L050	2.5	5	0.9°	3.5	50	6.5	1.8°	6.27	110	8	3	●	1	0	51		
VF3XBR0250T0054L060	2.5	5	0.9°	3.5	60	6.5	1.5°	6.58	110	8	3	●	1	0	61.1		

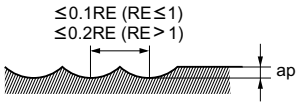
VF3XB

RECOMMENDED CUTTING CONDITIONS

Work material			Carbon steel, Cast iron, Alloy steel (—30HRC) AISI 1050, AISI No 35 B, AISI P20			Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21			Hardened steel (45— 55HRC) AISI H13			Hardened steel (55— 62HRC) AISI D2		
R RE (mm)	Taper angle one side BHTA2	Neck length LB2(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)
R0.4	0.4°	6	34000	2700	0.03	31000	2200	0.025	24000	1700	0.02	19000	1400	0.015
		8	31000	2100	0.02	29000	1700	0.02	22000	1300	0.015	18000	1000	0.01
		12	28000	2000	0.015	26000	1600	0.01	20000	1200	0.01	16000	960	0.007
	0.9°	8	31000	2200	0.02	29000	1800	0.02	22000	1400	0.015	18000	1100	0.01
		12	28000	2100	0.015	26000	1700	0.01	20000	1300	0.01	16000	1000	0.007
		16	25000	1100	0.01	23000	910	0.01	18000	700	0.008	14000	560	0.006
R0.5	0.4°	8	27000	2700	0.04	25000	2200	0.04	19000	1700	0.03	15000	1400	0.02
		10	24000	2200	0.03	22000	1800	0.025	17000	1400	0.02	14000	1100	0.015
		12	24000	2200	0.03	22000	1800	0.025	17000	1400	0.02	14000	1100	0.015
		16	22000	2100	0.03	21000	1700	0.025	16000	1300	0.02	13000	1000	0.015
		20	20000	1400	0.015	18000	1200	0.01	14000	900	0.01	11000	720	0.007
		25	18000	1300	0.015	17000	1000	0.01	13000	800	0.009	10000	640	0.006
		30	15000	960	0.01	14000	780	0.01	11000	600	0.008	8800	480	0.006
		35	14000	800	0.008	13000	650	0.007	10000	500	0.006	8000	400	0.004
	0.9°	8	27000	2900	0.04	25000	2300	0.04	19000	1800	0.03	15000	1400	0.02
		12	24000	2400	0.03	22000	2000	0.025	17000	1500	0.02	14000	1200	0.015
		16	22000	2200	0.03	21000	1800	0.025	16000	1400	0.02	13000	1100	0.015
		20	20000	1600	0.015	18000	1300	0.01	14000	1000	0.01	11000	800	0.007
		25	18000	1400	0.015	17000	1200	0.01	13000	900	0.009	10000	720	0.006
		30	15000	1100	0.01	14000	910	0.009	11000	700	0.008	8800	560	0.006
		35	14000	960	0.008	13000	780	0.007	10000	600	0.006	8000	480	0.004
		40	11000	800	0.007	11000	650	0.006	8000	500	0.005	6400	400	0.003
		50	8400	610	0.006	7800	490	0.005	6000	380	0.004	4800	300	0.003
		60	7000	510	0.004	6500	400	0.004	5000	320	0.003	4000	260	0.002
		70	7000	480	0.003	6500	390	0.002	5000	300	0.002	4000	240	0.001
	1.5°	12	24000	2600	0.03	22000	2100	0.025	17000	1600	0.02	14000	1300	0.015
		16	22000	2400	0.03	21000	2000	0.025	16000	1500	0.02	13000	1200	0.015
		20	20000	1800	0.015	18000	1400	0.01	14000	1100	0.01	11000	880	0.007
		25	18000	1600	0.015	17000	1300	0.01	13000	1000	0.009	11000	800	0.006
		30	15000	1300	0.01	14000	1000	0.01	11000	800	0.008	8800	640	0.006
		35	14000	1100	0.008	13000	910	0.007	10000	700	0.006	8000	560	0.004
R0.75	0.4°	10	18000	2700	0.06	17000	2200	0.05	13000	1700	0.04	10000	1400	0.03
		15	17000	2200	0.04	16000	1800	0.04	12000	1400	0.03	9600	1100	0.02
		20	17000	2100	0.03	16000	1700	0.025	12000	1300	0.02	9600	1000	0.015
		30	14000	1600	0.015	13000	1300	0.01	10000	1000	0.01	8000	800	0.007
	0.9°	15	17000	2400	0.04	16000	2000	0.04	12000	1500	0.03	9600	1200	0.02
		20	17000	2200	0.03	16000	1800	0.025	12000	1400	0.02	9600	1100	0.015
		30	14000	1800	0.015	13000	1400	0.01	10000	1100	0.01	8000	880	0.007
		40	13000	1300	0.01	12000	1000	0.01	9000	800	0.008	7200	640	0.006
	1.5°	15	17000	2600	0.04	16000	2100	0.04	12000	1600	0.03	9600	1300	0.02
		20	17000	2400	0.03	16000	2000	0.025	12000	1500	0.02	9600	1200	0.015
		30	14000	2000	0.015	13000	1600	0.01	10000	1200	0.01	8000	960	0.007
R1	0.4°	16	15000	3200	0.07	14000	2600	0.06	11000	2000	0.05	8800	1600	0.03
		20	14000	2400	0.06	13000	2000	0.05	10000	1500	0.04	8000	1200	0.03
		25	14000	2100	0.04	13000	1700	0.04	10000	1300	0.03	8000	1000	0.02
		30	13000	1800	0.03	12000	1400	0.03	9000	1100	0.025	7200	880	0.02
		35	13000	1600	0.03	12000	1300	0.025	9000	1000	0.02	7200	800	0.015
		40	12000	1400	0.015	11000	1200	0.01	8500	900	0.01	6800	720	0.007
	0.9°	20	14000	2600	0.06	13000	2100	0.05	10000	1600	0.04	8000	1300	0.03
		25	14000	2200	0.05	13000	1800	0.04	10000	1400	0.03	8000	1100	0.025
		30	13000	1900	0.04	12000	1600	0.04	9000	1200	0.03	7200	960	0.02
		35	13000	1800	0.04	12000	1400	0.03	9000	1100	0.025	7200	880	0.02
		40	12000	1600	0.03	11000	1300	0.025	8500	1000	0.02	6800	800	0.015
		50	11000	1400	0.015	10000	1200	0.01	8000	900	0.01	6400	720	0.007

VF3XB

Work material			Carbon steel, Cast iron, Alloy steel (—30HRC) AISI 1050, AISI No 35 B, AISI P20			Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21			Hardened steel (45— 55HRC) AISI H13			Hardened steel (55— 62HRC) AISI D2		
R RE (mm)	Taper angle one side BHTA2	Neck length LB2(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)
		60	9800	1100	0.007	9100	910	0.006	7000	700	0.005	5600	560	0.003
		70	8400	960	0.004	7800	780	0.004	6000	600	0.003	4800	480	0.002
	1.5°	25	14000	2400	0.05	13000	2000	0.04	10000	1500	0.03	8000	1200	0.025
		30	12600	2100	0.04	12000	1700	0.04	9000	1300	0.03	7200	1000	0.02
		35	13000	1900	0.04	12000	1600	0.03	9000	1200	0.025	7200	960	0.02
		40	12000	1800	0.03	11000	1400	0.025	8500	1100	0.02	6800	880	0.015
R1.25	0.9°	20	13000	2900	0.06	12000	2300	0.05	9000	1800	0.04	7200	1400	0.03
		30	12000	2600	0.05	11000	2100	0.04	8500	1600	0.03	6800	1300	0.025
		40	11000	2200	0.04	9800	1800	0.04	7500	1400	0.03	6000	1100	0.02
	1.5°	20	13000	3000	0.06	12000	2500	0.05	9000	1900	0.04	7200	1500	0.03
		30	12000	2700	0.05	11050	2200	0.04	8500	1700	0.03	6800	1400	0.025
		40	11000	2400	0.04	9800	2000	0.04	7500	1500	0.03	6000	1200	0.02
R1.5	0.4°	20	12000	3700	0.13	11000	3000	0.1	8500	2300	0.09	6800	1800	0.06
		30	11000	2900	0.07	10000	2300	0.06	8000	1800	0.05	6400	1400	0.03
		40	11000	2400	0.06	10000	2000	0.05	8000	1500	0.04	6400	1200	0.03
		50	11000	2000	0.04	9800	1600	0.04	7500	1200	0.03	6000	960	0.02
	0.9°	20	12000	3800	0.13	11000	3100	0.1	8500	2400	0.09	6800	1900	0.06
		30	11000	3000	0.07	10000	2500	0.06	8000	1900	0.05	6400	1500	0.03
		40	11000	2600	0.06	10000	2100	0.05	8000	1600	0.04	6400	1300	0.03
		50	11000	2100	0.04	9800	1700	0.04	7500	1300	0.03	6000	1000	0.02
		60	9800	2000	0.03	9100	1600	0.025	7000	1200	0.02	5600	960	0.015
		70	9800	1800	0.015	9100	1400	0.01	7000	1100	0.01	5600	880	0.007
	1.5°	50	11000	2200	0.04	9800	1800	0.04	7500	1400	0.03	6000	1100	0.02
		60	9800	2100	0.03	9100	1700	0.025	7000	1300	0.02	5600	1000	0.015
		70	9800	2000	0.015	9100	1600	0.01	7000	1200	0.01	5600	960	0.007
R2	0.9°	30	10000	3200	0.3	9400	2600	0.25	7200	2000	0.2	5800	1600	0.15
		40	9500	2400	0.15	8800	2000	0.12	6800	1500	0.1	5400	1200	0.07
		50	9500	2100	0.1	8800	1700	0.1	6800	1300	0.08	5400	1000	0.06
		60	9000	1900	0.07	8300	1600	0.06	6400	1200	0.05	5100	960	0.03
R2.5	0.9°	35	8000	3500	0.3	7400	2900	0.25	5700	2200	0.2	4600	1800	0.15
		40	8000	3200	0.2	7400	2600	0.18	5700	2000	0.15	4600	1600	0.1
		60	7600	2400	0.15	7000	2000	0.12	5400	1500	0.1	4300	1200	0.07



- If the depth of cut is shallow, the revolution and feed rate can be increased.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

VC3MB

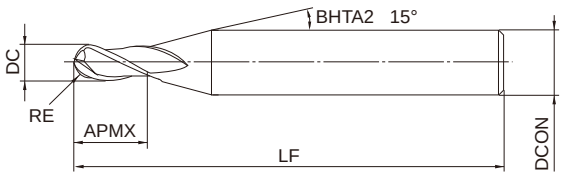
MIRACLE END MILLS

Ball nose, Medium cut length, 3 flute

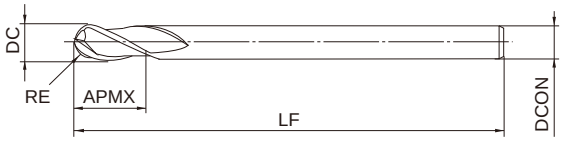
Product Information

Work Material

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668



Type1



Type2

R	RE≦6	RE>6		
	±0.01	±0.02		
	DC≦12	DC>12		
	0 - 0.020	0 - 0.030		
h6	DCON=6	8≦DCON≦10	12≦DCON≦16	DCON=20
	0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013

●Inventory maintained in Japan. Unit : mm

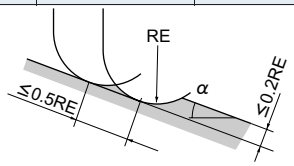
Order Number	RE	DC	APMX	LF	DCON	No. of Flutes	Stock	type
VC3MBR0100	1	2	6	60	6	3	●	1
VC3MBR0150	1.5	3	8	70	6	3	●	1
VC3MBR0200	2	4	8	70	6	3	●	1
VC3MBR0250	2.5	5	12	80	6	3	●	1
VC3MBR0300	3	6	12	80	6	3	●	2
VC3MBR0400	4	8	14	90	8	3	●	2
VC3MBR0500	5	10	18	100	10	3	●	2
VC3MBR0600	6	12	22	110	12	3	●	2
VC3MBR0800	8	16	30	140	16	3	●	2
VC3MBR1000	10	20	38	160	20	3	●	2

VC3MB

RECOMMENDED CUTTING CONDITIONS

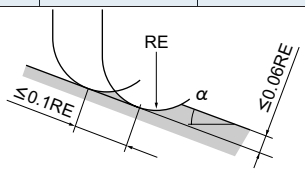
·Roughing

Work material	Carbon steel, Cast iron, Alloy steel, Pre-hardened steel AISI 1050, AISI No 35 B, AISI P20, AISI P21				Hardened steel (45— 55HRC) AISI H13			
R RE (mm)	α≦15°		α>15°		α≦15°		α>15°	
	Revolution (min-1)	Feed rate (mm/min)	Revolution (min-1)	Feed rate (mm/min)	Revolution (min-1)	Feed rate (mm/min)	Revolution (min-1)	Feed rate (mm/min)
R1	32000	3000	25000	1170	18000	1440	16000	640
R2	18500	3700	14500	1460	11000	1760	9200	740
R3	13000	4000	10000	1500	7700	1920	6400	800
R4	10000	5000	8000	2000	6000	2300	4800	920
R5	8000	5000	6500	2000	4800	2200	3800	870
R6	6600	4600	5300	1800	4000	2100	3200	840
R8	5000	4000	4000	1600	3000	1700	2400	680
R10	4000	3600	3200	1440	2400	1400	1900	550



·Finishing

Work material	Carbon steel, Cast iron, Alloy steel, Pre-hardened steel AISI 1050, AISI No 35 B, AISI P20, AISI P21				Hardened steel (45— 55HRC) AISI H13			
R RE (mm)	α≦15°		α>15°		α≦15°		α>15°	
	Revolution (min-1)	Feed rate (mm/min)	Revolution (min-1)	Feed rate (mm/min)	Revolution (min-1)	Feed rate (mm/min)	Revolution (min-1)	Feed rate (mm/min)
R1	32000	3200	32000	1500	25000	2000	20000	800
R2	25500	5000	20000	2000	17000	2700	13000	1000
R3	20000	6100	15000	2200	13000	3200	10000	1200
R4	15000	7500	11000	2700	10000	3800	7500	1400
R5	12000	7500	9000	2700	8000	3700	6000	1400
R6	10000	7000	7500	2500	6600	3500	5000	1300
R8	7500	6000	5600	2200	5000	2800	3700	1000
R10	6000	5400	4500	2000	4000	2300	3000	900



- α is the inclination angle of the machined surface.
- If the depth of cut is shallow, the revolution and feed rate can be increased.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

VF4SVB

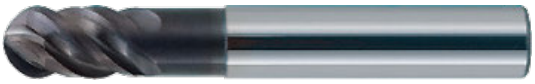
IMPACT MIRACLE END MILLS

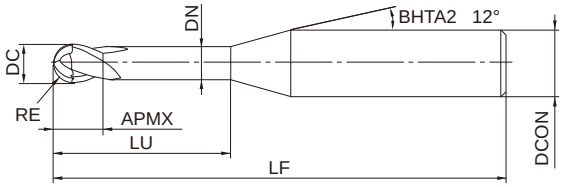
Ball nose, Short cut length, 4 flute, Variable curve

Product Information

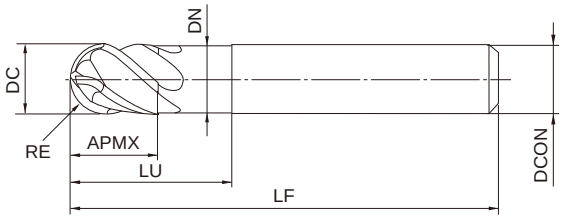
Work Material

Technical Info >> 1993
ISO13399 Property >> 1966
SYMBOL DESCRIPTIONS >> 664
END MILLS SELECTION CHART >> 668





Type1



Type2

R	RE≦6	RE>6		
	±0.01	±0.02		
	DC≦12	DC>12		
	0 - 0.02	0 - 0.03		
h6	DCON=6	8≦DCON≦10	12≦DCON≦16	DCON=20
	0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013

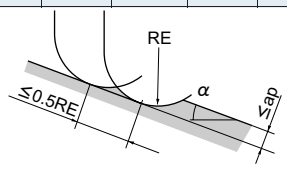
●Inventory maintained in Japan. Unit : mm

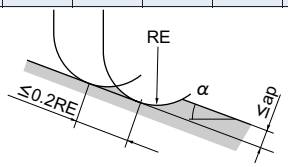
Order Number	RE	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	type
VF4SVBR0100	1	2	3	5	1.9	50	6	4	●	1
VF4SVBR0150	1.5	3	4.5	7.5	2.9	50	6	4	●	1
VF4SVBR0200	2	4	6	10	3.9	50	6	4	●	1
VF4SVBR0250	2.5	5	7.5	12.5	4.9	50	6	4	●	1
VF4SVBR0300	3	6	9	15	5.85	50	6	4	●	2
VF4SVBR0400	4	8	12	20	7.85	60	8	4	●	2
VF4SVBR0500	5	10	15	25	9.7	70	10	4	●	2
VF4SVBR0600	6	12	18	30	11.7	75	12	4	●	2
VF4SVBR0800	8	16	24	40	15.5	90	16	4	●	2
VF4SVBR1000	10	20	30	50	19.5	100	20	4	●	2

VF4SVB

RECOMMENDED CUTTING CONDITIONS

Work material	Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21						Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V						Heat resistant alloys Inconel718					
R RE (mm)	α≦15°		α>15°		Depth of cut ap (mm)	Pick feed pf (mm)	α≦15°		α>15°		Depth of cut ap (mm)	Pick feed pf (mm)	α≦15°		α>15°		Depth of cut ap (mm)	Pick feed pf (mm)
	Revolution (min-1)	Feed rate (mm/min)	Revolution (min-1)	Feed rate (mm/min)			Revolution (min-1)	Feed rate (mm/min)	Revolution (min-1)	Feed rate (mm/min)			Revolution (min-1)	Feed rate (mm/min)	Revolution (min-1)	Feed rate (mm/min)		
R1	40000	8000	32000	3800	0.17	≦0.5	36000	6500	24000	2900	0.17	≦0.5	9600	960	6400	510	0.08	≦0.2
R1.5	32000	7700	21000	3200	0.25	≦0.75	24000	4800	16000	1900	0.25	≦0.75	6400	640	4200	340	0.13	≦0.3
R2	24000	5800	16000	2800	0.33	≦1	18000	4000	12000	1700	0.33	≦1	4800	580	3200	260	0.17	≦0.4
R2.5	19000	5300	12700	2600	0.42	≦1.25	14400	3500	9600	1500	0.42	≦1.25	3800	530	2500	250	0.21	≦0.5
R3	16000	4800	10600	2100	0.5	≦1.5	12000	3200	8000	1400	0.5	≦1.5	3200	500	2100	210	0.25	≦0.6
R4	12000	4300	8000	1900	0.8	≦2	9000	3200	6000	1400	0.8	≦2	2400	430	1600	190	0.4	≦0.8
R5	9600	4100	6400	1800	1	≦2.5	7200	3000	4800	1300	1	≦2.5	2000	420	1300	180	0.5	≦1
R6	8000	4000	5300	1800	1.2	≦3	6000	3000	4000	1300	1.2	≦3	1700	350	1100	150	0.6	≦1.2
R8	6000	3200	4000	1400	1.6	≦4	4500	2500	3000	1100	1.6	≦4	1200	300	800	130	0.8	≦1.6
R10	4800	3000	3200	1300	2.0	≦5	3600	2300	2400	1000	2.0	≦5	1000	250	640	100	1.0	≦2





- When cutting austenitic stainless steel, the use of water-soluble cutting fluid is effective.
- If the depth of cut is shallow, the revolution and feed rate can be increased.
- The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abnormal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.
- α is the inclination angle of the machined surface.

VC4MB

MIRACLE END MILLS

Ball nose, Medium cut length, 4 flute

Product Information

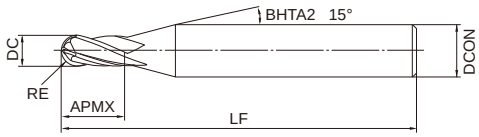
UWC 20° 30° VC

RE<3 RE≧3

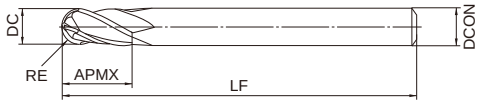
Work Material

P M S H F M

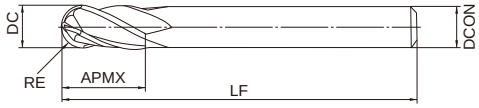
Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668



Type1



Type2



Type3

R	RE≦6	RE≧7		
	±0.01	±0.02		
	DC≦12	DC>12		
	0 - 0.020	0 - 0.030		
h6	DCON=6	8≦DCON≦10	12≦DCON≦16	DCON=20
	0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013

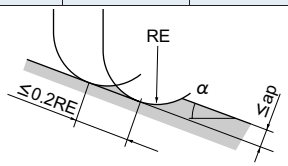
●Inventory maintained in Japan. Unit : mm

Order Number	RE	DC	APMX	LF	DCON	No. of Flutes	Stock	type
VC4MBR0050	0.5	1	2.5	50	6	4	●	1
VC4MBR0075	0.75	1.5	4	50	6	4	●	1
VC4MBR0100	1	2	6	60	6	4	●	1
VC4MBR0150	1.5	3	8	70	6	4	●	1
VC4MBR0200	2	4	8	70	6	4	●	1
VC4MBR0250	2.5	5	12	80	6	4	●	1
VC4MBR0300	3	6	12	80	6	4	●	2
VC4MBR0400	4	8	14	90	8	4	●	2
VC4MBR0500	5	10	18	100	10	4	●	2
VC4MBR0600	6	12	22	110	12	4	●	2
VC4MBR0700	7	14	26	120	12	4	●	3
VC4MBR0800	8	16	30	140	16	4	●	2
VC4MBR0900	9	18	34	140	16	4	●	3
VC4MBR1000	10	20	38	160	20	4	●	2

VC4MB

RECOMMENDED CUTTING CONDITIONS

Work material	Alloy steel, Tool steel, Pre-hardened steel Hardened steel (— 55HRC) AISI H13, AISI W1-10, AISI P21					Hardened steel (55— 62HRC) AISI D2				
R RE (mm)	α≦15°		α>15°		Depth of cut ap (mm)	α≦15°		α>15°		Depth of cut ap (mm)
	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)		Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	
R0.5	40000	8000	40000	3800	0.06	40000	5600	40000	3100	0.05
R0.75	40000	9600	40000	4800	0.09	40000	7200	38000	4200	0.08
R1	40000	9600	40000	5600	0.11	40000	8000	28000	3100	0.10
R1.5	40000	12000	32000	5600	0.13	32000	7700	19000	2900	0.12
R2	32000	11000	24000	4700	0.15	24000	6200	14000	2500	0.13
R2.5	25000	9000	19000	3800	0.20	19000	5300	12000	2200	0.15
R3	21000	8400	15000	3400	0.25	16000	4800	9600	2000	0.20
R4	16000	6400	12000	2600	0.30	12000	3600	7200	1600	0.20
R5	13000	5200	9600	2200	0.50	10000	3200	5800	1300	0.20
R6	9000	3600	7200	1700	0.50	7000	2200	4300	940	0.30



- If the depth of cut is shallow, the revolution and feed rate can be increased.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

VQ4SVB

SMART MIRACLE END MILLS

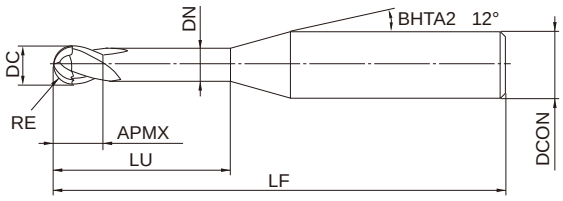
Ball nose, Short cut length, 4 flute, Variable curve

Product Information

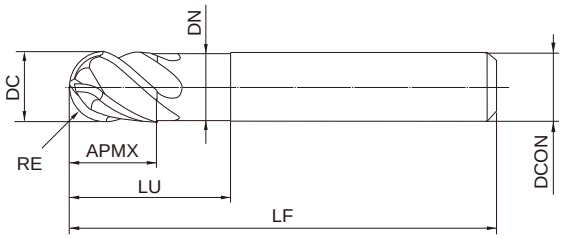
Work Material

P M N S F M

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668



Type1



Type2

R	1≦RE≦6		
	±0.01		
	DC≦12		
	0 - 0.02		
h6	DCON=6	8≦DCON≦10	DCON=12
	0 - 0.008	0 - 0.009	0 - 0.011

●Inventory maintained in Japan. Unit : mm

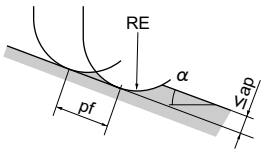
Order Number	RE	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	type
VQ4SVBR0100	1	2	3	5	1.9	50	6	4	●	1
VQ4SVBR0150	1.5	3	4.5	7.5	2.9	50	6	4	●	1
VQ4SVBR0200	2	4	6	10	3.9	50	6	4	●	1
VQ4SVBR0250	2.5	5	7.5	12.5	4.9	50	6	4	●	1
VQ4SVBR0300	3	6	9	15	5.85	50	6	4	●	2
VQ4SVBR0400	4	8	12	20	7.85	60	8	4	●	2
VQ4SVBR0500	5	10	15	25	9.7	70	10	4	●	2
VQ4SVBR0600	6	12	18	30	11.7	75	12	4	●	2

VQ4SVB

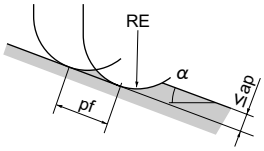
RECOMMENDED CUTTING CONDITIONS

·Side milling (Slotting)

Work material	Carbon steel, Alloy steel, Mild Steel, Pre-hardened steel, AISI 1045, AISI 4140, ASTM A36, AISI 1010, AISI P21, AISI P20, AISI 4340								Austenitic stainless steel, Titanium alloy, Precipitation hardening stainless steel Cobalt chromium alloy, Ferritic and Martensitic stainless steel AISI 304, AISI 316, Ti-6Al-4V, AISI 630, AISI 631, 15-5PH, 17-4PH, AISI 431, AISI 420							
R RE (mm)	α≦15°			α>15°			Depth of cut ap (mm)	Pick feed pf (mm)	α≦15°			α>15°			Depth of cut ap (mm)	Pick feed pf (mm)
	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)			Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)		
R1	250	40000	8000	200	32000	3800	0.17	0.5	230	36000	6500	150	24000	2900	0.17	0.5
R1.5	300	32000	7700	200	21000	3200	0.25	0.75	230	24000	4800	150	16000	1900	0.25	0.75
R2	300	24000	5800	200	16000	2800	0.33	1	230	18000	4000	150	12000	1700	0.33	1
R2.5	300	19000	5300	200	12700	2600	0.42	1.25	230	14400	3500	150	9600	1500	0.42	1.25
R3	300	16000	4800	200	10600	2100	0.5	1.5	230	12000	3200	150	8000	1400	0.5	1.5
R4	300	12000	4300	200	8000	1900	0.8	2	230	9000	3200	150	6000	1400	0.8	2
R5	300	9600	4100	200	6400	1800	1	2.5	230	7200	3000	150	4800	1300	1	2.5
R6	300	8000	4000	200	5300	1800	1.2	3	230	6000	3000	150	4000	1300	1.2	3



Work material	Copper, Copper alloys								Heat resistant alloys Inconel718							
R RE (mm)	α≦15°			α>15°			Depth of cut ap (mm)	Pick feed pf (mm)	α≦15°			α>15°			Depth of cut ap (mm)	Pick feed pf (mm)
	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)			Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)		
R1	250	40000	8000	240	38000	4500	0.17	0.5	60	9600	960	40	6400	510	0.08	0.2
R1.5	360	38000	9100	240	25000	3800	0.25	0.7	60	6400	640	40	4200	340	0.13	0.3
R2	360	29000	7000	240	19000	3300	0.33	1	60	4800	580	40	3200	260	0.17	0.4
R2.5	360	23000	6400	240	15000	3100	0.42	1.2	60	3800	530	39	2500	250	0.21	0.5
R3	360	19000	5700	240	13000	2600	0.5	1.5	60	3200	500	40	2100	210	0.25	0.6
R4	360	14000	5000	240	9600	2300	0.8	2	60	2400	430	40	1600	190	0.4	0.8
R5	360	12000	5100	240	7700	2200	1	2.5	63	2000	420	41	1300	180	0.5	1
R6	360	9600	4800	240	6400	2200	1.2	3	64	1700	350	41	1100	150	0.6	1.2



- SMART MIRACLE Coating is not energized because of its nature. Therefore, an external contact (voltaic type) tool setter cannot be used. An internal contact (non-voltaic) type or laser type tool setter is recommended to measure the length of the tool.
- For stainless steel, titanium alloy and heat resistant alloy, the use of water-soluble coolant is effective.
- The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abnormal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.
- If the depth of cut is shallow, the revolution and feed rate can be increased.
- α is the inclination angle of the machined surface.

VF4MB

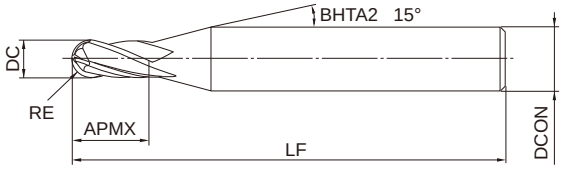
IMPACT MIRACLE END MILLS

Ball nose, Medium cut length, 4 flute

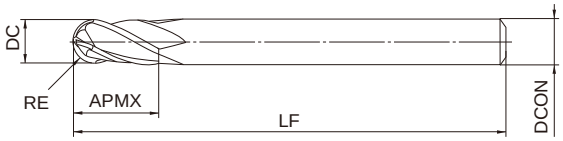
Product Information

Work Material

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668



Type1



Type2

R	0.5≦RE≦6		
	±0.01		
	1≦DC≦12		
	0 - 0.020		
h6	DCON=6	8≦DCON≦10	DCON=12
	0 - 0.008	0 - 0.009	0 - 0.011

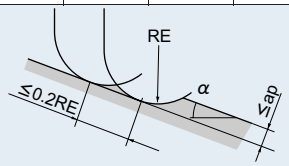
●Inventory maintained in Japan. Unit : mm

Order Number	RE	DC	APMX	LF	DCON	No. of Flutes	Stock	type
VF4MBR0050	0.5	1	2.5	50	6	4	●	1
VF4MBR0100	1	2	6	60	6	4	●	1
VF4MBR0150	1.5	3	8	70	6	4	●	1
VF4MBR0200	2	4	8	70	6	4	●	1
VF4MBR0250	2.5	5	12	80	6	4	●	1
VF4MBR0300	3	6	12	80	6	4	●	2
VF4MBR0400	4	8	14	90	8	4	●	2
VF4MBR0500	5	10	18	100	10	4	●	2
VF4MBR0600	6	12	22	110	12	4	●	2

VF4MB

RECOMMENDED CUTTING CONDITIONS

Work material	Hardened steel (45— 55HRC) AISI H13					Hardened steel (55— 62HRC) AISI D2					Hardened steel (62— 70HRC) AISI W1, AISI M2				
R RE (mm)	α≦15°		α>15°		Depth of cut ap(mm)	α≦15°		α>15°		Depth of cut ap(mm)	α≦15°		α>15°		Depth of cut ap(mm)
	Revolution (min-1)	Feed rate (mm/min)	Revolution (min-1)	Feed rate (mm/min)		Revolution (min-1)	Feed rate (mm/min)	Revolution (min-1)	Feed rate (mm/min)		Revolution (min-1)	Feed rate (mm/min)	Revolution (min-1)	Feed rate (mm/min)	
R0.5	40000	8000	40000	3800	0.06	40000	5600	40000	3100	0.05	40000	4700	32000	1700	0.03
R1	40000	9600	40000	5600	0.11	40000	8000	28000	3100	0.10	24000	5000	16000	1200	0.06
R1.5	40000	12000	32000	5600	0.13	32000	7700	19000	2900	0.12	16000	4200	11000	1100	0.07
R2	32000	11000	24000	4700	0.15	24000	6200	14000	2500	0.13	12000	3100	8000	1000	0.08
R2.5	25000	9000	19000	3800	0.20	19000	5300	12000	2200	0.15	9600	2700	6000	780	0.08
R3	21000	8400	15000	3400	0.25	16000	4800	9600	2000	0.20	8000	2300	5000	780	0.09
R4	16000	6400	12000	2600	0.30	12000	3600	7200	1600	0.20	6000	1900	4000	620	0.09
R5	13000	5200	9600	2200	0.50	10000	3200	5800	1300	0.20	4800	1500	3000	550	0.10
R6	9000	3600	7200	1700	0.50	7000	2200	4300	940	0.30	3600	1100	2200	400	0.10



- α is the inclination angle of the machined surface.
- If the depth of cut is shallow, the revolution and feed rate can be increased.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

MS2MRB

MSTAR END MILLS

Corner radius end mill, Medium cut length, 2 flute

Product Information

UWC 30° MS

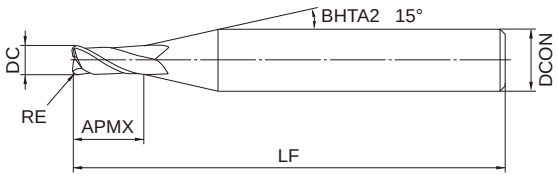
DC<3 DC≧3

Technical Info >> 1993 ISO13399 Property >> 1966

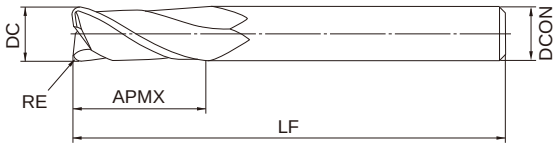
Work Material

P M S H F M

SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668



Type1



Type2

h6	1≦DC≦12		
	0 - 0.020		
	4≦DCON≦6	8≦DCON≦10	DCON=12
	0 - 0.008	0 - 0.009	0 - 0.011

●Inventory maintained in Japan. Unit : mm

Order Number	DC	RE	APMX	LF	DCON	No. of Flutes	Stock	type
MS2MRBD0100R010	1	0.1	2	40	4	2	●	1
MS2MRBD0100R020	1	0.2	2	40	4	2	●	1
MS2MRBD0100R030	1	0.3	2	40	4	2	●	1
MS2MRBD0150R010	1.5	0.1	3	40	4	2	●	1
MS2MRBD0150R020	1.5	0.2	3	40	4	2	●	1
MS2MRBD0150R030	1.5	0.3	3	40	4	2	●	1
MS2MRBD0150R050	1.5	0.5	3	40	4	2	●	1
MS2MRBD0200R010	2	0.1	4	40	4	2	●	1
MS2MRBD0200R020	2	0.2	4	40	4	2	●	1
MS2MRBD0200R030	2	0.3	4	40	4	2	●	1
MS2MRBD0200R050	2	0.5	4	40	4	2	●	1
MS2MRBD0250R010	2.5	0.1	5	40	4	2	●	1
MS2MRBD0250R020	2.5	0.2	5	40	4	2	●	1
MS2MRBD0250R030	2.5	0.3	5	40	4	2	●	1
MS2MRBD0250R050	2.5	0.5	5	40	4	2	●	1
MS2MRBD0300R010	3	0.1	6	50	6	2	●	1
MS2MRBD0300R020	3	0.2	6	50	6	2	●	1
MS2MRBD0300R030	3	0.3	6	50	6	2	●	1
MS2MRBD0300R050	3	0.5	6	50	6	2	●	1
MS2MRBD0300R100	3	1	6	50	6	2	●	1
MS2MRBD0400R010	4	0.1	8	50	6	2	●	1
MS2MRBD0400R020	4	0.2	8	50	6	2	●	1
MS2MRBD0400R030	4	0.3	8	50	6	2	●	1
MS2MRBD0400R050	4	0.5	8	50	6	2	●	1
MS2MRBD0400R100	4	1	8	50	6	2	●	1
MS2MRBD0500R010	5	0.1	10	50	6	2	●	1
MS2MRBD0500R020	5	0.2	10	50	6	2	●	1
MS2MRBD0500R030	5	0.3	10	50	6	2	●	1

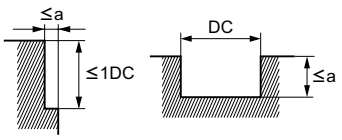
MS2MRB

Order Number	DC	RE	APMX	LF	DCON	No. of Flutes	Stock	type
MS2MRBD0500R050	5	0.5	10	50	6	2	●	1
MS2MRBD0500R100	5	1	10	50	6	2	●	1
MS2MRBD0600R010	6	0.1	12	50	6	2	●	2
MS2MRBD0600R020	6	0.2	12	50	6	2	●	2
MS2MRBD0600R030	6	0.3	12	50	6	2	●	2
MS2MRBD0600R050	6	0.5	12	50	6	2	●	2
MS2MRBD0600R100	6	1	12	50	6	2	●	2
MS2MRBD0600R150	6	1.5	12	50	6	2	●	2
MS2MRBD0600R200	6	2	12	50	6	2	●	2
MS2MRBD0800R020	8	0.2	16	60	8	2	●	2
MS2MRBD0800R030	8	0.3	16	60	8	2	●	2
MS2MRBD0800R050	8	0.5	16	60	8	2	●	2
MS2MRBD0800R100	8	1	16	60	8	2	●	2
MS2MRBD0800R150	8	1.5	16	60	8	2	●	2
MS2MRBD0800R200	8	2	16	60	8	2	●	2
MS2MRBD0800R250	8	2.5	16	60	8	2	●	2
MS2MRBD0800R300	8	3	16	60	8	2	●	2
MS2MRBD1000R020	10	0.2	20	70	10	2	●	2
MS2MRBD1000R030	10	0.3	20	70	10	2	●	2
MS2MRBD1000R050	10	0.5	20	70	10	2	●	2
MS2MRBD1000R100	10	1	20	70	10	2	●	2
MS2MRBD1000R150	10	1.5	20	70	10	2	●	2
MS2MRBD1000R200	10	2	20	70	10	2	●	2
MS2MRBD1000R250	10	2.5	20	70	10	2	●	2
MS2MRBD1000R300	10	3	20	70	10	2	●	2
MS2MRBD1200R020	12	0.2	24	75	12	2	●	2
MS2MRBD1200R030	12	0.3	24	75	12	2	●	2
MS2MRBD1200R050	12	0.5	24	75	12	2	●	2
MS2MRBD1200R100	12	1	24	75	12	2	●	2
MS2MRBD1200R150	12	1.5	24	75	12	2	●	2
MS2MRBD1200R200	12	2	24	75	12	2	●	2
MS2MRBD1200R250	12	2.5	24	75	12	2	●	2
MS2MRBD1200R300	12	3	24	75	12	2	●	2

MS2MRB

RECOMMENDED CUTTING CONDITIONS

Work material	Carbon steel, Cast iron, Alloy steel, Pre-hardened steel AISI 1050, AISI No 35 B, AISI P20, AISI P21			Hardened steel (45— 55HRC) AISI H13		
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut a(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut a(mm)
0.1	40000	40	0.001	40000	40	0.001
0.2	40000	100	0.002	40000	100	0.002
0.3	40000	200	0.005	40000	200	0.005
0.4	40000	600	0.01	40000	600	0.01
0.5	40000	1000	0.015	40000	960	0.015
0.6	40000	1200	0.02	40000	1200	0.02
0.7	40000	1400	0.02	40000	1400	0.02
0.8	40000	1600	0.03	40000	1600	0.03
0.9	40000	1800	0.04	40000	1600	0.04
1	40000	2000	0.06	32000	1600	0.06
1.5	40000	3000	0.12	32000	1900	0.08
2	30000	3000	0.18	24000	1900	0.10
2.5	24000	2600	0.25	19000	1600	0.13
3	20000	2300	0.30	16000	1400	0.15
4	15000	2000	0.40	12000	1200	0.20
5	12000	1600	0.50	9000	900	0.25
6	10000	1400	0.60	7000	700	0.30
8	8000	1000	0.80	5600	550	0.40
10	6400	900	1.00	4500	500	0.50
12	5400	820	1.00	3800	450	0.50
16	2400	380	3.00	1200	100	0.80
20	1900	320	4.00	1000	80	1.00



- If the depth of cut is shallow, the revolution and feed rate can be increased.
- In case of slotting with over 3 mm endmill, please reduce revolution to 50—70% of above value, and reduce feed rate to 40—60% of above value.
- When drilling, please set the feed rate at 1/3 or below of the values above.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

MS2XLRB

MSTAR END MILLS

Corner radius end mill, Short cut length,2 flute, Long neck

Product Information

UWC 30° MS

DC<3 DC≧3

Technical Info >> 1993

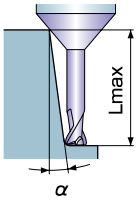
ISO13399 Property >> 1966

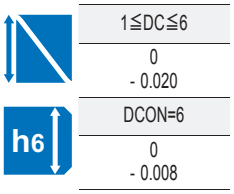
Work Material

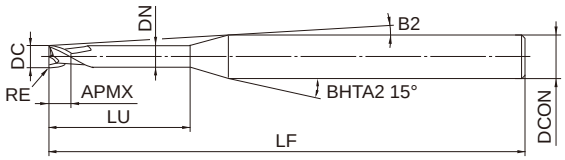
P M S H F M

SYMBOL DESCRIPTIONS >> 664

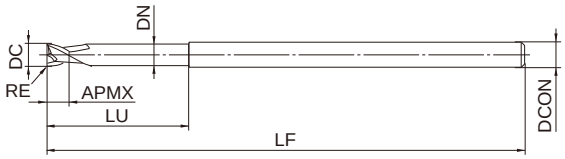
END MILLS SELECTION CHART >> 668







Type1



Type2

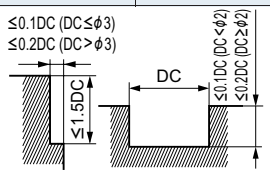
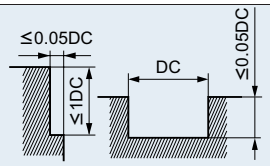
- α: Inclined angle Lmax: Effective length
- Lmax indicates "0: Not available, blank: No interference".

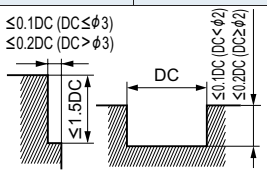
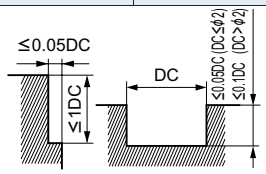
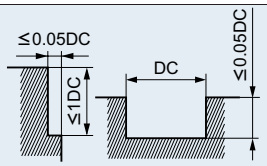
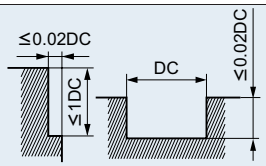
●Inventory maintained in Japan. Unit : mm

Order Number	DC	RE	APMX	LU	DN	B2	LF	DCON	No. of Flutes	Stock	type	Effective length for inclined angle			
												0.5°	1°	2°	3°
MS2XLRBD0100R010N020	1	0.1	1	2	0.94	12.3°	60	6	2	●	1	2.1	2.3	2.4	2.8
MS2XLRBD0100R010N050	1	0.1	1	5	0.94	9.8°	60	6	2	●	1	5.3	5.6	6	6.5
MS2XLRBD0200R010N040	2	0.1	2	4	1.9	9.9°	60	6	2	●	1	4.2	4.4	4.8	5.2
MS2XLRBD0200R010N100	2	0.1	2	10	1.9	6.5°	60	6	2	●	1	10.5	10.9	11.7	12.6
MS2XLRBD0200R030N040	2	0.3	2	4	1.9	10°	60	6	2	●	1	4.2	4.4	4.7	5.1
MS2XLRBD0200R030N100	2	0.3	2	10	1.9	6.6°	60	6	2	●	1	10.5	10.8	11.6	12.6
MS2XLRBD0300R010N060	3	0.1	3	6	2.9	7.4°	50	6	2	●	1	6.3	6.6	7.1	7.6
MS2XLRBD0300R010N150	3	0.1	3	15	2.9	4.2°	60	6	2	●	1	15.7	16.2	17.4	18.8
MS2XLRBD0300R030N060	3	0.3	3	6	2.9	7.5°	50	6	2	●	1	6.3	6.6	7	7.6
MS2XLRBD0300R030N150	3	0.3	3	15	2.9	4.2°	60	6	2	●	1	15.7	16.2	17.4	18.8
MS2XLRBD0400R010N080	4	0.1	4	8	3.9	4.9°	50	6	2	●	1	8.4	8.7	9.4	10.1
MS2XLRBD0400R010N200	4	0.1	4	20	3.9	2.5°	60	6	2	●	1	20.8	21.6	23.2	
MS2XLRBD0400R030N080	4	0.3	4	8	3.9	5°	50	6	2	●	1	8.4	8.7	9.3	10.1
MS2XLRBD0400R030N200	4	0.3	4	20	3.9	2.5°	60	6	2	●	1	20.8	21.5	23.1	
MS2XLRBD0400R050N080	4	0.5	4	8	3.9	5°	50	6	2	●	1	8.4	8.7	9.3	10
MS2XLRBD0400R050N200	4	0.5	4	20	3.9	2.5°	60	6	2	●	1	20.8	21.5	23.1	
MS2XLRBD0600R010N120	6	0.1	6	12	5.85		50	6	2	●	2				
MS2XLRBD0600R010N300	6	0.1	6	30	5.85		70	6	2	●	2				
MS2XLRBD0600R030N120	6	0.3	6	12	5.85		50	6	2	●	2				
MS2XLRBD0600R030N300	6	0.3	6	30	5.85		70	6	2	●	2				
MS2XLRBD0600R050N120	6	0.5	6	12	5.85		50	6	2	●	2				
MS2XLRBD0600R050N300	6	0.5	6	30	5.85		70	6	2	●	2				

MS2XLRB

RECOMMENDED CUTTING CONDITIONS

Work material			Carbon steel, Cast iron, Alloy steel (—30HRC) AISI 1050, AISI No 35 B, AISI P20		Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21	
Dia. DC(mm)	Neck length LU(mm)		Revolution (min⁻¹)	Feed rate (mm/min)	Revolution (min⁻¹)	Feed rate (mm/min)
1	2	(2D)	30000	600	20000	400
2	4		15000	600	10000	400
3	6		10000	600	7000	400
4	8		7500	600	5200	400
6	12		5000	600	3500	400
1	5	(5D)	22000	350	17000	280
2	10		11000	350	8800	280
3	15		7400	350	5800	280
4	20		5600	350	4400	280
6	30		3700	350	2900	280
LU=2D						
LU=5D						

Work material			Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V		Hardened steel (45— 55HRC) AISI H13	
Dia. DC(mm)	Neck length LU(mm)		Revolution (min⁻¹)	Feed rate (mm/min)	Revolution (min⁻¹)	Feed rate (mm/min)
1	2	(2D)	18000	300	15000	120
2	4		9100	300	8000	120
3	6		6000	300	5000	120
4	8		4500	300	4000	120
6	12		3000	300	2700	120
1	5	(5D)	14000	200	12000	100
2	10		7200	200	6400	100
3	15		4800	200	4200	100
4	20		3600	200	3200	100
6	30		2400	200	2100	100
LU=2D						
LU=5D						

- When cutting austenitic stainless steel, the use of water-soluble cutting fluid is effective.
- If the depth of cut is shallow, the revolution and feed rate can be increased.

MPMHVRB

MS PLUS END MILLS

Corner radius, Medium cut length, 4 flute, Irregular helix flutes

Product Information

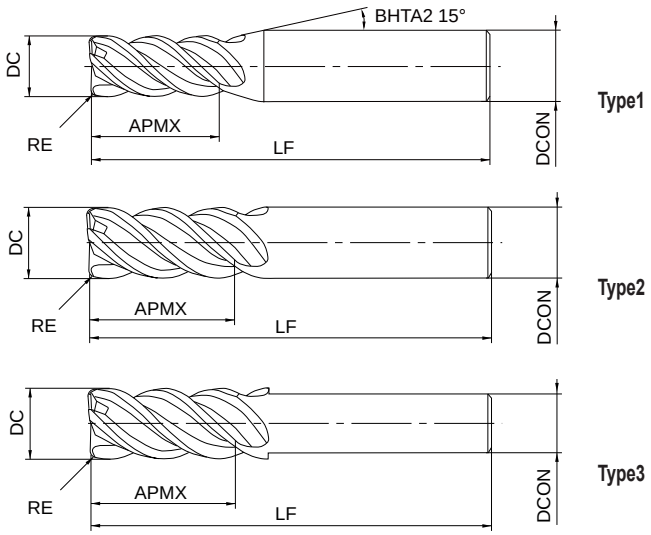
UWC 37° 40° MS+

Work Material

P M S H

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668

R	0.1≦R E≦5				
	±0.015				
	DC≦12	DC>12			
	0 - 0.02	0 - 0.03			
h5	DCON=4	DCON=6	DCON=8		
	0 - 0.005	0 - 0.005	0 - 0.006		
h6	DCON= 8(DC=10)	DCON= 10(DC= 12)	DCON= 10	12≦DCON≦16	DCON= 20
	0 - 0.009	0 - 0.009	0 - 0.009	0 - 0.011	0 - 0.013



●Inventory maintained in Japan. Unit : mm

Order Number	DC	RE	APMX	LF	DCON	No. of Flutes	Stock	type
MPMHVRBD0100R010	1	0.1	2.5	45	4	4	●	1
MPMHVRBD0100R020	1	0.2	2.5	45	4	4	●	1
MPMHVRBD0200R010	2	0.1	5	45	4	4	●	1
MPMHVRBD0200R020	2	0.2	5	45	4	4	●	1
MPMHVRBD0200R030	2	0.3	5	45	4	4	●	1
MPMHVRBD0200R050	2	0.5	5	45	4	4	●	1
MPMHVRBD0300R010	3	0.1	7.5	45	6	4	●	1
MPMHVRBD0300R020	3	0.2	7.5	45	6	4	●	1
MPMHVRBD0300R030	3	0.3	7.5	45	6	4	●	1
MPMHVRBD0300R050	3	0.5	7.5	45	6	4	●	1
MPMHVRBD0400R010	4	0.1	10	45	6	4	●	1
MPMHVRBD0400R020	4	0.2	10	45	6	4	●	1
MPMHVRBD0400R030	4	0.3	10	45	6	4	●	1
MPMHVRBD0400R050	4	0.5	10	45	6	4	●	1
MPMHVRBD0400R100	4	1	10	45	6	4	●	1
MPMHVRBD0500R010	5	0.1	12.5	50	6	4	●	1
MPMHVRBD0500R020	5	0.2	12.5	50	6	4	●	1
MPMHVRBD0500R030	5	0.3	12.5	50	6	4	●	1
MPMHVRBD0500R050	5	0.5	12.5	50	6	4	●	1
MPMHVRBD0500R100	5	1	12.5	50	6	4	●	1
MPMHVRBD0600R010	6	0.1	15	60	6	4	●	2
MPMHVRBD0600R020	6	0.2	15	60	6	4	●	2
MPMHVRBD0600R030	6	0.3	15	60	6	4	●	2
MPMHVRBD0600R050	6	0.5	15	60	6	4	●	2
MPMHVRBD0600R100	6	1	15	60	6	4	●	2
MPMHVRBD0800R020	8	0.2	20	70	8	4	●	2
MPMHVRBD0800R030	8	0.3	20	70	8	4	●	2

MPMHVRB

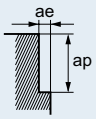
Order Number	DC	RE	APMX	LF	DCON	No. of Flutes	Stock	type
MPMHVRBD0800R050	8	0.5	20	70	8	4	●	2
MPMHVRBD0800R100	8	1	20	70	8	4	●	2
MPMHVRBD0800R150	8	1.5	20	70	8	4	●	2
MPMHVRBD0800R200	8	2	20	70	8	4	●	2
MPMHVRBD0800R250	8	2.5	20	70	8	4	●	2
MPMHVRBD0800R300	8	3	20	70	8	4	●	2
MPMHVRBD1000R020	10	0.2	25	80	10	4	●	2
MPMHVRBD1000R030	10	0.3	25	80	10	4	●	2
MPMHVRBD1000R030S08	10	0.3	25	100	8	4	●	3
MPMHVRBD1000R050	10	0.5	25	80	10	4	●	2
MPMHVRBD1000R050S08	10	0.5	25	100	8	4	●	3
MPMHVRBD1000R100	10	1	25	80	10	4	●	2
MPMHVRBD1000R100S08	10	1	25	100	8	4	●	3
MPMHVRBD1000R150	10	1.5	25	80	10	4	●	2
MPMHVRBD1000R200	10	2	25	80	10	4	●	2
MPMHVRBD1000R200S08	10	2	25	100	8	4	●	3
MPMHVRBD1000R250	10	2.5	25	80	10	4	●	2
MPMHVRBD1000R300	10	3	25	80	10	4	●	2
MPMHVRBD1200R030	12	0.3	30	100	12	4	●	2
MPMHVRBD1200R030S10	12	0.3	30	110	10	4	●	3
MPMHVRBD1200R050	12	0.5	30	100	12	4	●	2
MPMHVRBD1200R050S10	12	0.5	30	110	10	4	●	3
MPMHVRBD1200R100	12	1	30	100	12	4	●	2
MPMHVRBD1200R100S10	12	1	30	110	10	4	●	3
MPMHVRBD1200R150	12	1.5	30	100	12	4	●	2
MPMHVRBD1200R200	12	2	30	100	12	4	●	2
MPMHVRBD1200R200S10	12	2	30	110	10	4	●	3
MPMHVRBD1200R300	12	3	30	100	12	4	●	2
MPMHVRBD1200R300S10	12	3	30	110	10	4	●	3
MPMHVRBD1600R030	16	0.3	40	110	16	4	●	2
MPMHVRBD1600R050	16	0.5	40	110	16	4	●	2
MPMHVRBD1600R100	16	1	40	110	16	4	●	2
MPMHVRBD1600R200	16	2	40	110	16	4	●	2
MPMHVRBD1600R300	16	3	40	110	16	4	●	2
MPMHVRBD1600R500	16	5	40	110	16	4	●	2
MPMHVRBD2000R030	20	0.3	50	125	20	4	●	2
MPMHVRBD2000R050	20	0.5	50	125	20	4	●	2
MPMHVRBD2000R100	20	1	50	125	20	4	●	2
MPMHVRBD2000R200	20	2	50	125	20	4	●	2
MPMHVRBD2000R300	20	3	50	125	20	4	●	2
MPMHVRBD2000R500	20	5	50	125	20	4	●	2

MPMHVRB

RECOMMENDED CUTTING CONDITIONS

·Side milling

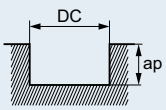
Work material	Carbon steel, Alloy steel (180—280HB) Ductile Cast Iron AISI 1045, AISI 4140, FCD450				Carbon steel, Alloy steel (280—350HB) Pre-hardened steel, Alloy tool steel AISI 4340, AISI P21, AISI P20,SKD, SKT				Austenitic stainless steel (≦200HB) Titanium alloy AISI 304, AISI 306,Ti-6Al-4V				Hardened steel (45— 52HRC) AISI H13, AISI L6			
Dia. DC(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)
1	38000	910	1.7	0.2	31000	500	1.7	0.2	25000	500	1.7	0.2	18000	290	1.7	0.05
2	21000	1500	3.5	0.4	17000	820	3.5	0.4	14000	640	3.5	0.4	10000	320	3.5	0.1
3	16000	1800	5	0.6	13000	940	5	0.6	11000	880	5	0.6	7400	380	5	0.15
4	12000	1700	7	0.8	9500	950	7	0.8	8000	900	7	0.8	5600	400	7	0.2
5	9500	1800	8.5	1	7600	1100	8.5	1	6400	900	8.5	1	4500	430	8.5	0.25
6	8000	2100	10	1.2	6400	1300	10	1.2	5300	1100	10	1.2	3700	440	10	0.3
8	6000	2000	13.5	1.6	4800	1400	13.5	1.6	4000	1200	13.5	1.6	2800	450	13.5	0.4
10	4800	2100	17	2	3800	1500	17	2	3200	1100	17	2	2200	440	17	0.5
12	4000	1900	20.5	2.4	3200	1400	20.5	2.4	2700	1100	20.5	2.4	1900	380	20.5	0.6
16	3000	1400	27.2	3.2	2400	1100	27.2	3.2	2000	840	27.2	3.2	1400	340	27.2	0.8
20	2400	1200	34	4	1900	840	34	4	1600	670	34	4	1100	260	34	1



- When using a slim shank with DC=10 or 12, reduce the cutting speed by 60%, the feed rate by 80%, and the depth of cutting ae by 50% from the above conditions.
- Water-soluble cutting fluids are recommended for stainless steel and titanium alloys. Air blowing is recommended for carbon steel.
- The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abnormal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.

·Slotting

Work material	Carbon steel, Alloy steel (180—280HB) Ductile Cast Iron AISI 1045, AISI 4140, FCD450			Carbon steel, Alloy steel (280—350HB) Pre-hardened steel, Alloy tool steel AISI 4340, AISI P21, AISI P20,SKD, SKT			Austenitic stainless steel (≦200HB) Titanium alloy AISI 304, AISI 306,Ti-6Al-4V			Hardened steel (45— 52HRC) AISI H13, AISI L6		
Dia. DC(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap(mm)
1	31000	620	0.5	24000	380	0.5	20000	320	0.5	9500	110	0.2
2	17000	650	2	14000	450	2	11000	350	2	4800	130	0.4
3	13000	940	3	10000	660	3	8500	510	3	3200	140	0.6
4	9500	820	4	7600	600	4	6400	460	4	2400	150	0.8
5	7600	910	5	6100	670	5	5100	510	5	1900	170	1
6	6400	860	6	5100	630	6	4200	470	6	1600	190	1.2
8	4800	1000	8	3800	750	8	3200	580	8	1200	190	1.6
10	3800	910	10	3100	680	10	2500	500	10	950	150	2
12	3200	920	12	2500	660	12	2100	500	12	800	160	2.4
16	2400	690	16	1900	500	16	1600	380	16	600	120	3.2
20	1900	550	20	1500	400	20	1300	310	20	480	96	4



- Slotting is not recommended when using a slim shank type.

MPXLRB

MS PLUS END MILLS

Corner radius, Short cut length, Long neck

Product Information

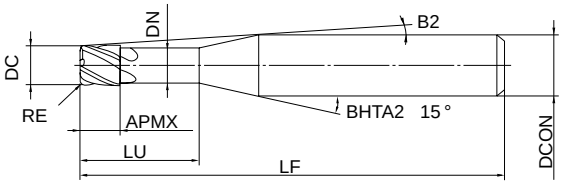
UWC 30° MS+

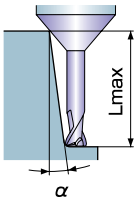
DC≦0.3 DC≧0.4

Work Material

P M N S H F

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668





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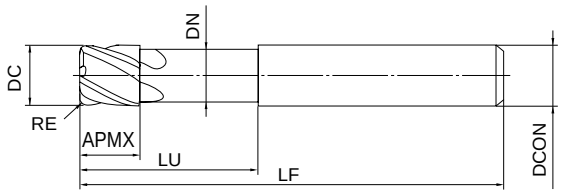


R	±0.005
	0.2≦DC≦6
	0 - 0.01
h5	4≦DCON≦6
	0 - 0.005

- α: Inclined angle Lmax: Effective length
- Lmax indicates "0: Not available, blank: No interference".

●Inventory maintained in Japan. Unit : mm

Order Number	DC	RE	APMX	LU	DN	B2	LF	DCON	No. of Flutes	Stock	type	Effective length for inclined angle			
												0.5°	1°	2°	3°
MPXLRBD0020R005N005	0.2	0.05	0.2	0.5	0.18	11.4°	50	4	2	●	1	0.5	0.5	0.6	0.7
MPXLRBD0020R005N010	0.2	0.05	0.2	1	0.18	10.8°	50	4	2	●	1	1	1.1	1.2	1.3
MPXLRBD0030R005N010	0.3	0.05	0.3	1	0.28	10.8°	50	4	2	●	1	1	1.1	1.2	1.3
MPXLRBD0030R005N020	0.3	0.05	0.3	2	0.28	9.8°	50	4	2	●	1	2.1	2.2	2.4	2.7
MPXLRBD0040R005N020	0.4	0.05	0.4	2	0.37	9.8°	50	4	4	●	1	2.1	2.2	2.4	2.6
MPXLRBD0040R005N030	0.4	0.05	0.4	3	0.37	8.9°	50	4	4	●	1	3.1	3.3	3.6	4
MPXLRBD0040R005N040	0.4	0.05	0.4	4	0.37	8.2°	50	4	4	●	1	4.2	4.3	4.8	5.3
MPXLRBD0050R005N020	0.5	0.05	0.5	2	0.47	9.7°	50	4	4	●	1	2.1	2.2	2.4	2.6
MPXLRBD0050R005N030	0.5	0.05	0.5	3	0.47	8.9°	50	4	4	●	1	3.1	3.3	3.6	4
MPXLRBD0050R005N040	0.5	0.05	0.5	4	0.47	8.1°	50	4	4	●	1	4.2	4.3	4.8	5.3
MPXLRBD0050R005N050	0.5	0.05	0.5	5	0.47	7.5°	50	4	4	●	1	5.2	5.4	6	6.6
MPXLRBD0060R005N020	0.6	0.05	0.6	2	0.57	9.7°	50	4	4	●	1	2.1	2.2	2.4	2.6
MPXLRBD0060R005N040	0.6	0.05	0.6	4	0.57	8.1°	50	4	4	●	1	4.2	4.3	4.8	5.3
MPXLRBD0060R005N060	0.6	0.05	0.6	6	0.57	6.9°	50	4	4	●	1	6.2	6.5	7.2	7.9
MPXLRBD0080R005N040	0.8	0.05	0.8	4	0.77	7.9°	50	4	4	●	1	4.2	4.3	4.8	5.3
MPXLRBD0080R005N060	0.8	0.05	0.8	6	0.77	6.8°	50	4	4	●	1	6.2	6.5	7.2	7.9
MPXLRBD0100R005N030	1	0.05	1	3	0.96	8.3°	50	4	4	●	1	3.2	3.4	3.8	4.2
MPXLRBD0100R005N040	1	0.05	1	4	0.96	7.6°	50	4	4	●	1	4.3	4.5	5	5.6
MPXLRBD0100R005N050	1	0.05	1	5	0.96	7°	50	4	4	●	1	5.4	5.6	6.2	6.9
MPXLRBD0100R005N060	1	0.05	1	6	0.96	6.5°	50	4	4	●	1	6.4	6.7	7.4	8.2
MPXLRBD0100R005N080	1	0.05	1	8	0.96	5.6°	50	4	4	●	1	8.5	8.9	9.8	10.9

MPXLRB

Order Number	DC	RE	APMX	LU	DN	B2	LF	DCON	No. of Flutes	Stock	type	Effective length for inclined angle			
												0.5°	1°	2°	3°
MPXLRBD0100R005N100	1	0.05	1	10	0.96	5°	50	4	4	●	1	10.6	11.1	12.2	13.5
MPXLRBD0100R005N120	1	0.05	1	12	0.96	4.5°	50	4	4	●	1	12.7	13.3	14.6	16.2
MPXLRBD0100R010N030	1	0.1	1	3	0.96	8.4°	50	4	4	●	1	3.2	3.4	3.8	4.2
MPXLRBD0100R010N040	1	0.1	1	4	0.96	7.6°	50	4	4	●	1	4.3	4.5	5	5.5
MPXLRBD0100R010N050	1	0.1	1	5	0.96	7°	50	4	4	●	1	5.3	5.6	6.2	6.9
MPXLRBD0100R010N060	1	0.1	1	6	0.96	6.5°	50	4	4	●	1	6.4	6.7	7.4	8.2
MPXLRBD0100R010N080	1	0.1	1	8	0.96	5.6°	50	4	4	●	1	8.5	8.9	9.8	10.8
MPXLRBD0100R010N100	1	0.1	1	10	0.96	5°	50	4	4	●	1	10.6	11.1	12.2	13.5
MPXLRBD0100R010N120	1	0.1	1	12	0.96	4.5°	50	4	4	●	1	12.7	13.3	14.6	16.2
MPXLRBD0120R010N100	1.2	0.1	1.2	10	1.16	4.8°	50	4	4	●	1	10.6	11.1	12.2	13.5
MPXLRBD0120R020N100	1.2	0.2	1.2	10	1.16	4.8°	50	4	4	●	1	10.6	11.1	12.2	13.5
MPXLRBD0150R010N060	1.5	0.1	1.5	6	1.44	6°	50	4	4	●	1	6.4	6.7	7.3	8.1
MPXLRBD0150R010N120	1.5	0.1	1.5	12	1.44	4°	50	4	4	●	1	12.6	13.2	14.5	16.1
MPXLRBD0150R010N180	1.5	0.1	1.5	18	1.44	3°	60	4	4	●	1	18.9	19.7	21.7	24
MPXLRBD0150R020N060	1.5	0.2	1.5	6	1.44	6°	50	4	4	●	1	6.4	6.7	7.3	8.1
MPXLRBD0150R020N120	1.5	0.2	1.5	12	1.44	4°	50	4	4	●	1	12.6	13.2	14.5	16
MPXLRBD0150R020N180	1.5	0.2	1.5	18	1.44	3°	60	4	4	●	1	18.9	19.7	21.7	
MPXLRBD0150R030N060	1.5	0.3	1.5	6	1.44	6.1°	50	4	4	●	1	6.3	6.6	7.3	8
MPXLRBD0150R030N120	1.5	0.3	1.5	12	1.44	4°	50	4	4	●	1	12.6	13.2	14.5	16
MPXLRBD0150R030N180	1.5	0.3	1.5	18	1.44	3°	60	4	4	●	1	18.9	19.7	21.6	
MPXLRBD0200R010N080	2	0.1	2	8	1.94	4.5°	50	4	4	●	1	8.5	8.8	9.7	10.8
MPXLRBD0200R010N120	2	0.1	2	12	1.94	3.4°	50	4	4	●	1	12.6	13.2	14.5	16.1
MPXLRBD0200R010N160	2	0.1	2	16	1.94	2.8°	60	4	4	●	1	16.8	17.6	19.3	
MPXLRBD0200R010N200	2	0.1	2	20	1.94	2.3°	60	4	4	●	1	21	21.9	24.1	
MPXLRBD0200R010N240	2	0.1	2	24	1.94	2°	70	4	4	●	1	25.2	26.3		
MPXLRBD0200R020N080	2	0.2	2	8	1.94	4.5°	50	4	4	●	1	8.5	8.8	9.7	10.7
MPXLRBD0200R020N120	2	0.2	2	12	1.94	3.4°	50	4	4	●	1	12.6	13.2	14.5	
MPXLRBD0200R020N160	2	0.2	2	16	1.94	2.8°	60	4	4	●	1	16.8	17.6	19.3	
MPXLRBD0200R020N200	2	0.2	2	20	1.94	2.3°	60	4	4	●	1	21	21.9	24	
MPXLRBD0200R020N240	2	0.2	2	24	1.94	2°	70	4	4	●	1	25.1	26.3		
MPXLRBD0200R030N080	2	0.3	2	8	1.94	4.5°	50	4	4	●	1	8.5	8.8	9.7	10.7
MPXLRBD0200R030N120	2	0.3	2	12	1.94	3.5°	50	4	4	●	1	12.6	13.2	14.5	16
MPXLRBD0200R030N160	2	0.3	2	16	1.94	2.8°	60	4	4	●	1	16.8	17.5	19.2	
MPXLRBD0200R030N200	2	0.3	2	20	1.94	2.3°	60	4	4	●	1	21	21.9	24	
MPXLRBD0200R030N240	2	0.3	2	24	1.94	2°	70	4	4	●	1	25.1	26.3		
MPXLRBD0300R010N080	3	0.1	3	8	2.9	5.7°	60	6	4	●	1	8.4	8.8	9.6	10.7
MPXLRBD0300R010N120	3	0.1	3	12	2.9	4.5°	60	6	4	●	1	12.6	13.1	14.4	16
MPXLRBD0300R010N180	3	0.1	3	18	2.9	3.4°	70	6	4	●	1	18.8	19.7	21.6	23.9
MPXLRBD0300R010N240	3	0.1	3	24	2.9	2.8°	70	6	4	●	1	25.1	26.2	28.8	
MPXLRBD0300R010N300	3	0.1	3	30	2.9	2.3°	70	6	4	●	1	31.3	32.7	35.9	
MPXLRBD0300R010N360	3	0.1	3	36	2.9	2°	90	6	4	●	1	37.6	39.3		
MPXLRBD0300R020N120	3	0.2	3	12	2.9	4.5°	60	6	4	●	1	12.6	13.1	14.4	15.9
MPXLRBD0300R020N180	3	0.2	3	18	2.9	3.4°	60	6	4	●	1	18.8	19.6	21.6	23.9
MPXLRBD0300R020N240	3	0.2	3	24	2.9	2.8°	70	6	4	●	1	25.1	26.2	28.7	
MPXLRBD0300R020N300	3	0.2	3	30	2.9	2.3°	70	6	4	●	1	31.3	32.7	35.9	
MPXLRBD0300R020N360	3	0.2	3	36	2.9	2°	90	6	4	●	1	37.6	39.3	43.1	
MPXLRBD0300R030N120	3	0.3	3	12	2.9	4.5°	60	6	4	●	1	12.5	13.1	14.4	15.9
MPXLRBD0300R030N180	3	0.3	3	18	2.9	3.5°	60	6	4	●	1	18.8	19.6	21.5	23.9
MPXLRBD0300R030N240	3	0.3	3	24	2.9	2.8°	70	6	4	●	1	25.1	26.2	28.7	
MPXLRBD0300R030N300	3	0.3	3	30	2.9	2.3°	70	6	4	●	1	31.3	32.7	35.9	
MPXLRBD0300R030N360	3	0.3	3	36	2.9	2°	90	6	4	●	1	37.6	39.2		
MPXLRBD0300R050N120	3	0.5	3	12	2.9	4.6°	60	6	4	●	1	12.5	13.1	14.3	15.8
MPXLRBD0300R050N180	3	0.5	3	18	2.9	3.5°	60	6	4	●	1	18.8	19.6	21.5	23.8
MPXLRBD0300R050N240	3	0.5	3	24	2.9	2.8°	70	6	4	●	1	25.1	26.2	28.7	

MPXLRB

Order Number	DC	RE	APMX	LU	DN	B2	LF	DCON	No. of Flutes	Stock	type	Effective length for inclined angle			
												0.5°	1°	2°	3°
MPXLRBD0300R050N300	3	0.5	3	30	2.9	2.3°	70	6	4	●	1	31.3	32.7	35.9	
MPXLRBD0300R050N360	3	0.5	3	36	2.9	2°	90	6	4	●	1	37.6	39.2		
MPXLRBD0400R010N160	4	0.1	4	16	3.9	2.8°	70	6	4	●	1	16.7	17.5	19.2	
MPXLRBD0400R010N240	4	0.1	4	24	3.9	2°	70	6	4	●	1	25.1	26.2		
MPXLRBD0400R010N320	4	0.1	4	32	3.9	1.6°	70	6	4	●	1	33.4	34.9		
MPXLRBD0400R010N480	4	0.1	4	48	3.9	1.1°	90	6	4	●	1	50.1	52.3		
MPXLRBD0400R020N160	4	0.2	4	16	3.9	2.8°	70	6	4	●	1	16.7	17.5	19.2	
MPXLRBD0400R020N240	4	0.2	4	24	3.9	2°	70	6	4	●	1	25.1	26.2		
MPXLRBD0400R020N320	4	0.2	4	32	3.9	1.6°	70	6	4	●	1	33.4	34.9		
MPXLRBD0400R020N480	4	0.2	4	48	3.9	1.1°	90	6	4	●	1	50.1	52.3		
MPXLRBD0400R030N160	4	0.3	4	16	3.9	2.8°	70	6	4	●	1	16.7	17.5	19.1	
MPXLRBD0400R030N240	4	0.3	4	24	3.9	2°	70	6	4	●	1	25.1	26.2		
MPXLRBD0400R030N320	4	0.3	4	32	3.9	1.6°	70	6	4	●	1	33.4	34.9		
MPXLRBD0400R030N480	4	0.3	4	48	3.9	1.1°	90	6	4	●	1	50.1	52.3		
MPXLRBD0400R050N160	4	0.5	4	16	3.9	2.8°	70	6	4	●	1	16.7	17.4	19.1	
MPXLRBD0400R050N240	4	0.5	4	24	3.9	2°	70	6	4	●	1	25.1	26.2		
MPXLRBD0400R050N320	4	0.5	4	32	3.9	1.6°	70	6	4	●	1	33.4	34.9		
MPXLRBD0400R050N480	4	0.5	4	48	3.9	1.1°	90	6	4	●	1	50.1	52.3		
MPXLRBD0600R010N240	6	0.1	6	24	5.85		70	6	4	●	2				
MPXLRBD0600R010N480	6	0.1	6	48	5.85		100	6	4	●	2				
MPXLRBD0600R020N240	6	0.2	6	24	5.85		70	6	4	●	2				
MPXLRBD0600R020N480	6	0.2	6	48	5.85		100	6	4	●	2				
MPXLRBD0600R030N240	6	0.3	6	24	5.85		70	6	4	●	2				
MPXLRBD0600R030N480	6	0.3	6	48	5.85		100	6	4	●	2				
MPXLRBD0600R050N240	6	0.5	6	24	5.85		70	6	4	●	2				
MPXLRBD0600R050N480	6	0.5	6	48	5.85		100	6	4	●	2				

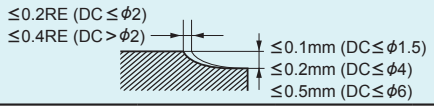
MPXLRB

Recommended Cutting Conditions

(mm)

Work material		Carbon steel, Alloy steel (180—280HB) Pre-hardened steel, Alloy tool steel Precipitation stainless steel (<450HB)				Hardened Steel (45—52HRC)			
Dia. **DC**	Neck length **LU**	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut **ap**	Depth of cut **ae**	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut **ap**	Depth of cut **ae**
0.2	**0.5**	30000	180	0.003	0.04	30000	150	0.003	0.04
	1	30000	120	0.003	0.04	30000	100	0.003	0.04
0.3	**1**	30000	210	0.003	0.08	30000	180	0.003	0.08
	2	30000	120	0.003	0.08	30000	100	0.003	0.08
0.4	**2**	31000	970	0.005	0.10	31000	810	0.005	0.10
	3	31000	790	0.004	0.10	31000	660	0.004	0.10
	4	31000	540	0.003	0.10	31000	450	0.003	0.10
0.5	**2**	31000	1500	0.006	0.12	31000	1300	0.006	0.12
	3	31000	1300	0.005	0.12	31000	1100	0.005	0.12
	4	31000	970	0.004	0.12	31000	810	0.004	0.12
	5	25000	790	0.004	0.12	25000	660	0.004	0.12
0.6	**2**	31000	2100	0.020	0.13	31000	1800	0.020	0.13
	4	25000	1300	0.015	0.13	25000	1100	0.015	0.13
	6	20000	790	0.008	0.13	20000	660	0.008	0.13
0.8	**4**	25000	3200	0.025	0.20	25000	2700	0.025	0.20
	6	20000	2100	0.020	0.20	20000	1800	0.020	0.20
1	**3**	24000	2400	0.045	0.30	20000	2000	0.045	0.30
	4	24000	1900	0.040	0.30	20000	1600	0.040	0.30
	5	24000	1800	0.035	0.25	20000	1500	0.035	0.25
	6	20000	1400	0.030	0.25	17000	1200	0.030	0.25
	8	20000	1000	0.020	0.20	17000	880	0.020	0.20
	10	15000	800	0.015	0.10	13000	670	0.015	0.10
	12	15000	370	0.010	0.01	13000	310	0.010	0.01
1.2	**10**	18000	1500	0.030	0.25	15000	1300	0.030	0.25
1.5	**6**	20000	2400	0.050	0.40	17000	2000	0.050	0.40
	12	15000	1400	0.040	0.30	13000	1200	0.040	0.30
	18	12000	670	0.010	0.15	10000	560	0.010	0.15
2	**8**	15000	2600	0.050	0.50	13000	2200	0.050	0.50
	12	15000	2100	0.045	0.50	13000	1800	0.045	0.50
	16	14000	1900	0.040	0.35	12000	1600	0.040	0.35
	20	14000	1100	0.015	0.25	12000	960	0.015	0.25
	24	9300	930	0.010	0.20	7800	780	0.010	0.20
3	**8**	12000	3300	0.100	0.80	10000	2800	0.100	0.80
	12	12000	3100	0.080	0.80	10000	2600	0.080	0.80
	18	11000	3100	0.070	0.70	9600	2600	0.070	0.70
	24	11000	2600	0.060	0.50	9300	2200	0.060	0.50
	30	9000	1300	0.030	0.40	7500	1100	0.030	0.40
	36	6200	910	0.010	0.30	5200	760	0.010	0.30
4	**16**	9000	3200	0.100	1.00	7500	2700	0.100	1.00
	24	7900	2500	0.085	0.80	6600	2100	0.085	0.80
	32	6900	1600	0.040	0.70	5800	1400	0.040	0.70
	48	4800	740	0.010	0.35	4000	620	0.010	0.35
6	**24**	5500	2700	0.120	1.50	4600	2263	0.120	1.50
	48	3800	1200	0.050	1.20	3200	1000	0.050	1.20

Depth of cut



DC:Dia.

1) The cutting conditions above are a guide only to machining with cutting edges with a corner radius. When machining with peripheral cutting edges, use the minimum feed rate as a guide.
2) If the depth of cut is shallow, the revolution and feed rate can be increased.
3) For profile machining such as moulds, machining conditions may differ considerably depending on the workpiece geometry, machining methods and depth of cut. Reduce the feed rate especially when machining the corner sections of a workpiece.
4) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

MPXLRB

(mm)

Work material		Austenitic stainless steels (≤200HB) Titanium alloys (<450HB)				Copper, Copper alloys			
Dia. DC	Neck length LU	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap	Depth of cut ae	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap	Depth of cut ae
0.2	0.5	33000	170	0.003	0.04	30000	150	0.003	0.08
	1	30000	110	0.003	0.04	30000	100	0.003	0.08
0.3	1	30000	200	0.003	0.08	30000	180	0.003	0.16
	2	30000	110	0.003	0.08	30000	100	0.003	0.16
0.4	2	31000	930	0.005	0.10	31000	810	0.005	0.20
	3	31000	750	0.004	0.10	31000	660	0.004	0.20
	4	31000	510	0.003	0.10	31000	450	0.003	0.20
0.5	2	31000	1400	0.006	0.12	31000	1300	0.006	0.24
	3	31000	1200	0.005	0.12	31000	1100	0.005	0.24
	4	31000	930	0.004	0.12	31000	810	0.004	0.24
	5	25000	750	0.004	0.12	25000	660	0.004	0.24
0.6	2	31000	2000	0.020	0.13	31000	1800	0.020	0.26
	4	25000	1200	0.015	0.13	25000	1100	0.015	0.26
	6	20000	750	0.008	0.13	20000	660	0.008	0.26
0.8	4	25000	3100	0.025	0.20	25000	2700	0.025	0.40
	6	20000	2000	0.020	0.20	20000	1800	0.020	0.40
1	3	23000	2300	0.045	0.30	20000	2000	0.045	0.60
	4	23000	1800	0.040	0.30	20000	1600	0.040	0.60
	5	23000	1700	0.035	0.25	20000	1500	0.035	0.50
	6	19000	1300	0.030	0.25	17000	1200	0.030	0.50
	8	19000	1000	0.020	0.20	17000	880	0.020	0.40
	10	14000	770	0.015	0.10	13000	670	0.015	0.20
	12	14000	350	0.010	0.01	13000	310	0.010	0.02
1.2	10	17000	1400	0.030	0.25	15000	1300	0.030	0.50
1.5	6	19000	2300	0.050	0.40	14700	1700	0.050	0.80
	12	14000	1300	0.040	0.30	11000	1000	0.040	0.60
	18	11000	640	0.010	0.15	8600	480	0.010	0.30
2	8	14000	2500	0.050	0.50	11000	1900	0.050	1.00
	12	14000	2000	0.045	0.50	11000	1500	0.045	1.00
	16	13000	1800	0.040	0.35	10000	1300	0.040	0.70
	20	13000	1100	0.015	0.25	10000	830	0.015	0.50
	24	8900	890	0.010	0.20	6700	670	0.010	0.40
3	8	11000	3200	0.100	0.80	8600	2400	0.100	1.60
	12	11000	2900	0.080	0.80	8600	2200	0.080	1.60
	18	11000	2900	0.070	0.70	8300	2200	0.070	1.40
	24	10000	2500	0.060	0.50	8000	1900	0.060	1.00
	30	8600	1200	0.030	0.40	6500	950	0.030	0.80
	36	5900	870	0.010	0.30	4500	660	0.010	0.60
4	16	8600	3100	0.100	1.00	6500	2300	0.100	2.00
	24	7500	2400	0.085	0.80	5700	1800	0.085	1.60
	32	6600	1600	0.040	0.70	5000	1200	0.040	1.40
	48	4600	710	0.010	0.35	3400	530	0.010	0.70
6	24	5200	2600	0.120	1.50	4000	1900	0.120	3.00
	48	3600	1100	0.050	1.20	2700	870	0.050	2.40
Depth of cut		≤0.2RE (DC≤ϕ2) ≤0.4RE (DC> ϕ2) ≤0.1mm (DC≤ϕ1.5) ≤0.2mm (DC≤ϕ4) ≤0.5mm (DC≤ϕ6)							

DC:Dia.

VCPSRB

MIRACLE ORBIT END MILLS

Corner radius end mill, Short cut length, 2—4 flute, High precision

Product Information

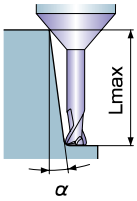
UWC 30° VC

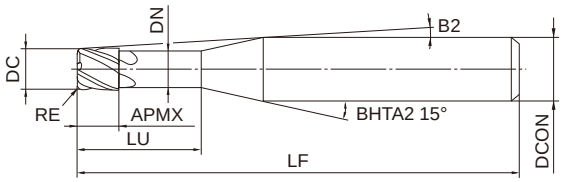
DC≦1.5 DC≧2

Work Material

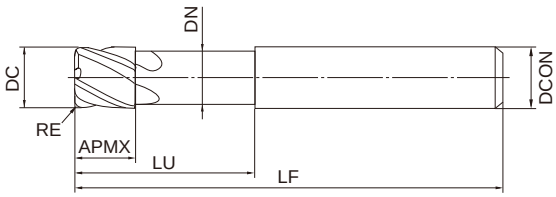
P M S H F M

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668





Type1



Type2

R	0.05≦RE≦5		
	±0.01		
	0.6≦DC≦12		
	0 - 0.01		
h5	DCON=6	8≦DCON≦10	DCON=12
	0 - 0.005	0 - 0.006	0 - 0.008

- α: Inclined angle Lmax: Effective length
- Lmax indicates "0: Not available, blank: No interference".

●Inventory maintained in Japan. Unit : mm

Order Number	DC	RE	APMX	LU	DN	B2	LF	DCON	No. of Flutes	Stock	type	Effective length for inclined angle			
												0.5°	1°	2°	3°
VCPSRBD0060N02R005	0.6	0.05	0.6	2	0.56	12.6°	50	6	2	●	1	2.1	2.2	2.4	2.6
VCPSRBD0060N02R01	0.6	0.1	0.6	2	0.56	12.6°	50	6	2	●	1	2.1	2.2	2.3	2.6
VCPSRBD0060N02R02	0.6	0.2	0.6	2	0.56	12.7°	50	6	2	●	1	2.1	2.2	2.2	2.5
VCPSRBD0060N04R01	0.6	0.1	0.6	4	0.56	10.9°	50	6	2	●	1	4.2	4.4	4.7	5.1
VCPSRBD0060N04R02	0.6	0.2	0.6	4	0.56	11°	50	6	2	●	1	4.2	4.3	4.7	5.0
VCPSRBD0080N04R005	0.8	0.05	0.8	4	0.76	10.7°	50	6	2	●	1	4.2	4.4	4.7	5.1
VCPSRBD0080N04R01	0.8	0.1	0.8	4	0.76	10.8°	50	6	2	●	1	4.2	4.4	4.7	5.1
VCPSRBD0080N04R02	0.8	0.2	0.8	4	0.76	10.8°	50	6	2	●	1	4.2	4.3	4.7	5.0
VCPSRBD0080N04R03	0.8	0.3	0.8	4	0.76	10.9°	50	6	2	●	1	4.2	4.3	4.6	5.0
VCPSRBD0080N06R01	0.8	0.1	0.8	6	0.76	9.4°	50	6	2	●	1	6.3	6.5	7.0	7.5
VCPSRBD0080N06R02	0.8	0.2	0.8	6	0.76	9.5°	50	6	2	●	1	6.3	6.5	7.0	7.5
VCPSRBD0080N06R03	0.8	0.3	0.8	6	0.76	9.5°	50	6	2	●	1	6.3	6.5	6.9	7.5
VCPSRBD0080N08R03	0.8	0.3	0.8	8	0.76	8.5°	50	6	2	●	1	8.3	8.6	9.2	10
VCPSRBD0100N04R005	1	0.05	1	4	0.94	10.5°	50	6	2	●	1	4.2	4.5	4.8	5.3
VCPSRBD0100N04R01	1	0.1	1	4	0.94	10.5°	50	6	2	●	1	4.2	4.5	4.8	5.3
VCPSRBD0100N04R02	1	0.2	1	4	0.94	10.6°	50	6	2	●	1	4.2	4.5	4.7	5.3
VCPSRBD0100N04R03	1	0.3	1	4	0.94	10.6°	50	6	2	●	1	4.2	4.5	4.6	5.2
VCPSRBD0100N04R04	1	0.4	1	4	0.94	10.7°	50	6	2	●	1	4.2	4.5	4.4	5.2
VCPSRBD0100N06R01	1	0.1	1	6	0.94	9.2°	50	6	2	●	1	6.4	6.7	7.2	7.8
VCPSRBD0100N06R02	1	0.2	1	6	0.94	9.2°	50	6	2	●	1	6.4	6.7	7.2	7.7
VCPSRBD0100N06R03	1	0.3	1	6	0.94	9.3°	50	6	2	●	1	6.3	6.6	7.2	7.7
VCPSRBD0100N06R04	1	0.4	1	6	0.94	9.4°	50	6	2	●	1	6.3	6.6	7.1	7.7

VCPSRB

Order Number	DC	RE	APMX	LU	DN	B2	LF	DCON	No. of Flutes	Stock	type	Effective length for inclined angle			
												0.5°	1°	2°	3°
VCPSRBD0100N10R03	1	0.3	1	10	0.94	7.4°	50	6	2	●	1	10.5	10.9	11.8	12.7
VCPSRBD0100N10R04	1	0.4	1	10	0.94	7.4°	50	6	2	●	1	10.5	10.9	11.7	12.7
VCPSRBD0120N06R05	1.2	0.5	1.2	6	1.14	9.3°	50	6	2	●	1	6.3	6.6	7.1	7.7
VCPSRBD0120N10R05	1.2	0.5	1.2	10	1.14	7.3°	50	6	2	●	1	10.5	10.9	11.7	12.6
VCPSRBD0120N15R05	1.2	0.5	1.2	15	1.14	5.8°	50	6	2	●	1	15.7	16.3	17.5	18.9
VCPSRBD0150N04R01	1.5	0.1	1.5	4	1.44	10.2°	50	6	2	●	1	4.2	4.5	4.8	5.3
VCPSRBD0150N04R02	1.5	0.2	1.5	4	1.44	10.2°	50	6	2	●	1	4.2	4.5	4.7	5.3
VCPSRBD0150N04R03	1.5	0.3	1.5	4	1.44	10.3°	50	6	2	●	1	4.2	4.5	4.6	5.2
VCPSRBD0150N04R05	1.5	0.5	1.5	4	1.44	10.5°	50	6	2	●	1	4.2	4.4	4.3	5.2
VCPSRBD0150N06R01	1.5	0.1	1.5	6	1.44	8.8°	50	6	2	●	1	6.4	6.7	7.2	7.8
VCPSRBD0150N06R02	1.5	0.2	1.5	6	1.44	8.9°	50	6	2	●	1	6.4	6.7	7.2	7.7
VCPSRBD0150N06R03	1.5	0.3	1.5	6	1.44	8.9°	50	6	2	●	1	6.3	6.6	7.2	7.7
VCPSRBD0150N06R05	1.5	0.5	1.5	6	1.44	9°	50	6	2	●	1	6.3	6.6	7.1	7.7
VCPSRBD0150N10R01	1.5	0.1	1.5	10	1.44	6.9°	50	6	2	●	1	10.6	11.0	11.8	12.7
VCPSRBD0150N10R02	1.5	0.2	1.5	10	1.44	7°	50	6	2	●	1	10.5	11.0	11.8	12.7
VCPSRBD0150N10R03	1.5	0.3	1.5	10	1.44	7°	50	6	2	●	1	10.5	10.9	11.8	12.7
VCPSRBD0150N10R05	1.5	0.5	1.5	10	1.44	7.1°	50	6	2	●	1	10.5	10.9	11.7	12.6
VCPSRBD0150N15R01	1.5	0.1	1.5	15	1.44	5.5°	50	6	2	●	1	15.8	16.3	17.5	18.9
VCPSRBD0150N15R02	1.5	0.2	1.5	15	1.44	5.5°	50	6	2	●	1	15.8	16.3	17.5	18.9
VCPSRBD0150N15R03	1.5	0.3	1.5	15	1.44	5.5°	50	6	2	●	1	15.7	16.3	17.5	18.9
VCPSRBD0150N15R05	1.5	0.5	1.5	15	1.44	5.7°	50	6	2	●	1	15.7	16.3	17.4	18.6
VCPSRBD0150N20R03	1.5	0.3	1.5	20	1.44	4.7°	60	6	2	●	1	20.9	21.6	22.9	24.5
VCPSRBD0150N20R05	1.5	0.5	1.5	20	1.44	4.8°	60	6	2	●	1	20.9	21.5	22.8	24.2
VCPSRBD0200N06R01	2	0.1	2	6	1.9	9.4°	50	6	4	●	1	6.3	6.6	6.9	7.5
VCPSRBD0200N06R02	2	0.2	2	6	1.9	9.7°	50	6	4	●	1	6.3	6.6	6.8	7.4
VCPSRBD0200N06R03	2	0.3	2	6	1.9	10°	50	6	4	●	1	6.3	6.6	6.7	7.4
VCPSRBD0200N06R05	2	0.5	2	6	1.9	10.3°	50	6	4	●	1	6.3	6.5	6.5	7.4
VCPSRBD0200N10R01	2	0.1	2	10	1.9	7.6°	50	6	4	●	1	10.5	10.9	11.4	12.0
VCPSRBD0200N10R02	2	0.2	2	10	1.9	7.7°	50	6	4	●	1	10.5	10.8	11.2	12.0
VCPSRBD0200N10R03	2	0.3	2	10	1.9	7.8°	50	6	4	●	1	10.5	10.8	11.1	11.9
VCPSRBD0200N10R05	2	0.5	2	10	1.9	8°	50	6	4	●	1	10.5	10.8	10.9	11.9
VCPSRBD0200N15R01	2	0.1	2	15	1.9	5.9°	50	6	4	●	1	15.7	16.1	16.8	17.5
VCPSRBD0200N15R02	2	0.2	2	15	1.9	5.9°	50	6	4	●	1	15.7	16.1	16.7	17.5
VCPSRBD0200N15R03	2	0.3	2	15	1.9	6°	50	6	4	●	1	15.7	16.1	16.6	17.4
VCPSRBD0200N15R05	2	0.5	2	15	1.9	6.1°	50	6	4	●	1	15.6	16.1	16.3	17.4
VCPSRBD0200N20R03	2	0.3	2	20	1.9	4.8°	60	6	4	●	1	20.8	21.4	21.9	22.9
VCPSRBD0200N20R05	2	0.5	2	20	1.9	4.9°	60	6	4	●	1	20.8	21.4	21.7	22.9
VCPSRBD0200N25R03	2	0.3	2	25	1.9	4°	60	6	4	●	1	26.0	26.6	27.5	28.3
VCPSRBD0200N25R05	2	0.5	2	25	1.9	4°	60	6	4	●	1	26.0	26.6	27.0	28.2
VCPSRBD0250N08R01	2.5	0.1	2.5	8	2.4	8.6°	50	6	4	●	1	8.4	8.7	9.2	9.9
VCPSRBD0250N08R02	2.5	0.2	2.5	8	2.4	8.7°	50	6	4	●	1	8.4	8.7	9.0	9.9
VCPSRBD0250N08R03	2.5	0.3	2.5	8	2.4	8.8°	50	6	4	●	1	8.4	8.7	8.9	9.9
VCPSRBD0250N08R05	2.5	0.5	2.5	8	2.4	9°	50	6	4	●	1	8.4	8.7	8.7	9.9
VCPSRBD0250N08R10	2.5	1	2.5	8	2.4	9.4°	50	6	4	●	1	8.3	8.7	8.2	9.9
VCPSRBD0250N15R03	2.5	0.3	2.5	15	2.4	5.5°	50	6	4	●	1	15.7	16.1	16.6	17.5
VCPSRBD0250N15R05	2.5	0.5	2.5	15	2.4	5.6°	50	6	4	●	1	15.6	16.1	16.3	17.5
VCPSRBD0250N15R10	2.5	1	2.5	15	2.4	5.7°	50	6	4	●	1	15.6	16.1	15.8	17.5
VCPSRBD0300N10R01	3	0.1	3	10	2.9	6.6°	60	6	4	●	1	10.5	10.9	11.4	12.3
VCPSRBD0300N10R02	3	0.2	3	10	2.9	6.6°	60	6	4	●	1	10.5	10.8	11.2	12.3
VCPSRBD0300N10R03	3	0.3	3	10	2.9	6.6°	60	6	4	●	1	10.5	10.8	11.1	12.3
VCPSRBD0300N10R05	3	0.5	3	10	2.9	6.7°	60	6	4	●	1	10.5	10.8	10.9	12.4
VCPSRBD0300N10R10	3	1	3	10	2.9	7°	60	6	4	●	1	10.4	10.8	10.4	12.4
VCPSRBD0300N15R01	3	0.1	3	15	2.9	4.8°	60	6	4	●	1	15.7	16.1	16.8	17.7
VCPSRBD0300N15R02	3	0.2	3	15	2.9	4.8°	60	6	4	●	1	15.7	16.1	16.7	17.8

VCPSRB

Order Number	DC	RE	APMX	LU	DN	B2	LF	DCON	No. of Flutes	Stock	type	Effective length for inclined angle			
												0.5°	1°	2°	3°
VCPSRBD0300N15R03	3	0.3	3	15	2.9	4.8°	60	6	4	●	1	15.7	16.1	16.6	17.8
VCPSRBD0300N15R05	3	0.5	3	15	2.9	4.8°	60	6	4	●	1	15.6	16.1	16.3	17.8
VCPSRBD0300N15R10	3	1	3	15	2.9	5°	60	6	4	●	1	15.6	16.1	15.8	17.8
VCPSRBD0300N20R01	3	0.1	3	20	2.9	3.7°	60	6	4	●	1	20.8	21.4	22.1	23.1
VCPSRBD0300N20R02	3	0.2	3	20	2.9	3.7°	60	6	4	●	1	20.8	21.4	22.0	23.1
VCPSRBD0300N20R03	3	0.3	3	20	2.9	3.8°	60	6	4	●	1	20.8	21.4	21.9	23.2
VCPSRBD0300N20R05	3	0.5	3	20	2.9	3.8°	60	6	4	●	1	20.8	21.4	21.7	23.2
VCPSRBD0300N20R10	3	1	3	20	2.9	3.9°	60	6	4	●	1	20.8	21.3	21.2	23.2
VCPSRBD0300N30R03	3	0.3	3	30	2.9	2.6°	70	6	4	●	1	31.1	31.8	32.5	
VCPSRBD0300N30R05	3	0.5	3	30	2.9	2.6°	70	6	4	●	1	31.1	31.8	32.2	
VCPSRBD0400N12R01	4	0.1	4	12	3.9	3.8°	60	6	4	●	1	12.5	13.0	13.5	15.1
VCPSRBD0400N12R02	4	0.2	4	12	3.9	3.8°	60	6	4	●	1	12.5	13.0	13.4	15.2
VCPSRBD0400N12R03	4	0.3	4	12	3.9	3.8°	60	6	4	●	1	12.5	13.0	13.3	15.2
VCPSRBD0400N12R05	4	0.5	4	12	3.9	3.9°	60	6	4	●	1	12.5	13.0	13.1	15.3
VCPSRBD0400N12R10	4	1	4	12	3.9	4°	60	6	4	●	1	12.5	12.9	12.6	15.3
VCPSRBD0400N20R01	4	0.1	4	20	3.9	2.5°	60	6	4	●	1	20.8	21.4	22.1	
VCPSRBD0400N20R02	4	0.2	4	20	3.9	2.5°	60	6	4	●	1	20.8	21.4	22.0	
VCPSRBD0400N20R03	4	0.3	4	20	3.9	2.5°	60	6	4	●	1	20.8	21.4	21.9	
VCPSRBD0400N20R05	4	0.5	4	20	3.9	2.5°	60	6	4	●	1	20.8	21.4	21.7	
VCPSRBD0400N20R10	4	1	4	20	3.9	2.6°	60	6	4	●	1	20.8	21.3	21.2	
VCPSRBD0400N30R03	4	0.3	4	30	3.9	1.8°	70	6	4	●	1	31.1	31.8		
VCPSRBD0400N30R05	4	0.5	4	30	3.9	1.8°	70	6	4	●	1	31.1	31.8		
VCPSRBD0400N30R10	4	1	4	30	3.9	1.8°	70	6	4	●	1	31.1	31.8		
VCPSRBD0500N15R05	5	0.5	5	15	4.9	1.6°	60	6	4	●	1	15.6	16.1		
VCPSRBD0500N15R10	5	1	5	15	4.9	1.6°	60	6	4	●	1	15.6	16.1		
VCPSRBD0500N30R05	5	0.5	5	30	4.9	0.9°	70	6	4	●	1	31.1			
VCPSRBD0500N30R10	5	1	5	30	4.9	0.9°	70	6	4	●	1	31.1			
VCPSRBD0600N18R01	6	0.1	6	18	5.85		70	6	4	●	2				
VCPSRBD0600N18R02	6	0.2	6	18	5.85		70	6	4	●	2				
VCPSRBD0600N18R03	6	0.3	6	18	5.85		70	6	4	●	2				
VCPSRBD0600N18R05	6	0.5	6	18	5.85		70	6	4	●	2				
VCPSRBD0600N18R10	6	1	6	18	5.85		70	6	4	●	2				
VCPSRBD0600N18R20	6	2	6	18	5.85		70	6	4	●	2				
VCPSRBD0600N41R05	6	0.5	6	41	5.85		90	6	4	●	2				
VCPSRBD0600N50R10	6	1	6	50	5.85		90	6	4	●	2				
VCPSRBD0800N24R01	8	0.1	8	24	7.85		90	8	4	●	2				
VCPSRBD0800N24R02	8	0.2	8	24	7.85		90	8	4	●	2				
VCPSRBD0800N24R03	8	0.3	8	24	7.85		90	8	4	●	2				
VCPSRBD0800N24R05	8	0.5	8	24	7.85		90	8	4	●	2				
VCPSRBD0800N24R10	8	1	8	24	7.85		90	8	4	●	2				
VCPSRBD0800N24R20	8	2	8	24	7.85		90	8	4	●	2				
VCPSRBD0800N24R30	8	3	8	24	7.85		90	8	4	●	2				
VCPSRBD0800N50R10	8	1	8	50	7.85		90	8	4	●	2				
VCPSRBD0800N50R30	8	3	8	50	7.85		90	8	4	●	2				
VCPSRBD1000N30R03	10	0.3	10	30	9.7		100	10	4	●	2				
VCPSRBD1000N30R05	10	0.5	10	30	9.7		100	10	4	●	2				
VCPSRBD1000N30R10	10	1	10	30	9.7		100	10	4	●	2				
VCPSRBD1000N30R20	10	2	10	30	9.7		100	10	4	●	2				
VCPSRBD1000N30R30	10	3	10	30	9.7		100	10	4	●	2				
VCPSRBD1000N30R40	10	4	10	30	9.7		100	10	4	●	2				
VCPSRBD1000N50R10	10	1	10	50	9.7		100	10	4	●	2				
VCPSRBD1000N50R30	10	3	10	50	9.7		100	10	4	●	2				
VCPSRBD1200N36R03	12	0.3	12	36	11.7		110	12	4	●	2				
VCPSRBD1200N36R05	12	0.5	12	36	11.7		110	12	4	●	2				

VCPSRB

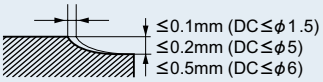
Order Number	DC	RE	APMX	LU	DN	B2	LF	DCON	No. of Flutes	Stock	type	Effective length for inclined angle			
												0.5°	1°	2°	3°
VCPSRBD1200N36R10	12	1	12	36	11.7		110	12	4	●	2				
VCPSRBD1200N36R20	12	2	12	36	11.7		110	12	4	●	2				
VCPSRBD1200N36R30	12	3	12	36	11.7		110	12	4	●	2				
VCPSRBD1200N36R40	12	4	12	36	11.7		110	12	4	●	2				
VCPSRBD1200N36R50	12	5	12	36	11.7		110	12	4	●	2				

VCPSRB

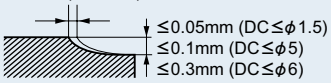
RECOMMENDED CUTTING CONDITIONS

Work material		Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Hardened steel (45— 55HRC) AISI H13		Hardened steel (55— 62HRC) AISI D2	
Dia. DC(mm)	Neck length LU(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
0.6	2	48000	200-600	40000	160-500	22000	80-250
	4	48000	160-500	40000	100-300	22000	50-150
0.8	4	48000	240-750	32000	160-500	19000	80-250
	6	38000	190-600	26000	130-400	16000	70-200
	8	29000	150-450	19000	100-300	12000	50-150
1	4	48000	270-900	32000	180-600	19000	90-300
	6	38000	220-720	26000	150-480	16000	70-240
	10	29000	160-540	19000	110-360	12000	60-180
1.2	6	48000	300-900	32000	200-600	19000	100-300
	10	38000	240-720	26000	160-480	15000	80-240
	15	29000	180-540	19000	120-360	12000	60-180
1.5	4	41000	300-900	27000	200-600	16000	100-300
	6	32000	240-720	22000	160-480	13000	80-240
	10	24000	180-540	16000	120-360	10000	60-180
2	6	36000	600-2000	24000	400-1300	14000	200-650
	10	29000	480-1600	19000	320-1000	12000	160-520
	15	22000	360-1200	14000	240-780	9000	120-390
2.5	8	33000	750-2400	22000	500-1600	13000	250-800
	15	20000	450-1400	13000	300-960	8000	150-480
3	10	30000	900-3000	20000	600-2000	12000	300-1000
	15	24000	720-2400	16000	480-1600	10000	240-800
	20	18000	540-1800	12000	360-1200	7000	180-600
4	12	26000	1200-4500	17000	800-3000	10000	400-1500
	20	20000	960-2000	14000	640-2000	8000	320-2000
	30	15000	720-1000	10000	480-1000	6000	240-1000
5	15	20000	1200-4800	13000	780-3120	10000	520-2000
	30	12000	720-1900	8000	480-1600	7000	360-1120
6	18	20000	1600-7500	13000	1100-5000	8000	550-2500
	41	15000	900-2400	12000	720-1600	10000	600-1200
	50	10000	600-1200	8000	480-800	6000	360-530
8	24	15000	1900-7500	10000	1300-5000	6000	650-2500
	50	10000	1300-2400	8000	1000-2200	3000	320-600
10	30	12000	1600-7500	8000	1100-5000	5000	550-2500
	50	10000	1300-3200	7000	950-2200	2500	280-600
12	36	10000	1500-7500	7000	1000-5000	4000	500-2500

≤0.2RE (DC≤ϕ2)
≤0.4RE (DC>ϕ2)



≤0.1RE (DC≤ϕ2)
≤0.2RE (DC>ϕ2)



- The cutting conditions above are a guide only to machining with cutting edges with a corner radius. When machining with peripheral cutting edges, use the minimum feed rate as a guide.
- If the depth of cut is shallow, the revolution and feed rate can be increased.
- For profile machining such as moulds, machining conditions may differ considerably depending on the workpiece geometry, machining methods and depth of cut. Reduce the feed rate especially when machining the corner sections of a workpiece.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

VCPSRB

MIRACLE ORBIT END MILLS

Corner radius end mill, Short cut length, 2—4 flute, High precision

Product Information

UWC 30° VC

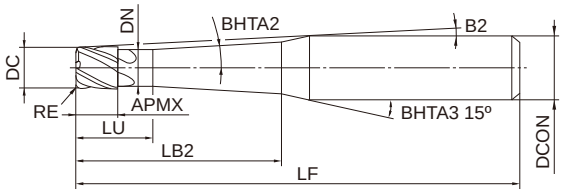
DC≦1.5 DC≧2

Work Material

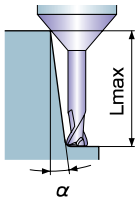
P M S H F M

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668

Taper neck type



R	0.5≦RE≦3		
	±0.01		
	1.5≦DC≦12		
	0 - 0.01		
h5	DCON=6	8≦DCON≦10	12≦DCON≦16
	0 - 0.005	0 - 0.006	0 - 0.008



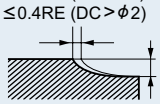
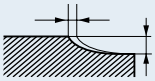
- α: Inclined angle Lmax: Effective length
- Lmax indicates "0: Not available, blank: No interference".

●Inventory maintained in Japan. Unit : mm

Order Number	DC	RE	BHTA2	APMX	LU	LB2	DN	B2	LF	DCON	No. of Flutes	Stock	type	Effective length for inclined angle 1°	2°	3°
VCPSRBD0150N03L06R05	1.5	0.5	1.5°	1.5	3	6	1.44	9°	50	6	2	●	1	0	7.1	7.7
VCPSRBD0150N03L10R05	1.5	0.5	1.5°	1.5	3	10	1.44	7.2°	50	6	2	●	1	0	11.3	12.2
VCPSRBD0200N04L10R05	2	0.5	1.5°	2	4	10	1.9	6.7°	60	6	4	●	1	0	11.5	12.4
VCPSRBD0200N04L15R05	2	0.5	1.5°	2	4	15	1.9	5.3°	60	6	4	●	1	0	16.7	18.0
VCPSRBD0250N05L12R10	2.5	1	1.5°	2.5	5	12	2.4	5.6°	60	6	4	●	1	0	14.2	15.3
VCPSRBD0250N05L20R10	2.5	1	1.5°	2.5	5	20	2.4	4°	60	6	4	●	1	0	22.5	24.2
VCPSRBD0300N06L15R05	3	0.5	1.5°	3	6	15	2.9	4.4°	60	6	4	●	1	0	16.9	18.2
VCPSRBD0300N06L15R10	3	1	1.5°	3	6	15	2.9	4.4°	60	6	4	●	1	0	17.4	18.7
VCPSRBD0300N06L20R05	3	0.5	1.5°	3	6	20	2.9	3.6°	60	6	4	●	1	0	22.1	23.8
VCPSRBD0300N06L20R10	3	1	1.5°	3	6	20	2.9	3.6°	60	6	4	●	1	0	22.6	24.4
VCPSRBD0400N08L20R10	4	1	1.5°	4	8	20	3.9	2.6°	60	6	4	●	1	0	22.8	
VCPSRBD0400N08L30R10	4	1	1.5°	4	8	30	3.9	1.9°	70	6	4	●	1	0		
VCPSRBD0500N08L40R05	5	0.5	1°	5	8	40	4.9	2°	90	8	4	●	1	41.2		
VCPSRBD0500N08L40R10	5	1	1°	5	8	40	4.9	2°	90	8	4	●	1	41.7		
VCPSRBD0500N08L60R05	5	0.5	1°	5	8	60	4.9	1.4°	110	8	4	●	1	61.2		
VCPSRBD0500N08L60R10	5	1	1°	5	8	60	4.9	1.4°	110	8	4	●	1	61.7		
VCPSRBD0600N08L40R20	6	2	1°	6	8	40	5.85	1.4°	70	8	4	●	1	42.8		
VCPSRBD0600N08L60R20	6	2	1°	6	8	60	5.85	1°	100	8	4	●	1			
VCPSRBD0800N10L53R20	8	2	1°	8	10	53	7.85	1.1°	90	10	4	●	1	55.9		
VCPSRBD0800N10L70R20	8	2	1°	8	10	70	7.85	1.6°	130	12	4	●	1	72.9		
VCPSRBD1000N12L55R30	10	3	1°	10	12	55	9.7	1.1°	100	12	4	●	1	59.4		
VCPSRBD1000N12L70R30	10	3	1°	10	12	70	9.7	0.9°	130	12	4	●	1			
VCPSRBD1200N24L70R30	12	3	1°	12	24	70	11.7	1.6°	130	16	4	●	1	75.2		

VCPSRB

RECOMMENDED CUTTING CONDITIONS

Work material			Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Hardened steel (45— 55HRC) AISI H13		Hardened steel (55—62HRC) AISI D2	
Dia. DC(mm)	Taper angle one side BHTA2	Neck length LB2(mm)	Revolution (min-1)	Feed rate (mm/min)	Revolution (min-1)	Feed rate (mm/min)	Revolution (min-1)	Feed rate (mm/min)
1.5	1.5°	6	36000	270-810	24000	180-540	15000	90-270
	1.5°	10	28000	210-630	19000	140-420	11000	70-210
2	1.5°	10	32000	540-1800	22000	360-1200	13000	180-590
	1.5°	15	25000	420-1400	17000	280-910	10000	140-460
2.5	1.5°	12	26000	600-1900	18000	400-1300	11000	200-640
	1.5°	20	20000	450-140	13000	300-960	8000	150-480
3	1.5°	15	27000	810-2700	18000	540-1800	11000	270-900
	1.5°	20	21000	630-2100	14000	420-1400	8000	210-700
4	1.5°	20	23000	1080-3000	15000	720-3000	9000	360-3000
	1.5°	30	18000	840-1500	12000	560-1500	7000	280-1500
5	1°	40	10000	520-1400	7000	420-840	5000	260-600
	1°	60	7000	360-840	5000	300-500	4000	210-400
6	1°	40	20000	1650-4500	13000	1100-3000	8000	550-1500
8	1°	53	15000	1950-4500	10000	1300-3000	6000	650-1500
10	1°	55	12000	1650-4500	8000	1100-3000	5000	550-1500
			≤0.2RE (DC≤ϕ2) ≤0.4RE (DC>ϕ2)  ≤0.1mm (DC≤ϕ1.5) ≤0.2mm (DC≤ϕ5) ≤0.5mm (DC≤ϕ6)				≤0.1RE (DC≤ϕ2) ≤0.2RE (DC>ϕ2)  ≤0.05mm (DC≤ϕ1.5) ≤0.1mm (DC≤ϕ5) ≤0.3mm (DC≤ϕ6)	

- The cutting conditions above are a guide only to machining with cutting edges with a corner radius. When machining with peripheral cutting edges, use the minimum feed rate as a guide.
- If the depth of cut is shallow, the revolution and feed rate can be increased.
- For profile machining such as moulds, machining conditions may differ considerably depending on the workpiece geometry, machining methods and depth of cut. Reduce the feed rate especially when machining the corner sections of a workpiece.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

CRN2MRB

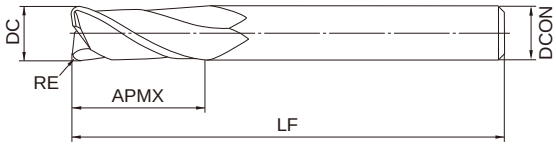
CRN END MILLS

Corner radius, Medium cut length, 2 flute,
For copper electrodes

Product Information

Work Material

Technical Info >> 1993
ISO13399 Property >> 1966
SYMBOL DESCRIPTIONS >> 664
END MILLS SELECTION CHART >> 668



Type1

	6≦DC≦12		
	0 - 0.02		
h6	DCON=6	8≦DCO N≦10	DCON=12
	0 - 0.008	0 - 0.009	0 - 0.011

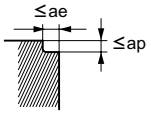
●Inventory maintained in Japan. Unit : mm

Order Number	DC	RE	APMX	LF	DCON	No. of Flutes	Stock	type
CRN2MRBD0600R020	6	0.2	13	50	6	2	●	1
CRN2MRBD0600R030	6	0.3	13	50	6	2	●	1
CRN2MRBD0600R050	6	0.5	13	50	6	2	●	1
CRN2MRBD0600R100	6	1	13	50	6	2	●	1
CRN2MRBD0800R030	8	0.3	19	60	8	2	●	1
CRN2MRBD0800R050	8	0.5	19	60	8	2	●	1
CRN2MRBD0800R100	8	1	19	60	8	2	●	1
CRN2MRBD1000R030	10	0.3	22	70	10	2	●	1
CRN2MRBD1000R050	10	0.5	22	70	10	2	●	1
CRN2MRBD1000R100	10	1	22	70	10	2	●	1
CRN2MRBD1200R030	12	0.3	26	75	12	2	●	1
CRN2MRBD1200R050	12	0.5	26	75	12	2	●	1
CRN2MRBD1200R100	12	1	26	75	12	2	●	1

CRN2MRB

RECOMMENDED CUTTING CONDITIONS

Work material		Copper, Copper alloys			
Dia. DC(mm)	Corner R RE (mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)
6	R0.2, R0.3, R0.5	10000	1400	6	0.6
	R1	10000	1700	6	0.6
8	R0.3, R0.5	8000	1000	8	0.8
	R1	8000	1200	8	0.8
10	R0.3, R0.5	6400	900	10	1.0
	R1	6400	1100	10	1.0
12	R0.3, R0.5	5400	800	12	1.0
	R1	5400	1000	12	1.0



- If the depth of cut is shallow, the revolution and feed rate can be increased.
- The use of water-soluble coolant is recommended.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

CRN2XLRB

CRN END MILLS

Corner radius, Medium cut length, 2 flute,
For copper electrodes

Product Information

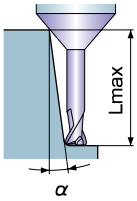
UWC 30° CRN

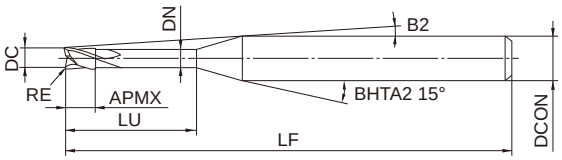
DC<3 DC≧3

Work Material

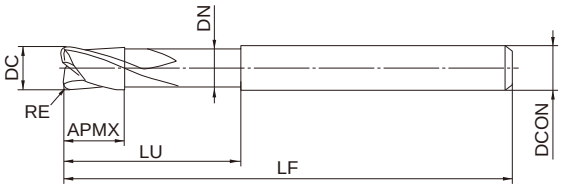
N F M

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668





Type1



Type2

0.5≦DC≦6	0 / - 0.02
h6 4≦DCON≦6	0 / - 0.008

- α: Inclined angle Lmax: Effective length
- Lmax indicates "0: Not available, blank: No interference".

●Inventory maintained in Japan. Unit : mm

Order Number	DC	RE	APMX	LU	DN	B2	LF	DCON	No. of Flutes	Stock	type	Effective length for inclined angle 0.5°	1°	2°	3°
CRN2XLRBD0050R005N04	0.5	0.05	0.5	4	0.46	9.5°	50	4	2	●	1	4.1	4.3	4.6	5
CRN2XLRBD0050R005N06	0.5	0.05	0.5	6	0.46	8°	50	4	2	●	1	6.2	6.4	6.9	7.5
CRN2XLRBD0050R010N04	0.5	0.1	0.5	4	0.46	9.5°	50	4	2	●	1	4.1	4.3	4.6	5
CRN2XLRBD0050R010N06	0.5	0.1	0.5	6	0.46	8°	50	4	2	●	1	6.2	6.4	6.9	7.5
CRN2XLRBD0080R005N06	0.8	0.05	0.8	6	0.76	7.6°	50	4	2	●	1	6.3	6.5	7	7.6
CRN2XLRBD0080R005N08	0.8	0.05	0.8	8	0.76	6.5°	50	4	2	●	1	8.3	8.6	9.3	10
CRN2XLRBD0080R010N06	0.8	0.1	0.8	6	0.76	7.6°	50	4	2	●	1	6.3	6.5	7	7.5
CRN2XLRBD0080R010N08	0.8	0.1	0.8	8	0.76	6.6°	50	4	2	●	1	8.3	8.6	9.3	10
CRN2XLRBD0100R010N08	1	0.1	1	8	0.94	6.3°	50	4	2	●	1	8.5	8.8	9.5	10.2
CRN2XLRBD0100R010N10	1	0.1	1	10	0.94	5.5°	55	4	2	●	1	10.6	11	11.8	12.7
CRN2XLRBD0100R010N12	1	0.1	1	12	0.94	4.9°	55	4	2	●	1	12.6	13.1	14.1	15.2
CRN2XLRBD0100R030N08	1	0.3	1	8	0.94	6.3°	50	4	2	●	1	8.5	8.8	9.5	10.2
CRN2XLRBD0100R030N10	1	0.3	1	10	0.94	5.5°	55	4	2	●	1	10.5	10.9	11.8	12.7
CRN2XLRBD0100R030N12	1	0.3	1	12	0.94	4.9°	55	4	2	●	1	12.6	13.1	14.1	15.2
CRN2XLRBD0150R010N12	1.5	0.1	1.5	12	1.44	4.3°	55	4	2	●	1	12.6	13.1	14.1	15.2
CRN2XLRBD0150R010N20	1.5	0.1	1.5	20	1.44	2.9°	60	4	2	●	1	20.9	21.7	23.3	
CRN2XLRBD0150R020N12	1.5	0.2	1.5	12	1.44	4.3°	55	4	2	●	1	12.6	13.1	14.1	15.2
CRN2XLRBD0150R020N20	1.5	0.2	1.5	20	1.44	2.9°	60	4	2	●	1	20.9	21.7	23.3	
CRN2XLRBD0150R030N12	1.5	0.3	1.5	12	1.44	4.3°	55	4	2	●	1	12.6	13.1	14.1	15.2
CRN2XLRBD0150R030N20	1.5	0.3	1.5	20	1.44	3°	60	4	2	●	1	20.9	21.6	23.3	
CRN2XLRBD0200R010N12	2	0.1	2	12	1.9	3.7°	55	4	2	●	1	12.5	13	14	15.1
CRN2XLRBD0200R010N16	2	0.1	2	16	1.9	2.9°	55	4	2	●	1	16.7	17.3	18.6	
CRN2XLRBD0200R010N20	2	0.1	2	20	1.9	2.5°	60	4	2	●	1	20.8	21.6	23.2	
CRN2XLRBD0200R020N12	2	0.2	2	12	1.9	3.7°	55	4	2	●	1	12.5	13	14	15.1

CRN2XLRB

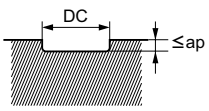
Order Number	DC	RE	APMX	LU	DN	B2	LF	DCON	No. of Flutes	Stock	type	Effective length for inclined angle			
												0.5°	1°	2°	3°
CRN2XLRBD0200R020N16	2	0.2	2	16	1.9	2.9°	55	4	2	●	1	16.7	17.3	18.6	
CRN2XLRBD0200R020N20	2	0.2	2	20	1.9	2.5°	60	4	2	●	1	20.8	21.5	23.2	
CRN2XLRBD0200R030N12	2	0.3	2	12	1.9	3.7°	55	4	2	●	1	12.5	13	13.9	15
CRN2XLRBD0200R030N16	2	0.3	2	16	1.9	3°	55	4	2	●	1	16.7	17.3	18.5	
CRN2XLRBD0200R030N20	2	0.3	2	20	1.9	2.5°	60	4	2	●	1	20.8	21.5	23.1	
CRN2XLRBD0200R050N12	2	0.5	2	12	1.9	3.8°	55	4	2	●	1	12.5	13	13.9	15
CRN2XLRBD0200R050N16	2	0.5	2	16	1.9	3°	55	4	2	●	1	16.7	17.2	18.5	
CRN2XLRBD0200R050N20	2	0.5	2	20	1.9	2.5°	60	4	2	●	1	20.8	21.5	23.1	
CRN2XLRBD0300R020N20	3	0.2	3	20	2.9	3.4°	65	6	2	●	1	20.8	21.5	23.2	25
CRN2XLRBD0300R030N20	3	0.3	3	20	2.9	3.4°	65	6	2	●	1	20.8	21.5	23.1	25
CRN2XLRBD0300R050N20	3	0.5	3	20	2.9	3.4°	65	6	2	●	1	20.8	21.5	23.1	24.9
CRN2XLRBD0400R020N20	4	0.2	4	20	3.9	2.5°	65	6	2	●	1	20.8	21.5	23.2	
CRN2XLRBD0400R030N20	4	0.3	4	20	3.9	2.5°	65	6	2	●	1	20.8	21.5	23.1	
CRN2XLRBD0400R050N20	4	0.5	4	20	3.9	2.5°	65	6	2	●	1	20.8	21.5	23.1	
CRN2XLRBD0500R020N25	5	0.2	5	25	4.9	1.1°	65	6	2	●	1	26	26.9		
CRN2XLRBD0500R030N25	5	0.3	5	25	4.9	1.1°	65	6	2	●	1	26	26.9		
CRN2XLRBD0500R050N25	5	0.5	5	25	4.9	1.1°	65	6	2	●	1	26	26.9		
CRN2XLRBD0600R020N30	6	0.2	6	30	5.85		70	6	2	●	2				
CRN2XLRBD0600R030N30	6	0.3	6	30	5.85		70	6	2	●	2				
CRN2XLRBD0600R050N30	6	0.5	6	30	5.85		70	6	2	●	2				
CRN2XLRBD0600R100N30	6	1	6	30	5.85		70	6	2	●	2				

CRN2XLRB

RECOMMENDED CUTTING CONDITIONS

·Slotting

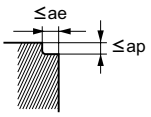
Work material			Copper, Copper alloys		
Dia. DC(mm)	Corner R RE (mm)	Neck length (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)
0.5	R0.05, R0.1	4	40000	800	0.005
		6	40000	700	0.003
0.8	R0.05, R0.1	6	40000	1200	0.02
		8	40000	1200	0.015
1	R0.1, R0.3	8	40000	2000	0.03
		10	35000	1600	0.025
		12	30000	1200	0.02
1.5	R0.1, R0.2, R0.3	12	30000	1500	0.05
		20	20000	1000	0.02
2	R0.1, R0.2 R0.3, R0.5	12	30000	1500	0.1
		16	30000	1000	0.06
		20	20000	600	0.04
3	R0.2, R0.3	20	20000	2000	0.12
	R0.5	20	20000	2200	0.12
4	R0.2, R0.3	20	15000	2000	0.25
	R0.5	20	15000	2200	0.25
5	R0.2, R0.3	25	12000	1500	0.3
	R0.5	25	12000	1700	0.3
6	R0.2, R0.3, R0.5	30	10000	1200	0.4
	R1	30	10000	1500	0.4



CRN2XLRB

·Contour Cutting

Work material			Copper, Copper alloys			
Dia. DC(mm)	Corner R RE (mm)	Neck length (mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)
0.5	R0.05, R0.1	4	40000	1500	0.01	0.1
		6	40000	1000	0.005	0.1
0.8	R0.05, R0.1	6	40000	2500	0.02	0.15
		8	40000	1600	0.01	0.15
1	R0.1, R0.3	8	40000	3000	0.03	0.2
		10	35000	2000	0.025	0.2
		12	30000	1800	0.02	0.2
1.5	R0.1, R0.2, R0.3	12	40000	4500	0.04	0.3
		20	20000	2000	0.02	0.3
2	R0.1, R0.2 R0.3, R0.5	12	40000	4500	0.08	0.4
		16	30000	3000	0.05	0.4
		20	20000	2000	0.04	0.4
3	R0.2, R0.3	20	35000	6000	0.1	0.6
	R0.5	20	35000	8000	0.1	0.6
4	R0.2, R0.3	20	32000	5000	0.15	0.8
	R0.5	20	32000	7000	0.15	0.8
5	R0.2, R0.3	25	22000	5000	0.2	1.0
	R0.5	25	22000	7000	0.2	1.0
6	R0.2, R0.3, R0.5	30	20000	5000	0.25	1.2
	R1	30	20000	7000	0.25	1.2



- If the depth of cut is shallow, the revolution and feed rate can be increased.
- The use of water-soluble coolant is recommended.
- Cutting condition may be considerably different due to the overhang (milling depth), depth of cut, and machine tools. Please see the above table as a standard.

C3SARB

ALIMASTER END MILLS

Corner radius, Short cut length, 3 flute, For aluminium alloy

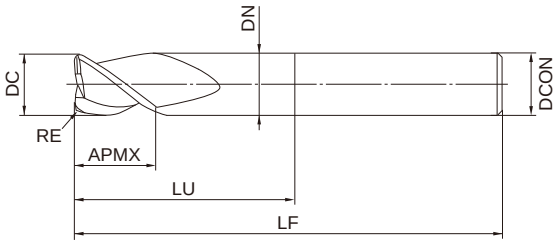
Product Information

UWC 37.5°

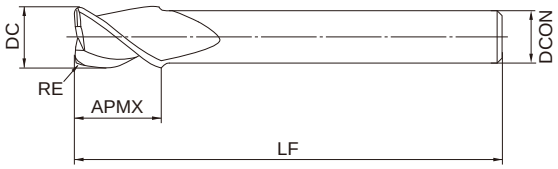
Work Material

N F M

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668



Type1



Type2

h6

DC≦12	DC>12
0 - 0.020	0 - 0.030
12≦DCON≦16	20≦DCON≦25
0 - 0.011	0 - 0.013

●Inventory maintained in Japan. Unit : mm

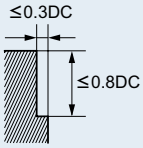
Order Number	DC	RE	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	type
C3SARBD1200N0300R100	12	1	15	30	11.4	75	12	3	●	1
C3SARBD1200N0300R320	12	3.2	15	30	11.4	75	12	3	●	1
C3SARBD1200N0400R100	12	1	15	40	11.4	125	12	3	●	1
C3SARBD1200N0400R320	12	3.2	15	40	11.4	125	12	3	●	1
C3SARBD1600N0450R100	16	1	15	45	15.4	125	16	3	●	1
C3SARBD1600N0450R320	16	3.2	15	45	15.4	125	16	3	●	1
C3SARBD1600N0700R100	16	1	15	70	15.4	150	16	3	●	1
C3SARBD1600N0700R320	16	3.2	15	70	15.4	150	16	3	●	1
C3SARBD1800R100	18	1	18			150	16	3	●	2
C3SARBD1800R320	18	3.2	18			150	16	3	●	2
C3SARBD2000N0600R100	20	1	20	60	18	125	20	3	●	1
C3SARBD2000N0600R320	20	3.2	20	60	18	125	20	3	●	1
C3SARBD2000N0600R400	20	4	20	60	18	125	20	3	●	1
C3SARBD2000N0850R100	20	1	20	85	18	150	20	3	●	1
C3SARBD2000N0850R320	20	3.2	20	85	18	150	20	3	●	1
C3SARBD2000N0850R400	20	4	20	85	18	150	20	3	●	1
C3SARBD2500N0650R320	25	3.2	20	65	23	125	25	3	●	1
C3SARBD2500N0650R400	25	4	20	65	23	125	25	3	●	1
C3SARBD2500N0650R500	25	5	20	65	23	125	25	3	●	1
C3SARBD2500N0900R320	25	3.2	20	90	23	150	25	3	●	1
C3SARBD2500N0900R400	25	4	20	90	23	150	25	3	●	1
C3SARBD2500N0900R500	25	5	20	90	23	150	25	3	●	1

C3SARB

RECOMMENDED CUTTING CONDITIONS

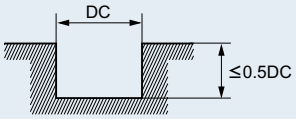
·Side milling

Work material	Aluminium alloy A7075	
Dia. DC(mm)	Revolution (min⁻¹)	Feed rate (mm/min)
12	13000	5400
16	10000	5400
18	9000	5000
20	8000	5000
25	6000	4500



·Slotting

Work material	Aluminium alloy A7075	
Dia. DC(mm)	Revolution (min⁻¹)	Feed rate (mm/min)
12	13000	3200
16	10000	3200
18	9000	3000
20	8000	3000
25	6000	2800



- The use of water-soluble coolant is recommended.
- Climb cutting is recommended for side milling.
- This table shows the cutting condition with less than 4DC overhang length. If more than 4DC, spindle speed, feed rate and depth of cut should be reduced.
- These end mills do not have a centre cutting edge, therefore when entering a workpiece use a ramping process rather than vertical feed.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately, or set the depth of cut smaller.

CSRARB

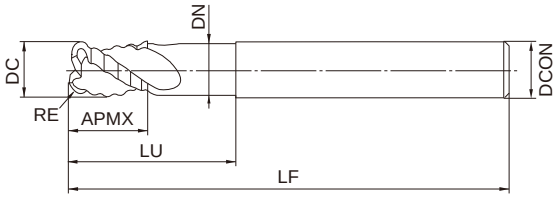
ALIMASTER END MILLS

Corner radius roughing end mill, Short cut length, 3 flute, For aluminium alloy

Product Information

Work Material

Technical Info >> 1993
ISO13399 Property >> 1966
SYMBOL DESCRIPTIONS >> 664
END MILLS SELECTION CHART >> 668



Type1

h6	DCON=10	12≦DCO N≦16	20≦DCO N≦25
	0 - 0.009	0 - 0.011	0 - 0.013

●Inventory maintained in Japan. Unit : mm

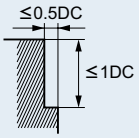
Order Number	DC	RE	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	type
CSRARBD1000R100	10	1	12	25	9.4	75	10	3	●	1
CSRARBD1000R200	10	2	12	25	9.4	75	10	3	●	1
CSRARBD1200R100	12	1	15	30	11.4	75	12	3	●	1
CSRARBD1200R200	12	2	15	30	11.4	75	12	3	●	1
CSRARBD1600R200	16	2	18	35	15.4	100	16	3	●	1
CSRARBD1600R300	16	3	18	35	15.4	100	16	3	●	1
CSRARBD2000R200	20	2	25	50	18	125	20	3	●	1
CSRARBD2000R300	20	3	25	50	18	125	20	3	●	1
CSRARBD2500R300	25	3	30	60	23	125	25	3	●	1
CSRARBD2500R400	25	4	30	60	23	125	25	3	●	1
CSRARBD2500R500	25	5	30	60	23	125	25	3	●	1

CSRARB

RECOMMENDED CUTTING CONDITIONS

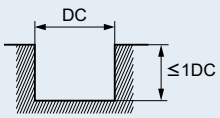
·Side milling

Work material	Aluminium alloy A7075		Aluminium cast AC4B	
Dia. DC(mm)	Revolution (min⁻¹)	Feed rate (mm/min)	Revolution (min⁻¹)	Feed rate (mm/min)
10	19000	8600	9500	3400
12	16000	8200	8000	3200
16	12000	7600	6000	3100
18	10500	7200	5300	2900
20	9500	7100	4800	2900
22	8500	6900	4300	2800
25	7500	6800	3800	2700



·Slotting

Work material	Aluminium alloy A7075		Aluminium cast AC4B	
Dia. DC(mm)	Revolution (min⁻¹)	Feed rate (mm/min)	Revolution (min⁻¹)	Feed rate (mm/min)
10	19000	6800	9500	2700
12	16000	6500	8000	2600
16	12000	6100	6000	2400
18	10500	5800	5300	2400
20	9500	5700	4800	2300
22	8500	5500	4300	2200
25	7500	5400	3800	2200



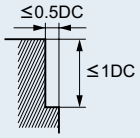
- The use of water-soluble coolant is recommended.
- If the depth of cut is shallow, the revolution and feed rate can be increased.
- Climb cutting is recommended for side milling.
- These end mills do not have a centre cutting edge, therefore when entering a workpiece use a ramping process rather than vertical feed.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately, or set the depth of cut smaller.

CSRARB

·Side milling

Using a high-speed and high-rigidity machining center

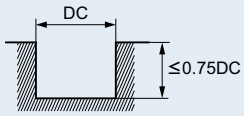
Work material	Aluminium alloy A7075		Aluminium cast AC4B	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
10	30000	11000	19000	5400
12	30000	12000	16000	5300
16	24000	12000	12000	4900
18	21000	12000	10500	4700
20	19000	11000	9500	4600
22	17000	11000	8500	4300
25	15000	11000	7500	4300



·Slotting

Using a high-speed and high-rigidity machining center

Work material	Aluminium alloy A7075		Aluminium cast AC4B	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
10	30000	8600	19000	4300
12	30000	9900	16000	4300
16	24000	9700	12000	4000
18	21000	9500	10500	3800
20	19000	9100	9500	3700
22	17000	8700	8500	3400
25	15000	8600	7500	3400



- The use of water-soluble coolant is recommended.
- If the depth of cut is shallow, the revolution and feed rate can be increased.
- Climb cutting is recommended for side milling.
- These end mills do not have a centre cutting edge, therefore when entering a workpiece use a ramping process rather than vertical feed.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately, or set the depth of cut smaller.

MS4MRB

MSTAR END MILLS

Corner radius end mill, Medium cut length, 4 flute

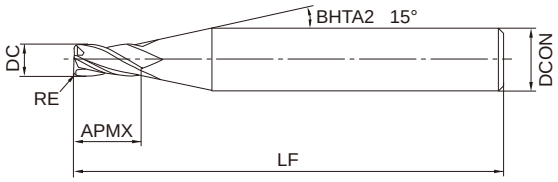
Product Information

UWC 30° MS

Work Material

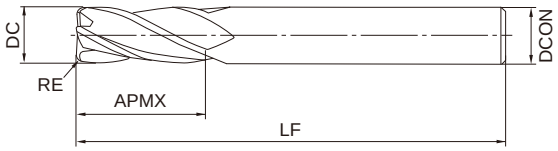
P M S H F M

Technical Info >> 1993
ISO13399 Property >> 1966
SYMBOL DESCRIPTIONS >> 664
END MILLS SELECTION CHART >> 668



Type1

	DC≦12	DC>12		
	0 - 0.020	0 - 0.030		
h6	DCON=6	8≦DCON≦10	12≦DCON≦16	DCON=20
	0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013



Type2

●Inventory maintained in Japan. Unit : mm

Order Number	DC	RE	APMX	LF	DCON	No. of Flutes	Stock	type
MS4MRBD0300R010	3	0.1	8	45	6	4	●	1
MS4MRBD0300R020	3	0.2	8	45	6	4	●	1
MS4MRBD0300R030	3	0.3	8	45	6	4	●	1
MS4MRBD0300R050	3	0.5	8	45	6	4	●	1
MS4MRBD0300R100	3	1	8	45	6	4	●	1
MS4MRBD0400R010	4	0.1	11	45	6	4	●	1
MS4MRBD0400R020	4	0.2	11	45	6	4	●	1
MS4MRBD0400R030	4	0.3	11	45	6	4	●	1
MS4MRBD0400R050	4	0.5	11	45	6	4	●	1
MS4MRBD0400R100	4	1	11	45	6	4	●	1
MS4MRBD0500R010	5	0.1	13	50	6	4	●	1
MS4MRBD0500R020	5	0.2	13	50	6	4	●	1
MS4MRBD0500R030	5	0.3	13	50	6	4	●	1
MS4MRBD0500R050	5	0.5	13	50	6	4	●	1
MS4MRBD0500R100	5	1	13	50	6	4	●	1
MS4MRBD0600R010	6	0.1	13	50	6	4	●	2
MS4MRBD0600R020	6	0.2	13	50	6	4	●	2
MS4MRBD0600R030	6	0.3	13	50	6	4	●	2
MS4MRBD0600R050	6	0.5	13	50	6	4	●	2
MS4MRBD0600R100	6	1	13	50	6	4	●	2
MS4MRBD0600R150	6	1.5	13	50	6	4	●	2
MS4MRBD0600R200	6	2	13	50	6	4	●	2
MS4MRBD0800R020	8	0.2	19	60	8	4	●	2
MS4MRBD0800R030	8	0.3	19	60	8	4	●	2
MS4MRBD0800R050	8	0.5	19	60	8	4	●	2
MS4MRBD0800R100	8	1	19	60	8	4	●	2
MS4MRBD0800R150	8	1.5	19	60	8	4	●	2
MS4MRBD0800R200	8	2	19	60	8	4	●	2

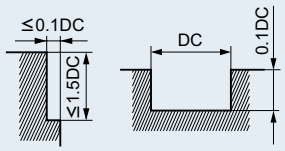
MS4MRB

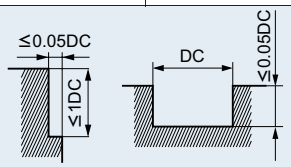
Order Number	DC	RE	APMX	LF	DCON	No. of Flutes	Stock	type
MS4MRBD0800R250	8	2.5	19	60	8	4	●	2
MS4MRBD0800R300	8	3	19	60	8	4	●	2
MS4MRBD1000R020	10	0.2	22	70	10	4	●	2
MS4MRBD1000R030	10	0.3	22	70	10	4	●	2
MS4MRBD1000R050	10	0.5	22	70	10	4	●	2
MS4MRBD1000R100	10	1	22	70	10	4	●	2
MS4MRBD1000R150	10	1.5	22	70	10	4	●	2
MS4MRBD1000R200	10	2	22	70	10	4	●	2
MS4MRBD1000R250	10	2.5	22	70	10	4	●	2
MS4MRBD1000R300	10	3	22	70	10	4	●	2
MS4MRBD1200R020	12	0.2	26	75	12	4	●	2
MS4MRBD1200R030	12	0.3	26	75	12	4	●	2
MS4MRBD1200R050	12	0.5	26	75	12	4	●	2
MS4MRBD1200R100	12	1	26	75	12	4	●	2
MS4MRBD1200R150	12	1.5	26	75	12	4	●	2
MS4MRBD1200R200	12	2	26	75	12	4	●	2
MS4MRBD1200R250	12	2.5	26	75	12	4	●	2
MS4MRBD1200R300	12	3	26	75	12	4	●	2
MS4MRBD1600R050	16	0.5	32	90	16	4	●	2
MS4MRBD1600R100	16	1	32	90	16	4	●	2
MS4MRBD1600R150	16	1.5	32	90	16	4	●	2
MS4MRBD1600R200	16	2	32	90	16	4	●	2
MS4MRBD1600R250	16	2.5	32	90	16	4	●	2
MS4MRBD1600R300	16	3	32	90	16	4	●	2
MS4MRBD2000R050	20	0.5	38	100	20	4	●	2
MS4MRBD2000R100	20	1	38	100	20	4	●	2
MS4MRBD2000R150	20	1.5	38	100	20	4	●	2
MS4MRBD2000R200	20	2	38	100	20	4	●	2
MS4MRBD2000R250	20	2.5	38	100	20	4	●	2
MS4MRBD2000R300	20	3	38	100	20	4	●	2

MS4MRB

RECOMMENDED CUTTING CONDITIONS

Work material	Carbon steel, Cast iron, Alloy steel (—30HRC) AISI 1050, AISI No 35 B, AISI P20		Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V		Hardened steel (45— 55HRC) AISI H13	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
3	16000	1500	10000	800	7400	480	8000	240
4	12000	1800	8000	1000	5600	600	6000	240
5	9600	1800	6400	1000	4400	600	4800	240
6	8000	1800	5300	1000	3700	600	4000	240
8	6000	1600	4000	900	2800	560	3000	240
10	4800	1400	3200	800	2200	500	2400	240
12	4000	1200	2700	700	1800	430	2000	230
16	3000	960	2000	560	1400	360	1500	190
20	2400	800	1600	480	1100	300	1200	170





- When cutting austenitic stainless steel, the use of water-soluble cutting fluid is effective.
- If the depth of cut is shallow, the revolution and feed rate can be increased.
- When drilling, please set the feed rate at 1/3 or below of the values above.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

MSMHDRB

MSTAR END MILLS

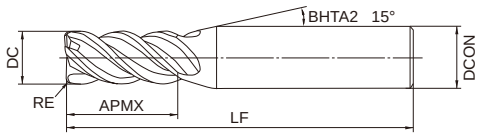
High power, Corner radius, Medium cut length, 4 flute

Product Information

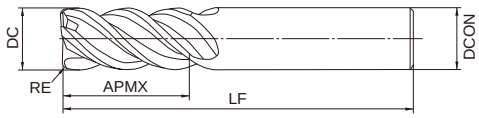
Work Material

P M S H F M

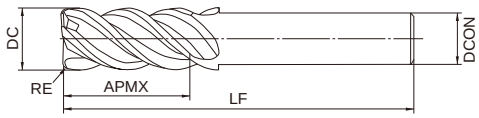
Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668



Type1



Type2



Type3

R	0.2≦RE≦6.35		
	±0.020		
	DC≦12	DC>12	
	0 - 0.020	0 - 0.030	
h6	4≦DCON≦6	8≦DCON≦10	12≦DCON≦16	DCON=20
	0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013

●Inventory maintained in Japan. Unit : mm

Order Number	DC	RE	APMX	LF	DCON	No. of Flutes	Stock	type
MSMHDRBD0200R020	2	0.2	4	45	4	4	●	1
MSMHDRBD0200R030	2	0.3	4	45	4	4	●	1
MSMHDRBD0300R020	3	0.2	8	45	6	4	●	1
MSMHDRBD0300R030	3	0.3	8	45	6	4	●	1
MSMHDRBD0300R050	3	0.5	8	45	6	4	●	1
MSMHDRBD0400R020	4	0.2	11	45	6	4	●	1
MSMHDRBD0400R030	4	0.3	11	45	6	4	●	1
MSMHDRBD0400R050	4	0.5	11	45	6	4	●	1
MSMHDRBD0500R020	5	0.2	13	50	6	4	●	1
MSMHDRBD0500R030	5	0.3	13	50	6	4	●	1
MSMHDRBD0500R050	5	0.5	13	50	6	4	●	1
MSMHDRBD0500R100	5	1	13	50	6	4	●	1
MSMHDRBD0600R030	6	0.3	13	50	6	4	●	2
MSMHDRBD0600R050	6	0.5	13	50	6	4	●	2
MSMHDRBD0600R100	6	1	13	50	6	4	●	2
MSMHDRBD0800R030	8	0.3	19	60	8	4	●	2
MSMHDRBD0800R050	8	0.5	19	60	8	4	●	2
MSMHDRBD0800R100	8	1	19	60	8	4	●	2
MSMHDRBD0800R150	8	1.5	19	60	8	4	●	2
MSMHDRBD1000R030	10	0.3	22	70	10	4	●	2
MSMHDRBD1000R050	10	0.5	22	70	10	4	●	2
MSMHDRBD1000R100	10	1	22	70	10	4	●	2
MSMHDRBD1000R150	10	1.5	22	70	10	4	●	2

MSMHDRB

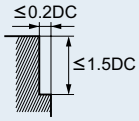
Order Number	DC	RE	APMX	LF	DCON	No. of Flutes	Stock	type
MSMHDRBD1000R200	10	2	22	70	10	4	●	2
MSMHDRBD1200R050	12	0.5	26	75	12	4	●	2
MSMHDRBD1200R050S10	12	0.5	26	75	10	4	●	3
MSMHDRBD1200R100	12	1	26	75	12	4	●	2
MSMHDRBD1200R100S10	12	1	26	75	10	4	●	3
MSMHDRBD1200R150	12	1.5	26	75	12	4	●	2
MSMHDRBD1200R150S10	12	1.5	26	75	10	4	●	3
MSMHDRBD1200R200	12	2	26	75	12	4	●	2
MSMHDRBD1200R200S10	12	2	26	75	10	4	●	3
MSMHDRBD1200R300	12	3	26	75	12	4	●	2
MSMHDRBD1200R300S10	12	3	26	75	10	4	●	3
MSMHDRBD1600R100	16	1	35	90	16	4	●	2
MSMHDRBD1600R150	16	1.5	35	90	16	4	●	2
MSMHDRBD1600R200	16	2	35	90	16	4	●	2
MSMHDRBD1600R300	16	3	35	90	16	4	●	2
MSMHDRBD1600R500	16	5	35	90	16	4	●	2
MSMHDRBD1800R100	18	1	40	100	16	4	●	3
MSMHDRBD1800R150	18	1.5	40	100	16	4	●	3
MSMHDRBD1800R200	18	2	40	100	16	4	●	3
MSMHDRBD1800R300	18	3	40	100	16	4	●	3
MSMHDRBD2000R100	20	1	45	110	20	4	●	2
MSMHDRBD2000R150	20	1.5	45	110	20	4	●	2
MSMHDRBD2000R200	20	2	45	110	20	4	●	2
MSMHDRBD2000R300	20	3	45	110	20	4	●	2
MSMHDRBD2000R500	20	5	45	110	20	4	●	2
MSMHDRBD2000R635	20	6.35	45	110	20	4	●	2

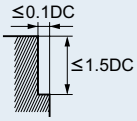
MSMHDRB

RECOMMENDED CUTTING CONDITIONS

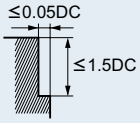
·Side milling

Work material	Carbon steel, Cast iron, Alloy steel (—30HRC) AISI 1050, AISI No 35 B, AISI P20		Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
2	15000	550	10000	340	10000	320
3	11000	800	7400	500	7400	480
4	8000	900	5600	540	5600	520
5	6400	1000	4500	600	4500	580
6	5900	1100	3700	640	3700	600
8	4400	1100	2800	660	2800	600
10	3500	1000	2300	640	2300	560
12	2900	1000	1900	640	1900	530
16	2200	800	1400	500	1400	450
18	2000	800	1250	480	1250	450
20	1800	750	1100	460	1100	440





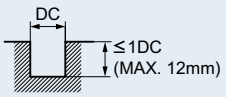
Work material	Hardened steel (45— 55HRC) AISI H13		Heat resistant alloys Inconel718	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
2	6400	160	4800	100
3	4800	250	4000	170
4	3600	270	3200	240
5	2900	300	2600	240
6	2400	320	2100	230
8	1800	330	1600	220
10	1400	320	1300	200
12	1200	320	1100	170
16	900	250	800	130
18	800	240	710	110
20	720	230	650	100

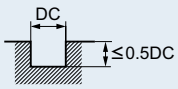


MSMHDRB

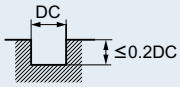
·Slotting

Work material	Carbon steel, Cast iron, Alloy steel (—30HRC) AISI 1050, AISI No 35 B, AISI P20		Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
2	12000	400	7000	200	7000	100
3	9000	600	5300	300	5300	150
4	7200	720	4000	360	4000	180
5	5800	720	3200	360	3200	180
6	5000	800	2700	400	2700	200
8	3700	800	2000	400	2000	200
10	3000	720	1600	360	1600	180
12	2500	600	1300	290	1300	150
16	2000	480	1000	230	1000	120
18	1800	460	900	210	900	110
20	1600	430	800	200	800	100





Work material	Hardened steel (45— 55HRC) AISI H13		Heat resistant alloys Inconel718	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
2	4200	80	2300	40
3	3200	130	1900	70
4	2400	140	1400	95
5	1900	150	1100	95
6	1600	160	950	95
8	1200	170	720	90
10	960	160	570	80
12	800	140	480	70
16	600	110	360	50
18	550	110	320	45
20	480	100	290	40



- When cutting austenitic stainless steel, the use of water-soluble cutting fluid is effective.
- If the depth of cut is shallow, the revolution and feed rate can be increased.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

VFFDRB

IMPACT MIRACLE END MILLS

Multi-task corner radius end mill for impact miracle high speed cutting

Product Information

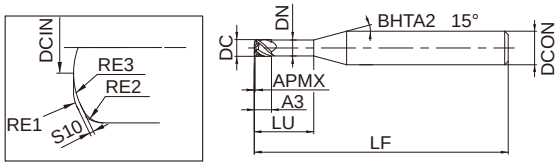
UWC 40° VF

DC≦6 DC≧8

Work Material

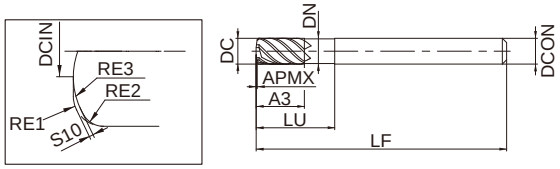
P H R

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668



Type1

DC≦12		
0 - 0.020		
DCON=6	8≦DCON≦10	DCON=12
0 - 0.008	0 - 0.009	0 - 0.011



Type2

●Inventory maintained in Japan. Unit : mm

Order Number	DC	RE1	APMX	A3	LU	DN	LF	DCON	No. of Flutes	Multi-task radius part				RMPX	Stock	type
										S10	DCIN	RE2	RE3			
VFFDRBD0300	3	0.64	0.18	3	10	2.8	60	6	4	0.08	0.75	0.5	2	2.1°	●	1
VFFDRBD0400	4	0.71	0.25	4	12	3.8	60	6	4	0.13	1	0.5	3	1.9°	●	1
VFFDRBD0600	6	0.92	0.36	9	18	5.6	80	6	4	0.21	1.5	0.6	5	1.7°	●	2
VFFDRBD0800	8	1.16	0.44	12	24	7.6	90	8	6	0.22	3.2	0.8	4.5	1.7°	●	2
VFFDRBD1000	10	1.47	0.57	15	30	9.4	100	10	6	0.28	4	1	5.5	1.7°	●	2
VFFDRBD1200	12	1.77	0.7	18	36	11.4	110	12	6	0.34	4.8	1.2	6.5	1.8°	●	2

VFFDRB

RECOMMENDED CUTTING CONDITIONS

·Side milling

Work material	Carbon steel, Alloy steel (180—280HB) Alloy tool steel (≤350HB) Mild steel (≤180HB) AISI 1045, AISI 4140, ASTM A36, AISI 1010						Pre-hardened steel (35—45HRC) AISI P21, AISI P20, AISI 4340, SKD, SKT					
Dia. DC(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)
3	150	16000	0.15	9600	0.12	1.5	135	14000	0.15	8400	0.12	1.5
4	150	12000	0.20	9600	0.16	2.0	135	11000	0.20	8800	0.16	2.0
6	150	8000	0.35	11000	0.24	3.0	135	7200	0.35	10000	0.24	3.0
8	150	6000	0.35	13000	0.32	4.8	135	5400	0.35	11000	0.32	4.8
10	150	4800	0.40	12000	0.40	6.0	135	4300	0.40	10000	0.40	6.0
12	150	4000	0.45	11000	0.48	7.2	135	3600	0.45	9700	0.48	7.2

Work material	Hardened steel (40—55HRC), Ferritic and Martensitic stainless steel (>200HB), Precipitation hardening stainless steel (<450HB) AISI H13, AISI L6, AISI 431, AISI 420, 15-5PH, 17-4PH						Hardened steel (55— 62HRC) AISI D2					
Dia. DC(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)
3	120	13000	0.15	7800	0.12	1.5	80	8500	0.10	3400	0.12	1.5
4	120	9500	0.21	8000	0.16	2.0	80	6400	0.15	3800	0.16	2.0
6	120	6400	0.35	9000	0.24	3.0	80	4200	0.30	5000	0.24	3.0
8	120	4800	0.35	10000	0.32	4.8	80	3200	0.30	5800	0.32	4.8
10	120	3800	0.40	9100	0.40	6.0	80	2500	0.35	5300	0.40	6.0
12	120	3200	0.45	8600	0.48	7.2	80	2100	0.40	5000	0.48	7.2

- When ramping process set the feed rate at 50%. A ramping angle of 1° is recommended.
- Use at a revolution of 70% and feed rate of 50% when the tool overhang exceeds 5DC.

VFHVRB

IMPACT MIRACLE END MILLS

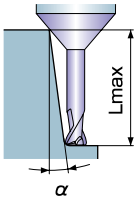
4 flute, Corner radius, Short cut length, Irregular helix flutes

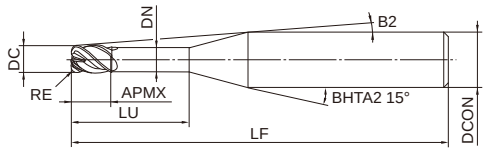
Product Information

Work Material

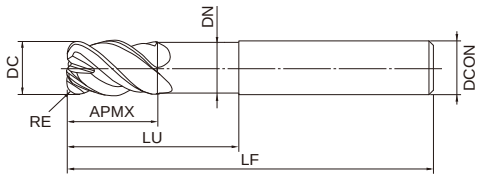
P M S H F M

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668

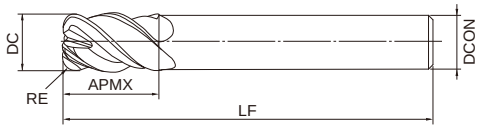




Type1



Type2



Type3

R	DC≦10	DC>10	
	±0.007	±0.01	
	DC≦12	DC>12	
	0 - 0.02	0 - 0.03	
h6	DCON=6	8≦DCON≦10	12≦DCON≦16
	0 - 0.008	0 - 0.009	0 - 0.011

- α: Inclined angle Lmax: Effective length
- Lmax indicates "0: Not available, blank: No interference".

●Inventory maintained in Japan. Unit : mm

Order Number	DC	RE	APMX	LU	DN	B2	LF	DCON	No. of Flutes	Stock	type	Effective length for inclined angle			
												0.5°	1°	2°	3°
VFHVRBD0100R02N004	1	0.2	1	4	0.94	10.6°	60	6	4	●	1	4.2	4.5	4.7	5.3
VFHVRBD0100R02N006	1	0.2	1	6	0.94	9.2°	60	6	4	●	1	6.4	6.7	7.2	7.7
VFHVRBD0100R02N008	1	0.2	1	8	0.94	8.2°	60	6	4	●	1	8.5	8.8	9.5	10.2
VFHVRBD0100R02N010	1	0.2	1	10	0.94	7.4°	60	6	4	●	1	10.5	11.0	11.8	12.7
VFHVRBD0100R02N015	1	0.2	1	15	0.94	5.9°	60	6	4	●	1	15.8	16.3	17.5	18.9
VFHVRBD0100R02N020	1	0.2	1	20	0.94	4.9°	80	6	4	●	1	20.9	21.7	23.3	25.1
VFHVRBD0150R03N004	1.5	0.3	1.5	4	1.44	10.3°	60	6	4	●	1	4.2	4.5	4.6	5.2
VFHVRBD0150R03N006	1.5	0.3	1.5	6	1.44	8.9°	60	6	4	●	1	6.3	6.6	7.2	7.7
VFHVRBD0150R03N010	1.5	0.3	1.5	10	1.44	7°	60	6	4	●	1	10.5	10.9	11.8	12.7
VFHVRBD0150R03N015	1.5	0.3	1.5	15	1.44	5.5°	60	6	4	●	1	15.7	16.3	17.5	18.9
VFHVRBD0150R03N020	1.5	0.3	1.5	20	1.44	4.6°	80	6	4	●	1	20.9	21.6	23.3	25.1
VFHVRBD0150R03N025	1.5	0.3	1.5	25	1.44	3.9°	80	6	4	●	1	26.1	27.0	29.0	31.3
VFHVRBD0150R03N030	1.5	0.3	1.5	30	1.44	3.4°	80	6	4	●	1	31.3	32.3	34.7	37.5
VFHVRBD0200R05N006	2	0.5	2	6	1.9	8.7°	60	6	4	●	1	6.3	6.5	7.0	7.5
VFHVRBD0200R05N010	2	0.5	2	10	1.9	6.7°	60	6	4	●	1	10.5	10.8	11.6	12.5
VFHVRBD0200R05N015	2	0.5	2	15	1.9	5.2°	60	6	4	●	1	15.6	16.2	17.4	18.7
VFHVRBD0200R05N020	2	0.5	2	20	1.9	4.3°	80	6	4	●	1	20.8	21.5	23.1	24.9
VFHVRBD0200R05N025	2	0.5	2	25	1.9	3.6°	80	6	4	●	1	26	26.9	28.9	31.2

VFHVRB

Order Number	DC	RE	APMX	LU	DN	B2	LF	DCON	No. of Flutes	Stock	type	Effective length for inclined angle			
												0.5°	1°	2°	3°
VFHVRBD0200R05N030	2	0.5	2	30	1.9	3.1°	80	6	4	●	1	31.2	32.2	34.6	37.4
VFHVRBD0200R05N035	2	0.5	2	35	1.9	2.8°	90	6	4	●	1	36.3	37.6	40.4	
VFHVRBD0200R05N040	2	0.5	2	40	1.9	2.5°	90	6	4	●	1	41.5	42.9	46.1	
VFHVRBD0300R05N010	3	0.5	3	10	2.9	5.6°	60	6	4	●	1	10.5	10.8	11.6	12.5
VFHVRBD0300R05N015	3	0.5	3	15	2.9	4.3°	60	6	4	●	1	15.6	16.2	17.4	18.7
VFHVRBD0300R05N020	3	0.5	3	20	2.9	3.4°	80	6	4	●	1	20.8	21.5	23.1	24.9
VFHVRBD0300R05N030	3	0.5	3	30	2.9	2.5°	80	6	4	●	1	31.2	32.2	34.6	
VFHVRBD0300R08N010	3	0.8	3	10	2.9	5.7°	60	6	4	●	1	10.4	10.8	11.6	12.4
VFHVRBD0300R08N015	3	0.8	3	15	2.9	4.3°	60	6	4	●	1	15.6	16.2	17.3	18.7
VFHVRBD0300R08N020	3	0.8	3	20	2.9	3.5°	80	6	4	●	1	20.8	21.5	23.1	24.9
VFHVRBD0300R08N030	3	0.8	3	30	2.9	2.5°	80	6	4	●	1	31.1	32.2	34.6	
VFHVRBD0300R08N040	3	0.8	3	40	2.9	2°	90	6	4	●	1	41.5	42.9		
VFHVRBD0300R08N050	3	0.8	3	50	2.9	1.6°	90	6	4	●	1	51.8	53.6		
VFHVRBD0400R05N012	4	0.5	4	12	3.9	3.8°	60	6	4	●	1	12.5	13.0	13.9	15.0
VFHVRBD0400R05N020	4	0.5	4	20	3.9	2.5°	80	6	4	●	1	20.8	21.5	23.1	
VFHVRBD0400R05N030	4	0.5	4	30	3.9	1.8°	80	6	4	●	1	31.2	32.2		
VFHVRBD0400R05N048	4	0.5	4	48	3.9	1.2°	90	6	4	●	1	49.8	51.5		
VFHVRBD0400R10N012	4	1	4	12	3.9	3.9°	60	6	4	●	1	12.5	12.9	13.8	14.9
VFHVRBD0400R10N020	4	1	4	20	3.9	2.5°	80	6	4	●	1	20.8	21.5	23.0	
VFHVRBD0400R10N030	4	1	4	30	3.9	1.8°	80	6	4	●	1	31.1	32.2		
VFHVRBD0600R05N018	6	0.5	9	18	5.85		60	6	4	●	2				
VFHVRBD0600R05N030	6	0.5	9	30	5.85		80	6	4	●	2				
VFHVRBD0600R10N018	6	1	9	18	5.85		60	6	4	●	2				
VFHVRBD0600R10N030	6	1	9	30	5.85		80	6	4	●	2				
VFHVRBD0600R10N054	6	1	9	54	5.85		90	6	4	●	2				
VFHVRBD0600R15N018	6	1.5	9	18	5.85		60	6	4	●	2				
VFHVRBD0600R15N030	6	1.5	9	30	5.85		80	6	4	●	2				
VFHVRBD0600R15N042	6	1.5	9	42	5.85		90	6	4	●	2				
VFHVRBD0600R15N054	6	1.5	9	54	5.85		90	6	4	●	2				
VFHVRBD0600R20N018	6	2	9	18	5.85		60	6	4	●	2				
VFHVRBD0600R20N030	6	2	9	30	5.85		80	6	4	●	2				
VFHVRBD0700R15	7	1.5	11				80	6	4	●	3				
VFHVRBD0800R05N024	8	0.5	12	24	7.85		60	8	4	●	2				
VFHVRBD0800R05N040	8	0.5	12	40	7.85		100	8	4	●	2				
VFHVRBD0800R10N024	8	1	12	24	7.85		60	8	4	●	2				
VFHVRBD0800R10N040	8	1	12	40	7.85		100	8	4	●	2				
VFHVRBD0800R20N024	8	2	12	24	7.85		60	8	4	●	2				
VFHVRBD0800R20N040	8	2	12	40	7.85		100	8	4	●	2				
VFHVRBD0800R20N056	8	2	12	56	7.85		120	8	4	●	2				
VFHVRBD0800R20N072	8	2	12	72	7.85		120	8	4	●	2				
VFHVRBD0900R20	9	2	13.5				100	8	4	●	3				
VFHVRBD1000R05N030	10	0.5	15	30	9.7		70	10	4	●	2				
VFHVRBD1000R05N050	10	0.5	15	50	9.7		110	10	4	●	2				
VFHVRBD1000R10N030	10	1	15	30	9.7		70	10	4	●	2				
VFHVRBD1000R10N050	10	1	15	50	9.7		110	10	4	●	2				
VFHVRBD1000R20N030	10	2	15	30	9.7		70	10	4	●	2				
VFHVRBD1000R20N050	10	2	15	50	9.7		110	10	4	●	2				
VFHVRBD1000R20N070	10	2	15	70	9.7		150	10	4	●	2				
VFHVRBD1000R20N090	10	2	15	90	9.7		150	10	4	●	2				
VFHVRBD1100R20	11	2	16.5				110	10	4	●	3				
VFHVRBD1200R05N036	12	0.5	18	36	11.7		80	12	4	●	2				
VFHVRBD1200R05N060	12	0.5	18	60	11.7		120	12	4	●	2				
VFHVRBD1200R10N036	12	1	18	36	11.7		80	12	4	●	2				
VFHVRBD1200R10N060	12	1	18	60	11.7		120	12	4	●	2				

VFHVRB

Order Number	DC	RE	APMX	LU	DN	B2	LF	DCON	No. of Flutes	Stock	type	Effective length for inclined angle			
												0.5°	1°	2°	3°
VFHVRBD1200R20N036	12	2	18	36	11.7		80	12	4	●	2				
VFHVRBD1200R20N060	12	2	18	60	11.7		120	12	4	●	2				
VFHVRBD1200R20N084	12	2	18	84	11.7		160	12	4	●	2				
VFHVRBD1200R20N108	12	2	18	108	11.7		160	12	4	●	2				
VFHVRBD1200R30N036	12	3	18	36	11.7		80	12	4	●	2				
VFHVRBD1200R30N060	12	3	18	60	11.7		120	12	4	●	2				
VFHVRBD1300R30	13	3	19.5				120	12	4	●	3				
VFHVRBD1600R05N042	16	0.5	24	42	15.5		100	16	4	●	2				
VFHVRBD1600R20N042	16	2	24	42	15.5		100	16	4	●	2				
VFHVRBD1600R30N042	16	3	24	42	15.5		100	16	4	●	2				
VFHVRBD1600R30N080	16	3	24	80	15.5		140	16	4	●	2				
VFHVRBD1600R30N120	16	3	24	120	15.5		175	16	4	●	2				

VFHVRB

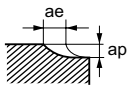
RECOMMENDED CUTTING CONDITIONS

·High speed milling

Work material			Carbon steel, Cast iron, Alloy steel (—30HRC) AISI 1050, AISI No 35 B, AISI P20				Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21				Hardened steel (45— 55HRC) AISI H13				Hardened steel (55— 62HRC) AISI D2			
Dia. DC(mm)	Corner R RE (mm)	Neck length LU(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)
1	0.2	4	40000	7200	0.04	0.45	33000	5100	0.03	0.45	27000	4100	0.025	0.45	20000	1800	0.013	0.45
1	0.2	6	40000	6500	0.03	0.45	33000	4600	0.022	0.45	27000	3700	0.018	0.45	20000	1600	0.01	0.45
1	0.2	8	32000	4500	0.022	0.45	27000	3200	0.018	0.45	21000	2600	0.012	0.45	16000	1100	0.008	0.45
1	0.2	10	24000	2700	0.015	0.45	20000	1900	0.01	0.45	16000	1500	0.008	0.45	12000	700	0.006	0.45
1	0.2	15	16000	1200	0.008	0.45	14000	700	0.005	0.45	12000	500	0.003	0.45	10000	400	0.003	0.45
1	0.2	20	14000	1000	0.005	0.45	12000	600	0.004	0.45	10000	400	0.002	0.45	9000	300	0.002	0.45
1.5	0.3	4	32000	10000	0.1	0.65	27000	7100	0.08	0.65	21000	5700	0.06	0.65	16000	2500	0.03	0.65
1.5	0.3	6	32000	7800	0.08	0.65	27000	5500	0.06	0.65	21000	4200	0.05	0.65	16000	2000	0.025	0.65
1.5	0.3	10	27000	5700	0.05	0.65	22000	4000	0.035	0.65	18000	3000	0.03	0.65	14000	1400	0.014	0.65
1.5	0.3	15	22000	3200	0.03	0.65	18000	2300	0.025	0.65	15000	1700	0.018	0.65	11000	1000	0.009	0.65
1.5	0.3	20	16000	1400	0.02	0.65	14000	1200	0.016	0.65	13000	1000	0.012	0.65	9000	700	0.007	0.65
1.5	0.3	25	13000	1000	0.015	0.65	11000	800	0.012	0.65	10000	700	0.009	0.65	7500	500	0.005	0.65
1.5	0.3	30	13000	900	0.01	0.65	11000	700	0.008	0.65	10000	600	0.006	0.65	7500	400	0.004	0.65
2	0.5	6	24000	10000	0.1	0.75	20000	7100	0.08	0.75	16000	5700	0.06	0.75	12000	2500	0.03	0.75
2	0.5	10	24000	10000	0.08	0.75	20000	7100	0.06	0.75	16000	5700	0.05	0.75	12000	2500	0.025	0.75
2	0.5	15	20000	7000	0.05	0.75	17000	5000	0.04	0.75	13000	3200	0.03	0.75	10000	1800	0.016	0.75
2	0.5	20	20000	3600	0.04	0.75	17000	2600	0.03	0.75	13000	1800	0.025	0.75	10000	900	0.012	0.75
2	0.5	25	16000	1800	0.03	0.75	14000	1400	0.025	0.75	12000	1100	0.02	0.75	9000	720	0.01	0.75
2	0.5	30	16000	1400	0.025	0.75	14000	1200	0.02	0.75	12000	900	0.016	0.75	9000	650	0.008	0.75
2	0.5	35	13000	1100	0.02	0.75	11000	800	0.018	0.75	10000	700	0.014	0.75	7000	500	0.007	0.75
2	0.5	40	13000	1000	0.02	0.75	11000	700	0.015	0.75	10000	600	0.012	0.75	7000	400	0.006	0.75
3	0.5	10	16000	11000	0.12	1.5	13000	7800	0.09	1.5	11000	6300	0.07	1.5	8000	2800	0.04	1.5
3	0.5	15	16000	9000	0.11	1.5	13000	6400	0.08	1.5	11000	5100	0.06	1.5	8000	2300	0.04	1.5
3	0.5	20	13000	7200	0.09	1.5	11000	5100	0.07	1.5	8700	4000	0.05	1.5	6500	1800	0.03	1.5
3	0.5	30	13000	5700	0.06	1.5	11000	4000	0.05	1.5	8700	3000	0.04	1.5	6500	1400	0.02	1.5
3	0.8	10	16000	11000	0.24	1	13000	7800	0.19	1	11000	6300	0.14	1	8000	2800	0.07	1
3	0.8	15	16000	9000	0.22	1	13000	6400	0.17	1	11000	5100	0.13	1	8000	2300	0.07	1
3	0.8	20	13000	7200	0.19	1	11000	5100	0.15	1	8700	4000	0.11	1	6500	1800	0.06	1
3	0.8	30	13000	5700	0.12	1	11000	4000	0.09	1	8700	3000	0.07	1	6500	1400	0.04	1
3	0.8	40	11000	3600	0.08	1	9100	2600	0.06	1	7400	2000	0.05	1	5500	1000	0.025	1
3	0.8	50	8000	2600	0.07	1	6600	1800	0.05	1	5800	1500	0.04	1	4600	800	0.02	1
4	0.5	12	8400	6000	0.15	2	7000	4300	0.12	2	5600	3400	0.09	2	4200	1500	0.05	2
4	0.5	20	8400	6000	0.14	2	7000	4300	0.11	2	5600	3400	0.08	2	4200	1500	0.04	2
4	0.5	30	6900	4900	0.12	2	5700	3500	0.09	2	4600	2800	0.07	2	3500	1200	0.03	2
4	0.5	48	5600	2000	0.07	2	4600	1400	0.05	2	3800	1100	0.04	2	2800	500	0.02	2
4	1	12	12000	12000	0.3	1.5	10000	8500	0.23	1.5	8000	6800	0.18	1.5	6000	3000	0.1	1.5
4	1	20	12000	12000	0.27	1.5	10000	8500	0.21	1.5	8000	6800	0.16	1.5	6000	3000	0.08	1.5
4	1	30	10000	9900	0.24	1.5	8300	7000	0.19	1.5	6700	5600	0.14	1.5	5000	2500	0.07	1.5
6	0.5	18	4000	3900	0.15	3.5	3300	2800	0.12	3.5	2700	2200	0.09	3.5	2000	1000	0.05	3.5
6	0.5	30	4000	3900	0.14	3.5	3300	2800	0.11	3.5	2700	2200	0.08	3.5	2000	1000	0.04	3.5
6	1	18	8000	13000	0.5	3	6600	9200	0.4	3	5400	7400	0.3	3	4000	3300	0.15	3
6	1	30	8000	13000	0.45	3	6600	9200	0.35	3	5400	7400	0.27	3	4000	3300	0.14	3
6	1	54	6600	11000	0.25	3	5500	7800	0.2	3	4400	6300	0.15	3	3300	2800	0.08	3
6	1.5	18	8000	13000	0.5	2	6600	9200	0.4	2	5400	7400	0.3	2	4000	3300	0.15	2
6	1.5	30	8000	13000	0.45	2	6600	9200	0.35	2	5400	7400	0.27	2	4000	3300	0.14	2
6	1.5	42	6600	11000	0.4	2	5500	7800	0.3	2	4400	6300	0.24	2	3300	2800	0.12	2
6	1.5	54	6600	11000	0.25	2	5500	7800	0.2	2	4400	6300	0.15	2	3300	2800	0.08	2
6	2	18	8000	13000	0.5	1.5	6600	9200	0.4	1.5	5400	7400	0.3	1.5	4000	3300	0.15	1.5
6	2	30	8000	13000	0.45	1.5	6600	9200	0.35	1.5	5400	7400	0.27	1.5	4000	3300	0.14	1.5
7	1.5	—	6800	13000	0.5	3	5600	9200	0.4	3	4600	7400	0.3	3	3400	3300	0.15	3
8	0.5	24	3000	3900	0.18	5	2500	2800	0.14	5	2000	2200	0.11	5	1500	1000	0.05	5
8	0.5	40	3000	3900	0.16	5	2500	2800	0.12	5	2000	2200	0.1	5	1500	1000	0.05	5
8	1	24	4200	6500	0.3	4.5	3500	4600	0.23	4.5	2800	3700	0.18	4.5	2100	1600	0.09	4.5

VFHVRB

Work material			Carbon steel, Cast iron, Alloy steel (—30HRC) AISI 1050, AISI No 35 B, AISI P20				Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21				Hardened steel (45— 55HRC) AISI H13				Hardened steel (55— 62HRC) AISI D2			
Dia. DC(mm)	Corner R RE (mm)	Neck length LU(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)
8	1	40	4200	6500	0.27	4.5	3500	4600	0.21	4.5	2800	3700	0.16	4.5	2100	1600	0.08	4.5
8	2	24	6000	13000	0.6	3	5000	9200	0.46	3	4000	7400	0.36	3	3000	3300	0.18	3
8	2	40	6000	13000	0.54	3	5000	9200	0.42	3	4000	7400	0.32	3	3000	3300	0.16	3
8	2	56	5000	11000	0.48	3	4200	7800	0.37	3	3400	6300	0.3	3	2500	2800	0.14	3
8	2	72	5000	11000	0.3	3	4200	7800	0.23	3	3400	6300	0.2	3	2500	2800	0.09	3
9	2	—	5300	13000	0.6	3.5	4400	9200	0.46	3.5	3600	7400	0.36	3.5	2700	3300	0.18	3.5
10	0.5	30	2400	3900	0.18	6.5	2000	2800	0.14	6.5	1600	2200	0.11	6.5	1200	1000	0.05	6.5
10	0.5	50	2400	3900	0.16	6.5	2000	2800	0.12	6.5	1600	2200	0.1	6.5	1200	1000	0.05	6.5
10	1	30	3300	6500	0.3	6	2700	4600	0.23	6	2200	3700	0.18	6	1700	1600	0.09	6
10	1	50	3300	6500	0.27	6	2700	4600	0.21	6	2200	3700	0.16	6	1700	1600	0.08	6
10	2	30	4800	13000	0.6	4.5	4000	9200	0.46	4.5	3200	7400	0.36	4.5	2400	3300	0.18	4.5
10	2	50	4800	13000	0.54	4.5	4000	9200	0.42	4.5	3200	7400	0.32	4.5	2400	3300	0.16	4.5
10	2	70	4000	11000	0.48	4.5	3300	7800	0.37	4.5	2700	6300	0.3	4.5	2000	2800	0.14	4.5
10	2	90	4000	11000	0.48	4.5	3300	7800	0.37	4.5	2700	6300	0.3	4.5	2000	2800	0.14	4.5
11	2	—	4300	12000	0.6	5	3600	8500	0.46	5	2900	6800	0.36	5	2200	3000	0.18	5
12	0.5	36	2000	3600	0.27	8	1700	2600	0.21	8	1300	2100	0.14	8	1000	900	0.07	8
12	0.5	60	2000	3600	0.24	8	1700	2600	0.18	8	1300	2100	0.12	8	1000	900	0.06	8
12	1	36	2400	4800	0.36	7.5	2000	3400	0.28	7.5	1600	2700	0.18	7.5	1200	1200	0.09	7.5
12	1	60	2400	4800	0.32	7.5	2000	3400	0.25	7.5	1600	2700	0.16	7.5	1200	1200	0.08	7.5
12	2	36	4000	12000	0.9	6	3300	8500	0.7	6	2700	6800	0.45	6	2000	3000	0.23	6
12	2	60	4000	12000	0.8	6	3300	8500	0.6	6	2700	6800	0.4	6	2000	3000	0.2	6
12	2	84	3300	9900	0.7	6	2700	7000	0.55	6	2200	5600	0.36	6	1700	2500	0.18	6
12	2	108	3300	9900	0.45	6	2700	7000	0.35	6	2200	5600	0.23	6	1700	2500	0.11	6
12	3	36	4000	12000	0.9	4.5	3300	8500	0.7	4.5	2700	6800	0.45	4.5	2000	3000	0.23	4.5
12	3	60	4000	12000	0.8	4.5	3300	8500	0.6	4.5	2700	6800	0.4	4.5	2000	3000	0.2	4.5
13	3	—	3700	12000	0.9	5	3100	8500	0.7	5	2500	6800	0.45	5	1900	3000	0.23	5
16	0.5	42	1500	3000	0.27	11	1200	2100	0.21	11	1000	1700	0.12	11	750	750	0.05	11
16	2	42	2100	5000	0.45	9	1700	3600	0.35	9	1400	2900	0.2	9	1100	1300	0.08	9
16	3	42	3000	10000	0.9	7.5	2500	7100	0.7	7.5	2000	5700	0.4	7.5	1500	2500	0.15	7.5
16	3	80	3000	10000	0.8	7.5	2500	7100	0.6	7.5	2000	5700	0.37	7.5	1500	2500	0.14	7.5
16	3	120	2500	8300	0.7	7.5	2100	5900	0.55	7.5	1700	4700	0.32	7.5	1300	2100	0.12	7.5



- If the depth of cut is shallow, the revolution and feed rate can be increased.
- Air blow or oil mist is recommended for good chip evacuation.
- For profile machining such as moulds, machining conditions may differ considerably depending on the workpiece geometry, machining methods and depth of cut. Reduce the feed rate especially when machining the corner sections of a workpiece.
- The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abnormal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.

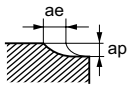
VFHVRB

·High depth of cut conditions

Work material			Carbon steel, Cast iron, Alloy steel (—30HRC) AISI 1050, AISI No 35 B, AISI P20				Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21				Hardened steel (45— 55HRC) AISI H13				Hardened steel (55— 62HRC) AISI D2			
Dia. DC(mm)	Corner R RE (mm)	Neck length LU(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)
1	0.2	4	24000	2200	0.08	0.45	20000	1500	0.07	0.45	16000	1200	0.05	0.45	12000	550	0.025	0.45
1	0.2	6	24000	2000	0.07	0.45	20000	1400	0.05	0.45	16000	1100	0.04	0.45	12000	500	0.02	0.45
1	0.2	8	19000	1400	0.05	0.45	16000	1000	0.04	0.45	13000	800	0.03	0.45	9500	350	0.016	0.45
1	0.2	10	14000	800	0.04	0.45	12000	600	0.03	0.45	9000	400	0.025	0.45	7000	200	0.012	0.45
1	0.2	15	16000	1200	0.008	0.45	14000	700	0.005	0.45	12000	500	0.003	0.45	10000	400	0.003	0.45
1	0.2	20	14000	1000	0.005	0.45	12000	600	0.004	0.45	10000	400	0.002	0.45	9000	300	0.002	0.45
1.5	0.3	4	19000	3000	0.2	0.65	16000	2100	0.16	0.65	13000	1700	0.12	0.65	9500	750	0.06	0.65
1.5	0.3	6	19000	2300	0.16	0.65	16000	1600	0.13	0.65	13000	1300	0.1	0.65	9500	580	0.05	0.65
1.5	0.3	10	16000	1700	0.1	0.65	13000	1200	0.07	0.65	11000	1000	0.05	0.65	8000	430	0.03	0.65
1.5	0.3	15	13000	1000	0.06	0.65	11000	700	0.05	0.65	9000	600	0.04	0.65	6500	250	0.018	0.65
1.5	0.3	20	16000	1400	0.02	0.65	14000	1200	0.016	0.65	13000	1000	0.012	0.65	9000	700	0.007	0.65
1.5	0.3	25	13000	1000	0.015	0.65	11000	800	0.012	0.65	10000	700	0.009	0.65	7500	500	0.005	0.65
1.5	0.3	30	13000	900	0.01	0.65	11000	700	0.008	0.65	10000	600	0.006	0.65	7500	400	0.004	0.65
2	0.5	6	14000	3000	0.2	0.75	12000	2100	0.16	0.75	9400	1700	0.12	0.75	7000	750	0.06	0.75
2	0.5	10	14000	3000	0.16	0.75	12000	2100	0.13	0.75	9400	1700	0.1	0.75	7000	750	0.05	0.75
2	0.5	15	12000	2100	0.1	0.75	10000	1500	0.08	0.75	8000	1200	0.06	0.75	6000	530	0.03	0.75
2	0.5	20	12000	1100	0.08	0.75	10000	800	0.06	0.75	8000	600	0.05	0.75	6000	280	0.025	0.75
2	0.5	25	16000	1800	0.03	0.75	14000	1400	0.025	0.75	12000	1100	0.02	0.75	9000	720	0.01	0.75
2	0.5	30	16000	1400	0.025	0.75	14000	1200	0.02	0.75	12000	900	0.016	0.75	9000	650	0.008	0.75
2	0.5	35	13000	1100	0.02	0.75	11000	800	0.018	0.75	10000	700	0.014	0.75	7000	500	0.007	0.75
2	0.5	40	13000	1000	0.02	0.75	11000	700	0.015	0.75	10000	600	0.012	0.75	7000	400	0.006	0.75
3	0.5	10	9600	3300	0.24	1.5	8000	2300	0.2	1.5	6400	1800	0.14	1.5	4800	830	0.07	1.5
3	0.5	15	9600	2700	0.22	1.5	8000	1900	0.17	1.5	6400	1500	0.13	1.5	4800	680	0.06	1.5
3	0.5	20	7800	2200	0.18	1.5	6500	1500	0.14	1.5	5200	1200	0.11	1.5	3900	550	0.05	1.5
3	0.5	30	7800	1700	0.12	1.5	6500	1200	0.1	1.5	5200	1000	0.07	1.5	3900	430	0.04	1.5
3	0.8	10	9600	3300	0.5	1	8000	2300	0.4	1	6400	1800	0.3	1	4800	830	0.14	1
3	0.8	15	9600	2700	0.5	1	8000	1900	0.35	1	6400	1500	0.25	1	4800	680	0.13	1
3	0.8	20	7800	2200	0.4	1	6500	1500	0.3	1	5200	1200	0.23	1	3900	550	0.11	1
3	0.8	30	7800	1700	0.24	1	6500	1200	0.2	1	5200	1000	0.14	1	3900	430	0.05	1
3	0.8	40	11000	3600	0.08	1	9100	2600	0.06	1	7400	2000	0.05	1	5500	1000	0.025	1
3	0.8	50	8000	2600	0.07	1	6600	1800	0.05	1	5800	1500	0.04	1	4600	800	0.02	1
4	0.5	12	5000	1800	0.3	2	4200	1300	0.24	2	3400	1000	0.18	2	2500	450	0.06	2
4	0.5	20	5000	1800	0.3	2	4200	1300	0.22	2	3400	1000	0.17	2	2500	450	0.06	2
4	0.5	30	4100	1500	0.24	2	3400	1100	0.19	2	2700	840	0.14	2	2100	380	0.05	2
4	0.5	48	5600	2000	0.07	2	4600	1400	0.05	2	3800	1100	0.04	2	2800	500	0.02	2
4	1	12	7200	3600	0.6	1.5	6000	2500	0.5	1.5	4800	2000	0.36	1.5	3600	900	0.12	1.5
4	1	20	7200	3600	0.6	1.5	6000	2500	0.4	1.5	4800	2000	0.32	1.5	3600	900	0.11	1.5
4	1	30	6000	3000	0.5	1.5	5000	2100	0.4	1.5	4000	1700	0.3	1.5	3000	750	0.1	1.5
6	0.5	18	2400	1200	0.3	3.5	2000	840	0.24	3.5	1600	670	0.18	3.5	1200	300	0.06	3.5
6	0.5	30	2400	1200	0.3	3.5	2000	840	0.22	3.5	1600	670	0.17	3.5	1200	300	0.06	3.5
6	1	18	4800	3900	1	3	4000	2700	0.8	3	3200	2200	0.6	3	2400	980	0.2	3
6	1	30	4800	3900	0.9	3	4000	2700	0.7	3	3200	2200	0.5	3	2400	980	0.18	3
6	1	54	4000	3300	0.5	3	3300	2300	0.4	3	2700	1800	0.3	3	2000	830	0.1	3
6	1.5	18	4800	3900	1	2	4000	2700	0.8	2	3200	2200	0.6	2	2400	980	0.2	2
6	1.5	30	4800	3900	0.9	2	4000	2700	0.7	2	3200	2200	0.5	2	2400	980	0.18	2
6	1.5	42	4000	3300	0.8	2	3300	2300	0.6	2	2700	1800	0.5	2	2000	830	0.16	2
6	1.5	54	4000	3300	0.5	2	3300	2300	0.4	2	2700	1800	0.3	2	2000	830	0.1	2
6	2	18	4800	3900	1	1.5	4000	2700	0.8	1.5	3200	2200	0.6	1.5	2400	980	0.2	1.5
6	2	30	4800	3900	0.9	1.5	4000	2700	0.7	1.5	3200	2200	0.5	1.5	2400	980	0.18	1.5
7	1.5	—	4100	3900	1	3	3400	2700	0.8	3	2700	2200	0.6	3	2100	980	0.2	3
8	0.5	24	1800	1200	0.35	5	1500	840	0.3	5	1200	670	0.2	5	900	300	0.07	5
8	0.5	40	1800	1200	0.3	5	1500	840	0.25	5	1200	670	0.2	5	900	300	0.06	5
8	1	24	2500	2000	0.6	4.5	2100	1400	0.5	4.5	1700	1100	0.4	4.5	1300	500	0.12	4.5
8	1	40	2500	2000	0.5	4.5	2100	1400	0.4	4.5	1700	1100	0.3	4.5	1300	500	0.11	4.5
8	2	24	3600	3900	1.2	3	3000	2700	1	3	2400	2200	0.7	3	1800	980	0.24	3

VFHVRB

Work material			Carbon steel, Cast iron, Alloy steel (—30HRC) AISI 1050, AISI No 35 B, AISI P20				Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21				Hardened steel (45— 55HRC) AISI H13				Hardened steel (55— 62HRC) AISI D2			
Dia. DC(mm)	Corner R RE (mm)	Neck length LU(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)
8	2	40	3600	3900	1.1	3	3000	2700	0.9	3	2400	2200	0.7	3	1800	980	0.22	3
8	2	56	3000	3300	1	3	2500	2300	0.8	3	2000	1800	0.6	3	1500	830	0.2	3
8	2	72	3000	3300	0.6	3	2500	2300	0.5	3	2000	1800	0.4	3	1500	830	0.12	3
9	2	—	3200	3900	1.2	3.5	2700	2700	1	3.5	2100	2200	0.7	3.5	1600	980	0.24	3.5
10	0.5	30	1400	1200	0.35	6.5	1200	840	0.3	6.5	940	670	0.2	6.5	700	300	0.07	6.5
10	0.5	50	1400	1200	0.3	6.5	1200	840	0.25	6.5	940	670	0.2	6.5	700	300	0.06	6.5
10	1	30	2000	2000	0.6	6	1700	1400	0.5	6	1300	1100	0.4	6	1000	500	0.12	6
10	1	50	2000	2000	0.5	6	1700	1400	0.4	6	1300	1100	0.3	6	1000	500	0.11	6
10	2	30	2900	3900	1.2	4.5	2400	2700	1	4.5	1900	2200	0.7	4.5	1500	980	0.24	4.5
10	2	50	2900	3900	1.1	4.5	2400	2700	0.9	4.5	1900	2200	0.7	4.5	1500	980	0.22	4.5
10	2	70	2400	3300	1	4.5	2000	2300	0.8	4.5	1600	1800	0.6	4.5	1200	830	0.2	4.5
10	2	90	2400	3300	1	4.5	2000	2300	0.8	4.5	1600	1800	0.6	4.5	1200	830	0.2	4.5
11	2	—	2600	3600	1.2	5	2200	2500	1	5	1700	2000	0.7	5	1300	900	0.24	5
12	0.5	36	1200	1100	0.5	8	1000	770	0.4	8	800	620	0.3	8	600	280	0.11	8
12	0.5	60	1200	1100	0.5	8	1000	770	0.4	8	800	620	0.3	8	600	280	0.1	8
12	1	36	1400	1400	0.7	7.5	1200	1000	0.6	7.5	940	780	0.4	7.5	700	350	0.14	7.5
12	1	60	1400	1400	0.6	7.5	1200	1000	0.5	7.5	940	780	0.4	7.5	700	350	0.13	7.5
12	2	36	2400	3600	1.8	6	2000	2500	1.4	6	1600	2000	1.1	6	1200	900	0.4	6
12	2	60	2400	3600	1.6	6	2000	2500	1.3	6	1600	2000	1	6	1200	900	0.3	6
12	2	84	2000	3000	1.4	6	1700	2100	1.1	6	1300	1700	0.8	6	1000	750	0.3	6
12	2	108	2000	3000	0.9	6	1700	2100	0.7	6	1300	1700	0.5	6	1000	750	0.2	6
12	3	36	2400	3600	1.8	4.5	2000	2500	1.4	4.5	1600	2000	1.1	4.5	1200	900	0.4	4.5
12	3	60	2400	3600	1.6	4.5	2000	2500	1.3	4.5	1600	2000	1	4.5	1200	900	0.3	4.5
13	3	—	2200	3600	1.8	5	1800	2500	1.4	5	1500	2000	1.1	5	1100	900	0.4	5
16	0.5	42	900	900	0.5	11	750	630	0.4	11	600	500	0.3	11	450	230	0.1	11
16	2	42	1300	1500	0.9	9	1100	1100	0.7	9	870	840	0.5	9	650	380	0.2	9
16	3	42	1800	3000	1.8	7.5	1500	2100	1.4	7.5	1200	1700	0.9	7.5	900	750	0.4	7.5
16	3	80	1800	3000	1.6	7.5	1500	2100	1.3	7.5	1200	1700	0.8	7.5	900	750	0.3	7.5
16	3	120	1500	2500	1.4	7.5	1200	1800	1.1	7.5	1000	1400	0.7	7.5	750	630	0.3	7.5



- If the depth of cut is shallow, the revolution and feed rate can be increased.
- Air blow or oil mist is recommended for good chip evacuation.
- For profile machining such as moulds, machining conditions may differ considerably depending on the workpiece geometry, machining methods and depth of cut. Reduce the feed rate especially when machining the corner sections of a workpiece.
- The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abnormal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.

VFHVRB

IMPACT MIRACLE END MILLS

4 flute, Corner radius, Short cut length, Irregular helix flutes

Product Information

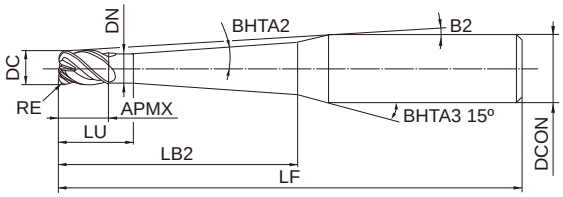
UWC 43° 45° VF

Work Material

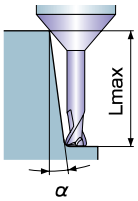
P M S H F M

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668

Taper neck type



R	DC≦10	DC>10	
	±0.007	±0.01	
	DC≦12		
	0 - 0.02		
h6	DCON=6	8≦DCON≦10	12≦DCON≦16
	0 - 0.008	0 - 0.009	0 - 0.011



- α: Inclined angle Lmax: Effective length
- Lmax indicates "0: Not available, blank: No interference".

●Inventory maintained in Japan. Unit : mm

Order Number	DC	RE	BHTA2	APMX	LU	LB2	DN	B2	LF	DCON	No. of Flutes	Stock	type	Effective length for inclined angle 0.5°	1°	2°	3°
VFHVRBD010R02N006T09	1	0.2	0.9°	1	2.5	6	0.94	9.3°	60	6	4	●	1	0	6.6	7.1	7.6
VFHVRBD010R02N010T09	1	0.2	0.9°	1	2.5	10	0.94	7.5°	60	6	4	●	1	0	10.6	11.4	12.3
VFHVRBD010R02N015T09	1	0.2	0.9°	1	2.5	15	0.94	6.1°	60	6	4	●	1	0	15.6	16.8	18.1
VFHVRBD010R02N020T09	1	0.2	0.9°	1	2.5	20	0.94	5.1°	80	6	4	●	1	0	20.6	22.1	23.9
VFHVRBD010R02N025T09	1	0.2	0.9°	1	2.5	25	0.94	4.4°	80	6	4	●	1	0	25.6	27.5	29.7
VFHVRBD010R02N030T09	1	0.2	0.9°	1	2.5	30	0.94	3.8°	80	6	4	●	1	0	30.6	32.9	35.5
VFHVRBD010R02N035T09	1	0.2	0.9°	1	2.5	35	0.94	3.4°	90	6	4	●	1	0	35.6	38.3	41.3
VFHVRBD010R02N040T09	1	0.2	0.9°	1	2.5	40	0.94	3.1°	90	6	4	●	1	0	40.6	43.6	47.2
VFHVRBD010R02N045T09	1	0.2	0.9°	1	2.5	45	0.94	2.8°	90	6	4	●	1	0	45.6	49.0	
VFHVRBD010R02N050T09	1	0.2	0.9°	1	2.5	50	0.94	2.6°	90	6	4	●	1	0	50.6	54.4	
VFHVRBD015R03N010T09	1.5	0.3	0.9°	1.5	3	10	1.44	7.1°	60	6	4	●	1	0	10.6	11.4	12.3
VFHVRBD015R03N015T09	1.5	0.3	0.9°	1.5	3	15	1.44	5.7°	60	6	4	●	1	0	15.6	16.8	18.1
VFHVRBD015R03N020T09	1.5	0.3	0.9°	1.5	3	20	1.44	4.7°	80	6	4	●	1	0	20.6	22.2	23.9
VFHVRBD015R03N030T09	1.5	0.3	0.9°	1.5	3	30	1.44	3.5°	80	6	4	●	1	0	30.6	32.9	35.6
VFHVRBD015R03N040T09	1.5	0.3	0.9°	1.5	3	40	1.44	2.8°	90	6	4	●	1	0	40.6	43.7	
VFHVRBD015R03N050T09	1.5	0.3	0.9°	1.5	3	50	1.44	2.4°	90	6	4	●	1	0	50.6	54.4	
VFHVRBD020R05N015T04	2	0.5	0.4°	2	4	15	1.9	5.2°	60	6	4	●	1	15.6	16.2	17.4	18.7
VFHVRBD020R05N020T04	2	0.5	0.4°	2	4	20	1.9	4.3°	80	6	4	●	1	20.6	21.3	22.9	24.7
VFHVRBD020R05N020T09	2	0.5	0.9°	2	4	20	1.9	4.4°	80	6	4	●	1	0	20.8	22.3	24.1
VFHVRBD020R05N025T04	2	0.5	0.4°	2	4	25	1.9	3.6°	80	6	4	●	1	25.6	26.5	28.5	30.8
VFHVRBD020R05N025T09	2	0.5	0.9°	2	4	25	1.9	3.7°	90	6	4	●	1	0	25.8	27.7	29.9
VFHVRBD020R05N030T04	2	0.5	0.4°	2	4	30	1.9	3.2°	80	6	4	●	1	30.6	31.7	34.0	36.8
VFHVRBD020R05N030T09	2	0.5	0.9°	2	4	30	1.9	3.2°	90	6	4	●	1	0	30.8	33.0	35.7
VFHVRBD020R05N035T04	2	0.5	0.4°	2	4	35	1.9	2.8°	80	6	4	●	1	35.6	36.9	39.6	
VFHVRBD020R05N035T09	2	0.5	0.9°	2	4	35	1.9	2.9°	90	6	4	●	1	0	35.8	38.4	

VFHVRB

Order Number	DC	RE	BHTA2	APMX	LU	LB2	DN	B2	LF	DCON	No. of Flutes	Stock	type	Effective length for inclined angle			
														0.5°	1°	2°	3°
VFHVRBD020R05N040T04	2	0.5	0.4°	2	4	40	1.9	2.5°	80	6	4	●	1	40.6	42.0	45.2	
VFHVRBD020R05N040T09	2	0.5	0.9°	2	4	40	1.9	2.6°	90	6	4	●	1	0	40.8	43.8	
VFHVRBD020R05N045T09	2	0.5	0.9°	2	4	45	1.9	2.3°	90	6	4	●	1	0	45.8	49.2	
VFHVRBD020R05N050T09	2	0.5	0.9°	2	4	50	1.9	2.2°	100	6	4	●	1	0	50.8	54.5	
VFHVRBD020R05N055T09	2	0.5	0.9°	2	4	55	1.9	2°	100	6	4	●	1	0	55.8	59.9	
VFHVRBD020R05N060T09	2	0.5	0.9°	2	4	60	1.9	1.8°	100	6	4	●	1	0	60.8		
VFHVRBD030R08N020T09	3	0.8	0.9°	3	6	20	2.9	3.6°	80	6	4	●	1	0	20.9	22.4	24.1
VFHVRBD030R08N025T09	3	0.8	0.9°	3	6	25	2.9	3°	80	6	4	●	1	0	25.9	27.8	30.0
VFHVRBD030R08N030T09	3	0.8	0.9°	3	6	30	2.9	2.6°	80	6	4	●	1	0	30.9	33.1	
VFHVRBD030R08N040T09	3	0.8	0.9°	3	6	40	2.9	2°	90	6	4	●	1	0	40.9	43.9	
VFHVRBD030R08N050T09	3	0.8	0.9°	3	6	50	2.9	1.7°	90	6	4	●	1	0	50.9		
VFHVRBD030R08N060T09	3	0.8	0.9°	3	6	60	2.9	1.4°	100	6	4	●	1	0	60.9		
VFHVRBD040R10N025T04	4	1	0.4°	4	7	25	3.9	2.1°	80	6	4	●	1	25.7	26.6	28.5	
VFHVRBD040R10N025T09	4	1	0.9°	4	7	25	3.9	2.2°	90	6	4	●	1	0	25.9	27.8	
VFHVRBD040R10N030T04	4	1	0.4°	4	7	30	3.9	1.8°	80	6	4	●	1	30.7	31.8		
VFHVRBD040R10N030T09	4	1	0.9°	4	7	30	3.9	1.9°	90	6	4	●	1	0	30.9		
VFHVRBD040R10N035T04	4	1	0.4°	4	7	35	3.9	1.6°	80	6	4	●	1	35.7	36.9		
VFHVRBD040R10N040T04	4	1	0.4°	4	7	40	3.9	1.4°	80	6	4	●	1	40.7	42.1		
VFHVRBD040R10N040T09	4	1	0.9°	4	7	40	3.9	1.4°	100	6	4	●	1	0	40.9		
VFHVRBD040R10N045T04	4	1	0.4°	4	7	45	3.9	1.3°	90	6	4	●	1	45.7	47.3		
VFHVRBD040R10N050T04	4	1	0.4°	4	7	50	3.9	1.2°	90	6	4	●	1	50.7	52.5		
VFHVRBD040R10N050T09	4	1	0.9°	4	7	50	3.9	1.2°	100	6	4	●	1	0	50.9		
VFHVRBD040R10N060T09	4	1	0.9°	4	7	60	3.9	1°	100	6	4	●	1	0	60.9		
VFHVRBD060R15N040T09	6	1.5	0.9°	9	12	40	5.85	1.4°	110	8	4	●	1	0	41.4		
VFHVRBD060R15N050T09	6	1.5	0.9°	9	12	50	5.85	1.2°	110	8	4	●	1	0	51.4		
VFHVRBD060R15N060T09	6	1.5	0.9°	9	12	60	5.85	1°	110	8	4	●	1	0	61.4		
VFHVRBD060R15N070T09	6	1.5	0.9°	9	12	70	5.85	0.9°	110	8	4	●	1	0			
VFHVRBD080R20N060T09	8	2	0.9°	12	15	60	7.85	1°	150	10	4	●	1	0	61.5		
VFHVRBD080R20N080T09	8	2	0.9°	12	15	80	7.85	0.8°	150	10	4	●	1	0			
VFHVRBD100R20N080T09	10	2	0.9°	15	18	80	9.7	2°	130	16	4	●	1	0	82.0	88.0	
VFHVRBD100R20N120T09	10	2	0.9°	15	18	120	9.7	1.4°	180	16	4	●	1	0	122.0		
VFHVRBD120R20N080T09	12	2	0.9°	18	21	80	11.7	1.4°	130	16	4	●	1	0	82.2		
VFHVRBD120R20N120T09	12	2	0.9°	18	21	120	11.7	1°	180	16	4	●	1	0	122.2		

VFHVRB

RECOMMENDED CUTTING CONDITIONS

·High depth of cut conditions

Work material				Carbon steel, Cast iron, Alloy steel (—30HRC) AISI 1050, AISI No 35 B, AISI P20				Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21			
Dia. DC(mm)	Corner R RE (mm)	Taper angle one side BHTA2	Neck length LB2(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)
1	0.2	0.9°	6	40000	6500	0.03	0.45	33000	4600	0.022	0.45
1	0.2	0.9°	10	24000	2700	0.015	0.45	20000	1900	0.01	0.45
1	0.2	0.9°	15	16000	1200	0.013	0.45	14000	700	0.008	0.45
1	0.2	0.9°	20	14000	1000	0.01	0.45	12000	600	0.006	0.45
1	0.2	0.9°	25	9500	610	0.008	0.45	8000	440	0.005	0.45
1	0.2	0.9°	30	4900	320	0.007	0.45	4100	220	0.004	0.45
1	0.2	0.9°	35	4000	260	0.006	0.45	3400	190	0.003	0.45
1	0.2	0.9°	40	3500	180	0.005	0.45	2900	130	0.003	0.45
1	0.2	0.9°	45	2900	150	0.004	0.45	2400	100	0.002	0.45
1	0.2	0.9°	50	2900	110	0.003	0.45	2400	80	0.002	0.45
1.5	0.3	0.9°	10	27000	5700	0.05	0.65	22000	4000	0.035	0.65
1.5	0.3	0.9°	15	22000	3200	0.03	0.65	18000	2300	0.025	0.65
1.5	0.3	0.9°	20	16000	1400	0.02	0.65	14000	1200	0.016	0.65
1.5	0.3	0.9°	30	13000	900	0.01	0.65	11000	700	0.008	0.65
1.5	0.3	0.9°	40	4500	230	0.008	0.65	3700	160	0.007	0.65
1.5	0.3	0.9°	50	3700	190	0.007	0.65	3000	130	0.006	0.65
2	0.5	0.4°	15	20000	7000	0.05	0.75	17000	5000	0.04	0.75
2	0.5	0.4°	20	20000	3600	0.04	0.75	17000	2600	0.03	0.75
2	0.5	0.4°	25	16000	1800	0.03	0.75	14000	1400	0.025	0.75
2	0.5	0.4°	30	16000	1400	0.025	0.75	14000	1200	0.02	0.75
2	0.5	0.4°	35	13000	1100	0.02	0.75	11000	800	0.018	0.75
2	0.5	0.4°	40	13000	1000	0.02	0.75	11000	700	0.015	0.75
2	0.5	0.9°	20	20000	3600	0.04	0.75	17000	2600	0.03	0.75
2	0.5	0.9°	25	16000	1800	0.03	0.75	14000	1400	0.025	0.75
2	0.5	0.9°	30	16000	1400	0.025	0.75	14000	1200	0.02	0.75
2	0.5	0.9°	35	13000	1100	0.02	0.75	11000	800	0.018	0.75
2	0.5	0.9°	40	13000	1000	0.02	0.75	11000	700	0.015	0.75
2	0.5	0.9°	45	8000	500	0.016	0.75	6800	360	0.012	0.75
2	0.5	0.9°	50	8000	500	0.016	0.75	6800	360	0.012	0.75
2	0.5	0.9°	55	4100	230	0.012	0.75	3500	170	0.009	0.75
2	0.5	0.9°	60	4100	230	0.012	0.75	3500	170	0.009	0.75
3	0.8	0.9°	20	13000	7200	0.19	1	11000	5100	0.15	1
3	0.8	0.9°	25	13000	7200	0.19	1	11000	5100	0.15	1
3	0.8	0.9°	30	13000	5700	0.12	1	11000	4000	0.09	1
3	0.8	0.9°	40	11000	3600	0.08	1	9100	2600	0.06	1
3	0.8	0.9°	50	8000	2600	0.07	1	6600	1800	0.05	1
3	0.8	0.9°	60	7800	2480	0.06	1	6600	1740	0.05	1
4	1	0.4°	25	10000	9900	0.24	1.5	8300	7000	0.19	1.5
4	1	0.4°	30	10000	9900	0.24	1.5	8300	7000	0.19	1.5
4	1	0.4°	35	10000	9900	0.15	1.5	8300	7000	0.12	1.5
4	1	0.4°	40	10000	9900	0.15	1.5	8300	7000	0.12	1.5
4	1	0.4°	45	10000	9900	0.15	1.5	8300	7000	0.12	1.5
4	1	0.4°	50	8100	6300	0.14	1.5	6700	4420	0.11	1.5
4	1	0.9°	25	10000	9900	0.24	1.5	8300	7000	0.19	1.5
4	1	0.9°	30	10000	9900	0.15	1.5	8300	7000	0.12	1.5
4	1	0.9°	40	10000	9900	0.15	1.5	8300	7000	0.12	1.5
4	1	0.9°	50	8100	6300	0.14	1.5	6700	4420	0.11	1.5
4	1	0.9°	60	8100	6300	0.11	1.5	6700	4420	0.08	1.5
6	1.5	0.9°	40	6600	11000	0.4	2	5500	7600	0.32	2
6	1.5	0.9°	50	6600	11000	0.4	2	5500	7600	0.32	2
6	1.5	0.9°	60	6600	11000	0.25	2	5500	7600	0.2	2
6	1.5	0.9°	70	5400	8700	0.23	2	4400	6200	0.18	2

VFHVRB

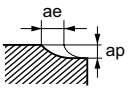
Work material				Carbon steel, Cast iron, Alloy steel (—30HRC) AISI 1050, AISI No 35 B, AISI P20				Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21			
Dia. DC(mm)	Corner R RE (mm)	Taper angle one side BHTA2	Neck length LB2(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)
8	2	0.9°	60	5000	11000	0.48	3	4200	7600	0.37	3
8	2	0.9°	80	5000	11000	0.3	3	4200	7600	0.23	3
10	2	0.9°	80	4000	11000	0.48	4.5	3300	7600	0.37	4.5
10	2	0.9°	120	3200	8700	0.27	4.5	2700	6200	0.21	4.5
12	2	0.9°	80	3300	10000	0.72	6	2700	7100	0.56	6
12	2	0.9°	120	3300	10000	0.45	6	2700	7100	0.35	6

VFHVRB

Work material				Hardened steel (45— 55HRC) AISI H13				Hardened steel (55— 62HRC) AISI D2			
Dia. DC(mm)	Corner R RE (mm)	Taper angle one side BHTA2	Neck length LB2(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)
1	0.2	0.9°	6	27000	3700	0.018	0.45	20000	1600	0.01	0.45
1	0.2	0.9°	10	16000	1500	0.008	0.45	12000	700	0.006	0.45
1	0.2	0.9°	15	12000	500	0.007	0.45	10000	400	0.003	0.45
1	0.2	0.9°	20	10000	400	0.005	0.45	9000	300	0.002	0.45
1	0.2	0.9°	25	6000	320	0.004	0.45	4800	160	0.002	0.45
1	0.2	0.9°	30	3000	160	0.003	0.45	2500	80	0.002	0.45
1	0.2	0.9°	35	3000	160	0.003	0.45	2000	70	0.001	0.45
1	0.2	0.9°	40	2000	90	0.003	0.45	1700	50	0.001	0.45
1	0.2	0.9°	45	2000	90	0.002	0.45	1400	40	0.001	0.45
1	0.2	0.9°	50	2000	60	0.002	0.45	1400	30	0.001	0.45
1.5	0.3	0.9°	10	18000	3000	0.03	0.65	14000	1400	0.014	0.65
1.5	0.3	0.9°	15	15000	1700	0.018	0.65	11000	1000	0.009	0.65
1.5	0.3	0.9°	20	13000	1000	0.012	0.65	9000	700	0.007	0.65
1.5	0.3	0.9°	30	10000	600	0.006	0.65	7500	400	0.004	0.65
1.5	0.3	0.9°	40	3000	120	0.005	0.65	2300	70	0.003	0.65
1.5	0.3	0.9°	50	3000	120	0.004	0.65	1900	60	0.002	0.65
2	0.5	0.4°	15	13000	3200	0.03	0.75	10000	1800	0.016	0.75
2	0.5	0.4°	20	13000	1800	0.025	0.75	10000	900	0.012	0.75
2	0.5	0.4°	25	12000	1100	0.02	0.75	9000	720	0.01	0.75
2	0.5	0.4°	30	12000	900	0.016	0.75	9000	650	0.008	0.75
2	0.5	0.4°	35	10000	700	0.014	0.75	7000	500	0.007	0.75
2	0.5	0.4°	40	10000	600	0.012	0.75	7000	400	0.006	0.75
2	0.5	0.9°	20	13000	1800	0.025	0.75	10000	900	0.012	0.75
2	0.5	0.9°	25	12000	1100	0.02	0.75	9000	720	0.01	0.75
2	0.5	0.9°	30	12000	900	0.016	0.75	9000	650	0.008	0.75
2	0.5	0.9°	35	10000	700	0.014	0.75	7000	500	0.007	0.75
2	0.5	0.9°	40	10000	600	0.012	0.75	7000	400	0.006	0.75
2	0.5	0.9°	45	5200	250	0.01	0.75	4000	120	0.005	0.75
2	0.5	0.9°	50	5200	250	0.01	0.75	4000	120	0.005	0.75
2	0.5	0.9°	55	2700	120	0.008	0.75	2000	60	0.004	0.75
2	0.5	0.9°	60	2700	120	0.008	0.75	2000	60	0.004	0.75
3	0.8	0.9°	20	8700	4000	0.11	1	6500	1800	0.06	1
3	0.8	0.9°	25	8700	4000	0.11	1	6500	1800	0.06	1
3	0.8	0.9°	30	8700	3000	0.07	1	6500	1400	0.04	1
3	0.8	0.9°	40	7400	2000	0.05	1	5500	1000	0.025	1
3	0.8	0.9°	50	5800	1500	0.04	1	4600	800	0.02	1
3	0.8	0.9°	60	5000	1250	0.04	1	3900	610	0.02	1
4	1	0.4°	25	6700	5600	0.14	1.5	5000	2500	0.07	1.5
4	1	0.4°	30	6700	5600	0.14	1.5	5000	2500	0.07	1.5
4	1	0.4°	35	6700	5600	0.09	1.5	5000	2500	0.04	1.5
4	1	0.4°	40	6700	5600	0.09	1.5	5000	2500	0.04	1.5
4	1	0.4°	45	6700	5600	0.09	1.5	5000	2500	0.04	1.5
4	1	0.4°	50	5400	3500	0.08	1.5	4000	1600	0.04	1.5
4	1	0.9°	25	6700	5600	0.14	1.5	5000	2500	0.07	1.5
4	1	0.9°	30	6700	5600	0.09	1.5	5000	2500	0.04	1.5
4	1	0.9°	40	6700	5600	0.09	1.5	5000	2500	0.04	1.5
4	1	0.9°	50	5400	3500	0.08	1.5	4000	1600	0.04	1.5
4	1	0.9°	60	5400	3500	0.06	1.5	4000	1600	0.03	1.5
6	1.5	0.9°	40	4500	6100	0.24	2	3300	2700	0.12	2
6	1.5	0.9°	50	4500	6100	0.24	2	3300	2700	0.12	2
6	1.5	0.9°	60	4500	6100	0.15	2	3300	2700	0.08	2
6	1.5	0.9°	70	3600	5000	0.14	2	2700	2200	0.07	2
8	2	0.9°	60	3300	6100	0.29	3	2500	2700	0.14	3
8	2	0.9°	80	3300	6100	0.18	3	2500	2700	0.09	3
10	2	0.9°	80	2700	6100	0.29	4.5	2000	2700	0.14	4.5
10	2	0.9°	120	2100	5000	0.16	4.5	1600	2200	0.08	4.5

VFHVRB

Work material				Hardened steel (45— 55HRC) AISI H13				Hardened steel (55— 62HRC) AISI D2			
Dia. DC(mm)	Corner R RE (mm)	Taper angle one side BHTA2	Neck length LB2(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)
12	2	0.9°	80	2200	5600	0.36	6	1700	2500	0.18	6
12	2	0.9°	120	2200	5600	0.23	6	1700	2500	0.12	6



- If the depth of cut is shallow, the revolution and feed rate can be increased.
- Air blow or oil mist is recommended for good chip evacuation.
- For profile machining such as moulds, machining conditions may differ considerably depending on the workpiece geometry, machining methods and depth of cut. Reduce the feed rate especially when machining the corner sections of a workpiece.
- The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abnormal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.

VFMHVRB

IMPACT MIRACLE END MILLS

Corner radius, Medium cut length, Irregular helix flutes

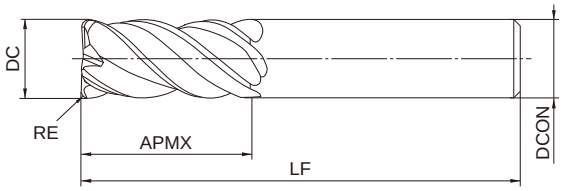
Product Information

UWC 42° 45° VF

Work Material

P M S H F M

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668



Type1

R	0.5≦RE≦6.35			
	±0.015			
	DC≦12	DC>12		
	0 - 0.020	0 - 0.030		
h6	DCON=6	8≦DCON≦10	12≦DCON≦16	DCON=20
	0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013

●Inventory maintained in Japan. Unit : mm

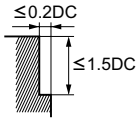
Order Number	DC	RE	APMX	LF	DCON	No. of Flutes	Stock	type
VFMHVRBD0600R050	6	0.5	13	50	6	4	●	1
VFMHVRBD0600R100	6	1	13	50	6	4	●	1
VFMHVRBD0800R050	8	0.5	19	60	8	4	●	1
VFMHVRBD0800R100	8	1	19	60	8	4	●	1
VFMHVRBD1000R050	10	0.5	22	70	10	4	●	1
VFMHVRBD1000R100	10	1	22	70	10	4	●	1
VFMHVRBD1000R200	10	2	22	70	10	4	●	1
VFMHVRBD1200R050	12	0.5	26	75	12	4	●	1
VFMHVRBD1200R100	12	1	26	75	12	4	●	1
VFMHVRBD1200R200	12	2	26	75	12	4	●	1
VFMHVRBD1600R100	16	1	35	90	16	4	●	1
VFMHVRBD1600R200	16	2	35	90	16	4	●	1
VFMHVRBD1600R300	16	3	35	90	16	4	●	1
VFMHVRBD1600R500	16	5	35	90	16	4	●	1
VFMHVRBD2000R100	20	1	45	110	20	4	●	1
VFMHVRBD2000R200	20	2	45	110	20	4	●	1
VFMHVRBD2000R300	20	3	45	110	20	4	●	1
VFMHVRBD2000R400	20	4	45	110	20	4	●	1
VFMHVRBD2000R500	20	5	45	110	20	4	●	1
VFMHVRBD2000R635	20	6.35	45	110	20	4	●	1

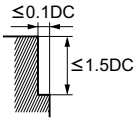
VFMHVRB

RECOMMENDED CUTTING CONDITIONS

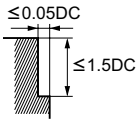
·Side milling

Work material	Carbon steel, Cast iron, Alloy steel (—30HRC) AISI 1050, AISI No 35 B, AISI P20		Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V	
Dia. DC(mm)	Revolution (min-1)	Feed rate (mm/min)	Revolution (min-1)	Feed rate (mm/min)	Revolution (min-1)	Feed rate (mm/min)
2	21000	1100	21000	1100	14000	560
3	15000	1250	15000	1250	10600	850
4	11000	1400	11000	1400	8000	960
5	9600	1920	9600	1920	6400	1020
6	8000	2240	8000	2240	5300	1060
7	6800	1900	6800	1900	4500	1010
8	6000	1680	6000	1680	4000	960
9	5300	1480	5300	1480	3500	840
10	4800	1440	4800	1440	3200	770
11	4400	1350	4400	1350	2900	760
12	4000	1250	4000	1250	2700	760
13	3700	1180	3700	1180	2500	700
14	3400	1160	3400	1160	2300	640
16	3000	1140	3000	1140	2000	560
18	2700	970	2700	970	1800	550
20	2400	860	2400	860	1600	510





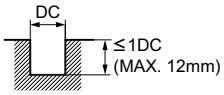
Work material	Hardened steel (45— 55HRC) AISI H13		Heat resistant alloys Inconel718	
Dia. DC(mm)	Revolution (min-1)	Feed rate (mm/min)	Revolution (min-1)	Feed rate (mm/min)
2	9600	310	4800	130
3	7400	380	4200	200
4	5600	400	3200	220
5	4500	430	2500	250
6	3700	440	2100	250
7	3200	450	1800	260
8	2800	450	1600	260
9	2500	450	1400	220
10	2200	440	1300	210
11	2000	400	1200	190
12	1900	380	1100	180
13	1700	360	1000	160
14	1600	350	900	140
16	1400	340	800	130
18	1200	340	700	110
20	1100	330	600	100

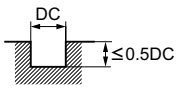


VFMHVRB

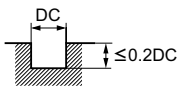
·Slotting

Work material	Carbon steel, Cast iron, Alloy steel (—30HRC) AISI 1050, AISI No 35 B, AISI P20		Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
2	17000	680	10000	400	9600	310
3	12000	720	6900	410	7400	380
4	9200	810	5600	490	5600	400
5	7600	1060	4500	630	4500	410
6	6400	1280	3700	740	3700	440
7	5500	1210	3200	700	3200	410
8	4800	1150	2800	670	2800	390
9	4200	1010	2500	600	2500	350
10	3800	910	2200	530	2200	350
11	3500	900	2000	530	2000	320
12	3200	900	1900	530	1900	300
13	2900	810	1700	480	1700	290
14	2700	760	1600	450	1600	290
16	2400	670	1400	390	1400	280
18	2100	670	1200	380	1200	270
20	1900	610	1100	350	1100	260





Work material	Hardened steel (45— 55HRC) AISI H13		Heat resistant alloys Inconel718	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
2	4800	130	3200	80
3	3200	140	2700	110
4	2400	150	2000	120
5	1900	170	1600	130
6	1600	190	1300	160
7	1400	190	1100	140
8	1200	190	1000	130
9	1100	180	900	130
10	1000	160	800	130
11	900	160	720	120
12	800	160	660	110
13	730	150	610	100
14	680	140	570	90
16	600	120	500	80
18	530	120	440	70
20	480	120	400	60



- When cutting austenitic stainless steel, the use of water-soluble cutting fluid is effective.
- If the depth of cut is shallow, the revolution and feed rate can be increased.
- The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abnormal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.

VFMHVRBCH

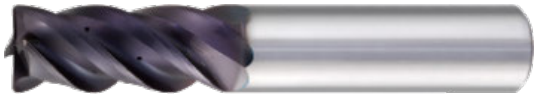
COOL STAR END MILLS

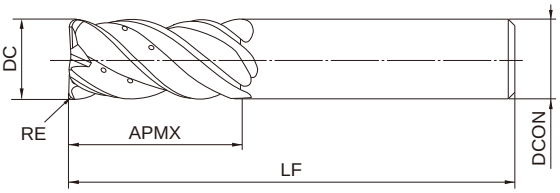
Corner radius end mill, Medium cut length, 4 flute, Irregular helix flutes, with multiple internal through coolant holes

Product Information

Work Material

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668





Type1

R	1≦RE≦3	
	±0.015	
	16≦DC≦20	
	0 - 0.03	
h6	DCON=16	DCON=20
	0 - 0.011	0 - 0.013

●Inventory maintained in Japan. Unit : mm

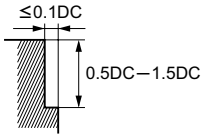
Order Number	DC	RE	APMX	LF	DCON	No. of Flutes	Stock	type
VFMHVRBCHD1600R100	16	1	35	90	16	4	●	1
VFMHVRBCHD1600R300	16	3	35	90	16	4	●	1
VFMHVRBCHD2000R100	20	1	45	110	20	4	●	1
VFMHVRBCHD2000R300	20	3	45	110	20	4	●	1

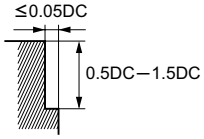
VFMHVRBCH

RECOMMENDED CUTTING CONDITIONS

·Side milling

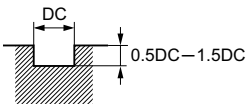
Work material	Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V		Heat resistant alloys Inconel718	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
16	2000	560	800	110
20	1600	510	600	100





·Slotting

Work material	Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)
16	1400	170
20	1100	130



- If the depth of cut is shallow, the revolution and feed rate can be increased.
- The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abnormal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.

VQMHVRB

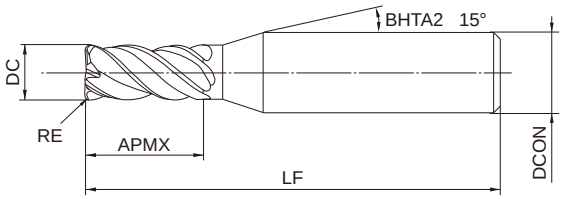
SMART MIRACLE END MILLS

Corner radius end mill, Medium cutting length, 4 flute, Irregular helix flutes

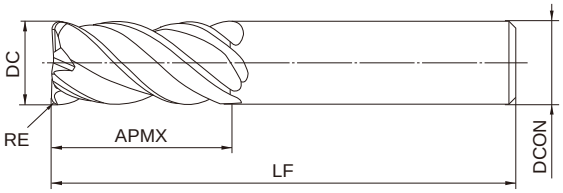
Product Information

Work Material

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668



Type1



Type2

R	0.2≦R E≦6.35			
	±0.015			
	DC≦12	DC>12		
	0 - 0.02	0 - 0.03		
h6	4≦DCO N≦6	8≦DCO N≦10	12≦DCO N≦16	DCON=20
	0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013

●Inventory maintained in Japan. Unit : mm

Order Number	DC	RE	APMX	LF	DCON	No. of Flutes	Stock	type
VQMHVRBD0200R020	2	0.2	4	45	4	4	●	1
VQMHVRBD0200R030	2	0.3	4	45	4	4	●	1
VQMHVRBD0300R020	3	0.2	8	45	6	4	●	1
VQMHVRBD0300R030	3	0.3	8	45	6	4	●	1
VQMHVRBD0300R050	3	0.5	8	45	6	4	●	1
VQMHVRBD0400R020	4	0.2	11	45	6	4	●	1
VQMHVRBD0400R030	4	0.3	11	45	6	4	●	1
VQMHVRBD0400R050	4	0.5	11	45	6	4	●	1
VQMHVRBD0500R020	5	0.2	13	50	6	4	●	1
VQMHVRBD0500R030	5	0.3	13	50	6	4	●	1
VQMHVRBD0500R050	5	0.5	13	50	6	4	●	1
VQMHVRBD0500R100	5	1	13	50	6	4	●	1
VQMHVRBD0600R030	6	0.3	13	50	6	4	●	2
VQMHVRBD0600R050	6	0.5	13	50	6	4	●	2
VQMHVRBD0600R100	6	1	13	50	6	4	●	2
VQMHVRBD0800R030	8	0.3	19	60	8	4	●	2
VQMHVRBD0800R050	8	0.5	19	60	8	4	●	2
VQMHVRBD0800R100	8	1	19	60	8	4	●	2
VQMHVRBD0800R150	8	1.5	19	60	8	4	●	2
VQMHVRBD1000R030	10	0.3	22	70	10	4	●	2
VQMHVRBD1000R050	10	0.5	22	70	10	4	●	2
VQMHVRBD1000R100	10	1	22	70	10	4	●	2
VQMHVRBD1000R150	10	1.5	22	70	10	4	●	2
VQMHVRBD1000R200	10	2	22	70	10	4	●	2

VQMHVRB

Order Number	DC	RE	APMX	LF	DCON	No. of Flutes	Stock	type
VQMHVRBD1200R050	12	0.5	26	75	12	4	●	2
VQMHVRBD1200R100	12	1	26	75	12	4	●	2
VQMHVRBD1200R150	12	1.5	26	75	12	4	●	2
VQMHVRBD1200R200	12	2	26	75	12	4	●	2
VQMHVRBD1200R250	12	2.5	26	75	12	4	●	2
VQMHVRBD1200R300	12	3	26	75	12	4	●	2
VQMHVRBD1600R100	16	1	35	90	16	4	●	2
VQMHVRBD1600R150	16	1.5	35	90	16	4	●	2
VQMHVRBD1600R200	16	2	35	90	16	4	●	2
VQMHVRBD1600R250	16	2.5	35	90	16	4	●	2
VQMHVRBD1600R300	16	3	35	90	16	4	●	2
VQMHVRBD1600R400	16	4	35	90	16	4	●	2
VQMHVRBD1600R500	16	5	35	90	16	4	●	2
VQMHVRBD2000R100	20	1	45	110	20	4	●	2
VQMHVRBD2000R150	20	1.5	45	110	20	4	●	2
VQMHVRBD2000R200	20	2	45	110	20	4	●	2
VQMHVRBD2000R250	20	2.5	45	110	20	4	●	2
VQMHVRBD2000R300	20	3	45	110	20	4	●	2
VQMHVRBD2000R400	20	4	45	110	20	4	●	2
VQMHVRBD2000R500	20	5	45	110	20	4	●	2
VQMHVRBD2000R635	20	6.35	45	110	20	4	●	2

VQMHVRB

RECOMMENDED CUTTING CONDITIONS

·Side milling

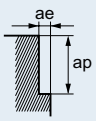
The rigidity of the machine or workpiece and chip discharge are sufficient at high efficiency conditions.

The rigidity of the machine or workpiece or chip discharge is insufficient at general-purpose conditions.

High efficiency conditions

Work material	Carbon steel, Alloy steel, Mild steel AISI 1045, AISI 4140, ASTM A36, AISI 1010					Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT					Austenitic stainless steel, Ferritic and Martensitic Stainless steels, Titanium alloys AISI 304, AISI 306, Ti-6Al-4V				
Dia. DC(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)
2	150	24000	2400	3	0.6	120	19000	1100	3	0.6	100	16000	830	3	0.6
3	150	16000	2600	4.5	0.9	120	13000	1200	4.5	0.9	100	11000	880	4.5	0.9
4	150	12000	2600	6	1.2	120	9500	1300	6	1.2	100	8000	900	6	1.2
5	150	9500	2600	7.5	1.5	120	7600	1300	7.5	1.5	100	6400	900	7.5	1.5
6	150	8000	2600	9	1.8	120	6400	1300	9	1.8	100	5300	1100	9	1.8
8	150	6000	2500	12	2.4	120	4800	1300	12	2.4	100	4000	1200	12	2.4
10	150	4800	2300	15	3	120	3800	1200	15	3	100	3200	1300	15	3
12	150	4000	1900	18	3.6	120	3200	1200	18	3.6	100	2700	1200	18	3.6
16	150	3000	1600	24	4.8	120	2400	960	24	4.8	100	2000	960	24	4.8
20	150	2400	1300	30	6	120	1900	760	30	6	100	1600	770	30	6
25	150	1900	1100	37.5	7.5	120	1500	600	37.5	7.5	100	1300	620	37.5	7.5

Work material	Precipitation hardening stainless steel, Cobalt chromium alloy AISI 630, AISI 631, 15-5PH,17-4PH					Copper, Copper alloys					Heat resistant alloys Inconel718				
Dia. DC(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)
2	75	12000	720	3	0.4	180	29000	2900	3	0.6	40	6400	230	3	0.2
3	75	8000	770	4.5	0.6	180	19000	3000	4.5	0.9	40	4200	240	4.5	0.3
4	75	6000	790	6	0.8	180	14000	3000	6	1.2	40	3200	240	6	0.4
5	75	4800	810	7.5	1	180	11000	3000	7.5	1.5	40	2500	240	7.5	0.5
6	75	4000	810	9	1.2	180	9500	3000	9	1.8	40	2100	250	9	0.6
8	75	3000	840	12	1.6	180	7200	3000	12	2.4	40	1600	260	12	0.8
10	75	2400	770	15	2	180	5700	2700	15	3	40	1300	290	15	1
12	75	2000	720	18	2.4	180	4800	2300	18	3.6	40	1100	280	18	1.2
16	75	1500	600	24	3.2	180	3600	1900	24	4.8	40	800	200	24	1.6
20	75	1200	480	30	4	180	2900	1600	30	6	40	640	160	30	2
25	75	950	380	37.5	5	180	2300	1300	37	7.5	40	510	130	37.5	2.5



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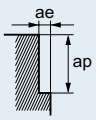
General purpose cutting conditions

Work material	Carbon steel, Alloy steel, Mild steel AISI 1045, AISI 4140, ASTM A36, AISI 1010					Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT					Austenitic stainless steel, Ferritic and Martensitic Stainless steels, Titanium alloys AISI 304, AISI 306, Ti-6Al-4V				
Dia. DC(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)
2	120	19000	1300	3	0.6	100	16000	630	3	0.6	80	13000	450	1.5	0.2
3	120	13000	1400	4.5	0.9	100	11000	700	4.5	0.9	80	8500	450	2.2	0.3
4	120	9500	1400	6	1.2	100	8000	700	6	1.2	80	6400	470	3	0.6
5	120	7600	1400	7.5	1.5	100	6400	710	7.5	1.5	80	5100	470	4.5	0.9
6	120	6400	1400	9	1.8	100	5300	710	9	1.8	80	4200	580	6	1.2
8	120	4800	1300	12	2.4	100	4000	740	12	2.4	80	3200	630	7.5	1.5
10	120	3800	1200	15	3	100	3200	680	15	3	80	2500	660	9	1.8
12	120	3200	1000	18	3.6	100	2700	640	18	3.6	80	2100	610	12	2.4
16	120	2400	860	24	4.8	100	2000	530	24	4.8	80	1600	510	15	3
20	120	1900	680	30	6	100	1600	420	30	6	80	1300	410	18	3.6
25	120	1500	390	37.5	7.5	100	1300	340	37.5	7.5	80	1000	210	24	4.8

Work material	Precipitation hardening stainless steel, Cobalt chromium alloy AISI 630, AISI 631, 15-5PH, 17-4PH					Copper, Copper alloys					Heat resistant alloys Inconel718				
Dia. DC(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)
2	70	11000	440	3	0.4	140	22000	1500	3	0.6	30	4800	110	3	0.2
3	70	7400	470	4.5	0.6	140	15000	1600	4.5	0.9	30	3200	120	4.5	0.3
4	70	5600	490	6	0.8	140	11000	1600	6	1.2	30	2400	120	6	0.4
5	70	4500	500	7.5	1	140	8900	1600	7.5	1.5	30	1900	120	7.5	0.5
6	70	3700	500	9	1.2	140	7400	1600	9	1.8	30	1600	130	9	0.6
8	70	2800	520	12	1.6	140	5600	1600	12	2.4	30	1200	130	12	0.8
10	70	2200	460	15	2	140	4500	1400	15	3	30	950	140	15	1
12	70	1900	450	18	2.4	140	3700	1200	18	3.6	30	800	140	18	1.2
16	70	1400	370	24	3.2	140	2800	1000	24	4.8	30	600	100	24	1.6
20	70	1100	290	30	4	140	2200	780	30	6	30	480	81	30	2
25	70	890	230	37.5	5	140	1800	670	37.5	7.5	30	380	64	37.5	2.5



- SMART MIRACLE Coating is not energized because of its nature. Therefore, an external contact (voltaic type) tool setter cannot be used. An internal contact (non-voltaic) type or laser type tool setter is recommended to measure the length of the tool.
- For stainless steel, titanium alloy and heat resistant alloy, the use of water-soluble coolant is effective.
- The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abnormal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.
- If the depth of cut is shallow, the revolution and feed rate can be increased.

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·Slotting

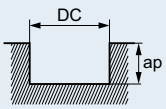
The rigidity of the machine or workpiece and chip discharge are sufficient at high efficiency conditions.

The rigidity of the machine or workpiece or chip discharge is insufficient at general-purpose conditions.

High efficiency conditions

Work material	Carbon steel, Alloy steel, Mild steel AISI 1045, AISI 4140, ASTM A36, AISI 1010				Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT				Austenitic stainless steel, Ferritic and Martensitic Stainless steels, Titanium alloys AISI 304, AISI 316, Ti-6Al-4V			
Dia. DC(mm)	Cutting speed (m/min)	Revolution (min⁻¹)	Feed rate (mm/min)	Depth of cut ap(mm)	Cutting speed (m/min)	Revolution (min⁻¹)	Feed rate (mm/min)	Depth of cut ap(mm)	Cutting speed (m/min)	Revolution (min⁻¹)	Feed rate (mm/min)	Depth of cut ap(mm)
2	150	24000	1200	2	120	19000	610	2	100	16000	640	2
3	150	16000	1500	3	120	13000	730	3	100	11000	660	3
4	150	12000	1900	4	120	9500	910	4	100	8000	700	4
5	150	9500	1900	5	120	7600	910	5	100	6400	720	5
6	150	8000	1900	6	120	6400	1000	6	100	5300	740	6
8	150	6000	1700	8	120	4800	960	8	100	4000	800	8
10	150	4800	1500	10	120	3800	840	10	100	3200	900	10
12	150	4000	1300	12	120	3200	770	12	100	2700	860	12
16	150	3000	1100	12	120	2400	670	12	100	2000	640	12
20	150	2400	860	12	120	1900	530	12	100	1600	510	12
25	150	1900	760	12	120	1500	420	12	100	1300	420	12

Work material	Precipitation hardening stainless steel, Cobalt chromium alloy AISI 630, AISI 631, 15-5PH, 17-4PH				Copper, Copper alloys				Heat resistant alloys Inconel718			
Dia. DC(mm)	Cutting speed (m/min)	Revolution (min⁻¹)	Feed rate (mm/min)	Depth of cut ap(mm)	Cutting speed (m/min)	Revolution (min⁻¹)	Feed rate (mm/min)	Depth of cut ap(mm)	Cutting speed (m/min)	Revolution (min⁻¹)	Feed rate (mm/min)	Depth of cut ap(mm)
2	60	9500	300	1	180	29000	1500	2	30	4800	130	0.6
3	60	6400	360	1.5	180	19000	1700	3	30	3200	150	0.9
4	60	4800	460	2	180	14000	2200	4	30	2400	170	1.2
5	60	3800	460	2.5	180	11000	2200	5	30	1900	170	1.5
6	60	3200	510	3	180	9500	2300	6	30	1600	180	1.8
8	60	2400	480	4	180	7200	2000	8	30	1200	190	2.4
10	60	1900	420	5	180	5700	1800	10	30	950	210	3
12	60	1600	380	6	180	4800	1500	12	30	800	200	3.6
16	60	1200	340	8	180	3600	1300	12	30	600	150	4.8
20	60	950	270	10	180	2900	1000	12	30	480	120	6
25	60	760	210	12	180	2300	920	12	30	380	100	7.5



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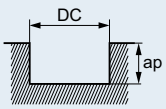
General purpose cutting conditions

Work material	Carbon steel, Alloy steel, Mild steel AISI 1045, AISI 4140, ASTM A36, AISI 1010				Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT				Austenitic stainless steel, Ferritic and Martensitic Stainless steels, Titanium alloys AISI 304, AISI 316, Ti-6Al-4V			
Dia. DC(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)
2	100	16000	550	2	80	13000	270	2	60	9500	250	2
3	100	11000	670	3	80	8500	310	3	60	6400	250	3
4	100	8000	840	4	80	6400	410	4	60	4800	280	4
5	100	6400	840	5	80	5100	410	5	60	3800	280	5
6	100	5300	840	6	80	4200	440	6	60	3200	300	6
8	100	4000	740	8	80	3200	420	8	60	2400	320	8
10	100	3200	680	10	80	2500	360	10	60	1900	350	10
12	100	2700	570	12	80	2100	330	12	60	1600	340	12
16	100	2000	480	12	80	1600	300	12	60	1200	250	12
20	100	1600	380	12	80	1300	240	12	60	950	200	12
25	100	1300	340	12	80	1000	180	12	60	760	160	12

Work material	Precipitation hardening stainless steel, Cobalt chromium alloy AISI 630, AISI 631, 15-5PH, 17-4PH				Copper, Copper alloys				Heat resistant alloys Inconel718			
Dia. DC(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)
2	50	8000	170	1	120	19000	650	2	25	4000	74	0.6
3	50	5300	200	1.5	120	13000	790	3	25	2700	86	0.9
4	50	4000	250	2	120	9500	1000	4	25	2000	93	1.2
5	50	3200	250	2.5	120	7600	1000	5	25	1600	95	1.5
6	50	2700	290	3	120	6400	1000	6	25	1300	96	1.8
8	50	2000	260	4	120	4800	890	8	25	990	100	2.4
10	50	1600	230	5	120	3800	800	10	25	800	120	3
12	50	1300	210	6	120	3200	680	12	25	660	110	3.6
16	50	990	180	8	120	2400	570	12	25	500	84	4.8
20	50	800	150	10	120	1900	450	12	25	400	68	6
25	50	640	120	12	120	1500	400	12	25	320	50	7.5



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- For stainless steel, titanium alloy and heat resistant alloy, the use of water-soluble coolant is effective.
- The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abnormal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.
- If the depth of cut is shallow, the revolution and feed rate can be increased.

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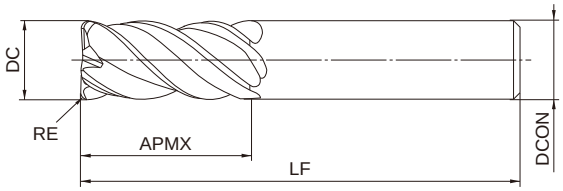
SMART MIRACLE END MILLS

Corner radius end mill, Medium cut length, 4 flute, Irregular helix flutes (for finishing)

Product Information

Work Material

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668



Type1

R	0.3≦RE≦3		
	±0.015		
	DC≦12	DC>12	
	0 - 0.02	0 - 0.03	
h6	DCON=6	8≦DCON≦10	12≦DCON≦16
	0 - 0.008	0 - 0.009	0 - 0.011

●Inventory maintained in Japan. Unit : mm

Order Number	DC	RE	APMX	LF	DCON	No. of Flutes	Stock	type
VQMHVRBFD0600R030	6	0.3	13	50	6	4	●	1
VQMHVRBFD0600R050	6	0.5	13	50	6	4	●	1
VQMHVRBFD0600R100	6	1	13	50	6	4	●	1
VQMHVRBFD0800R050	8	0.5	19	60	8	4	●	1
VQMHVRBFD0800R100	8	1	19	60	8	4	●	1
VQMHVRBFD1000R030	10	0.3	22	70	10	4	●	1
VQMHVRBFD1000R050	10	0.5	22	70	10	4	●	1
VQMHVRBFD1000R100	10	1	22	70	10	4	●	1
VQMHVRBFD1000R200	10	2	22	70	10	4	●	1
VQMHVRBFD1200R100	12	1	26	75	12	4	●	1
VQMHVRBFD1200R200	12	2	26	75	12	4	●	1
VQMHVRBFD1200R300	12	3	26	75	12	4	●	1
VQMHVRBFD1600R100	16	1	35	90	16	4	●	1
VQMHVRBFD1600R200	16	2	35	90	16	4	●	1

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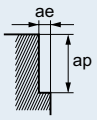
RECOMMENDED CUTTING CONDITIONS

·Side milling

Work material	Carbon steel, Alloy steel, Mild steel AISI 1045, AISI 4140, ASTM A36, AISI 1010					Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT					Precipitation hardening stainless steel, Cobalt chromium alloy AISI 630, AISI 631, 15-5PH, 17-4PH				
Dia. DC(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)
6	150	8000	2600	9	0.3	120	6400	1300	9	0.3	75	4000	800	9	0.3
8	150	6000	2500	12	0.4	120	4800	1300	12	0.4	75	3000	840	12	0.4
10	150	4800	2300	15	0.5	120	3800	1200	15	0.5	75	2400	770	15	0.5
12	150	4000	1900	18	0.6	120	3200	1200	18	0.6	75	2000	720	18	0.6
16	150	3000	1600	24	0.8	120	2400	960	24	0.8	75	1500	600	24	0.8

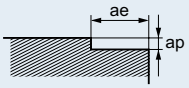
Work material	Copper, Copper alloys					Heat resistant alloys Inconel718				
Dia. DC(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)
6	180	9500	3000	9	0.3	40	2100	250	9	0.18
8	180	7200	3000	12	0.4	40	1600	260	12	0.24
10	180	5700	2700	15	0.5	41	1300	290	15	0.3
12	180	4800	2300	18	0.6	41	1100	280	18	0.36
16	180	3600	1900	24	0.8	40	800	200	24	0.48



·Bottom face milling

Work material	Carbon steel, Alloy steel, Mild steel AISI 1045, AISI 4140, ASTM A36, AISI 1010					Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT					Precipitation hardening stainless steel, Cobalt chromium alloy AISI 630, AISI 631, 15-5PH, 17-4PH				
Dia. DC(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)
6	110	5800	1400	0.3	4.8	90	4800	770	0.3	4.8	55	2900	460	0.3	4.8
8	110	4400	1200	0.4	6.4	90	3600	720	0.4	6.4	55	2200	440	0.4	6.4
10	110	3500	1100	0.5	8	90	2900	640	0.5	8	55	1800	400	0.5	8
12	110	2900	930	0.6	9.6	90	2400	580	0.6	9.6	55	1500	360	0.6	9.6
16	110	2200	790	0.8	12.8	90	1800	500	0.8	12.8	55	1100	310	0.8	12.8

Work material	Copper, Copper alloys					Heat resistant alloys Inconel718				
Dia. DC(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)
6	130	6900	1700	0.3	4.8	30	1600	180	0.18	4.8
8	130	5200	1500	0.4	6.4	30	1200	190	0.24	6.4
10	130	4100	1300	0.5	8	30	950	210	0.3	8
12	130	3400	1100	0.6	9.6	30	800	200	0.36	9.6
16	130	2600	940	0.8	12.8	30	600	150	0.48	12.8



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- For stainless steel, titanium alloy and heat resistant alloy, the use of water-soluble coolant is effective.
- The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abnormal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.
- If the depth of cut is shallow, the revolution and feed rate can be increased.

VC4SRB

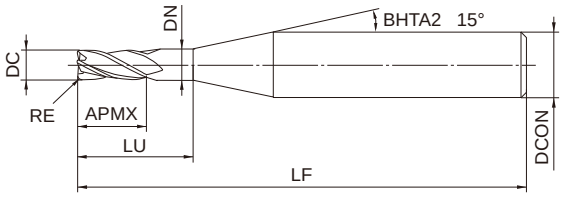
MIRACLE END MILLS

Corner radius end mill, Short cut length, 4 flute

Product Information

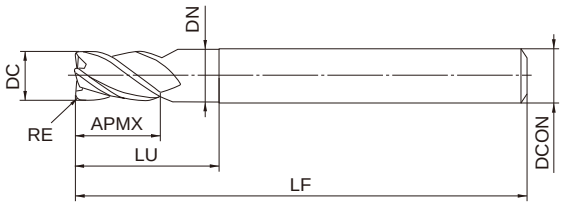
Work Material

Technical Info >> 1993
ISO13399 Property >> 1966
SYMBOL DESCRIPTIONS >> 664
END MILLS SELECTION CHART >> 668



Type1

4≦DC≦12		
0 - 0.020		
DCON=6	8≦DCON≦10	DCON=12
0 - 0.008	0 - 0.009	0 - 0.011



Type2

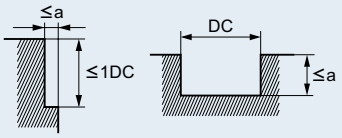
●Inventory maintained in Japan. Unit : mm

Order Number	DC	RE	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	type
VC4SRBD0400R0050	4	0.5	4	12	3.8	45	6	4	●	1
VC4SRBD0600R0050	6	0.5	6	18	5.8	50	6	4	●	2
VC4SRBD0600R0100	6	1	6	18	5.8	50	6	4	●	2
VC4SRBD0800R0050	8	0.5	8	24	7.8	60	8	4	●	2
VC4SRBD0800R0100	8	1	8	24	7.8	60	8	4	●	2
VC4SRBD1000R0100	10	1	10	30	9.7	70	10	4	●	2
VC4SRBD1000R0200	10	2	10	30	9.7	70	10	4	●	2
VC4SRBD1200R0100	12	1	12	36	11.7	75	12	4	●	2
VC4SRBD1200R0200	12	2	12	36	11.7	75	12	4	●	2

VC4SRB

RECOMMENDED CUTTING CONDITIONS

Work material	Carbon steel, Cast iron, Alloy steel, Pre-hardened steel AISI 1050, AISI No 35 B, AISI P20, AISI P21			Hardened steel (45— 55HRC) AISI H13		
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut a(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut a(mm)
2	30000	4500	0.18	24000	3600	0.10
2.5	24000	3900	0.25	19000	3000	0.13
3	20000	3500	0.30	16000	2700	0.15
4	15000	3000	0.40	12000	2400	0.20
5	12000	2400	0.50	9000	1800	0.25
6	10000	2100	0.60	7000	1470	0.30
8	8000	1500	0.80	5600	1050	0.40
10	6400	1400	1.00	4500	950	0.50
12	5400	1200	1.00	3800	860	0.50
16	2400	550	2.00	1200	120	0.80
20	1900	480	3.00	1000	100	1.00



- If the depth of cut is shallow, the revolution and feed rate can be increased.
- In case of slotting with over 3 mm endmill, please reduce revolution to 50—70% of above value, and reduce feed rate to 40—60% of above value.
- When drilling, please set the feed rate at 1/3 or below of the values above.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

VC4JRB

MIRACLE END MILLS

Corner radius end mill, Semi long cut length, 4 flute

Product Information

UWC 30° VC

Work Material

P M S H F M

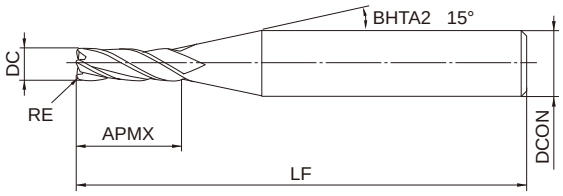
Technical Info >> 1993

ISO13399 Property >> 1966

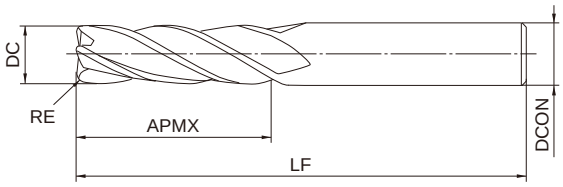
SYMBOL DESCRIPTIONS >> 664

END MILLS SELECTION CHART >> 668

	DC≦12	DC>12		
	0 - 0.020	0 - 0.030		
h6	DCON=6	8≦DCON≦10	12≦DCON≦16	DCON=20
	0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013



Type1



Type2

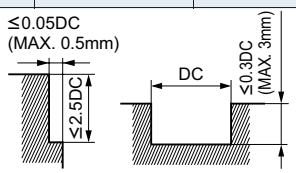
●Inventory maintained in Japan. Unit : mm

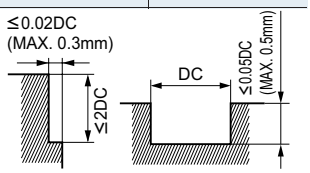
Order Number	DC	RE	APMX	LF	DCON	No. of Flutes	Stock	type
VC4JRBD0300R0030	3	0.3	12	50	6	4	●	1
VC4JRBD0400R0030	4	0.3	15	50	6	4	●	1
VC4JRBD0400R0050	4	0.5	15	50	6	4	●	1
VC4JRBD0500R0030	5	0.3	20	60	6	4	●	1
VC4JRBD0500R0050	5	0.5	20	60	6	4	●	1
VC4JRBD0600R0030	6	0.3	20	60	6	4	●	2
VC4JRBD0600R0050	6	0.5	20	60	6	4	●	2
VC4JRBD0600R0100	6	1	20	60	6	4	●	2
VC4JRBD0800R0030	8	0.3	25	70	8	4	●	2
VC4JRBD0800R0050	8	0.5	25	70	8	4	●	2
VC4JRBD0800R0100	8	1	25	70	8	4	●	2
VC4JRBD0800R0150	8	1.5	25	70	8	4	●	2
VC4JRBD0800R0200	8	2	25	70	8	4	●	2
VC4JRBD1000R0030	10	0.3	30	90	10	4	●	2
VC4JRBD1000R0050	10	0.5	30	90	10	4	●	2
VC4JRBD1000R0100	10	1	30	90	10	4	●	2
VC4JRBD1000R0150	10	1.5	30	90	10	4	●	2
VC4JRBD1000R0200	10	2	30	90	10	4	●	2
VC4JRBD1200R0050	12	0.5	30	90	12	4	●	2
VC4JRBD1200R0100	12	1	30	90	12	4	●	2
VC4JRBD1200R0150	12	1.5	30	90	12	4	●	2
VC4JRBD1200R0200	12	2	30	90	12	4	●	2
VC4JRBD1600R0050	16	0.5	50	110	16	4	●	2
VC4JRBD1600R0100	16	1	50	110	16	4	●	2
VC4JRBD1600R0150	16	1.5	50	110	16	4	●	2
VC4JRBD1600R0200	16	2	50	110	16	4	●	2
VC4JRBD2000R0050	20	0.5	55	110	20	4	●	2
VC4JRBD2000R0100	20	1	55	110	20	4	●	2
VC4JRBD2000R0150	20	1.5	55	110	20	4	●	2
VC4JRBD2000R0200	20	2	55	110	20	4	●	2

VC4JRB

RECOMMENDED CUTTING CONDITIONS

Work material	Carbon steel, Cast iron, Alloy steel (—30HRC) AISI 1050, AISI No 35 B, AISI P20		Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V		Hardened steel (45— 55HRC) AISI H13	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
3	4200	110	3400	95	2600	70	2100	50
4	3400	140	2700	110	2100	85	1700	60
5	2900	170	2300	140	1800	100	1500	70
6	2500	200	2000	170	1500	130	1300	85
8	1900	220	1500	170	1200	150	1000	85
10	1600	220	1300	170	950	130	800	85
12	1300	170	1100	150	800	100	670	70
16	1000	140	820	110	600	80	500	50
20	800	110	650	85	480	70	400	40
25	650	85	520	70	380	50	320	35





- When cutting austenitic stainless steel, the use of water-soluble cutting fluid is effective.
- If the depth of cut is shallow, the revolution and feed rate can be increased.
- The above table shows cutting conditions for standard side milling. For slotting, please reduce the feed rate only to 50% of the table figure. Please set the revolution rate at 60% and the feed rate at 40% when slotting austenitic stainless steels.
- When drilling, please set the feed rate at 1/3 or below of the values above.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

VCHFRB

MIRACLE END MILLS

Corner radius, Short flute length, 4 flute, High feed machining

Product Information

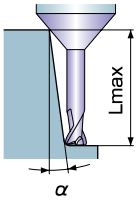
UWC 10° 20° VC

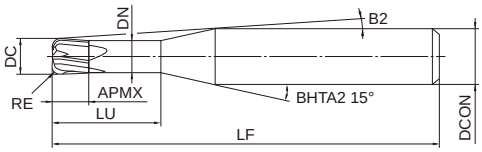
DC≧6 DC≦5

Work Material

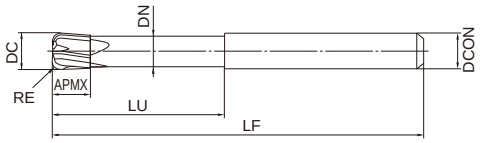
P S H F M

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668

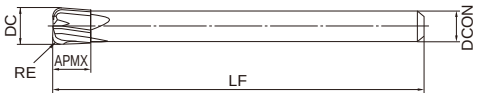




Type1



Type2



Type3

R	0.5≦RE≦3		
	±0.015		
	DC≦12	DC>12	
	0 - 0.02	0 - 0.03	
h6	DCON=6	8≦DCON≦10	12≦DCON≦16
	0 - 0.008	0 - 0.009	0 - 0.011

- α: Inclined angle Lmax: Effective length
- Lmax indicates "0: Not available, blank: No interference".

●Inventory maintained in Japan. Unit : mm

Order Number	DC	RE	APMX	LU	DN	B2	LF	DCON	No. of Flutes	Stock	type	Effective length for inclined angle			
												0.5°	1°	2°	3°
VCHFRBD0200R050N06	2	0.5	2	6	1.9	8.7°	50	6	4	●	1	6.2	6.5	6.9	7.5
VCHFRBD0200R050N10	2	0.5	2	10	1.9	6.7°	70	6	4	●	1	10.4	10.8	11.5	12.4
VCHFRBD0300R075N09	3	0.75	3	9	2.9	6.2°	50	6	4	●	1	9.4	9.7	10.4	11.1
VCHFRBD0300R075N15	3	0.75	3	15	2.9	4.3°	70	6	4	●	1	15.6	16.1	17.3	18.6
VCHFRBD0400R100N12	4	1	4	12	3.9	3.9°	50	6	4	●	1	12.4	12.8	13.7	14.7
VCHFRBD0400R100N20	4	1	4	20	3.9	2.6°	70	6	4	●	1	20.7	21.4	22.9	
VCHFRBD0500R120N15	5	1.2	5	15	4.9	1.9°	70	6	4	●	1	15.5	16		
VCHFRBD0600R150N18	6	1.5	6	18	5.85		50	6	4	●	2				
VCHFRBD0600R150N30	6	1.5	6	30	5.85		90	6	4	●	2				
VCHFRBD0700R150A050	7	1.5	7				50	6	4	●	3				
VCHFRBD0700R150A080	7	1.5	7				80	6	4	●	3				
VCHFRBD0800R200N24	8	2	8	24	7.85		60	8	4	●	2				
VCHFRBD0800R200N40	8	2	8	40	7.85		90	8	4	●	2				
VCHFRBD0900R200A065	9	2	9				65	8	4	●	3				
VCHFRBD0900R200A100	9	2	9				100	8	4	●	3				
VCHFRBD1000R200N30	10	2	10	30	9.7		70	10	4	●	2				
VCHFRBD1000R200N50	10	2	10	50	9.7		100	10	4	●	2				
VCHFRBD1100R200A070	11	2	11				70	10	4	●	3				

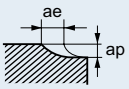
VCHFRB

Order Number	DC	RE	APMX	LU	DN	B2	LF	DCON	No. of Flutes	Stock	type	Effective length for inclined angle			
												0.5°	1°	2°	3°
VCHFRBD1100R200A110	11	2	11				110	10	4	●	3				
VCHFRBD1200R300N36	12	3	12	36	11.7		75	12	4	●	2				
VCHFRBD1200R300N60	12	3	12	60	11.7		110	12	4	●	2				
VCHFRBD1300R300A075	13	3	13				75	12	4	●	3				
VCHFRBD1300R300A120	13	3	13				120	12	4	●	3				
VCHFRBD1600R300N80	16	3	16	80	15.5		140	16	4	●	2				

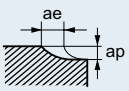
VCHFRB

RECOMMENDED CUTTING CONDITIONS

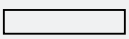
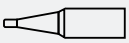
Work material		Carbon steel, Cast iron, Alloy steel (—30HRC) AISI 1050, AISI No 35 B, AISI P20				Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21			
Dia. DC(mm)	Corner R RE (mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)
2	R0.5	33000	10000	0.08	0.8	27000	8400	0.05	0.8
3	R0.75	22000	11000	0.12	1.2	18000	9000	0.08	1.2
4	R1	17000	12000	0.15	1.5	14000	9500	0.12	1.5
5	R1.2	13000	13000	0.20	2.0	11000	11000	0.15	2.0
6	R1.5	11000	13000	0.25	2.5	9000	11000	0.15	2.5
7	R1.5	9400	13000	0.25	3.0	7800	11000	0.15	3.0
8	R2	8200	13000	0.30	3.0	7000	11000	0.20	3.0
9	R2	7300	13000	0.30	4.0	6000	11000	0.20	4.0
10	R2	6500	13000	0.30	4.5	5500	11000	0.20	4.5
11	R2	6000	12000	0.30	5.5	5000	10000	0.20	5.5
12	R3	5500	12000	0.45	4.5	4600	10000	0.30	4.5
13	R3	5000	12000	0.45	5.5	4200	10000	0.30	5.5
16	R3	4100	10000	0.45	7.5	3400	8800	0.30	7.5



Work material		Hardened steel (45— 55HRC) AISI H13				Hardened steel (55— 62HRC) AISI D2			
Dia. DC(mm)	Corner R RE (mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)
2	R0.5	24000	7500	0.04	0.8	16000	3000	0.03	0.8
3	R0.75	16000	8500	0.06	1.2	11000	3300	0.05	1.2
4	R1	12000	8800	0.08	1.5	8000	3500	0.07	1.5
5	R1.2	9600	9500	0.10	2.0	6400	3800	0.08	2.0
6	R1.5	8000	9600	0.10	2.5	5300	3800	0.10	2.5
7	R1.5	6900	9600	0.10	3.0	4600	3800	0.10	3.0
8	R2	6000	9600	0.15	3.0	4000	3800	0.13	3.0
9	R2	5300	9500	0.15	4.0	3800	3800	0.13	4.0
10	R2	4800	9500	0.15	4.5	3200	3800	0.13	4.5
11	R2	4500	9000	0.15	5.5	2900	3500	0.13	5.5
12	R3	4100	9000	0.25	4.5	2700	3500	0.20	4.5
13	R3	3700	8900	0.25	5.5	2500	3500	0.20	5.5
16	R3	3000	7800	0.25	7.5	2000	3200	0.20	7.5



·Coefficients respective of tool overhang

type	overhang	Revolution	Feed rate	Depth of cut ap
	L/D≦5	100%	100%	100%
	L/D=6	90%	80%	80%
	L/D=7	80%	70%	70%
	L/D=6	100%	100%	100%
	L/D=8	90%	80%	80%
	L/D≧10	80%	70%	70%

VCHFRB

- The cutting conditions above are a guide only to machining with cutting edges with a corner radius.
- This table shows the cutting conditions with less than 5DC overhang length. In the case of longer overhangs, the revolution and the feed rate should be reduced proportionately.
- If the depth of cut is shallow, the revolution and feed rate can be increased.
- Air blow or oil mist is recommended for good chip evacuation.
- For profile machining such as moulds, machining conditions may differ considerably depending on the workpiece geometry, machining methods and depth of cut. Reduce the feed rate especially when machining the corner sections of a workpiece.
- When machining inclinations in the Z direction, set the inclination angle at 2° and reduce the feed rate by 50%.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

VCHFRB

MIRACLE END MILLS

Corner radius, Short flute length, 4 flute, High feed machining

Product Information

UWC 10° 20° VC

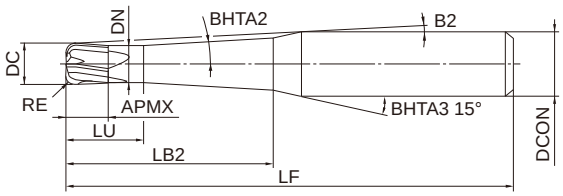
DC≧6 DC≦5

Work Material

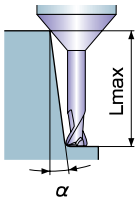
P S H F M

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668

Taper neck type



R	0.5≦RE≦3		
	±0.015		
	DC≦12	DC>12	
	0 - 0.02	0 - 0.03	
h6	DCON=6	8≦DCON≦10	12≦DCON≦16
	0 - 0.008	0 - 0.009	0 - 0.011



- α: Inclined angle Lmax: Effective length
- Lmax indicates "0: Not available, blank: No interference".

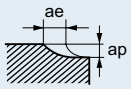
●Inventory maintained in Japan. Unit : mm

Order Number	DC	RE	BHTA2	APMX	LB2	LU	DN	B2	LF	DCON	No. of Flutes	Stock	type	Effective length for inclined angle		
														1°	2°	3°
VCHFRBD0200R050N12	2	0.5	1°	2	12	4	1.9	6°	70	6	4	●	1	12.9	13.9	15
VCHFRBD0200R050N16	2	0.5	1°	2	16	4	1.9	5°	70	6	4	●	1	16.9	18.2	19.6
VCHFRBD0200R050N20	2	0.5	1°	2	20	4	1.9	4.3°	70	6	4	●	1	20.9	22.5	24.3
VCHFRBD0300R075N18	3	0.75	1°	3	18	6	2.9	3.8°	80	6	4	●	1	19.3	20.7	22.3
VCHFRBD0300R075N24	3	0.75	1°	3	24	6	2.9	3°	80	6	4	●	1	25.3	27.2	
VCHFRBD0300R075N30	3	0.75	1°	3	30	6	2.9	2.6°	80	6	4	●	1	31.3	33.6	
VCHFRBD0400R100N24	4	1	1°	4	24	8	3.9	2.2°	90	6	4	●	1	25.7	27.6	
VCHFRBD0400R100N32	4	1	1°	4	32	8	3.9	1.7°	90	6	4	●	1	33.7		
VCHFRBD0400R100N40	4	1	1°	4	40	8	3.9	1.4°	90	6	4	●	1	41.7		
VCHFRBD0500R120N30	5	1.2	1°	5	30	8	4.9	1°	90	6	4	●	1			
VCHFRBD0500R120N40	5	1.2	1°	5	40	8	4.9	2°	90	8	4	●	1	41.9		
VCHFRBD0500R120N50	5	1.2	1°	5	50	8	4.9	1.7°	110	8	4	●	1	51.9		
VCHFRBD0600R150N50	6	1.5	1°	6	50	16	5.85	1.2°	110	8	4	●	1	52.9		
VCHFRBD0600R150N67	6	1.5	1°	6	67	16	5.85	0.9°	130	8	4	●	1			
VCHFRBD0800R200N70	8	2	1°	8	70	18	7.85	0.9°	120	10	4	●	1			
VCHFRBD0800R200N90	8	2	1°	8	90	18	7.85	1.3°	150	12	4	●	1	93.5		
VCHFRBD1000R200N110	10	2	1°	10	110	20	9.7	1.5°	160	16	4	●	1	113.9		
VCHFRBD1000R200N80	10	2	1°	10	80	20	9.7	2°	140	16	4	●	1	83.9		
VCHFRBD1200R300N110	12	3	1°	12	110	24	11.7	1.1°	160	16	4	●	1	115.2		

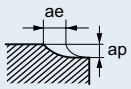
VCHFRB

RECOMMENDED CUTTING CONDITIONS

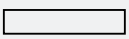
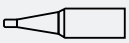
Work material		Carbon steel, Cast iron, Alloy steel (—30HRC) AISI 1050, AISI No 35 B, AISI P20				Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21			
Dia. DC(mm)	Corner R RE (mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)
2	R0.5	33000	10000	0.08	0.8	27000	8400	0.05	0.8
3	R0.75	22000	11000	0.12	1.2	18000	9000	0.08	1.2
4	R1	17000	12000	0.15	1.5	14000	9500	0.12	1.5
5	R1.2	13000	13000	0.20	2.0	11000	11000	0.15	2.0
6	R1.5	11000	13000	0.25	2.5	9000	11000	0.15	2.5
7	R1.5	9400	13000	0.25	3.0	7800	11000	0.15	3.0
8	R2	8200	13000	0.30	3.0	7000	11000	0.20	3.0
9	R2	7300	13000	0.30	4.0	6000	11000	0.20	4.0
10	R2	6500	13000	0.30	4.5	5500	11000	0.20	4.5
11	R2	6000	12000	0.30	5.5	5000	10000	0.20	5.5
12	R3	5500	12000	0.45	4.5	4600	10000	0.30	4.5
13	R3	5000	12000	0.45	5.5	4200	10000	0.30	5.5
16	R3	4100	10000	0.45	7.5	3400	8800	0.30	7.5



Work material		Hardened steel (45— 55HRC) AISI H13				Hardened steel (55— 62HRC) AISI D2			
Dia. DC(mm)	Corner R RE (mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)
2	R0.5	24000	7500	0.04	0.8	16000	3000	0.03	0.8
3	R0.75	16000	8500	0.06	1.2	11000	3300	0.05	1.2
4	R1	12000	8800	0.08	1.5	8000	3500	0.07	1.5
5	R1.2	9600	9500	0.10	2.0	6400	3800	0.08	2.0
6	R1.5	8000	9600	0.10	2.5	5300	3800	0.10	2.5
7	R1.5	6900	9600	0.10	3.0	4600	3800	0.10	3.0
8	R2	6000	9600	0.15	3.0	4000	3800	0.13	3.0
9	R2	5300	9500	0.15	4.0	3800	3800	0.13	4.0
10	R2	4800	9500	0.15	4.5	3200	3800	0.13	4.5
11	R2	4500	9000	0.15	5.5	2900	3500	0.13	5.5
12	R3	4100	9000	0.25	4.5	2700	3500	0.20	4.5
13	R3	3700	8900	0.25	5.5	2500	3500	0.20	5.5
16	R3	3000	7800	0.25	7.5	2000	3200	0.20	7.5



·Coefficients respective of tool overhang

type	overhang	Revolution	Feed rate	Depth of cut ap
	L/D≦5	100%	100%	100%
	L/D=6	90%	80%	80%
	L/D=7	80%	70%	70%
	L/D=6	100%	100%	100%
	L/D=8	90%	80%	80%
	L/D≧10	80%	70%	70%

VCHFRB

- The cutting conditions above are a guide only to machining with cutting edges with a corner radius.
- This table shows the cutting conditions with less than 5D overhang length. In the case of longer overhangs, the revolution and the feed rate should be reduced proportionately.
- If the depth of cut is shallow, the revolution and feed rate can be increased.
- Air blow or oil mist is recommended for good chip evacuation.
- For profile machining such as moulds, machining conditions may differ considerably depending on the workpiece geometry, machining methods and depth of cut. Reduce the feed rate especially when machining the corner sections of a workpiece.
- When machining inclinations in the Z direction, set the inclination angle at 2° and reduce the feed rate by 50%.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

VCMHDRB

MIRACLE END MILLS

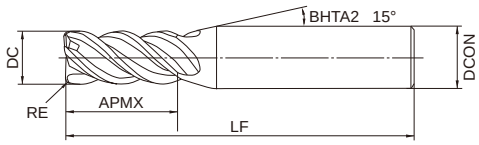
Corner radius end mill, Medium cut length, 4 flute, High helix angle

Product Information

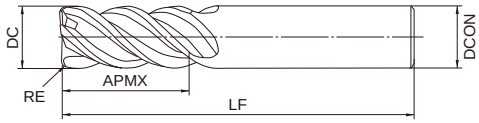
Work Material

P M S H F M

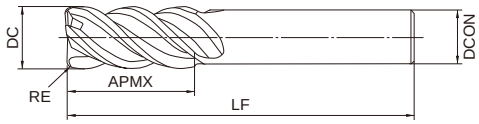
Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668



Type1



Type2



Type3

0.2≦RE≦6.35			
±0.020			
DC≦12	DC>12		
0 - 0.020	0 - 0.030		
4≦DCON≦6	8≦DCON≦10	12≦DCON≦16	20≦DCON≦25
0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013

●Inventory maintained in Japan. Unit : mm

Order Number	DC	RE	APMX	LF	DCON	No. of Flutes	Stock	type
VCMHDRBD0200R020S04	2	0.2	6	40	4	4	●	1
VCMHDRBD0200R030S04	2	0.3	6	40	4	4	●	1
VCMHDRBD0300R020S06	3	0.2	8	50	6	4	●	1
VCMHDRBD0300R030S06	3	0.3	8	50	6	4	●	1
VCMHDRBD0300R050S06	3	0.5	8	50	6	4	●	1
VCMHDRBD0400R020S06	4	0.2	11	50	6	4	●	1
VCMHDRBD0400R030S06	4	0.3	11	50	6	4	●	1
VCMHDRBD0400R050S06	4	0.5	11	50	6	4	●	1
VCMHDRBD0500R020S06	5	0.2	13	60	6	4	●	1
VCMHDRBD0500R030S06	5	0.3	13	60	6	4	●	1
VCMHDRBD0500R050S06	5	0.5	13	60	6	4	●	1
VCMHDRBD0500R100S06	5	1	13	60	6	4	●	1
VCMHDRBD0600R030S06	6	0.3	13	60	6	4	●	2
VCMHDRBD0600R050S06	6	0.5	13	60	6	4	●	2
VCMHDRBD0600R100S06	6	1	13	60	6	4	●	2
VCMHDRBD0800R030S08	8	0.3	19	70	8	4	●	2
VCMHDRBD0800R050S08	8	0.5	19	70	8	4	●	2
VCMHDRBD0800R100S08	8	1	19	70	8	4	●	2
VCMHDRBD0800R150S08	8	1.5	19	70	8	4	●	2
VCMHDRBD1000R030S08	10	0.3	22	90	8	4	●	3
VCMHDRBD1000R030S10	10	0.3	22	90	10	4	●	2
VCMHDRBD1000R050S08	10	0.5	22	90	8	4	●	3
VCMHDRBD1000R050S10	10	0.5	22	90	10	4	●	2

VCMHDRB

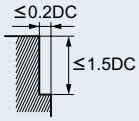
Order Number	DC	RE	APMX	LF	DCON	No. of Flutes	Stock	type
VCMHDRBD1000R100S08	10	1	22	90	8	4	●	3
VCMHDRBD1000R100S10	10	1	22	90	10	4	●	2
VCMHDRBD1000R150S08	10	1.5	22	90	8	4	●	3
VCMHDRBD1000R150S10	10	1.5	22	90	10	4	●	2
VCMHDRBD1000R200S08	10	2	22	90	8	4	●	3
VCMHDRBD1000R200S10	10	2	22	90	10	4	●	2
VCMHDRBD1200R050S10	12	0.5	26	90	10	4	●	3
VCMHDRBD1200R050S12	12	0.5	26	90	12	4	●	2
VCMHDRBD1200R100S10	12	1	26	90	10	4	●	3
VCMHDRBD1200R100S12	12	1	26	90	12	4	●	2
VCMHDRBD1200R150S10	12	1.5	26	90	10	4	●	3
VCMHDRBD1200R150S12	12	1.5	26	90	12	4	●	2
VCMHDRBD1200R200S10	12	2	26	90	10	4	●	3
VCMHDRBD1200R200S12	12	2	26	90	12	4	●	2
VCMHDRBD1200R300S10	12	3	26	90	10	4	●	3
VCMHDRBD1200R300S12	12	3	26	90	12	4	●	2
VCMHDRBD1600R100S16	16	1	32	110	16	4	●	2
VCMHDRBD1600R150S16	16	1.5	32	110	16	4	●	2
VCMHDRBD1600R200S16	16	2	32	110	16	4	●	2
VCMHDRBD1600R300S16	16	3	32	110	16	4	●	2
VCMHDRBD1800R100S16	18	1	32	110	16	4	●	3
VCMHDRBD1800R150S16	18	1.5	32	110	16	4	●	3
VCMHDRBD1800R200S16	18	2	32	110	16	4	●	3
VCMHDRBD1800R300S16	18	3	32	110	16	4	●	3
VCMHDRBD2000R100S20	20	1	38	110	20	4	●	2
VCMHDRBD2000R150S20	20	1.5	38	110	20	4	●	2
VCMHDRBD2000R200S20	20	2	38	110	20	4	●	2
VCMHDRBD2000R300S20	20	3	38	110	20	4	●	2
VCMHDRBD2200R100S20	22	1	38	140	20	4	●	3
VCMHDRBD2200R150S20	22	1.5	38	140	20	4	●	3
VCMHDRBD2200R200S20	22	2	38	140	20	4	●	3
VCMHDRBD2200R300S20	22	3	38	140	20	4	●	3
VCMHDRBD2500R100S25	25	1	45	140	25	4	●	2
VCMHDRBD2500R150S25	25	1.5	45	140	25	4	●	2
VCMHDRBD2500R200S25	25	2	45	140	25	4	●	2
VCMHDRBD2500R300S25	25	3	45	140	25	4	●	2

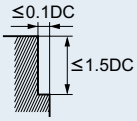
VCMHDRB

RECOMMENDED CUTTING CONDITIONS

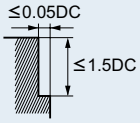
·Side milling

Work material	Carbon steel, Cast iron, Alloy steel (—30HRC) AISI 1050, AISI No 35 B, AISI P20		Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304, AISI 316, Ti-6Al-4V	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
2	15000	550	10000	340	10000	320
3	11000	800	7400	500	7400	480
4	8000	900	5600	540	5600	520
5	6400	1000	4500	600	4500	580
6	5900	1100	3700	640	3700	600
8	4400	1100	2800	660	2800	600
10	3500	1000	2300	640	2300	560
12	2900	1000	1900	640	1900	530
16	2200	800	1400	500	1400	450
20	1800	750	1100	460	1100	440
25	1400	600	900	400	900	380





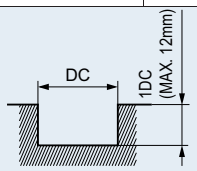
Work material	Hardened steel (45— 55HRC) AISI H13		Heat resistant alloys Inconel718	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
2	6400	160	4800	100
3	4800	250	4000	170
4	3600	270	3200	240
5	2900	300	2600	240
6	2400	320	2100	230
8	1800	330	1600	220
10	1400	320	1300	200
12	1200	320	1100	170
16	900	250	800	130
20	720	230	640	100
25	570	200	510	80

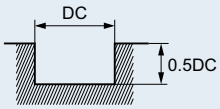


VCMHDRB

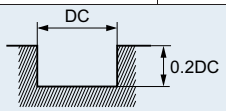
·Slotting

Work material	Carbon steel, Cast iron, Alloy steel (—30HRC) AISI 1050, AISI No 35 B, AISI P20		Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304, AISI 316, Ti-6Al-4V	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
2	12000	400	7000	200	7000	100
3	9000	600	5300	300	5300	150
4	7200	720	4000	360	4000	180
5	5800	720	3200	360	3200	180
6	5000	800	2700	400	2700	200
8	3700	800	2000	400	2000	200
10	3000	720	1600	360	1600	180
12	2500	720	1300	360	1300	180
16	2000	600	1000	280	1000	150
20	1600	540	800	250	800	130
25	1300	480	640	220	640	120





Work material	Hardened steel (45— 55HRC) AISI H13		Heat resistant alloys Inconel718	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
2	4200	80	2300	40
3	3200	130	1900	70
4	2400	140	1400	95
5	1900	150	1100	95
6	1600	160	950	95
8	1200	170	720	90
10	960	160	570	80
12	800	160	480	70
16	600	130	360	50
20	480	120	290	40
25	380	100	230	35



- When cutting austenitic stainless steel, the use of water-soluble cutting fluid is effective.
- If the depth of cut is shallow, the revolution and feed rate can be increased.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

DFPSRB

DF END MILLS

Corner radius end mill, Short cut length, 2-4 flute, High precision, For graphite

Product Information

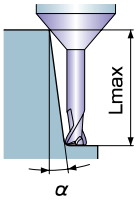
UWC 30° DF

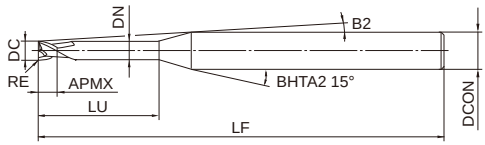
DC≦1.5 DC≧2

Work Material

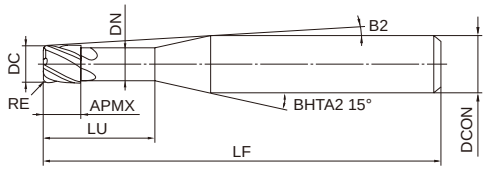
N F M

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668

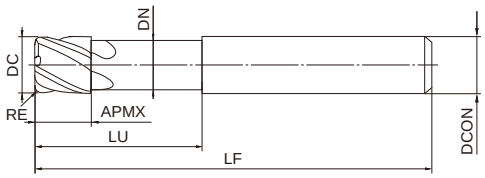




Type1



Type2



Type3

R	0.1≦RE≦1		
	±0.01		
	0.5≦DC≦12		
	0 - 0.02		
h6	4≦DCON≦6	8≦DCON≦10	DCON=12
	0 - 0.008	0 - 0.009	0 - 0.011

- α: Inclined angle Lmax: Effective length
- Lmax indicates "0: Not available, blank: No interference".

●Inventory maintained in Japan. Unit : mm

Order Number	DC	RE	APMX	LU	DN	B2	LF	DCON	No. of Flutes	Stock	type	Effective length for inclined angle			
												0.5°	1°	2°	3°
DFPSRBD0050R010N04	0.5	0.1	0.75	4	0.46	9.5°	60	4	2	●	1	4.1	4.3	4.6	5
DFPSRBD0050R010N05	0.5	0.1	0.75	5	0.46	8.7°	60	4	2	●	1	5.2	5.4	5.7	6.2
DFPSRBD0050R010N06	0.5	0.1	0.75	6	0.46	8°	60	4	2	●	1	6.2	6.4	6.9	7.5
DFPSRBD0050R010N10	0.5	0.1	0.75	10	0.46	6.1°	60	4	2	●	1	10.3	10.7	11.5	12.4
DFPSRBD0050R010N15	0.5	0.1	0.75	15	0.46	4.7°	60	4	2	●	1	15.5	16	17.2	18.6
DFPSRBD0080R010N06	0.8	0.1	1	6	0.76	7.7°	60	4	2	●	1	6.2	6.4	6.9	7.5
DFPSRBD0080R010N08	0.8	0.1	1	8	0.76	6.6°	60	4	2	●	1	8.3	8.6	9.2	9.9
DFPSRBD0100R010N08	1	0.1	1.5	8	0.94	6.3°	60	4	2	●	1	8.5	8.8	9.5	10.2
DFPSRBD0100R010N12	1	0.1	1.5	12	0.94	4.9°	60	4	2	●	1	12.6	13.1	14.1	15.2
DFPSRBD0100R020N08	1	0.2	1.5	8	0.94	6.3°	60	4	2	●	1	8.5	8.8	9.5	10.2
DFPSRBD0100R020N12	1	0.2	1.5	12	0.94	4.9°	60	4	2	●	1	12.6	13.1	14.1	15.2
DFPSRBD0100R020N16	1	0.2	1.5	16	0.94	4°	70	4	2	●	1	16.8	17.4	18.7	20.2
DFPSRBD0100R020N20	1	0.2	1.5	20	0.94	3.4°	70	4	2	●	1	20.9	21.7	23.3	25.1
DFPSRBD0100R020N30	1	0.2	1.5	30	0.94	2.5°	70	4	2	●	1	31.3	32.4	34.8	
DFPSRBD0150R020N10	1.5	0.2	2.3	10	1.44	4.9°	70	4	2	●	1	10.5	11	11.8	12.7
DFPSRBD0150R020N20	1.5	0.2	2.3	20	1.44	2.9°	70	4	2	●	1	20.9	21.7	23.3	
DFPSRBD0200R010N08	2	0.1	3	8	1.9	4.9°	70	4	4	●	2	8.4	8.7	9.4	10.1
DFPSRBD0200R020N12	2	0.2	3	12	1.9	3.7°	70	4	4	●	2	12.5	13	14	15.1
DFPSRBD0200R020N16	2	0.2	3	16	1.9	2.9°	70	4	4	●	2	16.7	17.3	18.6	

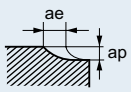
DFPSRB

Order Number	DC	RE	APMX	LU	DN	B2	LF	DCON	No. of Flutes	Stock	type	Effective length for inclined angle			
												0.5°	1°	2°	3°
DFPSRBD0200R020N20	2	0.2	3	20	1.9	2.5°	80	4	4	●	2	20.8	21.5	23.2	
DFPSRBD0200R020N30	2	0.2	3	30	1.9	1.7°	80	4	4	●	2	31.2	32.2		
DFPSRBD0200R020N40	2	0.2	3	40	1.9	1.4°	80	4	4	●	2	41.5	42.9		
DFPSRBD0200R030N08	2	0.3	3	8	1.9	5°	70	4	4	●	2	8.4	8.7	9.3	10.1
DFPSRBD0300R020N20	3	0.2	4.5	20	2.9	1.4°	80	4	4	●	2	20.8	21.5		
DFPSRBD0300R020N40	3	0.2	4.5	40	2.9	0.7°	80	4	4	●	2	41.5			
DFPSRBD0300R030N12	3	0.3	4.5	12	2.9	2.1°	80	4	4	●	2	12.5	13	13.9	
DFPSRBD0300R050N20	3	0.5	4.5	20	2.9	1.4°	80	4	4	●	2	20.8	21.5		
DFPSRBD0400R020N20	4	0.2	6	20	3.9		80	4	4	●	3				
DFPSRBD0400R020N40	4	0.2	6	40	3.9		80	4	4	●	3				
DFPSRBD0400R050N20	4	0.5	6	20	3.9		80	4	4	●	3				
DFPSRBD0400R050N40	4	0.5	6	40	3.9		80	4	4	●	3				
DFPSRBD0600R010N24	6	0.1	9	24	5.85		90	6	4	●	3				
DFPSRBD0600R030N24	6	0.3	9	24	5.85		90	6	4	●	3				
DFPSRBD0600R050N24	6	0.5	9	24	5.85		90	6	4	●	3				
DFPSRBD0600R050N30	6	0.5	9	30	5.85		90	6	4	●	3				
DFPSRBD0600R100N30	6	1	9	30	5.85		90	6	4	●	3				
DFPSRBD0800R050N30	8	0.5	12	30	7.85		90	8	4	●	3				
DFPSRBD0800R100N30	8	1	12	30	7.85		90	8	4	●	3				
DFPSRBD1000R050N40	10	0.5	15	40	9.7		130	10	4	●	3				
DFPSRBD1000R100N40	10	1	15	40	9.7		130	10	4	●	3				
DFPSRBD1200R050N40	12	0.5	18	40	11.7		130	12	4	●	3				

DFPSRB

RECOMMENDED CUTTING CONDITIONS

Work material			Graphite				Copper, Copper alloys			
Dia. DC(mm)	Corner R RE (mm)	Neck length LU(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)
0.5	0.1	4	30000	1100	0.05	0.23	24000	700	0.04	0.23
	0.1	5	28000	960	0.05	0.23	22000	600	0.04	0.23
	0.1	6	25000	850	0.05	0.23	20000	540	0.04	0.23
	0.1	10	22000	600	0.04	0.21	—	—	—	—
	0.1	15	20000	500	0.03	0.18	—	—	—	—
0.8	0.1	6	28000	1300	0.08	0.45	22000	830	0.06	0.45
	0.1	8	22000	900	0.08	0.45	18000	580	0.06	0.45
1	0.1	8	25000	1500	0.1	0.6	20000	960	0.08	0.6
	0.1	12	22000	1300	0.1	0.6	18000	830	0.08	0.6
	0.2	8	25000	1500	0.1	0.45	20000	960	0.08	0.45
	0.2	12	22000	1300	0.1	0.45	18000	830	0.08	0.45
	0.2	16	18000	1000	0.08	0.4	14000	640	0.06	0.4
	0.2	20	15000	800	0.08	0.4	—	—	—	—
	0.2	30	12000	600	0.07	0.35	—	—	—	—
1.5	0.2	10	18000	1400	0.15	0.8	14000	900	0.12	0.8
	0.2	20	12000	900	0.12	0.65	9600	580	0.1	0.65
2	0.1	8	24000	3300	0.2	1.2	19000	2100	0.16	1.2
	0.2	12	22000	3000	0.2	1.2	18000	1900	0.16	1.2
	0.2	16	19000	2500	0.2	1.2	15000	1600	0.16	1.2
	0.2	20	16000	2000	0.2	1.2	13000	1300	0.16	1.2
	0.2	30	13000	1600	0.16	1.0	—	—	—	—
	0.2	40	11000	1200	0.14	0.8	—	—	—	—
	0.3	8	24000	3300	0.3	1.2	19000	2100	0.24	1.2
3	0.2	20	18000	3000	0.3	2.0	14000	1900	0.24	2.0
	0.2	40	12000	1800	0.25	1.7	9600	1100	0.2	1.7
	0.5	20	18000	3000	0.3	1.5	14000	1900	0.24	1.5
	0.3	12	20000	4500	0.3	1.5	16000	2900	0.24	1.5
4	0.2	20	18000	4200	0.4	2.7	14000	2700	0.3	2.7
	0.2	40	13000	2800	0.4	2.7	10000	1800	0.3	2.7
	0.5	20	18000	4200	0.4	2.3	14000	2700	0.3	2.3
	0.5	40	13000	2800	0.4	2.3	10000	1800	0.3	2.3
6	0.1	24	14000	4600	0.6	3.8	11000	2900	0.5	3.8
	0.3	24	14000	4600	0.6	3.8	11000	2900	0.5	3.8
	0.5	24	14000	4600	0.6	3.8	11000	2900	0.5	3.8
	0.5	30	14000	4600	0.6	3.8	11000	2900	0.5	3.8
	1	30	14000	4600	0.6	3.0	11000	2900	0.5	3.0
8	0.5	30	10500	4000	0.8	5.3	8400	2600	0.6	5.3
	1	30	10500	4000	0.8	4.5	8400	2600	0.6	4.5
10	0.5	40	8700	3500	1.0	6.8	7000	2200	0.8	6.8
	1	40	8700	3500	1.0	6.0	7000	2200	0.8	6.0
12	0.5	40	7200	3000	1.2	8.0	5800	1900	1.0	8.0



- When high machining accuracy is needed, or the workpiece becomes chipped, we recommend lowering the feed rate.
- Use a milling machine dedicated for graphite.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

VF6MHVRB

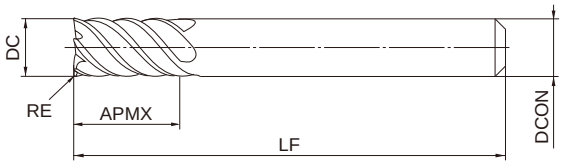
IMPACT MIRACLE END MILLS

Corner radius, Medium cut length, 6 flute, Irregular helix flutes

Product Information

Work Material

Technical Info >> 1993
ISO13399 Property >> 1966
SYMBOL DESCRIPTIONS >> 664
END MILLS SELECTION CHART >> 668



Type1

R	0.5≦RE≦2			
	±0.015			
	DC≦12	DC>12		
	0 - 0.020	0 - 0.030		
h6	DCON=6	8≦DCON≦10	12≦DCON≦16	DCON=20
	0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013

●Inventory maintained in Japan. Unit : mm

Order Number	DC	RE	APMX	LF	DCON	No. of Flutes	Stock	type
VF6MHVRBD0600R050	6	0.5	13	50	6	6	●	1
VF6MHVRBD0600R100	6	1	13	50	6	6	●	1
VF6MHVRBD0800R050	8	0.5	19	60	8	6	●	1
VF6MHVRBD0800R100	8	1	19	60	8	6	●	1
VF6MHVRBD1000R050	10	0.5	22	70	10	6	●	1
VF6MHVRBD1000R100	10	1	22	70	10	6	●	1
VF6MHVRBD1200R050	12	0.5	26	75	12	6	●	1
VF6MHVRBD1200R100	12	1	26	75	12	6	●	1
VF6MHVRBD1600R100	16	1	32	90	16	6	●	1
VF6MHVRBD1600R200	16	2	32	90	16	6	●	1
VF6MHVRBD2000R100	20	1	38	100	20	6	●	1
VF6MHVRBD2000R200	20	2	38	100	20	6	●	1

VF6MHVRB

RECOMMENDED CUTTING CONDITIONS

·Side milling

Work material	Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V		Heat resistant alloys Inconel718	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
6	10600	2900	8000	2000	2100	320
8	8000	2900	6000	2000	1600	300
10	6400	2700	4800	2000	1300	260
12	5300	2700	4000	2000	1100	230
16	4000	2200	3000	1600	800	180
20	3200	1900	2400	1400	640	150
	≤0.1DC ≤1.5DC				≤0.05DC ≤1.5DC	

- When cutting austenitic stainless steel, the use of water-soluble cutting fluid is effective.
- If the depth of cut is shallow, the revolution and feed rate can be increased.
- The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abnormal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.

VFSDRB

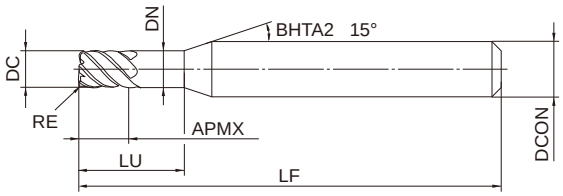
IMPACT MIRACLE END MILLS

Corner radius end mill, Short cut length, 6 flute

Product Information

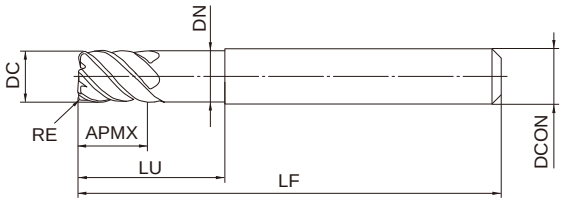
Work Material

Technical Info >> 1993
ISO13399 Property >> 1966
SYMBOL DESCRIPTIONS >> 664
END MILLS SELECTION CHART >> 668



Type1

	3≦DC≦12		
	0 - 0.02		
h6	DCON=6	8≦DCON≦10	DCON=12
	0 - 0.008	0 - 0.009	0 - 0.011



Type2

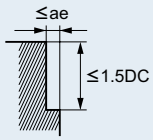
●Inventory maintained in Japan. Unit : mm

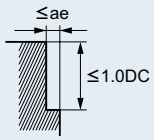
Order Number	DC	RE	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	type
VFSDRBD0300R030	3	0.3	3	9	2.9	45	6	6	●	1
VFSDRBD0400R030	4	0.3	4	12	3.9	45	6	6	●	1
VFSDRBD0500R030	5	0.3	5	15	4.9	50	6	6	●	1
VFSDRBD0600R030	6	0.3	6	18	5.85	50	6	6	●	2
VFSDRBD0600R050	6	0.5	6	18	5.85	50	6	6	●	2
VFSDRBD0600R100	6	1	6	18	5.85	50	6	6	●	2
VFSDRBD0800R030	8	0.3	8	24	7.85	60	8	6	●	2
VFSDRBD0800R050	8	0.5	8	24	7.85	60	8	6	●	2
VFSDRBD0800R100	8	1	8	24	7.85	60	8	6	●	2
VFSDRBD1000R050	10	0.5	10	30	9.7	70	10	6	●	2
VFSDRBD1000R100	10	1	10	30	9.7	70	10	6	●	2
VFSDRBD1200R050	12	0.5	12	36	11.7	75	12	6	●	2
VFSDRBD1200R100	12	1	12	36	11.7	75	12	6	●	2

VFSDRB

RECOMMENDED CUTTING CONDITIONS

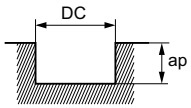
Work material	Hardened steel (45— 55HRC) AISI H13			Hardened steel (55— 62HRC) AISI D2			Hardened steel (62— 70HRC) AISI W1, AISI M2		
Dia. DC(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ae(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ae(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ae(mm)
1	40000	1200	0.05	40000	800	0.03	32000	500	0.02
2	40000	2000	0.1	24000	1000	0.05	16000	600	0.05
3	32000	3800	0.2	16000	1900	0.1	11000	1200	0.05
4	24000	4400	0.2	12000	2200	0.1	8000	1300	0.05
6	16000	5800	0.3	8000	2900	0.2	5300	1800	0.1
8	12000	5800	0.4	6000	2900	0.2	4000	1800	0.1
10	9600	5800	0.5	4800	2900	0.3	3200	1800	0.2
12	8000	4800	0.6	4000	2400	0.3	2700	1500	0.2
16	6000	3600	0.8	3000	1800	0.5	2000	1100	0.3
20	4800	2900	1.0	2400	1400	0.5	1600	880	0.3
25	3800	2300	1.0	1900	1100	0.5	1300	720	0.3





·Slot milling with small diameter tools

Work material	Hardened steel (45— 55HRC) AISI H13			Hardened steel (55— 62HRC) AISI D2		
Dia. DC(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap(mm)
1	15000	300	0.1	9500	110	0.05
2	8000	320	0.2	4800	190	0.1



- If the depth of cut is shallow, the revolution and feed rate can be increased.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

VFMDRB

IMPACT MIRACLE END MILLS

Corner radius end mill, Medium cut length, 6 flute, For hardened materials

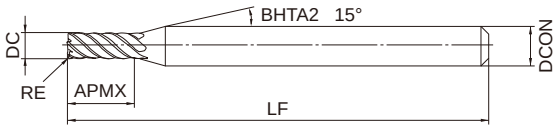
Product Information

UWC 45° VF

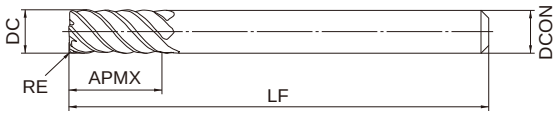
Work Material

P H F M

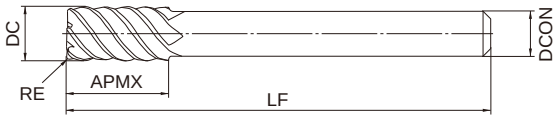
Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668



Type1



Type2



Type3

DC≦12	DC>12		
0 - 0.02	0 - 0.03		
DCON=6	8≦DCON≦10	12≦DCON≦16	DCON=20
0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013

h6

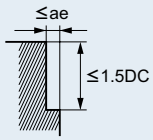
●Inventory maintained in Japan. Unit : mm

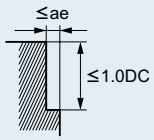
Order Number	DC	RE	APMX	LF	DCON	No. of Flutes	Stock	type
VFMDRBD0300R030	3	0.3	10	60	6	6	●	1
VFMDRBD0400R030	4	0.3	12	60	6	6	●	1
VFMDRBD0500R030	5	0.3	15	60	6	6	●	1
VFMDRBD0600R030	6	0.3	15	60	6	6	●	2
VFMDRBD0600R050	6	0.5	15	60	6	6	●	2
VFMDRBD0600R100	6	1	15	60	6	6	●	2
VFMDRBD0800R030	8	0.3	20	75	8	6	●	2
VFMDRBD0800R050	8	0.5	20	75	8	6	●	2
VFMDRBD0800R100	8	1	20	75	8	6	●	2
VFMDRBD1000R030	10	0.3	25	80	10	6	●	2
VFMDRBD1000R050	10	0.5	25	80	10	6	●	2
VFMDRBD1000R100	10	1	25	80	10	6	●	2
VFMDRBD1200R050	12	0.5	30	100	12	6	●	2
VFMDRBD1200R100	12	1	30	100	12	6	●	2
VFMDRBD1600R100	16	1	40	110	16	6	●	2
VFMDRBD1600R150	16	1.5	40	110	16	6	●	2
VFMDRBD1800R100	18	1	40	120	16	6	●	3
VFMDRBD1800R150	18	1.5	40	120	16	6	●	3
VFMDRBD2000R100	20	1	45	125	20	6	●	2
VFMDRBD2000R150	20	1.5	45	125	20	6	●	2
VFMDRBD2000R200	20	2	45	125	20	6	●	2

VFMDRB

RECOMMENDED CUTTING CONDITIONS

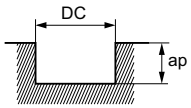
Work material	Hardened steel (45— 55HRC) AISI H13			Hardened steel (55— 62HRC) AISI D2			Hardened steel (62— 70HRC) AISI W1, AISI M2		
Dia. DC(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ae(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ae(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ae(mm)
1	40000	1200	0.05	40000	800	0.03	32000	500	0.02
2	40000	2000	0.1	24000	1000	0.05	16000	600	0.05
3	32000	3800	0.2	16000	1900	0.1	11000	1200	0.05
4	24000	4400	0.2	12000	2200	0.1	8000	1300	0.05
6	16000	5800	0.3	8000	2900	0.2	5300	1800	0.1
8	12000	5800	0.4	6000	2900	0.2	4000	1800	0.1
10	9600	5800	0.5	4800	2900	0.3	3200	1800	0.2
12	8000	4800	0.6	4000	2400	0.3	2700	1500	0.2
16	6000	3600	0.8	3000	1800	0.5	2000	1100	0.3
20	4800	2900	1.0	2400	1400	0.5	1600	880	0.3
25	3800	2300	1.0	1900	1100	0.5	1300	720	0.3





·Slot milling with small diameter tools

Work material	Hardened steel (45— 55HRC) AISI H13			Hardened steel (55— 62HRC) AISI D2		
Dia. DC(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap(mm)
1	15000	300	0.1	9500	110	0.05
2	8000	320	0.2	4800	190	0.1



- If the depth of cut is shallow, the revolution and feed rate can be increased.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

VF6MHVRBCH COOL STAR END MILLS

Corner radius end mill, Medium cut length, 6 flute, Irregular helix flutes, with multiple internal through coolant holes

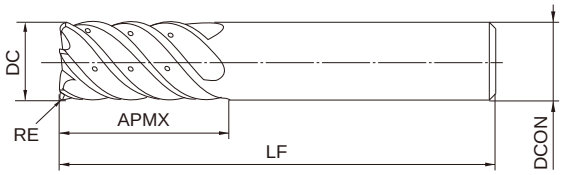
Product Information

UWC 43.5° 45° VF

Work Material

M S F M

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668



Type1

R	0.5≦RE≦3			
	±0.015			
	DC≦12	DC>12		
	0 - 0.020	0 - 0.030		
h6	DCON=10	DCON=12	DCON=16	DCON=20
	0 - 0.009	0 - 0.011	0 - 0.011	0 - 0.013

●Inventory maintained in Japan. Unit : mm

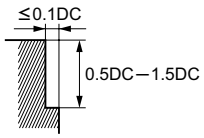
Order Number	DC	RE	APMX	LF	DCON	No. of Flutes	Stock	type
VF6MHVRBCHD1000R050	10	0.5	22	70	10	6	●	1
VF6MHVRBCHD1000R100	10	1	22	70	10	6	●	1
VF6MHVRBCHD1200R050	12	0.5	26	75	12	6	●	1
VF6MHVRBCHD1200R100	12	1	26	75	12	6	●	1
VF6MHVRBCHD1600R100	16	1	32	90	16	6	●	1
VF6MHVRBCHD1600R300	16	3	32	90	16	6	●	1
VF6MHVRBCHD2000R100	20	1	38	100	20	6	●	1
VF6MHVRBCHD2000R300	20	3	38	100	20	6	●	1

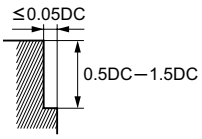
VF6MHVRBCH

RECOMMENDED CUTTING CONDITIONS

·Side milling

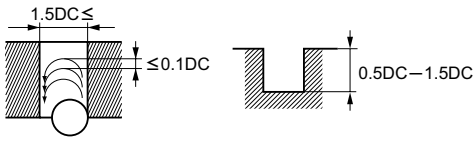
Work material	Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V		Heat resistant alloys Inconel718	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
10	4800	2000	1300	260
12	4000	2000	1100	230
16	3000	1600	800	180
20	2400	1400	640	150





·Trochoidal slotting

Work material	Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)
10	4800	1400
12	4000	1200
16	3000	1100
20	2400	900



- If the depth of cut is shallow, the revolution and feed rate can be increased.
- The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abnormal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.

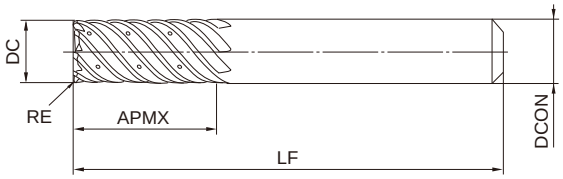
VF8MHVRBCH COOL STAR END MILLS

Corner radius end mill, Medium cut length, 8 flute, Irregular helix flutes, with multiple internal through coolant holes

Product Information

Work Material

Technical Info >> 1993
ISO13399 Property >> 1966
SYMBOL DESCRIPTIONS >> 664
END MILLS SELECTION CHART >> 668



Type1

R	1≦RE≦3	
	±0.015	
	16≦DC≦20	
	0 - 0.03	
h6	DCON=16	DCON=20
	0 - 0.011	0 - 0.013

●Inventory maintained in Japan. Unit : mm

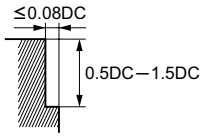
Order Number	DC	RE	APMX	LF	DCON	No. of Flutes	Stock	type
VF8MHVRBCHD1600R100	16	1	32	90	16	8	●	1
VF8MHVRBCHD1600R300	16	3	32	90	16	8	●	1
VF8MHVRBCHD2000R100	20	1	38	100	20	8	●	1
VF8MHVRBCHD2000R300	20	3	38	100	20	8	●	1

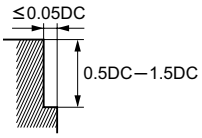
VF8MHVRBCH

RECOMMENDED CUTTING CONDITIONS

·Side milling

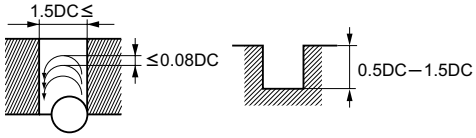
Work material	Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V		Heat resistant alloys Inconel718	
Dia. DC(mm)	Revolution (min⁻¹)	Feed rate (mm/min)	Revolution (min⁻¹)	Feed rate (mm/min)
16	3000	2100	800	240
20	2400	1900	640	200





·Trochoidal slotting

Work material	Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V	
Dia. DC(mm)	Revolution (min⁻¹)	Feed rate (mm/min)
16	3000	1400
20	2400	1200



- If the depth of cut is shallow, the revolution and feed rate can be increased.
- The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abnormal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.

MS2MT

MSTAR END MILLS

Taper end mill, Medium cut length, 2 flute

Product Information

UWC 30° MS Gash

DC<0.4 DC≧0.4

Work Material

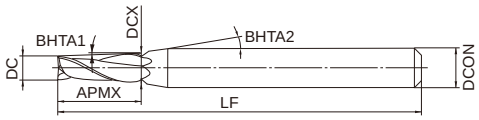
P M S H F M

Technical Info >> 1993

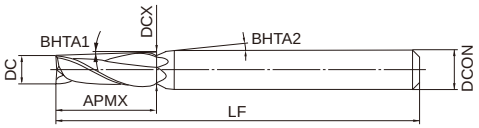
ISO13399 Property >> 1966

SYMBOL DESCRIPTIONS >> 664

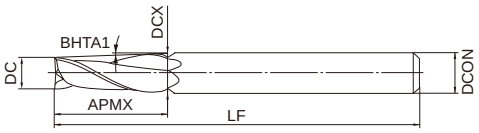
END MILLS SELECTION CHART >> 668



Type1



Type2



Type3

	DC<0.5	DC≧0.5	
	0 - 0.020	0 - 0.030	
	±5'		
h6	4≦DCON≦6	8≦DCON≦10	12≦DCON≦16
	0 - 0.008	0 - 0.009	0 - 0.011

●Inventory maintained in Japan. Unit : mm

Order Number	DC	BHTA1	BHTA2	APMX	DCX	LF	DCON	No. of Flutes	Stock	type
MS2MTD0020T0030	0.2	0.5°	9°	0.8	0.21	45	4	2	●	1
MS2MTD0020T0100	0.2	1°	9°	0.8	0.23	45	4	2	●	1
MS2MTD0020T0130	0.2	1.5°	9°	0.8	0.24	45	4	2	●	1
MS2MTD0020T0200	0.2	2°	9°	0.8	0.26	45	4	2	●	1
MS2MTD0020T0300	0.2	3°	9°	0.8	0.28	45	4	2	●	1
MS2MTD0020T0400	0.2	4°	9°	0.8	0.31	45	4	2	●	1
MS2MTD0020T0500	0.2	5°	9°	0.8	0.34	45	4	2	●	1
MS2MTD0020T0700	0.2	7°	9°	0.8	0.4	45	4	2	●	1
MS2MTD0020T1000	0.2	10°	10°	0.8	0.48	45	4	2	●	2
MS2MTD0030T0030	0.3	0.5°	9°	1.2	0.32	45	4	2	●	1
MS2MTD0030T0100	0.3	1°	9°	1.2	0.34	45	4	2	●	1
MS2MTD0030T0130	0.3	1.5°	9°	1.2	0.36	45	4	2	●	1
MS2MTD0030T0200	0.3	2°	9°	1.2	0.38	45	4	2	●	1
MS2MTD0030T0300	0.3	3°	9°	1.2	0.43	45	4	2	●	1
MS2MTD0030T0400	0.3	4°	9°	1.2	0.47	45	4	2	●	1
MS2MTD0030T0500	0.3	5°	9°	1.2	0.51	45	4	2	●	1
MS2MTD0030T0700	0.3	7°	9°	1.2	0.59	45	4	2	●	1
MS2MTD0030T1000	0.3	10°	10°	1.2	0.72	45	4	2	●	2
MS2MTD0040T0030	0.4	0.5°	9°	1.6	0.43	45	4	2	●	1
MS2MTD0040T0100	0.4	1°	9°	1.6	0.46	45	4	2	●	1
MS2MTD0040T0130	0.4	1.5°	9°	1.6	0.48	45	4	2	●	1
MS2MTD0040T0200	0.4	2°	9°	1.6	0.51	45	4	2	●	1
MS2MTD0040T0300	0.4	3°	9°	1.6	0.57	45	4	2	●	1

MS2MT

Order Number	DC	BHTA1	BHTA2	APMX	DCX	LF	DCON	No. of Flutes	Stock	type
MS2MTD0040T0400	0.4	4°	9°	1.6	0.62	45	4	2	●	1
MS2MTD0040T0500	0.4	5°	9°	1.6	0.68	45	4	2	●	1
MS2MTD0040T0700	0.4	7°	9°	1.6	0.79	45	4	2	●	1
MS2MTD0040T1000	0.4	10°	10°	1.6	0.96	45	4	2	●	2
MS2MTD0050T0030	0.5	0.5°	9°	2	0.53	45	4	2	●	1
MS2MTD0050T0100	0.5	1°	9°	2	0.57	45	4	2	●	1
MS2MTD0050T0130	0.5	1.5°	9°	2	0.6	45	4	2	●	1
MS2MTD0050T0200	0.5	2°	9°	2	0.64	45	4	2	●	1
MS2MTD0050T0300	0.5	3°	9°	2	0.71	45	4	2	●	1
MS2MTD0050T0400	0.5	4°	9°	2	0.78	45	4	2	●	1
MS2MTD0050T0500	0.5	5°	9°	2	0.85	45	4	2	●	1
MS2MTD0050T0700	0.5	7°	9°	2	0.99	45	4	2	●	1
MS2MTD0050T1000	0.5	10°	10°	2	1.21	45	4	2	●	2
MS2MTD0060T0030	0.6	0.5°	9°	2	0.63	45	4	2	●	1
MS2MTD0060T0100	0.6	1°	9°	2	0.67	45	4	2	●	1
MS2MTD0060T0130	0.6	1.5°	9°	2	0.7	45	4	2	●	1
MS2MTD0060T0200	0.6	2°	9°	2	0.74	45	4	2	●	1
MS2MTD0060T0230	0.6	2.5°	9°	2	0.77	45	4	2	●	1
MS2MTD0060T0300	0.6	3°	9°	2	0.81	45	4	2	●	1
MS2MTD0060T0400	0.6	4°	9°	2	0.88	45	4	2	●	1
MS2MTD0060T0500	0.6	5°	9°	2	0.95	45	4	2	●	1
MS2MTD0060T0700	0.6	7°	9°	2	1.09	45	4	2	●	1
MS2MTD0060T1000	0.6	10°	10°	2	1.31	45	4	2	●	2
MS2MTD0070T0030	0.7	0.5°	9°	2	0.73	45	4	2	●	1
MS2MTD0070T0100	0.7	1°	9°	2	0.77	45	4	2	●	1
MS2MTD0070T0130	0.7	1.5°	9°	2	0.8	45	4	2	●	1
MS2MTD0070T0200	0.7	2°	9°	2	0.84	45	4	2	●	1
MS2MTD0070T0300	0.7	3°	9°	2	0.91	45	4	2	●	1
MS2MTD0070T0400	0.7	4°	9°	2	0.98	45	4	2	●	1
MS2MTD0070T0500	0.7	5°	9°	2	1.05	45	4	2	●	1
MS2MTD0070T0700	0.7	7°	9°	2	1.19	45	4	2	●	1
MS2MTD0070T1000	0.7	10°	10°	2	1.41	45	4	2	●	2
MS2MTD0080T0030	0.8	0.5°	9°	3	0.85	45	4	2	●	1
MS2MTD0080T0100	0.8	1°	9°	3	0.9	45	4	2	●	1
MS2MTD0080T0130	0.8	1.5°	9°	3	0.96	45	4	2	●	1
MS2MTD0080T0200	0.8	2°	9°	3	1.01	45	4	2	●	1
MS2MTD0080T0230	0.8	2.5°	9°	3	1.06	45	4	2	●	1
MS2MTD0080T0300	0.8	3°	9°	3	1.11	45	4	2	●	1
MS2MTD0080T0400	0.8	4°	9°	3	1.22	45	4	2	●	1
MS2MTD0080T0500	0.8	5°	9°	3	1.32	45	4	2	●	1
MS2MTD0080T0700	0.8	7°	9°	3	1.54	45	4	2	●	1
MS2MTD0080T1000	0.8	10°	10°	3	1.86	45	4	2	●	2
MS2MTD0090T0030	0.9	0.5°	9°	3	0.95	45	4	2	●	1
MS2MTD0090T0100	0.9	1°	9°	3	1	45	4	2	●	1
MS2MTD0090T0130	0.9	1.5°	9°	3	1.06	45	4	2	●	1
MS2MTD0090T0200	0.9	2°	9°	3	1.11	45	4	2	●	1
MS2MTD0090T0300	0.9	3°	9°	3	1.21	45	4	2	●	1
MS2MTD0090T0400	0.9	4°	9°	3	1.32	45	4	2	●	1
MS2MTD0090T0500	0.9	5°	9°	3	1.42	45	4	2	●	1
MS2MTD0090T0700	0.9	7°	9°	3	1.64	45	4	2	●	1
MS2MTD0090T1000	0.9	10°	10°	3	1.96	45	4	2	●	2
MS2MTD0100T0030	1	0.5°	9°	4	1.07	45	4	2	●	1
MS2MTD0100T0100	1	1°	9°	4	1.14	45	4	2	●	1
MS2MTD0100T0130	1	1.5°	9°	4	1.21	45	4	2	●	1

MS2MT

Order Number	DC	BHTA1	BHTA2	APMX	DCX	LF	DCON	No. of Flutes	Stock	type
MS2MTD0100T0200	1	2°	9°	4	1.28	45	4	2	●	1
MS2MTD0100T0230	1	2.5°	9°	4	1.35	45	4	2	●	1
MS2MTD0100T0300	1	3°	9°	4	1.42	45	4	2	●	1
MS2MTD0100T0400	1	4°	9°	4	1.56	45	4	2	●	1
MS2MTD0100T0500	1	5°	9°	4	1.7	45	4	2	●	1
MS2MTD0100T0700	1	7°	9°	4	1.98	45	4	2	●	1
MS2MTD0100T1000	1	10°	10°	4	2.41	45	4	2	●	2
MS2MTD0150T0030	1.5	0.5°	9°	5	1.59	45	4	2	●	1
MS2MTD0150T0100	1.5	1°	9°	5	1.67	45	4	2	●	1
MS2MTD0150T0130	1.5	1.5°	9°	5	1.76	45	4	2	●	1
MS2MTD0150T0200	1.5	2°	9°	5	1.85	45	4	2	●	1
MS2MTD0150T0230	1.5	2.5°	9°	5	1.94	45	4	2	●	1
MS2MTD0150T0300	1.5	3°	9°	5	2.02	45	4	2	●	1
MS2MTD0150T0400	1.5	4°	9°	5	2.2	45	4	2	●	1
MS2MTD0150T0500	1.5	5°	9°	5	2.37	45	4	2	●	1
MS2MTD0150T0700	1.5	7°	9°	5	2.73	45	4	2	●	1
MS2MTD0150T1000	1.5	10°	10°	5	3.26	45	4	2	●	2
MS2MTD0200T0030	2	0.5°	9°	6	2.1	45	4	2	●	1
MS2MTD0200T0100	2	1°	9°	6	2.21	45	4	2	●	1
MS2MTD0200T0130	2	1.5°	9°	6	2.31	45	4	2	●	1
MS2MTD0200T0200	2	2°	9°	6	2.42	45	4	2	●	1
MS2MTD0200T0230	2	2.5°	9°	6	2.52	45	4	2	●	1
MS2MTD0200T0300	2	3°	9°	6	2.63	45	4	2	●	1
MS2MTD0200T0400	2	4°	9°	6	2.84	45	4	2	●	1
MS2MTD0200T0500	2	5°	9°	6	3.05	45	4	2	●	1
MS2MTD0200T0700	2	7°	7°	6	3.47	45	4	2	●	2
MS2MTD0200T1000	2	10°	10°	6	4.12	50	6	2	●	2
MS2MTD0250T0030	2.5	0.5°	9°	8	2.64	45	4	2	●	1
MS2MTD0250T0100	2.5	1°	9°	8	2.78	45	4	2	●	1
MS2MTD0250T0130	2.5	1.5°	9°	8	2.92	45	4	2	●	1
MS2MTD0250T0200	2.5	2°	9°	8	3.06	45	4	2	●	1
MS2MTD0250T0230	2.5	2.5°	9°	8	3.2	45	4	2	●	1
MS2MTD0250T0300	2.5	3°	9°	8	3.34	45	4	2	●	1
MS2MTD0250T0400	2.5	4°	4°	8	3.62	45	4	2	●	2
MS2MTD0250T0500	2.5	5°	5°	8	3.9	45	4	2	●	2
MS2MTD0250T0700	2.5	7°		8	4.46	50	4	2	●	3
MS2MTD0250T1000	2.5	10°	10°	8	5.32	50	6	2	●	2
MS2MTD0300T0030	3	0.5°	9°	10	3.17	50	6	2	●	1
MS2MTD0300T0100	3	1°	9°	10	3.35	50	6	2	●	1
MS2MTD0300T0130	3	1.5°	9°	10	3.52	50	6	2	●	1
MS2MTD0300T0200	3	2°	9°	10	3.7	50	6	2	●	1
MS2MTD0300T0300	3	3°	9°	10	4.05	50	6	2	●	1
MS2MTD0300T0400	3	4°	9°	10	4.4	50	6	2	●	1
MS2MTD0300T0500	3	5°	9°	10	4.75	50	6	2	●	1
MS2MTD0300T0700	3	7°	7°	10	5.46	50	6	2	●	2
MS2MTD0300T1000	3	10°		10	6.53	50	6	2	●	3
MS2MTD0400T0030	4	0.5°	9°	15	4.26	50	6	2	●	1
MS2MTD0400T0100	4	1°	9°	15	4.52	50	6	2	●	1
MS2MTD0400T0130	4	1.5°	9°	15	4.79	50	6	2	●	1
MS2MTD0400T0200	4	2°	9°	15	5.05	50	6	2	●	1
MS2MTD0400T0300	4	3°	9°	15	5.57	50	6	2	●	1
MS2MTD0400T0400	4	4°		15	6.1	55	6	2	●	3
MS2MTD0400T0500	4	5°		15	6.62	55	6	2	●	3
MS2MTD0400T0700	4	7°		15	7.68	55	6	2	●	3

MS2MT

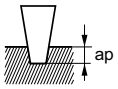
Order Number	DC	BHTA1	BHTA2	APMX	DCX	LF	DCON	No. of Flutes	Stock	type
MS2MTD0400T1000	4	10°		15	9.29	60	8	2	●	3
MS2MTD0500T0030	5	0.5°	9°	20	5.35	55	6	2	●	1
MS2MTD0500T0100	5	1°	9°	20	5.7	55	6	2	●	1
MS2MTD0500T0130	5	1.5°		20	6.05	55	6	2	●	3
MS2MTD0500T0200	5	2°		20	6.4	55	6	2	●	3
MS2MTD0500T0300	5	3°		20	7.1	55	6	2	●	3
MS2MTD0500T0400	5	4°		20	7.8	60	6	2	●	3
MS2MTD0500T0500	5	5°		20	8.5	60	8	2	●	3
MS2MTD0500T0700	5	7°	7°	20	9.91	70	10	2	●	2
MS2MTD0500T1000	5	10°		20	12.05	80	12	2	●	3
MS2MTD0600T0030	6	0.5°		20	6.35	60	6	2	●	3
MS2MTD0600T0100	6	1°		20	6.7	60	6	2	●	3
MS2MTD0600T0130	6	1.5°		20	7.05	60	6	2	●	3
MS2MTD0600T0200	6	2°		20	7.4	60	6	2	●	3
MS2MTD0600T0300	6	3°		20	8.1	65	8	2	●	3
MS2MTD0600T0500	6	5°		20	9.5	70	8	2	●	3
MS2MTD0800T0030	8	0.5°		25	8.44	70	8	2	●	3
MS2MTD0800T0100	8	1°		25	8.87	70	8	2	●	3
MS2MTD0800T0130	8	1.5°		25	9.31	70	8	2	●	3
MS2MTD0800T0200	8	2°		25	9.75	70	8	2	●	3
MS2MTD0800T0300	8	3°		25	10.62	75	10	2	●	3
MS2MTD0800T0500	8	5°		25	12.37	95	12	2	●	3
MS2MTD1000T0030	10	0.5°		35	10.61	90	10	2	●	3
MS2MTD1000T0100	10	1°		35	11.22	90	10	2	●	3
MS2MTD1000T0130	10	1.5°		35	11.83	90	10	2	●	3
MS2MTD1000T0200	10	2°		35	12.44	95	12	2	●	3
MS2MTD1000T0300	10	3°		35	13.67	95	12	2	●	3
MS2MTD1000T0500	10	5°		35	16.12	95	16	2	●	3

MS2MT

RECOMMENDED CUTTING CONDITIONS

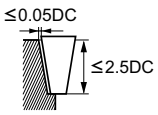
·Slotting

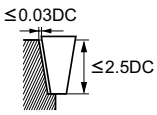
Work material	Carbon steel, Cast iron, Alloy steel (—30HRC) AISI 1050, AISI No 35 B, AISI P20			Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21			Hardened steel (45— 55HRC) AISI H13		
Dia. DC(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap(mm)
0.2	40000	320	0.005	40000	180	0.004	40000	100	0.002
0.3	40000	400	0.006	40000	220	0.005	35000	130	0.003
0.4	40000	450	0.008	40000	270	0.006	31000	150	0.004
0.5	37000	500	0.010	32000	320	0.008	25000	160	0.005
0.6	32000	530	0.013	26000	340	0.010	21000	170	0.006
0.7	27000	560	0.015	23000	380	0.011	18000	180	0.007
0.8	24000	610	0.018	20000	410	0.013	16000	210	0.008
0.9	21000	610	0.020	18000	450	0.015	14000	210	0.009
1	19000	610	0.025	16000	450	0.020	13000	210	0.010
1.5	13000	720	0.040	11000	540	0.030	8500	270	0.015



·Side milling

Work material	Carbon steel, Cast iron, Alloy steel (—30HRC) AISI 1050, AISI No 35 B, AISI P20		Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Hardened steel (45— 55HRC) AISI H13	
Dia. DC(mm)	Revolution (min-1)	Feed rate (mm/min)	Revolution (min-1)	Feed rate (mm/min)	Revolution (min-1)	Feed rate (mm/min)
2	9500	720	8000	540	6400	300
2.5	7800	800	6300	540	5000	300
3	6400	800	5300	540	4200	300
4	4800	800	4000	540	3200	300
5	3800	800	3200	540	2500	300
6	3200	800	2600	540	2100	300
8	2400	700	2000	480	1600	270
10	1900	600	1600	410	1300	240





- If the depth of cut is shallow, the revolution and feed rate can be increased.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

MS4LT

MSTAR END MILLS

Taper end mill, Long cut length, 4 flute

Product Information

UWC 25° MS Gash

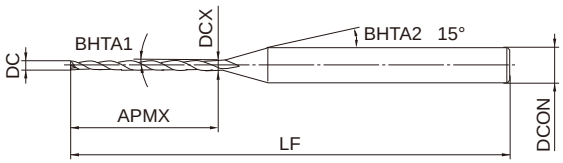
DC<3 DC≧3

Technical Info >> 1993 ISO13399 Property >> 1966

Work Material

P M H F M

SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668



Type1

	DC<0.5	DC≧0.5
	0 - 0.020	0 - 0.040
	±5'	
h6	DCON=3	4≦DCON≦6
	0 - 0.006	0 - 0.008

●Inventory maintained in Japan. Unit : mm

Order Number	DC	BHTA1	APMX	DCX	LF	DCON	No. of Flutes	Stock	type
MS4LTD0020T0030L02	0.2	0.5°	2	0.23	40	3	4	●	1
MS4LTD0020T0100L02	0.2	1°	2	0.27	40	3	4	●	1
MS4LTD0020T0130L02	0.2	1.5°	2	0.3	40	3	4	●	1
MS4LTD0020T0200L02	0.2	2°	2	0.34	40	3	4	●	1
MS4LTD0030T0030L03	0.3	0.5°	3	0.35	40	3	4	●	1
MS4LTD0030T0100L03	0.3	1°	3	0.4	40	3	4	●	1
MS4LTD0030T0130L03	0.3	1.5°	3	0.46	40	3	4	●	1
MS4LTD0030T0200L03	0.3	2°	3	0.51	40	3	4	●	1
MS4LTD0040T0030L04	0.4	0.5°	4	0.47	40	3	4	●	1
MS4LTD0040T0100L04	0.4	1°	4	0.54	40	3	4	●	1
MS4LTD0040T0130L04	0.4	1.5°	4	0.61	40	3	4	●	1
MS4LTD0040T0200L04	0.4	2°	4	0.68	40	3	4	●	1
MS4LTD0050T0030L04	0.5	0.5°	4	0.57	40	3	4	●	1
MS4LTD0050T0030L06	0.5	0.5°	6	0.6	40	3	4	●	1
MS4LTD0050T0100L04	0.5	1°	4	0.64	40	3	4	●	1
MS4LTD0050T0100L06	0.5	1°	6	0.71	40	3	4	●	1
MS4LTD0050T0130L04	0.5	1.5°	4	0.71	40	3	4	●	1
MS4LTD0050T0130L06	0.5	1.5°	6	0.81	40	3	4	●	1
MS4LTD0050T0200L04	0.5	2°	4	0.78	40	3	4	●	1
MS4LTD0050T0200L06	0.5	2°	6	0.92	40	3	4	●	1
MS4LTD0060T0030L04	0.6	0.5°	4	0.67	40	3	4	●	1
MS4LTD0060T0030L06	0.6	0.5°	6	0.7	40	3	4	●	1
MS4LTD0060T0100L04	0.6	1°	4	0.74	40	3	4	●	1
MS4LTD0060T0100L06	0.6	1°	6	0.81	40	3	4	●	1
MS4LTD0060T0130L04	0.6	1.5°	4	0.81	40	3	4	●	1
MS4LTD0060T0130L06	0.6	1.5°	6	0.91	40	3	4	●	1
MS4LTD0060T0200L04	0.6	2°	4	0.88	40	3	4	●	1
MS4LTD0060T0200L06	0.6	2°	6	1.02	40	3	4	●	1
MS4LTD0070T0030L06	0.7	0.5°	6	0.8	40	3	4	●	1
MS4LTD0070T0030L08	0.7	0.5°	8	0.84	45	3	4	●	1
MS4LTD0070T0100L06	0.7	1°	6	0.91	40	3	4	●	1
MS4LTD0070T0100L08	0.7	1°	8	0.98	45	3	4	●	1

MS4LT

Order Number	DC	BHTA1	APMX	DCX	LF	DCON	No. of Flutes	Stock	type
MS4LTD0070T0130L06	0.7	1.5°	6	1.01	40	3	4	●	1
MS4LTD0070T0130L08	0.7	1.5°	8	1.12	45	3	4	●	1
MS4LTD0070T0200L06	0.7	2°	6	1.12	40	3	4	●	1
MS4LTD0070T0200L08	0.7	2°	8	1.26	45	3	4	●	1
MS4LTD0080T0015L04	0.8	0.2°	4	0.83	45	4	4	●	1
MS4LTD0080T0015L06	0.8	0.2°	6	0.85	45	4	4	●	1
MS4LTD0080T0015L08	0.8	0.2°	8	0.87	45	4	4	●	1
MS4LTD0080T0015L10	0.8	0.2°	10	0.89	45	4	4	●	1
MS4LTD0080T0030L04	0.8	0.5°	4	0.87	45	4	4	●	1
MS4LTD0080T0030L06	0.8	0.5°	6	0.9	45	4	4	●	1
MS4LTD0080T0030L08	0.8	0.5°	8	0.94	45	4	4	●	1
MS4LTD0080T0030L10	0.8	0.5°	10	0.97	45	4	4	●	1
MS4LTD0080T0030L12	0.8	0.5°	12	1.01	50	4	4	●	1
MS4LTD0080T0100L04	0.8	1°	4	0.94	45	4	4	●	1
MS4LTD0080T0100L06	0.8	1°	6	1.01	45	4	4	●	1
MS4LTD0080T0100L08	0.8	1°	8	1.08	45	4	4	●	1
MS4LTD0080T0100L10	0.8	1°	10	1.15	45	4	4	●	1
MS4LTD0080T0100L12	0.8	1°	12	1.22	50	4	4	●	1
MS4LTD0080T0130L04	0.8	1.5°	4	1.01	45	4	4	●	1
MS4LTD0080T0130L06	0.8	1.5°	6	1.11	45	4	4	●	1
MS4LTD0080T0130L08	0.8	1.5°	8	1.22	45	4	4	●	1
MS4LTD0080T0130L10	0.8	1.5°	10	1.32	45	4	4	●	1
MS4LTD0080T0130L12	0.8	1.5°	12	1.43	50	4	4	●	1
MS4LTD0080T0200L04	0.8	2°	4	1.08	45	4	4	●	1
MS4LTD0080T0200L06	0.8	2°	6	1.22	45	4	4	●	1
MS4LTD0080T0200L08	0.8	2°	8	1.36	45	4	4	●	1
MS4LTD0080T0200L10	0.8	2°	10	1.5	45	4	4	●	1
MS4LTD0080T0200L12	0.8	2°	12	1.64	50	4	4	●	1
MS4LTD0100T0015L06	1	0.2°	6	1.05	45	4	4	●	1
MS4LTD0100T0015L08	1	0.2°	8	1.07	45	4	4	●	1
MS4LTD0100T0015L10	1	0.2°	10	1.09	45	4	4	●	1
MS4LTD0100T0015L12	1	0.2°	12	1.1	50	4	4	●	1
MS4LTD0100T0030L06	1	0.5°	6	1.1	45	4	4	●	1
MS4LTD0100T0030L08	1	0.5°	8	1.14	45	4	4	●	1
MS4LTD0100T0030L10	1	0.5°	10	1.17	45	4	4	●	1
MS4LTD0100T0030L12	1	0.5°	12	1.21	50	4	4	●	1
MS4LTD0100T0100L06	1	1°	6	1.21	45	4	4	●	1
MS4LTD0100T0100L08	1	1°	8	1.28	45	4	4	●	1
MS4LTD0100T0100L10	1	1°	10	1.35	45	4	4	●	1
MS4LTD0100T0100L12	1	1°	12	1.42	50	4	4	●	1
MS4LTD0100T0100L16	1	1°	16	1.56	55	4	4	●	1
MS4LTD0100T0130L06	1	1.5°	6	1.31	45	4	4	●	1
MS4LTD0100T0130L08	1	1.5°	8	1.42	45	4	4	●	1
MS4LTD0100T0130L10	1	1.5°	10	1.52	45	4	4	●	1
MS4LTD0100T0130L12	1	1.5°	12	1.63	50	4	4	●	1
MS4LTD0100T0130L16	1	1.5°	16	1.84	55	4	4	●	1
MS4LTD0100T0200L06	1	2°	6	1.42	45	4	4	●	1
MS4LTD0100T0200L08	1	2°	8	1.56	45	4	4	●	1
MS4LTD0100T0200L10	1	2°	10	1.7	45	4	4	●	1
MS4LTD0100T0200L12	1	2°	12	1.84	50	4	4	●	1
MS4LTD0100T0200L16	1	2°	16	2.12	55	4	4	●	1
MS4LTD0120T0015L06	1.2	0.2°	6	1.25	45	4	4	●	1
MS4LTD0120T0015L10	1.2	0.2°	10	1.29	45	4	4	●	1
MS4LTD0120T0015L12	1.2	0.2°	12	1.3	50	4	4	●	1

MS4LT

Order Number	DC	BHTA1	APMX	DCX	LF	DCON	No. of Flutes	Stock	type
MS4LTD0120T0015L16	1.2	0.2°	16	1.34	55	4	4	●	1
MS4LTD0120T0030L06	1.2	0.5°	6	1.3	45	4	4	●	1
MS4LTD0120T0030L10	1.2	0.5°	10	1.37	45	4	4	●	1
MS4LTD0120T0030L12	1.2	0.5°	12	1.41	50	4	4	●	1
MS4LTD0120T0030L16	1.2	0.5°	16	1.48	55	4	4	●	1
MS4LTD0120T0100L06	1.2	1°	6	1.41	45	4	4	●	1
MS4LTD0120T0100L10	1.2	1°	10	1.55	45	4	4	●	1
MS4LTD0120T0100L12	1.2	1°	12	1.62	50	4	4	●	1
MS4LTD0120T0100L16	1.2	1°	16	1.76	55	4	4	●	1
MS4LTD0120T0100L20	1.2	1°	20	1.9	55	4	4	●	1
MS4LTD0120T0130L06	1.2	1.5°	6	1.51	45	4	4	●	1
MS4LTD0120T0130L10	1.2	1.5°	10	1.72	45	4	4	●	1
MS4LTD0120T0130L12	1.2	1.5°	12	1.83	50	4	4	●	1
MS4LTD0120T0130L16	1.2	1.5°	16	2.04	55	4	4	●	1
MS4LTD0120T0130L20	1.2	1.5°	20	2.25	55	4	4	●	1
MS4LTD0120T0200L06	1.2	2°	6	1.62	45	4	4	●	1
MS4LTD0120T0200L10	1.2	2°	10	1.9	45	4	4	●	1
MS4LTD0120T0200L12	1.2	2°	12	2.04	50	4	4	●	1
MS4LTD0120T0200L16	1.2	2°	16	2.32	55	4	4	●	1
MS4LTD0120T0200L20	1.2	2°	20	2.6	55	4	4	●	1
MS4LTD0130T0030L12	1.3	0.5°	12	1.51	50	4	4	●	1
MS4LTD0130T0100L12	1.3	1°	12	1.72	50	4	4	●	1
MS4LTD0130T0130L12	1.3	1.5°	12	1.93	50	4	4	●	1
MS4LTD0130T0200L12	1.3	2°	12	2.14	50	4	4	●	1
MS4LTD0140T0030L12	1.4	0.5°	12	1.61	50	4	4	●	1
MS4LTD0140T0100L12	1.4	1°	12	1.82	50	4	4	●	1
MS4LTD0140T0130L12	1.4	1.5°	12	2.03	50	4	4	●	1
MS4LTD0140T0200L12	1.4	2°	12	2.24	50	4	4	●	1
MS4LTD0150T0015L06	1.5	0.2°	6	1.55	45	4	4	●	1
MS4LTD0150T0015L08	1.5	0.2°	8	1.57	45	4	4	●	1
MS4LTD0150T0015L10	1.5	0.2°	10	1.59	45	4	4	●	1
MS4LTD0150T0015L12	1.5	0.2°	12	1.6	50	4	4	●	1
MS4LTD0150T0015L16	1.5	0.2°	16	1.64	55	4	4	●	1
MS4LTD0150T0015L20	1.5	0.2°	20	1.67	55	4	4	●	1
MS4LTD0150T0030L06	1.5	0.5°	6	1.6	45	4	4	●	1
MS4LTD0150T0030L08	1.5	0.5°	8	1.64	45	4	4	●	1
MS4LTD0150T0030L10	1.5	0.5°	10	1.67	45	4	4	●	1
MS4LTD0150T0030L12	1.5	0.5°	12	1.71	50	4	4	●	1
MS4LTD0150T0030L16	1.5	0.5°	16	1.78	55	4	4	●	1
MS4LTD0150T0030L20	1.5	0.5°	20	1.85	55	4	4	●	1
MS4LTD0150T0100L06	1.5	1°	6	1.71	45	4	4	●	1
MS4LTD0150T0100L08	1.5	1°	8	1.78	45	4	4	●	1
MS4LTD0150T0100L10	1.5	1°	10	1.85	45	4	4	●	1
MS4LTD0150T0100L12	1.5	1°	12	1.92	50	4	4	●	1
MS4LTD0150T0100L16	1.5	1°	16	2.06	55	4	4	●	1
MS4LTD0150T0100L20	1.5	1°	20	2.2	55	4	4	●	1
MS4LTD0150T0100L25	1.5	1°	25	2.37	60	4	4	●	1
MS4LTD0150T0130L06	1.5	1.5°	6	1.81	45	4	4	●	1
MS4LTD0150T0130L08	1.5	1.5°	8	1.92	45	4	4	●	1
MS4LTD0150T0130L10	1.5	1.5°	10	2.02	45	4	4	●	1
MS4LTD0150T0130L12	1.5	1.5°	12	2.13	50	4	4	●	1
MS4LTD0150T0130L16	1.5	1.5°	16	2.34	55	4	4	●	1
MS4LTD0150T0130L20	1.5	1.5°	20	2.55	55	4	4	●	1
MS4LTD0150T0130L25	1.5	1.5°	25	2.81	60	4	4	●	1

MS4LT

Order Number	DC	BHTA1	APMX	DCX	LF	DCON	No. of Flutes	Stock	type
MS4LTD0150T0200L06	1.5	2°	6	1.92	45	4	4	●	1
MS4LTD0150T0200L08	1.5	2°	8	2.06	45	4	4	●	1
MS4LTD0150T0200L10	1.5	2°	10	2.2	45	4	4	●	1
MS4LTD0150T0200L12	1.5	2°	12	2.34	50	4	4	●	1
MS4LTD0150T0200L16	1.5	2°	16	2.62	55	4	4	●	1
MS4LTD0150T0200L20	1.5	2°	20	2.9	55	4	4	●	1
MS4LTD0150T0200L25	1.5	2°	25	3.25	60	4	4	●	1
MS4LTD0160T0030L08	1.6	0.5°	8	1.74	45	4	4	●	1
MS4LTD0160T0030L12	1.6	0.5°	12	1.81	50	4	4	●	1
MS4LTD0160T0030L16	1.6	0.5°	16	1.88	55	4	4	●	1
MS4LTD0160T0030L20	1.6	0.5°	20	1.95	55	4	4	●	1
MS4LTD0160T0100L08	1.6	1°	8	1.88	45	4	4	●	1
MS4LTD0160T0100L12	1.6	1°	12	2.02	50	4	4	●	1
MS4LTD0160T0100L16	1.6	1°	16	2.16	55	4	4	●	1
MS4LTD0160T0100L20	1.6	1°	20	2.3	55	4	4	●	1
MS4LTD0160T0130L08	1.6	1.5°	8	2.02	45	4	4	●	1
MS4LTD0160T0130L12	1.6	1.5°	12	2.23	50	4	4	●	1
MS4LTD0160T0130L16	1.6	1.5°	16	2.44	55	4	4	●	1
MS4LTD0160T0130L20	1.6	1.5°	20	2.65	55	4	4	●	1
MS4LTD0160T0200L08	1.6	2°	8	2.16	45	4	4	●	1
MS4LTD0160T0200L12	1.6	2°	12	2.44	50	4	4	●	1
MS4LTD0160T0200L16	1.6	2°	16	2.72	55	4	4	●	1
MS4LTD0160T0200L20	1.6	2°	20	3	55	4	4	●	1
MS4LTD0180T0015L08	1.8	0.2°	8	1.87	45	4	4	●	1
MS4LTD0180T0015L16	1.8	0.2°	16	1.94	55	4	4	●	1
MS4LTD0180T0015L24	1.8	0.2°	24	2.01	60	4	4	●	1
MS4LTD0180T0030L08	1.8	0.5°	8	1.94	45	4	4	●	1
MS4LTD0180T0030L16	1.8	0.5°	16	2.08	55	4	4	●	1
MS4LTD0180T0030L24	1.8	0.5°	24	2.22	60	4	4	●	1
MS4LTD0180T0100L08	1.8	1°	8	2.08	45	4	4	●	1
MS4LTD0180T0100L16	1.8	1°	16	2.36	55	4	4	●	1
MS4LTD0180T0100L24	1.8	1°	24	2.64	60	4	4	●	1
MS4LTD0180T0130L08	1.8	1.5°	8	2.22	45	4	4	●	1
MS4LTD0180T0130L16	1.8	1.5°	16	2.64	55	4	4	●	1
MS4LTD0180T0130L24	1.8	1.5°	24	3.06	60	4	4	●	1
MS4LTD0180T0200L08	1.8	2°	8	2.36	45	4	4	●	1
MS4LTD0180T0200L16	1.8	2°	16	2.92	55	4	4	●	1
MS4LTD0180T0200L24	1.8	2°	24	3.48	60	4	4	●	1
MS4LTD0200T0015L08	2	0.2°	8	2.07	45	4	4	●	1
MS4LTD0200T0015L10	2	0.2°	10	2.09	45	4	4	●	1
MS4LTD0200T0015L12	2	0.2°	12	2.1	50	4	4	●	1
MS4LTD0200T0015L16	2	0.2°	16	2.14	55	4	4	●	1
MS4LTD0200T0015L20	2	0.2°	20	2.17	55	4	4	●	1
MS4LTD0200T0015L25	2	0.2°	25	2.22	60	4	4	●	1
MS4LTD0200T0030L08	2	0.5°	8	2.14	45	4	4	●	1
MS4LTD0200T0030L10	2	0.5°	10	2.17	45	4	4	●	1
MS4LTD0200T0030L12	2	0.5°	12	2.21	50	4	4	●	1
MS4LTD0200T0030L16	2	0.5°	16	2.28	55	4	4	●	1
MS4LTD0200T0030L20	2	0.5°	20	2.35	55	4	4	●	1
MS4LTD0200T0030L25	2	0.5°	25	2.44	60	4	4	●	1
MS4LTD0200T0030L30	2	0.5°	30	2.52	65	4	4	●	1
MS4LTD0200T0100L08	2	1°	8	2.28	45	4	4	●	1
MS4LTD0200T0100L10	2	1°	10	2.35	45	4	4	●	1
MS4LTD0200T0100L12	2	1°	12	2.42	50	4	4	●	1

MS4LT

Order Number	DC	BHTA1	APMX	DCX	LF	DCON	No. of Flutes	Stock	type
MS4LTD0200T0100L16	2	1°	16	2.56	55	4	4	●	1
MS4LTD0200T0100L20	2	1°	20	2.7	55	4	4	●	1
MS4LTD0200T0100L25	2	1°	25	2.87	60	4	4	●	1
MS4LTD0200T0100L30	2	1°	30	3.05	65	4	4	●	1
MS4LTD0200T0130L08	2	1.5°	8	2.42	45	4	4	●	1
MS4LTD0200T0130L10	2	1.5°	10	2.52	45	4	4	●	1
MS4LTD0200T0130L12	2	1.5°	12	2.63	50	4	4	●	1
MS4LTD0200T0130L16	2	1.5°	16	2.84	55	4	4	●	1
MS4LTD0200T0130L20	2	1.5°	20	3.05	55	4	4	●	1
MS4LTD0200T0130L25	2	1.5°	25	3.31	60	4	4	●	1
MS4LTD0200T0130L30	2	1.5°	30	3.57	65	4	4	●	1
MS4LTD0200T0200L08	2	2°	8	2.56	45	4	4	●	1
MS4LTD0200T0200L10	2	2°	10	2.7	45	4	4	●	1
MS4LTD0200T0200L12	2	2°	12	2.84	50	4	4	●	1
MS4LTD0200T0200L16	2	2°	16	3.12	55	4	4	●	1
MS4LTD0200T0200L20	2	2°	20	3.4	55	4	4	●	1
MS4LTD0200T0200L25	2	2°	25	3.75	60	4	4	●	1
MS4LTD0200T0200L30	2	2°	30	4.1	65	6	4	●	1
MS4LTD0200T0300L12	2	3°	12	3.26	50	4	4	●	1
MS4LTD0200T0300L16	2	3°	16	3.68	55	4	4	●	1
MS4LTD0200T0300L20	2	3°	20	4.1	55	6	4	●	1
MS4LTD0200T0300L25	2	3°	25	4.62	60	6	4	●	1
MS4LTD0200T0300L30	2	3°	30	5.14	65	6	4	●	1
MS4LTD0250T0030L10	2.5	0.5°	10	2.67	45	4	4	●	1
MS4LTD0250T0030L16	2.5	0.5°	16	2.78	50	4	4	●	1
MS4LTD0250T0030L20	2.5	0.5°	20	2.85	55	4	4	●	1
MS4LTD0250T0030L25	2.5	0.5°	25	2.94	60	4	4	●	1
MS4LTD0250T0030L30	2.5	0.5°	30	3.02	65	4	4	●	1
MS4LTD0250T0100L10	2.5	1°	10	2.85	45	4	4	●	1
MS4LTD0250T0100L16	2.5	1°	16	3.06	50	4	4	●	1
MS4LTD0250T0100L20	2.5	1°	20	3.2	55	4	4	●	1
MS4LTD0250T0100L25	2.5	1°	25	3.37	60	4	4	●	1
MS4LTD0250T0100L30	2.5	1°	30	3.55	65	4	4	●	1
MS4LTD0250T0130L10	2.5	1.5°	10	3.02	45	4	4	●	1
MS4LTD0250T0130L16	2.5	1.5°	16	3.34	50	4	4	●	1
MS4LTD0250T0130L20	2.5	1.5°	20	3.55	55	4	4	●	1
MS4LTD0250T0130L25	2.5	1.5°	25	3.81	60	4	4	●	1
MS4LTD0250T0130L30	2.5	1.5°	30	4.07	65	6	4	●	1
MS4LTD0250T0200L10	2.5	2°	10	3.2	45	4	4	●	1
MS4LTD0250T0200L16	2.5	2°	16	3.62	50	4	4	●	1
MS4LTD0250T0200L20	2.5	2°	20	3.9	55	4	4	●	1
MS4LTD0250T0200L25	2.5	2°	25	4.25	60	6	4	●	1
MS4LTD0250T0200L30	2.5	2°	30	4.6	65	6	4	●	1
MS4LTD0300T0030L25	3	0.5°	25	3.44	65	6	4	●	1
MS4LTD0300T0030L40	3	0.5°	40	3.7	80	6	4	●	1
MS4LTD0300T0100L25	3	1°	25	3.87	65	6	4	●	1
MS4LTD0300T0100L40	3	1°	40	4.4	80	6	4	●	1
MS4LTD0300T0130L25	3	1.5°	25	4.31	65	6	4	●	1
MS4LTD0300T0130L40	3	1.5°	40	5.09	80	6	4	●	1
MS4LTD0300T0200L25	3	2°	25	4.75	65	6	4	●	1
MS4LTD0300T0200L40	3	2°	40	5.79	80	6	4	●	1

MS4LT

RECOMMENDED CUTTING CONDITIONS

Work material		Carbon steel, Cast iron, Alloy steel, Pre-hardened steel AISI 1050, AISI No 35 B, AISI P20, AISI P21			Hardened steel (45— 55HRC) AISI H13		
Dia. DC(mm)	Length of Cut APMX(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)
0.2	2	20000—40000	200—500	0.001	20000—40000	150—300	0.001
0.3	3	20000—40000	200—500	0.002	20000—40000	150—300	0.001
0.4	4	20000—40000	200—500	0.003	20000—36000	150—300	0.002
0.5	4	20000—38000	200—500	0.01	16000—29000	200—400	0.005
	6			0.005			0.003
0.6	4	18000—32000	250—600	0.01	13000—24000	200—400	0.005
	6			0.007			0.004
0.7	6	16000—27000	250—600	0.015	11000—20000	200—400	0.008
	8			0.01			0.005
0.8	4	14000—24000	250—600	0.03	10000—18000	200—400	0.015
	8			0.02			0.01
	12			0.013			0.007
1.0	6	11000—19000	300—800	0.03	8000—14000	200—500	0.015
	10			0.02			0.01
	16			0.015			0.008
1.2	6	9200—16000	300—800	0.04	6600—12000	200—500	0.02
	10			0.03			0.015
	16			0.02			0.01
	20			0.01			0.007
1.3	12	8500—15000	300—800	0.03	6100—11000	200—500	0.015
1.4	12	8000—14000	300—800	0.035	5700—10000	200—500	0.018
1.5	6	7500—13000	300—800	0.06	5300—9500	200—500	0.03
	10			0.04			0.02
	16			0.03			0.015
	25			0.015			0.008
1.6	8	7000—12000	300—800	0.06	5000—9000	200—500	0.03
	12			0.045			0.025
	16			0.035			0.02
	20			0.025			0.015
1.8	8	6200—11000	300—800	0.08	4400—8000	200—500	0.04
	16			0.05			0.03
	24			0.03			0.015
2.0	8	5500—9500	300—800	0.1	4000—7200	200—500	0.05
	12			0.07			0.04
	20			0.04			0.02
	30			0.02			0.01
2.5	10	4400—7600	300—800	0.1	3200—5700	200—500	0.05
	20			0.06			0.03
	30			0.03			0.015
3.0	25	3700—6400	300—800	0.08	2700—4800	200—500	0.04
	40			0.04			0.02

- If the depth of cut is shallow, the revolution and feed rate can be increased.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

MP3XB

MS PLUS END MILLS

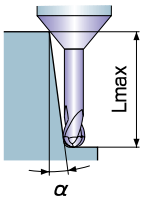
Ball nose, 3 flute, Taper neck

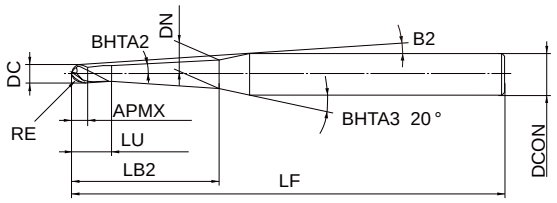
Product Information

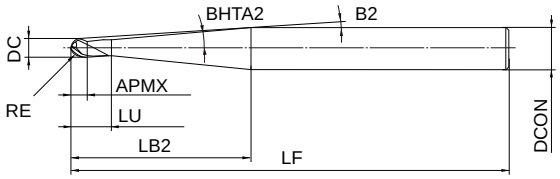
Work Material

P M S H

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668







R	RE≦3	4≦RE
	±0.005	±0.010
h5	DCON=6	DCON=8
	0 - 0.005	0 - 0.006
h6	DCON=10	12≦DCON
	0 - 0.009	0 - 0.011

- α: Inclined angle Lmax: Effective length
- Lmax indicates "0: Not available, blank: No interference".

●Inventory maintained in Japan. Unit : mm

Order Number	RE	DC	BHTA2	APMX	LB2	LU	B2	DN	LF	DCON	No. of Flutes	Stock	type	Effective length for inclined angle 0.5°	1°	2°	3°
MP3XBR0050N008T05	0.5	1	0.5°	0.8	8	2.3	9.3°	1.04	60	6	3	●	1	8.5	8.8	9.3	9.8
MP3XBR0050N010T10	0.5	1	1°	0.8	10	2.3	8.4°	1.2	60	6	3	●	1	0	10.6	11.2	11.8
MP3XBR0050N010T15	0.5	1	1.5°	0.8	10	2.3	8.5°	1.34	60	6	3	●	1	0	0	11	11.6
MP3XBR0050N010T30	0.5	1	3°	0.8	10	2.3	8.8°	1.74	60	6	3	●	1	0	0	0	10.8
MP3XBR0050N012T05	0.5	1	0.5°	0.8	12	2.3	7.5°	1.1	60	6	3	●	1	12.6	13	13.6	14.4
MP3XBR0050N016T05	0.5	1	0.5°	0.8	16	2.3	6.3°	1.18	60	6	3	●	1	16.6	17.1	18	18.9
MP3XBR0050N016T10	0.5	1	1°	0.8	16	2.3	6.4°	1.42	60	6	3	●	1	0	16.7	17.6	18.5
MP3XBR0050N016T15	0.5	1	1.5°	0.8	16	2.3	6.5°	1.66	60	6	3	●	1	0	0	17.2	18.1
MP3XBR0050N020T05	0.5	1	0.5°	0.8	20	2.3	5.4°	1.24	60	6	3	●	1	20.6	21.2	22.3	23.5
MP3XBR0050N020T10	0.5	1	1°	0.8	20	2.3	5.5°	1.56	60	6	3	●	1	0	20.7	21.8	23
MP3XBR0050N020T15	0.5	1	1.5°	0.8	20	2.3	5.6°	1.86	60	6	3	●	1	0	0	21.3	22.5
MP3XBR0050N020T30	0.5	1	3°	0.8	20	2.3	5.9°	2.8	60	6	3	●	1	0	0	0	20.9
MP3XBR0050N023T15	0.5	1	1.5°	0.8	23	2.3	5°	2.02	70	6	3	●	1	0	0	24.4	25.7
MP3XBR0050N025T05	0.5	1	0.5°	0.8	25	2.3	4.6°	1.34	70	6	3	●	1	25.7	26.3	27.7	29.3
MP3XBR0050N025T10	0.5	1	1°	0.8	25	2.3	4.7°	1.74	70	6	3	●	1	0	25.7	27.1	28.6
MP3XBR0050N025T15	0.5	1	1.5°	0.8	25	2.3	4.7°	2.12	70	6	3	●	1	0	0	26.5	27.9
MP3XBR0050N025T50	0.5	1	5°	0.8	25	2.3	5.4°	4.92	60	6	3	●	1	0	0	0	0
MP3XBR0050N030T05	0.5	1	0.5°	0.8	30	2.3	4°	1.42	70	6	3	●	1	30.7	31.5	33.1	35
MP3XBR0050N030T10	0.5	1	1°	0.8	30	2.3	4.1°	1.9	70	6	3	●	1	0	30.8	32.4	34.2
MP3XBR0050N030T30	0.5	1	3°	0.8	30	2.3	4.4°	3.84	70	6	3	●	1	0	0	0	31
MP3XBR0050N035T10	0.5	1	1°	0.8	35	2.3	3.6°	2.08	90	6	3	●	1	0	35.8	37.7	39.8

MP3XB

Order Number	RE	DC	BHTA2	APMX	LB2	LU	B2	DN	LF	DCON	No. of Flutes	Stock	type	Effective length for inclined angle			
														0.5°	1°	2°	3°
MP3XBR0050N042T30	0.5	1	3°	0.8	42	2.3	3.4°	5.1	90	6	3	●	1	0	0	0	43
MP3XBR0050N050T05	0.5	1	0.5°	0.8	50	2.3	2.6°	1.78	90	6	3	●	1	50.8	52.1	54.8	
MP3XBR0050N050T10	0.5	1	1°	0.8	50	2.3	2.7°	2.6	90	6	3	●	1	0	50.9	53.6	
MP3XBR0075N010T05	0.75	1.5	0.5°	1.2	10	2.7	7.8°	1.56	60	6	3	●	1	10.6	10.9	11.4	12
MP3XBR0075N010T10	0.75	1.5	1°	1.2	10	2.7	7.9°	1.7	60	6	3	●	1	0	10.6	11.2	11.8
MP3XBR0075N010T15	0.75	1.5	1.5°	1.2	10	2.7	8°	1.82	60	6	3	●	1	0	0	11	11.6
MP3XBR0075N016T05	0.75	1.5	0.5°	1.2	16	2.7	5.8°	1.68	60	6	3	●	1	16.6	17.1	17.9	18.9
MP3XBR0075N016T10	0.75	1.5	1°	1.2	16	2.7	5.9°	1.9	60	6	3	●	1	0	16.7	17.6	18.5
MP3XBR0075N016T15	0.75	1.5	1.5°	1.2	16	2.7	6°	2.14	60	6	3	●	1	0	0	17.2	18.1
MP3XBR0075N020T05	0.75	1.5	0.5°	1.2	20	2.7	5°	1.74	60	6	3	●	1	20.6	21.2	22.3	23.5
MP3XBR0075N020T10	0.75	1.5	1°	1.2	20	2.7	5.1°	2.04	60	6	3	●	1	0	20.7	21.8	23
MP3XBR0075N020T15	0.75	1.5	1.5°	1.2	20	2.7	5.1°	2.34	60	6	3	●	1	0	0	21.3	22.5
MP3XBR0075N025T15	0.75	1.5	1.5°	1.2	25	2.7	4.4°	2.6	80	6	3	●	1	0	0	26.5	27.9
MP3XBR0075N030T05	0.75	1.5	0.5°	1.2	30	2.7	3.7°	1.92	80	6	3	●	1	30.7	31.5	33.1	35
MP3XBR0075N030T10	0.75	1.5	1°	1.2	30	2.7	3.7°	2.4	80	6	3	●	1	0	30.8	32.4	34.2
MP3XBR0075N030T15	0.75	1.5	1.5°	1.2	30	2.7	3.8°	2.86	80	6	3	●	1	0	0	31.6	33.4
MP3XBR0075N046T30	0.75	1.5	3°	1.2	46	2.7	2.9°		80	6	3	●	2	0	0	0	
MP3XBR0100N016T05	1	2	0.5°	1.6	16	3.6	5.2°	2.12	60	6	3	●	1	17	17.6	18.6	19.5
MP3XBR0100N016T10	1	2	1°	1.6	16	3.6	5.3°	2.34	60	6	3	●	1	0	17.1	18.2	19.1
MP3XBR0100N016T15	1	2	1.5°	1.6	16	3.6	5.4°	2.54	60	6	3	●	1	0	0	22.8	18.7
MP3XBR0100N020T05	1	2	0.5°	1.6	20	3.6	4.5°	2.18	60	6	3	●	1	21.1	21.8	22.9	24.1
MP3XBR0100N020T10	1	2	1°	1.6	20	3.6	4.5°	2.48	60	6	3	●	1	0	21.2	22.4	23.6
MP3XBR0100N020T15	1	2	1.5°	1.6	20	3.6	4.6°	2.76	60	6	3	●	1	0	0	21.9	23.1
MP3XBR0100N020T30	1	2	3°	1.6	20	3.6	4.8°	3.62	60	6	3	●	1	0	0	0	20.5
MP3XBR0100N025T10	1	2	1°	1.6	25	3.6	3.8°	2.64	70	6	3	●	1	0	26.2	27.7	29.2
MP3XBR0100N025T15	1	2	1.5°	1.6	25	3.6	3.9°	3.02	70	6	3	●	1	0	0	27.1	28.5
MP3XBR0100N027T50	1	2	5°	1.6	27	3.6	4.3°		60	6	3	●	2	0	0	0	0
MP3XBR0100N030T05	1	2	0.5°	1.6	30	3.6	3.3°	2.36	70	6	3	●	1	31.1	32.1	33.7	35.6
MP3XBR0100N030T10	1	2	1°	1.6	30	3.6	3.3°	2.82	70	6	3	●	1	0	31.3	33	34.8
MP3XBR0100N030T15	1	2	1.5°	1.6	30	3.6	3.4°	3.28	70	6	3	●	1	0	0	32.2	34
MP3XBR0100N030T30	1	2	3°	1.6	30	3.6	3.6°	4.66	70	6	3	●	1	0	0	0	30.6
MP3XBR0100N035T05	1	2	0.5°	1.6	35	3.6	2.9°	2.44	80	6	3	●	1	36.2	37.2	39.2	
MP3XBR0100N035T10	1	2	1°	1.6	35	3.6	3°	3	80	6	3	●	1	0	36.3	38.3	40.4
MP3XBR0100N035T15	1	2	1.5°	1.6	35	3.6	3°	3.54	80	6	3	●	1	0	0	37.4	39.4
MP3XBR0100N040T05	1	2	0.5°	1.6	40	3.6	2.6°	2.54	80	6	3	●	1	41.2	42.4	44.6	
MP3XBR0100N040T10	1	2	1°	1.6	40	3.6	2.7°	3.18	80	6	3	●	1	0	41.3	43.6	
MP3XBR0100N040T15	1	2	1.5°	1.6	40	3.6	2.7°	3.8	80	6	3	●	1	0	0	42.6	
MP3XBR0100N042T30	1	2	3°	1.6	42	3.6	2.8°		80	6	3	●	2	0	0	0	18.7
MP3XBR0100N050T10	1	2	1°	1.6	50	3.6	2.2°	3.52	110	6	3	●	1	0	51.4	54.2	
MP3XBR0100N070T10	1	2	1°	1.6	70	3.6	1.7°	4.22	110	6	3	●	1	0	71.5		
MP3XBR0150N010T05	1.5	3	0.5°	2.4	10	5.4	5.7°	2.98	60	6	3	●	1	11	11.4	12	12.6
MP3XBR0150N020T05	1.5	3	0.5°	2.4	20	5.4	3.5°	3.16	60	6	3	●	1	21.1	21.8	22.9	24.1
MP3XBR0150N020T10	1.5	3	1°	2.4	20	5.4	3.6°	3.4	60	6	3	●	1	0	21.3	22.4	23.6
MP3XBR0150N020T15	1.5	3	1.5°	2.4	20	5.4	3.7°	3.66	60	6	3	●	1	0	0	22	23.2
MP3XBR0150N025T30	1.5	3	3°	2.4	25	5.4	3.3°	4.96	60	6	3	●	1	0	0	0	26.8
MP3XBR0150N030T05	1.5	3	0.5°	2.4	30	5.4	2.6°	3.32	70	6	3	●	1	31.2	32.1	33.7	
MP3XBR0150N030T10	1.5	3	1°	2.4	30	5.4	2.6°	3.76	70	6	3	●	1	0	31.3	33	
MP3XBR0150N030T15	1.5	3	1.5°	2.4	30	5.4	2.7°	4.18	70	6	3	●	1	0	0	32.3	
MP3XBR0150N034T30	1.5	3	3°	2.4	34	5.4	2.6°		70	6	3	●	2	0	0	0	
MP3XBR0150N035T10	1.5	3	1°	2.4	35	5.4	2.3°	3.94	80	6	3	●	1	0	36.4	38.3	
MP3XBR0150N035T15	1.5	3	1.5°	2.4	35	5.4	2.4°	4.46	70	6	3	●	1	0	0	37.5	
MP3XBR0150N040T05	1.5	3	0.5°	2.4	40	5.4	2°	3.5	80	6	3	●	1	41.3	42.4	44.6	
MP3XBR0150N040T10	1.5	3	1°	2.4	40	5.4	2.1°	4.1	80	6	3	●	1	0	41.4	43.6	
MP3XBR0150N040T15	1.5	3	1.5°	2.4	40	5.4	2.1°	4.72	80	6	3	●	1	0	0	42.6	

MP3XB

Order Number	RE	DC	BHTA2	APMX	LB2	LU	B2	DN	LF	DCON	No. of Flutes	Stock	type	Effective length for inclined angle			
														0.5°	1°	2°	3°
MP3XBR0150N040T30	1.5	3	3°	2.4	40	5.4	3.4°	6.52	90	8	3	●	1	0	0	0	41.9
MP3XBR0150N045T15	1.5	3	1.5°	2.4	45	5.4	1.9°	4.98	80	6	3	●	1	0	0		
MP3XBR0150N050T05	1.5	3	0.5°	2.4	50	5.4	1.7°	3.68	90	6	3	●	1	51.3	52.7		
MP3XBR0150N050T10	1.5	3	1°	2.4	50	5.4	1.7°	4.46	90	6	3	●	1	0	51.5		
MP3XBR0150N052T15	1.5	3	1.5°	2.4	52	5.4	1.7°	5.34	90	6	3	●	1	0	0		
MP3XBR0150N054T30	1.5	3	3°	2.4	54	5.4	2.7°		90	8	3	●	2	0	0	0	
MP3XBR0150N060T10	1.5	3	1°	2.4	60	5.4	1.5°	4.8	110	6	3	●	1	0	61.5		
MP3XBR0150N064T15	1.5	3	1.5°	2.4	64	5.4	1.4°		110	6	3	●	2	0	0		
MP3XBR0150N070T10	1.5	3	1°	2.4	70	5.4	1.3°	5.16	110	6	3	●	1	0	71.6		
MP3XBR0200N020T10	2	4	1°	3.2	20	6.2	2.6°	4.38	70	6	3	●	1	0	21.3	22.4	
MP3XBR0200N030T05	2	4	0.5°	3.2	30	6.2	1.8°	4.32	70	6	3	●	1	31.2	32.1		
MP3XBR0200N030T10	2	4	1°	3.2	30	6.2	1.8°	4.74	70	6	3	●	1	0	31.4		
MP3XBR0200N030T30	2	4	3°	3.2	30	6.2	3.6°	6.4	90	8	3	●	1	0	0	0	31.9
MP3XBR0200N035T10	2	4	1°	3.2	35	6.2	1.6°	4.9	70	6	3	●	1	0	36.4		
MP3XBR0200N040T05	2	4	0.5°	3.2	40	6.2	1.4°	4.48	80	6	3	●	1	41.3	42.4		
MP3XBR0200N040T10	2	4	1°	3.2	40	6.2	1.5°	5.08	80	6	3	●	1	0	41.4		
MP3XBR0200N045T10	2	4	1°	3.2	45	6.2	1.3°	5.26	80	6	3	●	1	0	46.5		
MP3XBR0200N045T30	2	4	3°	3.2	45	6.2	2.6°		90	8	3	●	2	0	0	0	
MP3XBR0200N050T15	2	4	1.5°	3.2	50	6.2	2.2°	6.2	90	8	3	●	1	0	0	53	
MP3XBR0200N060T05	2	4	0.5°	3.2	60	6.2	1°	4.84	100	6	3	●	1	61.4	63		
MP3XBR0200N066T10	2	4	1°	3.2	66	6.2	1°		100	6	3	●	2	0			
MP3XBR0200N084T15	2	4	1.5°	3.2	84	6.2	1.5°		120	8	3	●	2	0	0		
MP3XBR0250N036T30	2.5	5	3°	4	36	7	2.4°		90	8	3	●	2	0	0	0	
MP3XBR0250N038T10	2.5	5	1°	4	38	7	0.8°		80	6	3	●	2	0			
MP3XBR0250N050T10	2.5	5	1°	4	50	7	1.7°	6.4	90	8	3	●	1	0	51.5		
MP3XBR0250N065T10	2.5	5	1°	4	65	7	1.4°	6.92	110	8	3	●	1	0	66.6		
MP3XBR0250N066T15	2.5	5	1.5°	4	66	7	1.4°		110	8	3	●	2	0	0		
MP3XBR0300N032T30	3	6	3°	9	32	12	1.9°		80	8	3	●	2	0	0	0	
MP3XBR0300N040T10	3	6	1°	9	40	12	1.4°	6.82	80	8	3	●	1	0	41.8		
MP3XBR0300N050T10	3	6	1°	9	50	12	1.2°	7.18	90	8	3	●	1	0	51.8		
MP3XBR0300N053T15	3	6	1.5°	9	53	12	1.2°		90	8	3	●	2	0	0		
MP3XBR0300N073T10	3	6	1°	9	73	12	0.9°		110	8	3	●	2	0			
MP3XBR0300N090T10	3	6	1°	9	90	12	1.3°	8.58	140	10	3	●	1	0	92		
MP3XBR0400N035T30	4	8	3°	12	35	15	1.7°		90	10	3	●	2	0	0	0	
MP3XBR0400N040T15	4	8	1.5°	12	40	15	1.5°	9.16	90	10	3	●	1	0	0		
MP3XBR0400N050T10	4	8	1°	12	50	15	1.2°	9.08	110	10	3	●	1	0	51.9		
MP3XBR0400N056T15	4	8	1.5°	12	56	15	1.1°		110	10	3	●	2	0	0		
MP3XBR0400N065T10	4	8	1°	12	65	15	1°	9.6	130	10	3	●	1	0	67		
MP3XBR0400N076T10	4	8	1°	12	76	15	0.8°		130	10	3	●	2	0			
MP3XBR0400N090T10	4	8	1°	12	90	15	1.3°	10.46	150	12	3	●	1	0	92.1		
MP3XBR0500N046T30	5	10	3°	15	46	25	1.3°		100	12	3	●	2	0	0	0	
MP3XBR0500N050T15	5	10	1.5°	15	50	25	1.2°	11	100	12	3	●	1	0	0		
MP3XBR0500N060T10	5	10	1°	15	60	25	1°	10.92	120	12	3	●	1	0	62.6		
MP3XBR0500N068T15	5	10	1.5°	15	68	25	0.9°		120	12	3	●	2	0	0		
MP3XBR0500N070T10	5	10	1°	15	70	25	0.9°	11.28	120	12	3	●	1	0			
MP3XBR0500N100T10	5	10	1°	15	100	25	1.7°	12.32	160	16	3	●	1	0	102.8		
MP3XBR0600N069T30	6	12	3°	18	69	28	1.8°		130	16	3	●	2	0	0	0	
MP3XBR0600N070T10	6	12	1°	18	70	28	1.6°	13.16	130	16	3	●	1	0	72.7		
MP3XBR0600N080T15	6	12	1.5°	18	80	28	1.5°	14.42	130	16	3	●	1	0	0		
MP3XBR0600N100T10	6	12	1°	18	100	28	1.2°	14.22	160	16	3	●	1	0	102.9		

MP3XB

RECOMMENDED CUTTING CONDITIONS

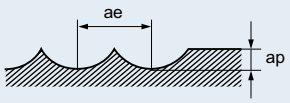
Work material			Carbon steel, Alloy steel (180—280HB) Alloy tool steel (≤350HB) Pre-hardened steel (35—45HRC) AISI 1045, AISI 4140, SKD, SKT, AISIP21, AISI P20				Hardened steel (45— 55HRC) AISI H13, AISI L6				Copper, Copper alloys			
R RE (mm)	Taper angle one side BHTA2	Neck length LU(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)
R0.5	0.5°	8	40000	1200	0.07	0.22	39000	1200	0.06	0.19	39000	1200	0.12	0.38
		12	40000	1200	0.06	0.19	39000	1200	0.05	0.16	39000	1200	0.1	0.32
		16	35000	1100	0.06	0.18	33000	900	0.04	0.14	33000	900	0.09	0.29
		20	32000	960	0.05	0.14	29000	800	0.04	0.11	29000	800	0.07	0.22
		25	28000	830	0.03	0.11	24000	600	0.02	0.07	24000	600	0.05	0.15
		30	24000	720	0.03	0.1	21000	450	0.02	0.06	21000	450	0.04	0.13
		50	10000	300	0.003	0.015	11000	150	0.003	0.015	11000	150	0.006	0.019
	1°	10	40000	1200	0.07	0.22	39000	1300	0.06	0.19	39000	1300	0.12	0.38
		16	35000	1100	0.06	0.18	33000	1000	0.05	0.14	33000	1000	0.09	0.29
		20	32000	960	0.05	0.14	29000	900	0.04	0.11	29000	900	0.07	0.22
		25	28000	830	0.04	0.11	24000	700	0.03	0.08	24000	700	0.05	0.16
		30	24000	720	0.03	0.1	21000	550	0.02	0.06	21000	550	0.04	0.13
		35	17000	500	0.03	0.08	13000	350	0.02	0.05	13000	350	0.03	0.1
		50	10000	300	0.003	0.015	11000	250	0.003	0.015	11000	250	0.006	0.019
	1.5°	10	40000	1200	0.07	0.22	39000	1400	0.06	0.19	39000	1400	0.12	0.38
		16	35000	1100	0.06	0.18	33000	1100	0.05	0.14	33000	1100	0.09	0.29
		20	32000	960	0.05	0.14	29000	1000	0.04	0.11	29000	1000	0.07	0.22
		23	27000	830	0.04	0.11	24000	800	0.03	0.08	24000	800	0.05	0.16
		25	27000	830	0.04	0.12	24000	800	0.03	0.09	24000	800	0.05	0.17
	3°	10	40000	1200	0.07	0.22	39000	1500	0.06	0.19	39000	1500	0.12	0.38
		20	32000	960	0.05	0.14	29000	1100	0.04	0.11	29000	1100	0.07	0.22
		30	22000	660	0.03	0.1	19000	700	0.02	0.06	19000	700	0.04	0.13
		42	13000	390	0.005	0.02	11000	390	0.005	0.02	11000	390	0.01	0.03
	5°	25	32000	960	0.04	0.11	29000	1000	0.03	0.08	29000	1000	0.05	0.16
R0.75	0.5°	10	30000	1800	0.11	0.34	28000	1500	0.1	0.3	28000	1500	0.19	0.61
		16	27000	1600	0.09	0.27	24000	1100	0.08	0.24	24000	1100	0.15	0.48
		20	26000	1500	0.08	0.24	24000	1100	0.07	0.21	24000	1100	0.13	0.42
		30	25000	1400	0.07	0.21	22000	1000	0.06	0.18	22000	1000	0.11	0.35
	1°	10	30000	1900	0.11	0.34	28000	1600	0.1	0.3	28000	1600	0.19	0.61
		16	26000	1600	0.09	0.27	24000	1200	0.08	0.24	24000	1200	0.15	0.48
		20	27000	1700	0.08	0.24	24000	1200	0.07	0.21	24000	1200	0.13	0.42
		30	25000	1500	0.07	0.21	22000	1100	0.06	0.18	22000	1100	0.11	0.35
	1.5°	10	30000	1900	0.11	0.34	28000	1700	0.1	0.3	28000	1700	0.19	0.61
		16	27500	1700	0.09	0.27	24000	1300	0.08	0.24	24000	1300	0.15	0.48
		20	26500	1700	0.08	0.24	24000	1300	0.07	0.21	24000	1300	0.13	0.42
		25	26000	1600	0.07	0.22	23000	1200	0.06	0.19	23000	1200	0.12	0.38
		30	25000	1500	0.07	0.21	22000	1100	0.06	0.18	22000	1100	0.11	0.35
	3°	46	15000	450	0.05	0.16	14000	800	0.04	0.13	14000	800	0.08	0.26
R1.0	0.5°	16	25000	1500	0.14	0.45	22000	1600	0.13	0.42	22000	1600	0.26	0.83
		20	23000	1400	0.1	0.3	20000	1400	0.09	0.27	20000	1400	0.17	0.54
		30	20000	1200	0.05	0.17	18000	1100	0.06	0.18	18000	1100	0.13	0.42
		35	19000	1100	0.05	0.15	17000	1000	0.05	0.16	17000	1000	0.12	0.38
		40	19000	1100	0.04	0.14	16000	900	0.05	0.14	16000	900	0.11	0.35
	1°	16	25000	2300	0.14	0.45	22000	1700	0.13	0.42	22000	1700	0.26	0.83
		20	23000	2100	0.1	0.3	20000	1500	0.09	0.27	20000	1500	0.17	0.54
		25	23000	1400	0.06	0.19	20000	1300	0.07	0.21	20000	1300	0.16	0.5
		30	20000	1200	0.05	0.17	18000	1200	0.06	0.18	18000	1200	0.13	0.42
		35	19000	1100	0.05	0.15	17000	1100	0.05	0.15	17000	1100	0.12	0.37
		40	19000	1100	0.04	0.14	16000	1000	0.05	0.14	16000	1000	0.11	0.35
		50	17000	900	0.03	0.09	15000	900	0.03	0.08	15000	900	0.06	0.19
		70	13000	700	0.02	0.06	11000	650	0.02	0.05	11000	650	0.04	0.12
	1.5°	16	25000	2300	0.14	0.45	22000	1800	0.13	0.42	22000	1800	0.26	0.83
		20	23000	2100	0.1	0.3	20000	1600	0.09	0.27	20000	1600	0.17	0.54

MP3XB

Work material			Carbon steel, Alloy steel (180—280HB) Alloy tool steel (≤350HB) Pre-hardened steel (35—45HRC) AISI 1045, AISI 4140, SKD, SKT, AISIP21, AISI P20				Hardened steel (45— 55HRC) AISI H13, AISI L6				Copper, Copper alloys			
R RE (mm)	Taper angle one side BHTA2	Neck length LU(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)
		25	23000	1600	0.06	0.19	20000	1400	0.07	0.21	20000	1400	0.16	0.5
		30	20000	1200	0.05	0.17	18000	1300	0.06	0.18	18000	1300	0.13	0.42
		35	19000	1100	0.05	0.15	16000	1100	0.05	0.16	17000	1100	0.12	0.38
		40	19000	1100	0.04	0.14	16000	1000	0.05	0.14	16000	1000	0.11	0.35
	3°	20	23000	2100	0.1	0.3	20000	1700	0.09	0.27	20000	1700	0.17	0.54
		30	18000	1600	0.08	0.26	16000	1300	0.07	0.22	16500	1300	0.14	0.45
		42	16000	1400	0.07	0.21	13000	1000	0.06	0.18	13000	1000	0.11	0.35
	5°	27	18000	2200	0.09	0.29	17000	1900	0.08	0.26	17000	1900	0.16	0.51
R1.5	0.5°	10	20000	2400	0.22	0.7	17000	1900	0.21	0.67	17000	1900	0.42	1.34
		20	17000	2000	0.2	0.64	15000	1600	0.19	0.61	15000	1600	0.38	1.22
		30	16000	1700	0.14	0.45	13000	1400	0.13	0.42	13000	1400	0.26	0.83
		40	16000	1400	0.08	0.24	12000	1200	0.09	0.27	12000	1200	0.2	0.65
		50	13000	1100	0.06	0.2	11000	1100	0.07	0.22	11000	1100	0.17	0.54
	1°	20	17000	2000	0.2	0.64	15000	1800	0.19	0.61	15000	1800	0.38	1.22
		30	17000	1900	0.14	0.45	13000	1500	0.13	0.42	13000	1500	0.26	0.83
		35	16000	1700	0.08	0.26	13000	1500	0.09	0.29	13000	1500	0.22	0.69
		40	16000	1500	0.08	0.24	13000	1300	0.09	0.27	13000	1300	0.2	0.65
		50	13000	1200	0.06	0.2	11000	1100	0.07	0.22	11000	1100	0.17	0.54
		60	13000	1100	0.06	0.19	11000	1000	0.07	0.21	11000	1000	0.16	0.5
		70	10000	800	0.05	0.17	9000	700	0.06	0.18	9000	700	0.13	0.42
	1.5°	20	17000	2000	0.2	0.64	15000	1900	0.19	0.61	15000	1900	0.38	1.22
		30	16000	1800	0.14	0.45	13000	1600	0.13	0.42	13000	1600	0.26	0.83
		35	15000	1700	0.08	0.26	12000	1400	0.09	0.29	12000	1400	0.22	0.69
		40	15000	1600	0.08	0.24	12000	1300	0.09	0.27	12000	1300	0.2	0.65
		45	13000	1400	0.07	0.22	11000	1300	0.08	0.24	11000	1300	0.18	0.58
		52	13000	1300	0.06	0.2	11000	1100	0.07	0.22	11000	1100	0.17	0.54
		64	10000	900	0.06	0.18	9000	900	0.06	0.19	9000	900	0.14	0.46
	3°	25	16000	2400	0.16	0.51	13000	1900	0.15	0.48	13000	1900	0.3	0.96
		34	14000	2100	0.13	0.4	11000	1600	0.12	0.37	11000	1600	0.23	0.74
		40	14000	1700	0.12	0.37	11000	1400	0.11	0.34	11000	1400	0.21	0.67
		54	12000	1400	0.1	0.3	10000	1200	0.09	0.27	10000	1200	0.17	0.54
R2.0	0.5°	30	14000	2100	0.23	0.74	11000	1800	0.22	0.7	11000	1800	0.44	1.41
		40	12000	1800	0.19	0.61	10000	1600	0.18	0.58	10000	1600	0.36	1.15
		60	9000	1300	0.06	0.19	8500	1400	0.07	0.21	8500	1400	0.16	0.5
	1°	20	15000	2700	0.31	0.99	12000	2200	0.3	0.96	12000	2200	0.72	2.3
		30	14000	2100	0.23	0.74	11000	1800	0.22	0.7	11000	1800	0.53	1.69
		35	12000	1800	0.21	0.67	10000	1700	0.2	0.64	10000	1700	0.48	1.54
		40	12000	1700	0.19	0.61	10000	1600	0.18	0.58	10000	1600	0.43	1.38
		45	12000	1500	0.13	0.42	10000	1600	0.12	0.38	10000	1600	0.29	0.92
		66	9000	1100	0.08	0.24	8500	1300	0.07	0.21	8500	1300	0.16	0.5
	1.5°	50	12000	2200	0.11	0.35	10000	1700	0.1	0.32	10000	1700	0.24	0.77
		84	8000	1400	0.04	0.13	6500	900	0.03	0.1	6500	900	0.07	0.23
	3°	30	14000	2500	0.23	0.74	11000	2000	0.22	0.7	11000	2000	0.53	1.69
		45	11000	1900	0.16	0.51	9000	1600	0.15	0.48	9000	1600	0.36	1.15
R2.5	1°	38	10000	2200	0.28	0.9	8500	2000	0.27	0.86	8500	2000	0.65	2.07
		50	9000	1900	0.24	0.77	8000	1800	0.23	0.74	8000	1800	0.55	1.77
		65	8000	1600	0.16	0.51	6500	1400	0.15	0.48	6500	1400	0.36	1.15
	1.5°	66	8000	1600	0.16	0.51	6500	1500	0.15	0.48	6500	1500	0.36	1.15
	3°	36	10000	2700	0.31	0.99	8500	2300	0.3	0.96	8500	2300	0.72	2.3
R3.0	1°	40	8000	2200	0.28	0.9	7500	2100	0.27	0.86	7500	2100	0.65	2.07
		50	8000	2000	0.23	0.74	6500	1800	0.22	0.7	6500	1800	0.53	1.69
		73	7000	1700	0.15	0.48	6500	1700	0.14	0.45	6500	1700	0.34	1.07
		90	6500	1500	0.09	0.29	6000	1300	0.08	0.26	6000	1300	0.19	0.61
	1.5°	53	7000	2100	0.22	0.7	6500	1900	0.21	0.67	6500	1900	0.5	1.61
	3°	32	9000	2400	0.35	1.12	8000	2200	0.34	1.09	8000	2200	0.82	2.61
R4.0	1°	50	6000	2200	0.41	1.31	5500	2000	0.4	1.28	5500	2000	0.96	3.07

MP3XB

Work material			Carbon steel, Alloy steel (180—280HB) Alloy tool steel (≤350HB) Pre-hardened steel (35—45HRC) AISI 1045, AISI 4140, SKD, SKT, AISIP21, AISI P20				Hardened steel (45— 55HRC) AISI H13, AISI L6				Copper, Copper alloys			
R RE (mm)	Taper angle one side BHTA2	Neck length LU(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)
		65	6000	2000	0.36	1.15	5200	1700	0.35	1.12	5200	1700	0.84	2.69
		76	6000	1800	0.29	0.93	5000	1500	0.28	0.9	5000	1500	0.67	2.15
		90	5000	1400	0.19	0.61	4700	1200	0.18	0.58	4700	1200	0.43	1.38
	1.5°	40	6000	2300	0.46	1.47	5800	2200	0.45	1.44	5800	2200	1.08	3.46
		56	6000	2200	0.38	1.22	5500	2000	0.37	1.18	5500	2000	0.9	2.84
	3°	35	7000	2700	0.49	1.57	6000	2400	0.48	1.54	6000	2400	1.15	3.69
R5.0	1°	60	5500	2600	0.51	1.63	4500	2300	0.5	1.6	4500	2300	1.2	3.84
		70	5500	2600	0.46	1.47	4500	2200	0.45	1.44	4500	2200	1.08	3.46
		100	5000	2400	0.36	1.15	4000	1900	0.35	1.12	4000	1900	0.84	2.69
	1.5°	50	5000	2400	0.56	1.79	4600	2400	0.55	1.76	4600	2400	1.32	4.22
		68	5000	2400	0.49	1.57	4600	2300	0.48	1.54	4600	2300	1.15	3.69
	3°	46	5000	2400	0.69	2.21	4800	2500	0.68	2.18	4800	2500	1.63	5.22
R6.0	1°	70	4500	2600	0.81	2.59	4000	2100	0.8	2.56	4000	2100	1.92	6.14
		100	4000	2200	0.61	1.95	3500	1800	0.6	1.92	3500	1800	1.44	4.61
	1.5°	80	5000	2300	0.71	2.27	4000	2000	0.7	2.24	4000	2000	1.68	5.38
	3°	69	5000	2700	0.81	2.59	4000	2200	0.8	2.56	4000	2200	1.92	6.14



- If the depth of cut is shallow, the revolution and feed rate can be increased.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

MS2MTB

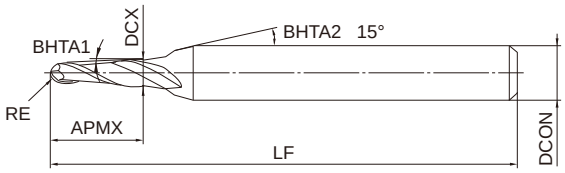
MSTAR END MILLS

Ball nose taper end mill, Medium cut length, 2 flute

Product Information

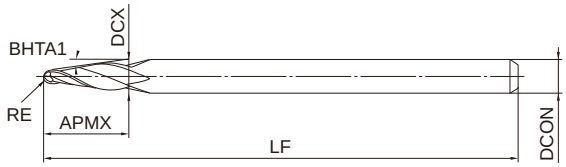
Work Material

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668



Type1

R	0.2≦RE≦1.5
	±0.01
	±5'
h6	4≦DCON≦6
	0 / - 0.008



Type2

●Inventory maintained in Japan. Unit : mm

Order Number	RE	BHTA1	APMX	DCX	LF	DCON	No. of Flutes	Stock	type
MS2MTBR0020T0300	0.2	3°	3	0.69	40	4	2	●	1
MS2MTBR0020T0500	0.2	5°	3	0.89	40	4	2	●	1
MS2MTBR0020T0700	0.2	7°	3	1.09	40	4	2	●	1
MS2MTBR0020T1000	0.2	10°	3	1.39	40	4	2	●	1
MS2MTBR0030T0300	0.3	3°	3	0.88	40	4	2	●	1
MS2MTBR0030T0500	0.3	5°	3	1.07	40	4	2	●	1
MS2MTBR0030T0700	0.3	7°	3	1.27	40	4	2	●	1
MS2MTBR0030T1000	0.3	10°	3	1.56	40	4	2	●	1
MS2MTBR0050T0030	0.5	0.5°	3	1.04	40	4	2	●	1
MS2MTBR0050T0100	0.5	1°	3	1.09	40	4	2	●	1
MS2MTBR0050T0130	0.5	1.5°	3	1.13	40	4	2	●	1
MS2MTBR0050T0200	0.5	2°	3	1.18	40	4	2	●	1
MS2MTBR0050T0300	0.5	3°	3	1.26	40	4	2	●	1
MS2MTBR0050T0500	0.5	5°	3	1.44	40	4	2	●	1
MS2MTBR0050T0700	0.5	7°	6	2.36	45	4	2	●	1
MS2MTBR0075T0030	0.75	0.5°	6	1.59	40	4	2	●	1
MS2MTBR0075T0100	0.75	1°	6	1.68	40	4	2	●	1
MS2MTBR0075T0130	0.75	1.5°	6	1.78	40	4	2	●	1
MS2MTBR0075T0200	0.75	2°	6	1.87	40	4	2	●	1
MS2MTBR0075T0300	0.75	3°	6	2.05	40	4	2	●	1
MS2MTBR0075T0700	0.75	7°	6	2.8	40	4	2	●	1
MS2MTBR0100T0030	1	0.5°	8	2.12	45	4	2	●	1
MS2MTBR0100T0100	1	1°	8	2.24	45	4	2	●	1
MS2MTBR0100T0130	1	1.5°	8	2.37	45	4	2	●	1
MS2MTBR0100T0200	1	2°	8	2.49	45	4	2	●	1
MS2MTBR0100T0300	1	3°	8	2.74	45	4	2	●	1
MS2MTBR0100T0400	1	4°	8	2.98	45	4	2	●	1
MS2MTBR0100T0500	1	5°	8	3.23	45	4	2	●	1

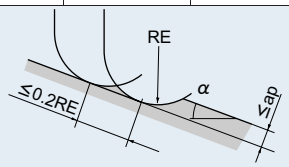
MS2MTB

Order Number	RE	BHTA1	APMX	DCX	LF	DCON	No. of Flutes	Stock	type
MS2MTBR0100T0700	1	7°	8	3.73	50	6	2	●	1
MS2MTBR0125T0030	1.25	0.5°	10	2.65	45	4	2	●	1
MS2MTBR0125T0100	1.25	1°	10	2.81	45	4	2	●	1
MS2MTBR0125T0130	1.25	1.5°	10	2.96	45	4	2	●	1
MS2MTBR0125T0200	1.25	2°	10	3.11	45	4	2	●	1
MS2MTBR0125T0300	1.25	3°	10	3.42	45	4	2	●	1
MS2MTBR0125T0400	1.25	4°	10	3.73	50	6	2	●	1
MS2MTBR0125T0500	1.25	5°	10	4.04	50	6	2	●	1
MS2MTBR0125T0700	1.25	7°	14.5	5.77	60	6	2	●	2
MS2MTBR0150T0700	1.5	7°	12.5	5.72	60	6	2	●	2

MS2MTB

RECOMMENDED CUTTING CONDITIONS

Work material	Carbon steel, Cast iron, Alloy steel, Pre-hardened steel AISI 1050, AISI No 35 B, AISI P20, AISI P21					Hardened steel (45— 55HRC) AISI H13				
R RE (mm)	α≦15°		α>15°		Depth of cut ap (mm)	α≦15°		α>15°		Depth of cut ap (mm)
	Revolution (min⁻¹)	Feed rate (mm/min)	Revolution (min⁻¹)	Feed rate (mm/min)		Revolution (min⁻¹)	Feed rate (mm/min)	Revolution (min⁻¹)	Feed rate (mm/min)	
R0.1	40000	300	40000	250	0.003	40000	300	40000	250	0.003
R0.15	40000	500	40000	350	0.007	40000	500	40000	350	0.007
R0.2	40000	1600	40000	1200	0.02	40000	1300	40000	950	0.015
R0.25	40000	2400	40000	1400	0.025	40000	1900	40000	1100	0.020
R0.3	40000	3200	40000	1600	0.03	40000	2500	40000	1300	0.025
R0.4	40000	4800	40000	2400	0.05	40000	4000	40000	1900	0.04
R0.5	40000	5600	40000	3200	0.06	40000	5600	40000	3000	0.05
R0.75	40000	6500	40000	4000	0.09	40000	6500	32000	3200	0.08
R1	40000	6500	39000	4700	0.11	40000	6500	31000	3500	0.11
R1.25	40000	7000	33000	4500	0.12	36000	6500	26000	3500	0.12
R1.5	40000	7500	27000	4300	0.13	32000	6000	22000	3400	0.13
R2	32000	7500	20000	3600	0.15	25000	6000	16000	2700	0.15
R2.5	25000	6000	16000	2900	0.20	20000	5400	13000	2300	0.20
R3	21000	5800	13000	2600	0.25	17000	4700	10000	2000	0.25
R4	16000	4500	10000	2000	0.30	13000	3600	8000	1500	0.30
R5	13000	3600	8000	1700	0.50	10000	2900	6400	1200	0.50
R6	9000	2500	6000	1300	0.50	7200	2000	4800	1000	0.50



- α is the inclination angle of the machined surface.
- If the depth of cut is shallow, the revolution and feed rate can be increased.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

MS4LTB

MSTAR END MILLS

Ball nose, 4 flute, Taper, For rib milling

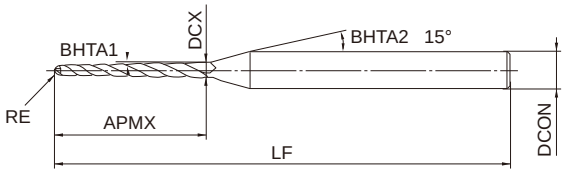
Product Information

UWC 20° MS

Work Material

P M S H F M

Technical Info >> 1993
ISO13399 Property >> 1966
SYMBOL DESCRIPTIONS >> 664
END MILLS SELECTION CHART >> 668



R	0.3≦RE≦1
	±0.03
	±5'
h6	4≦DCON≦6
	0
	- 0.008

●Inventory maintained in Japan. Unit : mm

Order Number	RE	BHTA1	APMX	DCX	LF	DCON	No. of Flutes	Stock	type
MS4LTBR0030T0030L04	0.3	0.5°	4	0.66	45	4	4	●	1
MS4LTBR0030T0030L06	0.3	0.5°	6	0.7	45	4	4	●	1
MS4LTBR0030T0100L04	0.3	1°	4	0.73	45	4	4	●	1
MS4LTBR0030T0100L06	0.3	1°	6	0.8	45	4	4	●	1
MS4LTBR0030T0130L04	0.3	1.5°	4	0.79	45	4	4	●	1
MS4LTBR0030T0130L06	0.3	1.5°	6	0.9	45	4	4	●	1
MS4LTBR0030T0200L04	0.3	2°	4	0.86	45	4	4	●	1
MS4LTBR0030T0200L06	0.3	2°	6	1	45	4	4	●	1
MS4LTBR0040T0030L06	0.4	0.5°	6	0.9	50	4	4	●	1
MS4LTBR0040T0030L08	0.4	0.5°	8	0.93	50	4	4	●	1
MS4LTBR0040T0030L10	0.4	0.5°	10	0.97	50	4	4	●	1
MS4LTBR0040T0100L06	0.4	1°	6	1	50	4	4	●	1
MS4LTBR0040T0100L08	0.4	1°	8	1.07	50	4	4	●	1
MS4LTBR0040T0100L10	0.4	1°	10	1.14	50	4	4	●	1
MS4LTBR0040T0130L06	0.4	1.5°	6	1.09	50	4	4	●	1
MS4LTBR0040T0130L08	0.4	1.5°	8	1.2	50	4	4	●	1
MS4LTBR0040T0130L10	0.4	1.5°	10	1.3	50	4	4	●	1
MS4LTBR0040T0200L06	0.4	2°	6	1.19	50	4	4	●	1
MS4LTBR0040T0200L08	0.4	2°	8	1.33	50	4	4	●	1
MS4LTBR0040T0200L10	0.4	2°	10	1.47	50	4	4	●	1
MS4LTBR0050T0030L08	0.5	0.5°	8	1.13	50	4	4	●	1
MS4LTBR0050T0030L10	0.5	0.5°	10	1.17	50	4	4	●	1
MS4LTBR0050T0030L12	0.5	0.5°	12	1.2	50	4	4	●	1
MS4LTBR0050T0030L16	0.5	0.5°	16	1.27	55	4	4	●	1
MS4LTBR0050T0100L08	0.5	1°	8	1.26	50	4	4	●	1
MS4LTBR0050T0100L10	0.5	1°	10	1.33	50	4	4	●	1
MS4LTBR0050T0100L12	0.5	1°	12	1.4	50	4	4	●	1
MS4LTBR0050T0100L16	0.5	1°	16	1.54	55	4	4	●	1
MS4LTBR0050T0130L08	0.5	1.5°	8	1.39	50	4	4	●	1
MS4LTBR0050T0130L10	0.5	1.5°	10	1.5	50	4	4	●	1
MS4LTBR0050T0130L12	0.5	1.5°	12	1.6	50	4	4	●	1
MS4LTBR0050T0130L16	0.5	1.5°	16	1.81	55	4	4	●	1

MS4LTB

Order Number	RE	BHTA1	APMX	DCX	LF	DCON	No. of Flutes	Stock	type
MS4LTBR0050T0200L08	0.5	2°	8	1.52	50	4	4	●	1
MS4LTBR0050T0200L10	0.5	2°	10	1.66	50	4	4	●	1
MS4LTBR0050T0200L12	0.5	2°	12	1.8	50	4	4	●	1
MS4LTBR0050T0200L16	0.5	2°	16	2.08	55	4	4	●	1
MS4LTBR0060T0030L08	0.6	0.5°	8	1.33	50	4	4	●	1
MS4LTBR0060T0030L10	0.6	0.5°	10	1.36	50	4	4	●	1
MS4LTBR0060T0030L12	0.6	0.5°	12	1.4	50	4	4	●	1
MS4LTBR0060T0030L16	0.6	0.5°	16	1.47	55	4	4	●	1
MS4LTBR0060T0100L08	0.6	1°	8	1.46	50	4	4	●	1
MS4LTBR0060T0100L10	0.6	1°	10	1.53	50	4	4	●	1
MS4LTBR0060T0100L12	0.6	1°	12	1.6	50	4	4	●	1
MS4LTBR0060T0100L16	0.6	1°	16	1.74	55	4	4	●	1
MS4LTBR0060T0130L08	0.6	1.5°	8	1.59	50	4	4	●	1
MS4LTBR0060T0130L10	0.6	1.5°	10	1.69	50	4	4	●	1
MS4LTBR0060T0130L12	0.6	1.5°	12	1.8	50	4	4	●	1
MS4LTBR0060T0130L16	0.6	1.5°	16	2.01	55	4	4	●	1
MS4LTBR0060T0200L08	0.6	2°	8	1.72	50	4	4	●	1
MS4LTBR0060T0200L10	0.6	2°	10	1.86	50	4	4	●	1
MS4LTBR0060T0200L12	0.6	2°	12	2	50	4	4	●	1
MS4LTBR0060T0200L16	0.6	2°	16	2.28	55	4	4	●	1
MS4LTBR0075T0030L08	0.75	0.5°	8	1.63	50	4	4	●	1
MS4LTBR0075T0030L10	0.75	0.5°	10	1.66	50	4	4	●	1
MS4LTBR0075T0030L12	0.75	0.5°	12	1.7	50	4	4	●	1
MS4LTBR0075T0030L16	0.75	0.5°	16	1.77	55	4	4	●	1
MS4LTBR0075T0030L20	0.75	0.5°	20	1.84	60	4	4	●	1
MS4LTBR0075T0100L08	0.75	1°	8	1.75	50	4	4	●	1
MS4LTBR0075T0100L10	0.75	1°	10	1.82	50	4	4	●	1
MS4LTBR0075T0100L12	0.75	1°	12	1.89	50	4	4	●	1
MS4LTBR0075T0100L16	0.75	1°	16	2.03	55	4	4	●	1
MS4LTBR0075T0100L20	0.75	1°	20	2.17	60	4	4	●	1
MS4LTBR0075T0130L08	0.75	1.5°	8	1.88	50	4	4	●	1
MS4LTBR0075T0130L10	0.75	1.5°	10	1.98	50	4	4	●	1
MS4LTBR0075T0130L12	0.75	1.5°	12	2.09	50	4	4	●	1
MS4LTBR0075T0130L16	0.75	1.5°	16	2.3	55	4	4	●	1
MS4LTBR0075T0130L20	0.75	1.5°	20	2.51	60	4	4	●	1
MS4LTBR0075T0200L08	0.75	2°	8	2.01	50	4	4	●	1
MS4LTBR0075T0200L10	0.75	2°	10	2.15	50	4	4	●	1
MS4LTBR0075T0200L12	0.75	2°	12	2.29	50	4	4	●	1
MS4LTBR0075T0200L16	0.75	2°	16	2.57	55	4	4	●	1
MS4LTBR0075T0200L20	0.75	2°	20	2.843	60	4	4	●	1
MS4LTBR0090T0030L08	0.9	0.5°	8	1.92	50	4	4	●	1
MS4LTBR0090T0030L10	0.9	0.5°	10	1.96	50	4	4	●	1
MS4LTBR0090T0030L12	0.9	0.5°	12	1.99	50	4	4	●	1
MS4LTBR0090T0030L16	0.9	0.5°	16	2.06	55	4	4	●	1
MS4LTBR0090T0030L20	0.9	0.5°	20	2.13	60	4	4	●	1
MS4LTBR0090T0100L08	0.9	1°	8	2.05	50	4	4	●	1
MS4LTBR0090T0100L10	0.9	1°	10	2.12	50	4	4	●	1
MS4LTBR0090T0100L12	0.9	1°	12	2.19	50	4	4	●	1
MS4LTBR0090T0100L16	0.9	1°	16	2.33	55	4	4	●	1
MS4LTBR0090T0100L20	0.9	1°	20	2.47	60	4	4	●	1
MS4LTBR0090T0130L08	0.9	1.5°	8	2.17	50	4	4	●	1
MS4LTBR0090T0130L10	0.9	1.5°	10	2.28	50	4	4	●	1
MS4LTBR0090T0130L12	0.9	1.5°	12	2.38	50	4	4	●	1
MS4LTBR0090T0130L16	0.9	1.5°	16	2.59	55	4	4	●	1

MS4LTB

Order Number	RE	BHTA1	APMX	DCX	LF	DCON	No. of Flutes	Stock	type
MS4LTBR0090T0130L20	0.9	1.5°	20	2.8	60	4	4	●	1
MS4LTBR0090T0200L08	0.9	2°	8	2.3	50	4	4	●	1
MS4LTBR0090T0200L10	0.9	2°	10	2.44	50	4	4	●	1
MS4LTBR0090T0200L12	0.9	2°	12	2.58	50	4	4	●	1
MS4LTBR0090T0200L16	0.9	2°	16	2.86	55	4	4	●	1
MS4LTBR0090T0200L20	0.9	2°	20	3.13	60	4	4	●	1
MS4LTBR0100T0030L10	1	0.5°	10	2.16	50	4	4	●	1
MS4LTBR0100T0030L12	1	0.5°	12	2.19	50	4	4	●	1
MS4LTBR0100T0030L16	1	0.5°	16	2.26	55	4	4	●	1
MS4LTBR0100T0030L20	1	0.5°	20	2.33	60	4	4	●	1
MS4LTBR0100T0030L25	1	0.5°	25	2.42	65	4	4	●	1
MS4LTBR0100T0030L30	1	0.5°	30	2.51	65	4	4	●	1
MS4LTBR0100T0100L10	1	1°	10	2.31	50	4	4	●	1
MS4LTBR0100T0100L12	1	1°	12	2.38	50	4	4	●	1
MS4LTBR0100T0100L16	1	1°	16	2.52	55	4	4	●	1
MS4LTBR0100T0100L20	1	1°	20	2.66	60	4	4	●	1
MS4LTBR0100T0100L25	1	1°	25	2.84	65	4	4	●	1
MS4LTBR0100T0100L30	1	1°	30	3.01	65	4	4	●	1
MS4LTBR0100T0130L10	1	1.5°	10	2.47	50	4	4	●	1
MS4LTBR0100T0130L12	1	1.5°	12	2.58	50	4	4	●	1
MS4LTBR0100T0130L16	1	1.5°	16	2.79	55	4	4	●	1
MS4LTBR0100T0130L20	1	1.5°	20	3	60	4	4	●	1
MS4LTBR0100T0130L25	1	1.5°	25	3.26	65	6	4	●	1
MS4LTBR0100T0130L30	1	1.5°	30	3.52	65	6	4	●	1
MS4LTBR0100T0200L10	1	2°	10	2.63	50	4	4	●	1
MS4LTBR0100T0200L12	1	2°	12	2.77	50	4	4	●	1
MS4LTBR0100T0200L16	1	2°	16	3.05	55	4	4	●	1
MS4LTBR0100T0200L20	1	2°	20	3.33	60	4	4	●	1
MS4LTBR0100T0200L25	1	2°	25	3.68	65	6	4	●	1
MS4LTBR0100T0200L30	1	2°	30	4.03	65	6	4	●	1

MS4LTB

RECOMMENDED CUTTING CONDITIONS

Work material		Carbon steel, Cast iron, Alloy steel, Pre-hardened steel AISI 1050, AISI No 35 B, AISI P20, AISI P21			Hardened steel (45— 55HRC) AISI H13		
R RE (mm)	Length of Cut APMX(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)
R0.3	4	18000—32000	250—600	0.01	13000—24000	200—400	0.005
	6			0.007			0.004
R0.4	6	14000—24000	250—600	0.025	10000—18000	200—400	0.013
	8			0.02			0.01
	10			0.015			0.008
R0.5	8	11000—19000	300—800	0.025	8000—14000	200—500	0.013
	10			0.02			0.01
	12			0.018			0.009
	16			0.015			0.008
R0.6	8	9200—16000	300—800	0.035	6600—12000	200—500	0.018
	10			0.03			0.015
	12			0.027			0.013
	16			0.02			0.01
R0.75	8	7500—13000	300—800	0.05	5300—9500	200—500	0.025
	10			0.04			0.02
	12			0.035			0.018
	16			0.03			0.015
	20			0.02			0.01
R0.9	8	6200—11000	300—800	0.08	4400—8000	200—500	0.04
	10			0.07			0.035
	12			0.06			0.035
	16			0.05			0.03
	20			0.04			0.02
R1	10	5500—9500	300—800	0.08	4000—7200	200—500	0.045
	12			0.07			0.04
	16			0.05			0.03
	20			0.04			0.02
	25			0.03			0.015
	30			0.02			0.01

- If the depth of cut is shallow, the revolution and feed rate can be increased.
- Cutting condition may be considerably different due to the overhang (milling depth), depth of cut, and machine tools. Please see the above table as a standard.

VC4STB

MIRACLE END MILLS

Ball nose taper end mill, Short cut length, 4 flute

Product Information

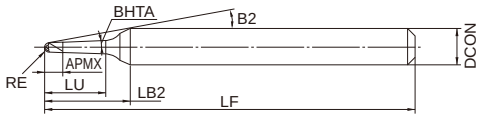
UWC 30° VC

RE<0.5 RE≧0.5

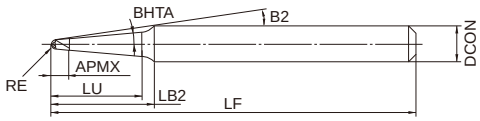
Work Material

P M S H F M

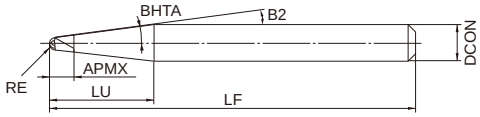
Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668



Type1



Type2



Type3

R	0.3≦RE≦4	
	±0.01	
h6	DCON=6	8≦DCON≦10
	0 - 0.008	0 - 0.009

●Inventory maintained in Japan. Unit : mm

Order Number	RE	BHTA	APMX	LU	LB2	B2	LF	DCON	No. of Flutes	Stock	type
VC4STBR0030T0130N05	0.3	1.5°	1	5	9	17.2°	60	6	4	●	1
VC4STBR0030T0200N05	0.3	2°	1	5	9	17.2°	60	6	4	●	1
VC4STBR0030T0500N05	0.3	5°	1	5	8.8	17.6°	60	6	4	●	1
VC4STBR0030T1000N15	0.3	10°	1	15		10.4°	60	6	4	●	3
VC4STBR0040T0130N10	0.4	1.5°	2	10	14	10.8°	60	6	4	●	1
VC4STBR0040T0130N15	0.4	1.5°	2	15	19	8°	60	6	4	●	1
VC4STBR0040T0200N10	0.4	2°	2	10	14	10.8°	60	6	4	●	1
VC4STBR0040T0500N10	0.4	5°	2	10	13.5	11.2°	60	6	4	●	1
VC4STBR0040T0700N10	0.4	7°	7	10	12.2	12.4°	60	6	4	●	2
VC4STBR0040T1000N15	0.4	10°	3	15		10.1°	60	6	4	●	3
VC4STBR0050T0130N10	0.5	1.5°	2	10	14	10.5°	60	6	4	●	1
VC4STBR0050T0130N15	0.5	1.5°	2	15	19	7.7°	60	6	4	●	1
VC4STBR0050T0130N20	0.5	1.5°	2	20	24	6.1°	60	6	4	●	1
VC4STBR0050T0200N10	0.5	2°	2	10	14	10.5°	60	6	4	●	1
VC4STBR0050T0200N15	0.5	2°	2	15	18.9	7.8°	60	6	4	●	1
VC4STBR0050T0200N20	0.5	2°	3	20	24	6.1°	60	6	4	●	1
VC4STBR0050T0500N10	0.5	5°	3	10	13.6	10.8°	60	6	4	●	1
VC4STBR0050T0500N15	0.5	5°	3	15	17.2	8.5°	60	6	4	●	2
VC4STBR0050T0500N20	0.5	5°	3	20	21.8	6.7°	60	6	4	●	2
VC4STBR0050T0700N10	0.5	7°	7	10	12.1	12.2°	60	6	4	●	2
VC4STBR0050T0700N15	0.5	7°	7	15	16.6	8.9°	60	6	4	●	2
VC4STBR0050T0700N20	0.5	7°	7	20		7.3°	60	6	4	●	3

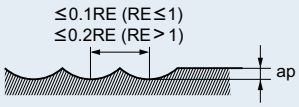
VC4STB

Order Number	RE	BHTA	APMX	LU	LB2	B2	LF	DCON	No. of Flutes	Stock	type
VC4STBR0050T1000N14	0.5	10°	3	14		10.5°	60	6	4	●	3
VC4STBR0075T0200N10	0.75	2°	3	10	14	9.6°	60	6	4	●	1
VC4STBR0075T0500N15	0.75	5°	3	15	17	7.9°	60	6	4	●	2
VC4STBR0100T0130N10	1	1.5°	4	10	13.5	9.1°	60	6	4	●	1
VC4STBR0100T0130N15	1	1.5°	4	15	18.5	6.5°	60	6	4	●	1
VC4STBR0100T0130N20	1	1.5°	4	20	23.5	5.1°	60	6	4	●	1
VC4STBR0100T0200N06	1	2°	4	6	8.7	14.4°	60	6	4	●	2
VC4STBR0100T0200N10	1	2°	4	10	13.8	8.9°	60	6	4	●	1
VC4STBR0100T0200N15	1	2°	4	15	17.5	6.9°	60	6	4	●	2
VC4STBR0100T0500N10	1	5°	4	10	12.2	10.1°	60	6	4	●	2
VC4STBR0100T0500N15	1	5°	4	15	16.8	7.2°	60	6	4	●	2
VC4STBR0100T0500N23	1	5°	4	23		5.2°	60	6	4	●	3
VC4STBR0100T0700N17	1	7°	7	17		7.1°	60	6	4	●	3
VC4STBR0100T1000N12	1	10°	4	12		10.3°	60	6	4	●	3
VC4STBR0125T0500N15	1.25	5°	4	15	16.5	6.6°	60	6	4	●	2
VC4STBR0150T0130N15	1.5	1.5°	4	15	17.3	5.4°	60	6	4	●	2
VC4STBR0150T0130N20	1.5	1.5°	4	20	22.2	4.2°	60	6	4	●	2
VC4STBR0150T0300N15	1.5	3°	4	15	16.9	5.6°	60	6	4	●	2
VC4STBR0150T0500N10	1.5	5°	4	10	11.7	8.3°	60	6	4	●	2
VC4STBR0150T0500N18	1.5	5°	4	18		5.2°	60	6	4	●	3
VC4STBR0175T0500N15	1.75	5°	4	15		5.4°	60	6	4	●	3
VC4STBR0200T0130N15	2	1.5°	5	15	16.8	3.9°	60	6	4	●	2
VC4STBR0200T0130N20	2	1.5°	5	20	21.6	3°	60	6	4	●	2
VC4STBR0200T0300N21	2	3°	4	21		3.1°	60	6	4	●	3
VC4STBR0200T0500N13	2	5°	4	13		5.2°	60	6	4	●	3
VC4STBR0200T0700N18	2	7°	7	18		7.1°	60	8	4	●	3
VC4STBR0300T0130N15	3	1.5°	6	15	16.8	4.2°	90	8	4	●	2
VC4STBR0300T0130N20	3	1.5°	6	20	21.7	3.1°	90	8	4	●	2
VC4STBR0300T0300N22	3	3°	6	22		3.1°	90	8	4	●	3
VC4STBR0400T0130N15	4	1.5°	8	15	16.9	4.4°	90	10	4	●	2
VC4STBR0400T0300N22	4	3°	8	22		3.2°	90	10	4	●	3

VC4STB

RECOMMENDED CUTTING CONDITIONS

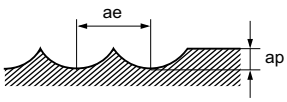
Work material			Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21				Hardened steel (45— 55HRC) AISI H13				Hardened steel (55— 62HRC) AISI D2			
R RE (mm)	one side BHTA	Neck length LU(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)
R0.3	1.5°	5	40000	1600	0.08	0.12	40000	1200	0.06	0.10	40000	700	0.04	0.06
	2°	5	40000	1600	0.08	0.12	40000	1200	0.06	0.10	40000	700	0.04	0.06
	5°	5	40000	1600	0.08	0.12	40000	1200	0.06	0.10	40000	700	0.04	0.06
	10°	15	40000	1600	0.05	0.08	40000	1200	0.04	0.06	40000	700	0.03	0.04
R0.4	1.5°	10	40000	2000	0.07	0.11	40000	1500	0.06	0.08	30000	700	0.04	0.05
	1.5°	15	40000	2000	0.05	0.08	40000	1500	0.04	0.06	30000	800	0.03	0.04
	2°	10	40000	2000	0.07	0.11	40000	1500	0.06	0.08	30000	800	0.04	0.05
	5°	10	40000	2000	0.07	0.11	40000	1500	0.06	0.08	30000	800	0.04	0.05
	7°	10	40000	2000	0.07	0.11	40000	1500	0.06	0.08	30000	800	0.04	0.05
	10°	15	40000	2000	0.06	0.09	40000	1500	0.05	0.07	30000	800	0.03	0.05
R0.5	1.5°	10	38000	2500	0.11	0.16	35000	1600	0.08	0.13	25000	800	0.05	0.08
	1.5°	15	38000	2500	0.09	0.14	35000	1600	0.07	0.11	25000	800	0.05	0.07
	1.5°	20	38000	2500	0.06	0.09	35000	1600	0.05	0.07	25000	800	0.03	0.05
	2°	10	38000	2500	0.11	0.16	35000	1600	0.08	0.13	25000	800	0.05	0.08
	2°	15	38000	2500	0.09	0.14	35000	1600	0.07	0.11	25000	800	0.05	0.07
	2°	20	38000	2500	0.06	0.09	35000	1600	0.05	0.07	25000	800	0.03	0.05
	5°	10	38000	2500	0.12	0.18	35000	1600	0.10	0.14	25000	800	0.06	0.09
	5°	15	38000	2500	0.09	0.14	35000	1600	0.07	0.11	25000	800	0.05	0.07
	5°	20	38000	2500	0.08	0.11	35000	1600	0.06	0.09	25000	800	0.04	0.06
	7°	10	38000	2500	0.12	0.18	35000	1600	0.10	0.14	25000	800	0.06	0.09
	7°	15	38000	2500	0.11	0.16	35000	1600	0.08	0.13	25000	800	0.05	0.08
	7°	20	38000	2500	0.08	0.11	35000	1600	0.06	0.09	25000	800	0.04	0.06
	10°	14	38000	2500	0.11	0.16	35000	1600	0.08	0.13	25000	800	0.05	0.08
R0.75	2°	10	38000	2500	0.18	0.27	35000	1600	0.14	0.22	18000	800	0.09	0.14
	5°	15	38000	2500	0.16	0.24	35000	1600	0.13	0.19	18000	800	0.08	0.12
R1	1.5°	10	35000	2800	0.18	0.27	30000	1800	0.14	0.22	15000	1000	0.09	0.14
	1.5°	15	35000	2800	0.16	0.24	30000	1800	0.13	0.19	15000	1000	0.08	0.12
	1.5°	20	35000	2800	0.14	0.21	30000	1800	0.11	0.17	15000	1000	0.07	0.11
	2°	6	35000	2800	0.20	0.30	30000	1800	0.16	0.24	15000	1000	0.10	0.15
	2°	10	35000	2800	0.18	0.27	30000	1800	0.14	0.22	15000	1000	0.09	0.14
	2°	15	35000	2800	0.16	0.24	30000	1800	0.13	0.19	15000	1000	0.08	0.12
	5°	10	35000	2800	0.18	0.27	30000	1800	0.14	0.22	15000	1000	0.09	0.14
	5°	15	35000	2800	0.18	0.27	30000	1800	0.14	0.22	15000	1000	0.09	0.14
	5°	23	35000	2800	0.14	0.21	30000	1800	0.11	0.17	15000	1000	0.07	0.11
	7°	17	35000	2800	0.16	0.24	30000	1800	0.13	0.19	15000	1000	0.08	0.12
	10°	12	35000	2800	0.18	0.27	30000	1800	0.14	0.22	15000	1000	0.09	0.14
R1.25	5°	15	35000	2800	0.23	0.34	30000	1800	0.18	0.27	15000	1000	0.11	0.17
R1.5	1.5°	15	32000	3000	0.23	0.34	27000	2000	0.18	0.27	16000	1200	0.11	0.17
	1.5°	20	32000	3000	0.23	0.34	27000	2000	0.18	0.27	16000	1200	0.11	0.17
	3°	15	32000	3000	0.23	0.34	27000	2000	0.18	0.27	16000	1200	0.11	0.17
	5°	10	32000	3000	0.25	0.38	27000	2000	0.20	0.30	16000	1200	0.13	0.19
	5°	18	32000	3000	0.23	0.34	27000	2000	0.18	0.27	16000	1200	0.11	0.17
R1.75	5°	15	27500	3500	0.23	0.34	23000	2500	0.18	0.27	14000	1500	0.11	0.17



VC4STB

RECOMMENDED CUTTING CONDITIONS

Work material			Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21				Hardened steel (45— 55HRC) AISI H13				Hardened steel (55— 62HRC) AISI D2			
R RE (mm)	one side BHTA	Neck length LU(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)
R2	1.5°	15	24000	3500	0.23	0.34	20000	2500	0.18	0.27	12000	1500	0.11	0.17
	1.5°	20	24000	3500	0.23	0.34	20000	2500	0.18	0.27	12000	1500	0.11	0.17
	3°	21	24000	3500	0.23	0.34	20000	2500	0.18	0.27	12000	1500	0.11	0.17
	5°	13	24000	3500	0.25	0.38	20000	2500	0.20	0.30	12000	1500	0.13	0.19
	7°	18	24000	3500	0.23	0.34	20000	2500	0.18	0.27	12000	1500	0.11	0.17
R3	1.5°	15	16000	3500	0.30	0.45	13500	2500	0.24	0.36	8000	1500	0.15	0.23
	1.5°	20	16000	3500	0.30	0.45	13500	2500	0.24	0.36	8000	1500	0.15	0.23
	3°	22	16000	3500	0.30	0.45	13500	2500	0.24	0.36	8000	1500	0.15	0.23
R4	1.5°	15	12000	3500	0.30	0.45	10000	2500	0.24	0.36	6000	1500	0.15	0.23
	3°	22	12000	3500	0.30	0.45	10000	2500	0.24	0.36	6000	1500	0.15	0.23



- If the depth of cut is shallow, the revolution and feed rate can be increased.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

C4LATB

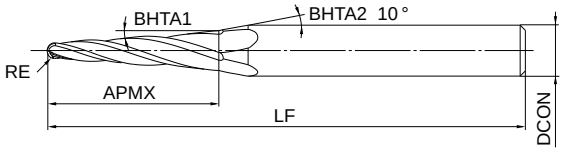
Ball nose taper end Mill, Long cut length, 4 flute, For aluminum Impellers

Product Information

Technical Info >> 1993
ISO13399 Property >> 1966

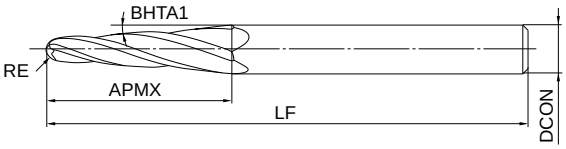
Work Material

SYMBOL DESCRIPTIONS >> 664
END MILLS SELECTION CHART >> 668



Type1

R	RE≦2	
	±0.010	
	±5'	
h6	DCON=6	DCON=8
	0 - 0.008	0 - 0.009



Type2

●Inventory maintained in Japan. Unit : mm

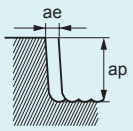
Order Number	RE	BHTA1	APMX	LF	DCON	No. of Flutes	Stock	type
C4LATBR050T040AP20	0.5	4°	20	70	6	4	●	1
C4LATBR100T040AP20	1	4°	20	70	6	4	●	1
C4LATBR150T040AP20	1.5	4°	20	75	8	4	●	1
C4LATBR200T040AP30	2	4°	30	75	8	4	●	2

C4LATB

RECOMMENDED CUTTING CONDITIONS

Side Milling

(mm)

Work material	Aluminum alloy			
RE	n (min⁻¹)	vf (mm/min)	ap	ae
R0.5	20000	2000	15	0.75
R1	20000	4000	15	1.5
R1.5	20000	5200	15	2.25
R2	20000	5200	23	3
Depth of cut				

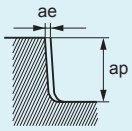
Slotting

(mm)

Work material	Aluminum alloy		
RE	n (min⁻¹)	vf (mm/min)	ap
R0.5	20000	600	10
R1	20000	2800	10
R1.5	20000	4000	10
R2	20000	4000	15
Depth of cut			

Side Milling (For Finishing)

(mm)

Work material	Aluminum alloy			
RE	n (min⁻¹)	vf (mm/min)	ap	ae
R0.5	20000	800	18	0.1
R1	20000	2000	18	0.2
R1.5	20000	2400	18	0.3
R2	20000	2400	27	0.3
Depth of cut				

1) Water-soluble cutting fluid is recommended.
2) Climb cutting is recommended for side milling.
3) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately, or set the depth of cut smaller.

VC2C

MIRACLE END MILLS

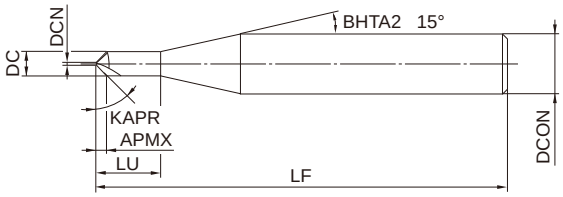
Chamfer cutter, 2 flute

Product Information

Work Material

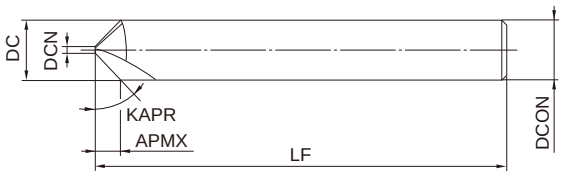
P M S H F M

Technical Info >> 1993
ISO13399 Property >> 1966
SYMBOL DESCRIPTIONS >> 664
END MILLS SELECTION CHART >> 668



Type1

DCN		
±0.02		
DCON=6	8≦DCON≦10	DCON=12
0 - 0.008	0 - 0.009	0 - 0.011



Type2

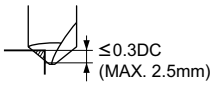
●Inventory maintained in Japan. Unit : mm

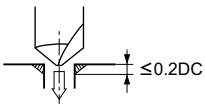
Order Number	DC	DCN	APMX	KAPR	LU	LF	DCON	No. of Flutes	Stock	type
VC2CD0200	2	0.3	0.85	45°	6	50	6	2	●	1
VC2CD0400	4	0.3	1.85	45°	12	50	6	2	●	1
VC2CD0600	6	0.3	2.85	45°		50	6	2	●	2
VC2CD0800	8	0.4	3.8	45°		60	8	2	●	2
VC2CD1000	10	0.5	4.75	45°		70	10	2	●	2
VC2CD1200	12	0.5	5.75	45°		75	12	2	●	2

VC2C

RECOMMENDED CUTTING CONDITIONS

Work material	Carbon steel, Cast iron, Alloy steel (—30HRC) AISI 1050, AISI No 35 B, AISI P20		Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V		Hardened steel (45— 55HRC) AISI H13	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
2	16000	960	11000	590	9500	460	8000	320
4	8000	480	5600	300	4800	230	4000	160
6	5300	320	3700	200	3200	150	2700	110
8	4000	240	2800	150	2400	120	2000	80
10	3200	190	2200	120	1900	90	1600	60
12	2700	160	1900	100	1600	80	1300	50





- When cutting austenitic stainless steel, the use of water-soluble cutting fluid is effective.
- If the depth of cut is shallow, the revolution and feed rate can be increased.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

DFC4JC

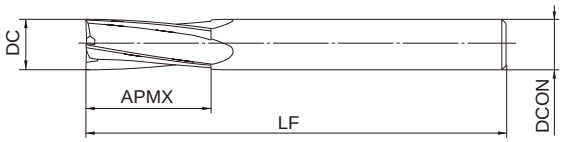
DFC END MILLS

Diamond coating end mill, 4 flute

Product Information

Work Material

Technical Info >> 1993
ISO13399 Property >> 1966
SYMBOL DESCRIPTIONS >> 664
END MILLS SELECTION CHART >> 668



Type1

6≦DC≦12		
0 - 0.03		
DCON=6	8≦DCON≦10	DCON=12
0 - 0.008	0 - 0.009	0 - 0.011

●Inventory maintained in Japan. Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
DFC4JCD0600	6	20	70	6	4	●	1
DFC4JCD0800	8	30	80	8	4	●	1
DFC4JCD1000	10	30	90	10	4	●	1
DFC4JCD1200	12	30	100	12	4	●	1

DFC4JC

RECOMMENDED CUTTING CONDITIONS

Work material	CFRP	
Dia. DC (mm)	Revolution (min^{-1})	Feed rate (mm/min)
6	11000	950
8	8000	780
10	6400	700
12	5300	650

- Cutting conditions may differ considerably due to the kind of CFRP, the rigidity of the machine, or the clamping and geometry of the workpiece. Please use the above table as a guideline.
- When high machining accuracy is needed or if large burrs or delamination occur, we recommend reducing the feed rate.
- When the depth of cut is greater than 0.8DC, we recommend reducing the feed rate.
- Please take precautions against dust.

DF4XL

DF END MILLS

Diamond coating end mill, Long neck, 4 flute, For graphite

Product Information

UWC 30° DF

DC<3 DC=3

Technical Info >> 1993

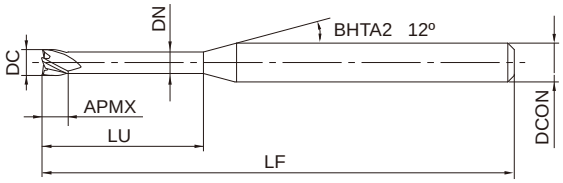
ISO13399 Property >> 1966

Work Material

N F M

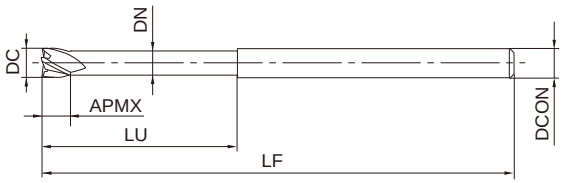
SYMBOL DESCRIPTIONS >> 664

END MILLS SELECTION CHART >> 668



Type1

	1≦DC≦12		
	0 - 0.02		
h6	4≦DCON≦6	8≦DCON≦10	DCON=12
	0 - 0.008	0 - 0.009	0 - 0.011



Type2

●Inventory maintained in Japan. Unit : mm

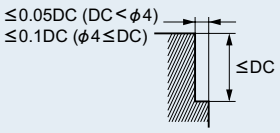
Order Number	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	type
DF4XLD0100N060	1	1.5	6	0.94	50	4	4	●	1
DF4XLD0100N080	1	1.5	8	0.94	50	4	4	●	1
DF4XLD0100N100	1	1.5	10	0.94	50	4	4	●	1
DF4XLD0150N100	1.5	2.3	10	1.44	60	4	4	●	1
DF4XLD0150N160	1.5	2.3	16	1.44	60	4	4	●	1
DF4XLD0200N100	2	3	10	1.9	60	4	4	●	1
DF4XLD0200N160	2	3	16	1.9	60	4	4	●	1
DF4XLD0200N200	2	3	20	1.9	60	4	4	●	1
DF4XLD0300N160	3	4.5	16	2.9	70	4	4	●	1
DF4XLD0300N200	3	4.5	20	2.9	70	4	4	●	1
DF4XLD0300N300	3	4.5	30	2.9	70	4	4	●	1
DF4XLD0400N200	4	6	20	3.9	80	4	4	●	2
DF4XLD0400N400	4	6	40	3.9	80	4	4	●	2
DF4XLD0600N300	6	9	30	5.85	70	6	4	●	2
DF4XLD0800N300	8	12	30	7.85	90	8	4	●	2
DF4XLD1000N300	10	15	30	9.7	90	10	4	●	2
DF4XLD1200N300	12	18	30	11.7	110	12	4	●	2

DF4XL

RECOMMENDED CUTTING CONDITIONS

·Side milling

Work material		Graphite				Copper, Copper alloys			
Dia. DC(mm)	Neck length LU(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (mm)	Width of cut (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (mm)	Width of cut (mm)
1	6	30000	1300	1	0.05	30000	1300	1	0.05
	8	25000	1000	1	0.05	25000	1000	1	0.05
	10	22000	700	1	0.05	22000	700	1	0.05
1.5	10	25000	1200	1.5	0.075	21000	1000	1.5	0.075
	16	18000	800	1.5	0.075	18000	800	1.5	0.075
2	10	22000	1500	2	0.1	16000	1100	2	0.1
	16	19000	1100	2	0.1	16000	930	2	0.1
	20	16000	800	2	0.1	16000	800	2	0.1
3	16	21000	1900	3	0.15	10600	960	3	0.15
	20	18000	1500	3	0.15	10600	890	3	0.15
	30	14000	1000	3	0.15	10600	760	3	0.15
4	20	18000	2400	4	0.4	8000	1100	4	0.4
	40	13000	1500	4	0.4	8000	920	4	0.4
6	30	14000	3200	6	0.6	5300	1200	6	0.6
8	30	10500	2900	8	0.8	4000	1100	8	0.8
10	30	8700	2600	10	1.0	3200	960	10	1.0
12	30	7200	2200	12	1.2	2650	800	12	1.2

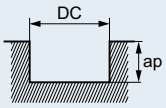


- When high machining accuracy is needed, or the workpiece becomes chipped, we recommend lowering the feed rate.
- Use a milling machine dedicated for graphite.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

DF4XL

·Slotting

Work material		Graphite			Copper, Copper alloys		
Dia. DC(mm)	Neck length LU(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (mm)
1	6	30000	1000	0.1	30000	980	0.1
	8	25000	700	0.08	25000	700	0.08
	10	22000	500	0.06	22000	500	0.06
1.5	10	25000	1100	0.14	21000	750	0.14
	16	18000	600	0.1	18000	600	0.1
2	10	22000	1200	0.2	16000	820	0.2
	16	19000	800	0.16	16000	700	0.16
	20	16000	600	0.12	16000	600	0.12
3	16	21000	1400	0.3	10600	720	0.3
	20	18000	1100	0.25	10600	670	0.25
	30	14000	700	0.2	10600	570	0.2
4	20	18000	1800	0.5	8000	820	0.5
	40	13000	900	0.4	8000	690	0.4
6	30	14000	2300	1.2	5300	900	1.2
8	30	10500	2000	2.0	4000	820	2.0
10	30	8700	1900	3.0	3200	720	3.0
12	30	7200	1700	4.0	2650	600	4.0



- When high machining accuracy is needed, or the workpiece becomes chipped, we recommend lowering the feed rate.
- Use a milling machine dedicated for graphite.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

DF4JC

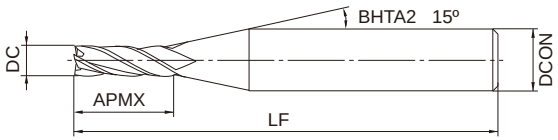
DF END MILLS

Diamond coating end mill, Semi long cut length, 4 flute, For graphite

Product Information

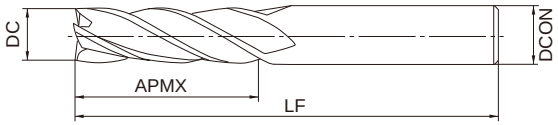
Work Material

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668



Type1

3≦DC≦12		
0 - 0.02		
DCON=6	8≦DCON≦10	DCON=12
0 - 0.008	0 - 0.009	0 - 0.011



Type2

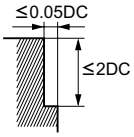
●Inventory maintained in Japan. Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
DF4JCD0300	3	12	60	6	4	●	1
DF4JCD0400	4	16	60	6	4	●	1
DF4JCD0600	6	24	60	6	4	●	2
DF4JCD0800	8	28	70	8	4	●	2
DF4JCD1000	10	35	90	10	4	●	2
DF4JCD1200	12	36	110	12	4	●	2

DF4JC

RECOMMENDED CUTTING CONDITIONS

Work material	Graphite				Copper, Copper alloys			
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (mm)	Width of cut (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (mm)	Width of cut (mm)
3	22000	2500	6	0.15	10600	280	6	0.15
4	18000	2900	8	0.2	8000	330	8	0.2
6	14000	3200	12	0.3	6400	380	12	0.3
8	10500	2900	16	0.4	4000	420	16	0.4
10	8700	2600	20	0.5	3200	460	20	0.5
12	7200	2200	24	0.6	2700	460	24	0.6



- When high machining accuracy is needed, or the workpiece becomes chipped, we recommend lowering the feed rate.
- Use a milling machine dedicated for graphite.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

DLC2MA

DLC END MILLS

Diamond coating end mill, Medium cut length, 2 flute

Product Information

UWC 30° 37.5° DLC Sharp

DC<3 DC≧3 DC<3 DC≧3

Technical Info >> 1993

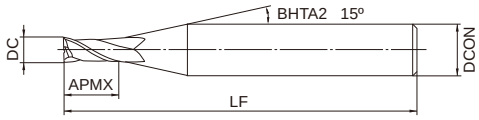
ISO13399 Property >> 1966

Work Material

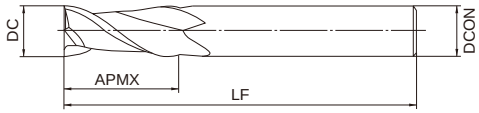
N F M

SYMBOL DESCRIPTIONS >> 664

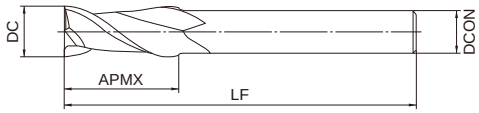
END MILLS SELECTION CHART >> 668



Type1



Type2



Type3

	DC≦12	DC>12		
	0 - 0.020	0 - 0.030		
h6	4≦DCON≦6	8≦DCON≦10	12≦DCON≦16	DCON=20
	0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013

●Inventory maintained in Japan. Unit : mm

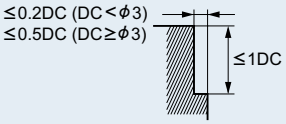
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
DLC2MAD0100	1	2.5	40	4	2	●	1
DLC2MAD0150	1.5	4	40	4	2	●	1
DLC2MAD0200	2	6	40	4	2	●	1
DLC2MAD0250	2.5	8	40	4	2	●	1
DLC2MAD0300	3	8	45	6	2	●	1
DLC2MAD0350	3.5	10	45	6	2	●	1
DLC2MAD0400	4	11	45	6	2	●	1
DLC2MAD0450	4.5	11	45	6	2	●	1
DLC2MAD0500	5	13	50	6	2	●	1
DLC2MAD0600	6	13	50	6	2	●	2
DLC2MAD0800	8	19	60	8	2	●	2
DLC2MAD1000	10	22	70	10	2	●	2
DLC2MAD1200	12	26	75	12	2	●	2
DLC2MAD1400	14	26	75	12	2	●	3
DLC2MAD1500	15	30	80	16	2	●	1
DLC2MAD1600	16	32	90	16	2	●	2
DLC2MAD1800	18	32	90	16	2	●	3
DLC2MAD2000	20	38	100	20	2	●	2

DLC2MA

RECOMMENDED CUTTING CONDITIONS

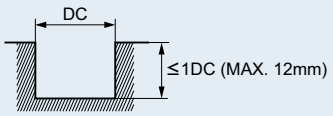
·Side milling

Work material	Aluminium alloy A7075		Aluminium cast Copper, Copper alloys AC4B	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
1	40000	600	40000	460
2	40000	1100	38000	850
3	32000	1400	25000	950
4	24000	1500	19000	1000
5	19000	1600	15000	1000
6	16000	1900	13000	1100
8	12000	1900	9500	1200
10	9500	1900	7600	1200
12	8000	1900	6400	1200
16	6000	1900	4800	1200
20	4800	1500	3800	1000



·Slotting

Work material	Aluminium alloy A7075		Aluminium cast Copper, Copper alloys AC4B	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
1	40000	460	40000	350
2	38000	850	32000	550
3	25000	950	21000	600
4	19000	1000	16000	650
5	15000	1000	13000	700
6	13000	1100	11000	750
8	9500	1200	8000	800
10	7600	1200	6400	800
12	6400	1200	5300	800
16	4800	1000	4000	720
20	3800	970	3200	660



- When cutting a very hard workpiece, reduce the feed rate.
- If the depth of cut is shallow, the revolution and feed rate can be increased.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

DFCJRT

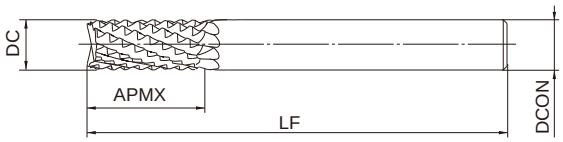
DFC END MILLS

Diamond coating end mill with cross-nick

Product Information

Work Material

Technical Info >> 1993
ISO13399 Property >> 1966
SYMBOL DESCRIPTIONS >> 664
END MILLS SELECTION CHART >> 668



Type1

h6	DCON=6	8≦DCON≦10	DCON=12
	0 - 0.008	0 - 0.009	0 - 0.011

●Inventory maintained in Japan. Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
DFCJRTD0600	6	20	70	6	10	●	1
DFCJRTD0800	8	30	80	8	10	●	1
DFCJRTD1000	10	30	90	10	12	●	1
DFCJRTD1200	12	30	100	12	12	●	1

DFCJRT

RECOMMENDED CUTTING CONDITIONS

Work material	CFRP	
Dia. DC (mm)	Revolution (min^{-1})	Feed rate (mm/min)
6	11000	1200
8	8000	1000
10	6400	900
12	5300	850

- Cutting conditions may differ considerably due to the kind of CFRP, the rigidity of the machine, or the clamping and geometry of the workpiece. Please use the above table as a guideline.
- When high machining accuracy is needed or if large burrs or delamination occur, we recommend reducing the feed rate.
- When the depth of cut is greater than 0.8DC, we recommend reducing the feed rate.
- Please take precautions against dust.

DLC2MB

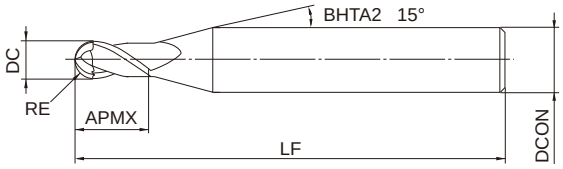
DLC END MILLS

Diamond coating end mill, Ball nose, Medium cut length, 2 flute

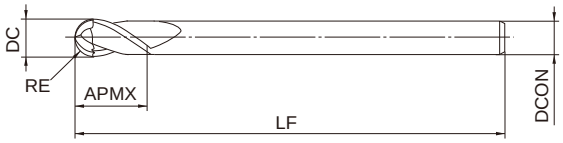
Product Information

Work Material

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668



Type1



Type2

R	RE≦6	RE>6		
	±0.01	±0.02		
	DC≦12	DC>12		
	0 - 0.020	0 - 0.030		
h6	4≦DCON≦6	8≦DCON≦10	12≦DCON≦16	DCON=20
	0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013

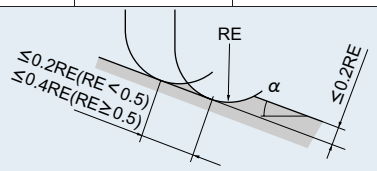
●Inventory maintained in Japan. Unit : mm

Order Number	RE	DC	APMX	LF	DCON	No. of Flutes	Stock	type
DLC2MBR0010	0.1	0.2	0.4	40	4	2	●	1
DLC2MBR0015	0.15	0.3	0.6	40	4	2	●	1
DLC2MBR0020	0.2	0.4	0.8	40	4	2	●	1
DLC2MBR0025	0.25	0.5	1	40	4	2	●	1
DLC2MBR0030	0.3	0.6	1.2	40	4	2	●	1
DLC2MBR0040	0.4	0.8	1.6	40	4	2	●	1
DLC2MBR0050	0.5	1	2.5	40	4	2	●	1
DLC2MBR0075	0.75	1.5	4	40	4	2	●	1
DLC2MBR0100	1	2	6	60	6	2	●	1
DLC2MBR0125	1.25	2.5	6	60	6	2	●	1
DLC2MBR0150	1.5	3	8	70	6	2	●	1
DLC2MBR0200	2	4	8	70	6	2	●	1
DLC2MBR0250	2.5	5	12	80	6	2	●	1
DLC2MBR0300	3	6	12	80	6	2	●	2
DLC2MBR0400	4	8	14	90	8	2	●	2
DLC2MBR0500	5	10	18	100	10	2	●	2
DLC2MBR0600	6	12	22	110	12	2	●	2
DLC2MBR0800	8	16	30	140	16	2	●	2
DLC2MBR1000	10	20	38	160	20	2	●	2

DLC2MB

RECOMMENDED CUTTING CONDITIONS

Work material	Aluminium alloy A7075				Aluminium cast Copper, Copper alloys AC4B			
R RE (mm)	α≦15°		α>15°		α≦15°		α>15°	
	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
R0.1	40000	350	40000	260	40000	280	40000	210
R0.15	40000	480	40000	360	40000	380	40000	290
R0.2	40000	600	40000	450	40000	480	40000	360
R0.25	40000	800	40000	600	40000	640	40000	480
R0.3	40000	1000	40000	750	40000	800	40000	600
R0.4	40000	1500	40000	1100	40000	1200	40000	880
R0.5	40000	2000	40000	1500	40000	1600	40000	1200
R0.75	40000	2200	40000	1600	40000	1800	40000	1300
R1	40000	2800	40000	2200	40000	2200	32000	1400
R1.25	40000	3200	38000	2200	32000	2000	30000	1400
R1.5	40000	4000	32000	2600	32000	2600	26000	1700
R2	30000	4200	24000	2800	24000	2700	19000	1800
R2.5	24000	4400	19000	2800	19000	2800	15000	1800
R3	20000	4000	16000	2800	16000	2600	13000	1800
R4	15000	3600	12000	2400	12000	2300	9600	1500
R5	12000	3600	9500	2000	9600	2300	7600	1300
R6	10000	3200	8000	2200	8000	2000	6400	1400
R8	7500	2800	6000	1800	6000	1800	4800	1200
R10	6000	2500	4800	1600	4800	1600	3800	1000



- α is the inclination angle of the machined surface.
- When cutting a very hard workpiece, reduce the feed rate.
- If the depth of cut is shallow, the revolution and feed rate can be increased.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

DC2XLB

DLC END MILLS

Diamond coating end mill, Ball nose, Short cut length, 2 flute, Long neck, For hard brittle materials

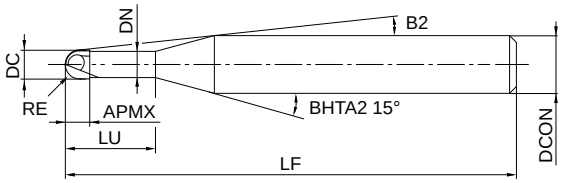
Product Information

UWC DC

Work Material

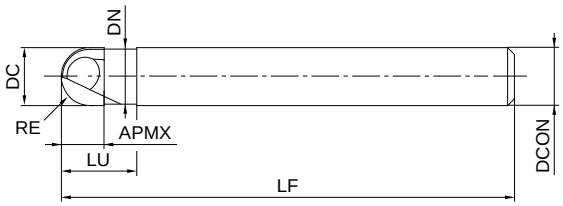
N F M

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668



Type1

R	0.1≦RE≦3
	±0.01
h6	4≦DCON≦6
	0 / - 0.008



Type2

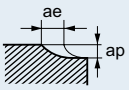
●Inventory maintained in Japan. Unit : mm

Order Number	RE	DC	APMX	LU	DN	LF	B2	DCON	No. of Flutes	Stock	type
DC2XLBR0010N005	0.1	0.2	0.12	0.5	0.18	50	11.5°	4	2	●	1
DC2XLBR0020N010	0.2	0.4	0.24	1	0.36	50	11°	4	2	●	1
DC2XLBR0030N015	0.3	0.6	0.36	1.5	0.56	50	10.4°	4	2	●	1
DC2XLBR0040N020	0.4	0.8	0.48	2	0.76	50	9.9°	4	2	●	1
DC2XLBR0050N025	0.5	1	0.6	2.5	0.96	50	9.2°	4	2	●	1
DC2XLBR0050N050	0.5	1	0.6	5	0.96	50	7.3°	4	2	●	1
DC2XLBR0075N038	0.75	1.5	0.9	3.8	1.44	50	7.8°	4	2	●	1
DC2XLBR0100N060	1	2	1.2	6	1.94	50	5.8°	4	2	●	1
DC2XLBR0100N100	1	2	1.2	10	1.94	50	4.2°	4	2	●	1
DC2XLBR0150N080	1.5	3	1.8	8	2.9	60	6.3°	6	2	●	1
DC2XLBR0200N100	2	4	2.4	10	3.9	60	4.5°	6	2	●	1
DC2XLBR0250N100	2.5	5	3	10	4.9	60	2.9°	6	2	●	1
DC2XLBR0300N100	3	6	3.6	10	5.85	60		6	2	●	2

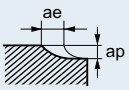
DC2XLB

RECOMMENDED CUTTING CONDITIONS

Work material			Cemented carbide				Alumina Zirconia			
Dia. DC(mm)	R半径 RE (mm)	Neck length LU(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)
0.2	0.1	0.5	30000	30	0.005	0.01	30000	30	0.005	0.01
0.4	0.2	1	30000	100	0.015	0.08	30000	100	0.015	0.08
0.6	0.3	1.5	30000	200	0.03	0.14	30000	200	0.03	0.14
0.8	0.4	2	30000	250	0.04	0.19	30000	250	0.04	0.19
1	0.5	2.5	30000	300	0.05	0.25	30000	300	0.05	0.25
1	0.5	5	30000	300	0.05	0.25	30000	300	0.05	0.25
1.5	0.75	3.8	30000	300	0.075	0.275	30000	300	0.075	0.275
2	1	6	30000	300	0.1	0.3	30000	300	0.1	0.3
2	1	10	30000	300	0.1	0.3	30000	300	0.1	0.3
3	1.5	8	27500	275	0.125	0.33	27500	275	0.125	0.33
4	2	10	24000	240	0.15	0.35	24000	240	0.15	0.35
5	2.5	10	22000	220	0.175	0.37	22000	220	0.175	0.37
6	3	10	20000	200	0.2	0.4	20000	200	0.2	0.4



Work material			Silicon carbide Silicon nitride				Quartz glass			
Dia. DC(mm)	R半径 RE (mm)	Neck length LU(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)
0.2	0.1	0.5	30000	15	0.003	0.005	30000	45	0.008	0.015
0.4	0.2	1	30000	50	0.008	0.04	30000	150	0.023	0.12
0.6	0.3	1.5	30000	100	0.015	0.07	30000	300	0.045	0.21
0.8	0.4	2	30000	125	0.02	0.095	30000	375	0.06	0.285
1	0.5	2.5	30000	150	0.025	0.125	30000	450	0.075	0.375
1	0.5	5	30000	150	0.025	0.125	30000	450	0.075	0.375
1.5	0.75	3.8	30000	150	0.038	0.138	30000	450	0.113	0.413
2	1	6	30000	150	0.05	0.15	30000	450	0.15	0.45
2	1	10	30000	150	0.05	0.15	30000	450	0.15	0.45
3	1.5	8	27500	138	0.063	0.165	27500	413	0.188	0.495
4	2	10	24000	120	0.075	0.175	24000	360	0.225	0.525
5	2.5	10	22000	110	0.088	0.185	22000	330	0.263	0.555
6	3	10	20000	100	0.1	0.2	20000	300	0.3	0.6



- The cemented carbide in the above mentioned cutting conditions table is based on CIS standard VM-40(90HRA).
- Air blow or dry processing is recommended with cemented carbide processing. *Note: Using coolants or oil mists may decrease tool longevity.
- The use of a water soluble cutting oil is recommended with the processing of hard brittle materials other than the cemented carbide mentioned in the above table. Be sure to refuel the oil and eliminate any chip discharge that adheres to the tool.
- Cutting conditions may need adjustments depending on the type of work material.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.
- Implementation of special countermeasures is recommended since fine chip discharge may enter gaps in the processing machinery.

DC2SB

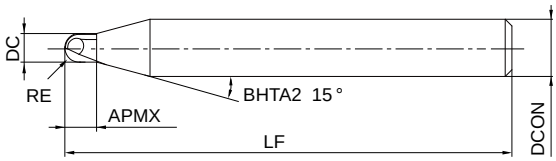
DLC END MILLS

Diamond coating end mill, Ball nose, Short cut length, 2 flute, For hard brittle materials

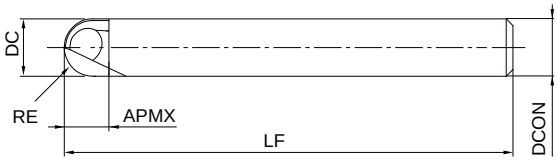
Product Information

Work Material

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668



Type1



Type2

R	0.1≦RE≦3
	±0.01
h6	4≦DCON≦6
	0 / - 0.008

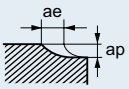
●Inventory maintained in Japan. Unit : mm

Order Number	RE	DC	APMX	LF	DCON	No. of Flutes	Stock	type
DC2SBR0010	0.1	0.2	0.12	50	4	2	●	1
DC2SBR0020	0.2	0.4	0.24	50	4	2	●	1
DC2SBR0030	0.3	0.6	0.42	50	4	2	●	1
DC2SBR0040	0.4	0.8	0.56	50	4	2	●	1
DC2SBR0050	0.5	1	0.7	50	4	2	●	1
DC2SBR0075	0.75	1.5	1	50	4	2	●	1
DC2SBR0100	1	2	1.4	50	4	2	●	1
DC2SBR0150	1.5	3	2.1	60	6	2	●	1
DC2SBR0200	2	4	2.8	60	6	2	●	1
DC2SBR0250	2.5	5	3.5	60	6	2	●	1
DC2SBR0300	3	6	4.2	60	6	2	●	2

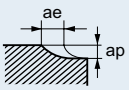
DC2SB

RECOMMENDED CUTTING CONDITIONS

Work material		Cemented carbide				Alumina Zirconia			
Dia. DC(mm)	R RE (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)
0.2	0.1	30000	100	0.01	0.01	30000	100	0.01	0.01
0.4	0.2	30000	150	0.02	0.08	30000	150	0.02	0.08
0.6	0.3	30000	200	0.03	0.14	30000	200	0.03	0.14
0.8	0.4	30000	250	0.04	0.19	30000	250	0.04	0.19
1	0.5	30000	300	0.05	0.25	30000	300	0.05	0.25
1.5	0.75	30000	300	0.075	0.275	30000	300	0.075	0.275
2	1	30000	300	0.1	0.3	30000	300	0.1	0.3
3	1.5	27500	275	0.125	0.33	27500	275	0.125	0.33
4	2	24000	240	0.15	0.35	24000	240	0.15	0.35
5	2.5	22000	220	0.175	0.37	22000	220	0.175	0.37
6	3	20000	200	0.2	0.4	20000	200	0.2	0.4



Work material		Silicon carbide Silicon nitride				Quartz glass			
Dia. DC(mm)	R RE (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)
0.2	0.1	30000	50	0.005	0.005	30000	150	0.015	0.015
0.4	0.2	30000	75	0.01	0.04	30000	225	0.03	0.12
0.6	0.3	30000	100	0.015	0.07	30000	300	0.045	0.21
0.8	0.4	30000	125	0.02	0.095	30000	375	0.06	0.285
1	0.5	30000	150	0.025	0.125	30000	450	0.075	0.375
1.5	0.75	30000	150	0.038	0.138	30000	450	0.113	0.413
2	1	30000	150	0.05	0.15	30000	450	0.15	0.45
3	1.5	27500	138	0.063	0.165	27500	413	0.188	0.495
4	2	24000	120	0.075	0.175	24000	360	0.225	0.525
5	2.5	22000	110	0.088	0.185	22000	330	0.263	0.555
6	3	20000	100	0.1	0.2	20000	300	0.3	0.6



- The cemented carbide in the above mentioned cutting conditions table is based on CIS standard VM-40(90HRA).
- Air blow or dry processing is recommended with cemented carbide processing. *Note: Using coolants or oil mists may decrease tool longevity.
- The use of a water soluble cutting oil is recommended with the processing of hard brittle materials other than the cemented carbide mentioned in the above table. Be sure to refuel the oil and eliminate any chip discharge that adheres to the tool.
- Cutting conditions may need adjustments depending on the type of work material.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.
- Implementation of special countermeasures is recommended since fine chip discharge may enter gaps in the processing machinery.

DF2MB

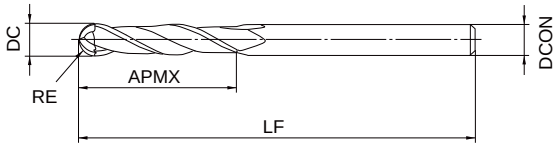
DF END MILLS

Diamond coating end mill, Ball nose, Medium cut length, 2 flute, For graphite

Product Information

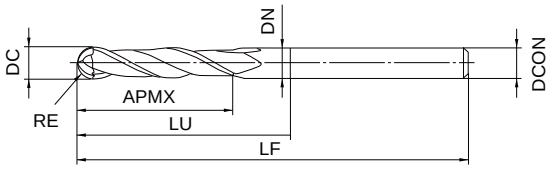
Work Material

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668



Type1

R	3≦RE≦6		
	±0.01		
h6	DCON=6	8≦DCON≦10	DCON=12
	0 - 0.008	0 - 0.009	0 - 0.011



Type2

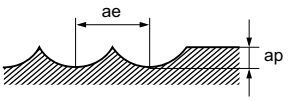
●Inventory maintained in Japan. Unit : mm

Order Number	RE	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	type
DF2MBR0300	3	6	30			100	6	2	●	1
DF2MBR0300A100	3	6	30	50	5.85	100	6	2	●	2
DF2MBR0300A150	3	6	30	50	5.85	150	6	2	●	2
DF2MBR0300N100A150	3	6	30	100	5.85	150	6	2	●	2
DF2MBR0400A110	4	8	40	60	7.85	110	8	2	●	2
DF2MBR0400A150	4	8	40	60	7.85	150	8	2	●	2
DF2MBR0500A120	5	10	50	70	9.7	120	10	2	●	2
DF2MBR0500A180	5	10	50	70	9.7	180	10	2	●	2
DF2MBR0500N140A180	5	10	50	140	9.7	180	10	2	●	2
DF2MBR0600A130	6	12	55	75	11.7	130	12	2	●	2
DF2MBR0600A200	6	12	55	75	11.7	200	12	2	●	2
DF2MBR0600N150A200	6	12	55	150	11.7	200	12	2	●	2

DF2MB

RECOMMENDED CUTTING CONDITIONS

Work material		Graphite				Copper, Copper alloys			
R RE (mm)	Overall length LF(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)
R3	100	16000	1900	0.6	1.5	16000	1500	0.6	1.5
	150	12000	1200	0.4	1.2	12000	960	0.4	1.2
R4	110	12000	2000	0.8	2.0	12000	1600	0.8	2.0
	150	9200	1400	0.6	1.6	9200	1100	0.6	1.6
R5	120	9500	2200	1.0	2.5	9500	1800	1.0	2.5
	180	7300	1500	0.8	2.0	7300	1200	0.8	2.0
R6	130	8000	1800	1.2	3.0	8000	1400	1.2	3.0
	200	6100	1200	1.0	2.5	6100	960	1.0	2.5



- When high machining accuracy is needed, or the workpiece becomes chipped, we recommend lowering the feed rate.
- Use a milling machine dedicated for graphite.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

DF2XLB

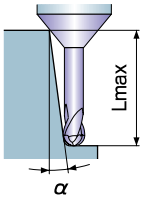
DF END MILLS

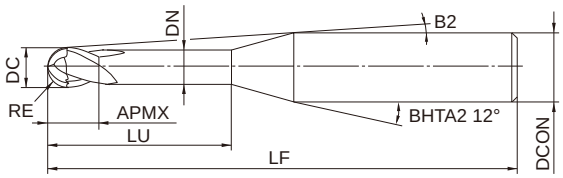
Diamond coating end mill, Ball nose, Medium cut length, 2 flute, Long neck, For graphite

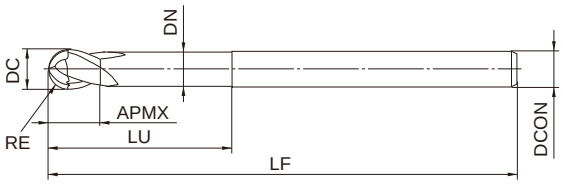
Product Information

Work Material

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668







R	0.1≦RE≦3
	±0.01
h6	DCON=4,6
	0 - 0.008

- α: Inclined angle Lmax: Effective length
- Lmax indicates "0: Not available, blank: No interference".

●Inventory maintained in Japan. Unit : mm

Order Number	RE	DC	APMX	LU	DN	B2	LF	DCON	No. of Flutes	Stock	type	Effective length for inclined angle			
												0.5°	1°	2°	3°
DF2XLBR0010N005	0.1	0.2	0.2	0.5	0.18	11.5°	50	4	2	●	1	0.5	0.5	0.6	0.7
DF2XLBR0015N020	0.15	0.3	0.3	2	0.27	9.9°	50	4	2	●	1	2.1	2.2	2.4	2.6
DF2XLBR0015N030	0.15	0.3	0.3	3	0.27	9.1°	50	4	2	●	1	3.1	3.2	3.6	3.9
DF2XLBR0020N010	0.2	0.4	0.6	1	0.36	11°	50	4	2	●	1	1.0	1.0	1.1	1.2
DF2XLBR0020N020	0.2	0.4	0.6	2	0.36	10°	50	4	2	●	1	2.0	2.1	2.3	2.6
DF2XLBR0020N030	0.2	0.4	0.6	3	0.36	9.1°	50	4	2	●	1	3.1	3.2	3.5	3.9
DF2XLBR0020N040	0.2	0.4	0.6	4	0.36	8.4°	60	4	2	●	1	4.1	4.3	4.7	5.2
DF2XLBR0020N080	0.2	0.4	0.6	8	0.36	6.4°	60	4	2	●	1	8.3	8.7	9.5	10.5
DF2XLBR0020N120	0.2	0.4	0.6	12	0.36	5.1°	60	4	2	●	1	12.5	13	14.3	15.8
DF2XLBR0025N040	0.25	0.5	0.6	4	0.46	8.3°	60	4	2	●	1	4.1	4.3	4.7	5.2
DF2XLBR0025N050	0.25	0.5	0.6	5	0.46	7.7°	60	4	2	●	1	5.2	5.4	5.9	6.5
DF2XLBR0025N080	0.25	0.5	0.6	8	0.46	6.3°	60	4	2	●	1	8.3	8.7	9.5	10.5
DF2XLBR0030N020	0.3	0.6	0.9	2	0.56	9.9°	60	4	2	●	1	2.1	2.2	2.4	2.6
DF2XLBR0030N040	0.3	0.6	0.9	4	0.56	8.3°	60	4	2	●	1	4.2	4.4	4.8	5.2
DF2XLBR0030N050	0.3	0.6	0.9	5	0.56	7.6°	60	4	2	●	1	5.2	5.4	6	6.6
DF2XLBR0030N060	0.3	0.6	0.9	6	0.56	7.1°	60	4	2	●	1	6.3	6.5	7.1	7.9
DF2XLBR0030N080	0.3	0.6	0.9	8	0.56	6.2°	60	4	2	●	1	8.3	8.7	9.5	10.6
DF2XLBR0030N100	0.3	0.6	0.9	10	0.56	5.5°	60	4	2	●	1	10.4	10.9	11.9	13.2
DF2XLBR0030N160	0.3	0.6	0.9	16	0.56	4.1°	60	4	2	●	1	16.7	17.4	19.1	21.2
DF2XLBR0040N060	0.4	0.8	1.2	6	0.76	7°	60	4	2	●	1	6.3	6.5	7.1	7.9
DF2XLBR0040N080	0.4	0.8	1.2	8	0.76	6.1°	60	4	2	●	1	8.3	8.7	9.5	10.5
DF2XLBR0050N040	0.5	1	1.5	4	0.94	8°	60	4	2	●	1	4.2	4.4	4.8	5.3
DF2XLBR0050N060	0.5	1	1.5	6	0.94	6.8°	60	4	2	●	1	6.3	6.6	7.2	8.0
DF2XLBR0050N080	0.5	1	1.5	8	0.94	5.9°	60	4	2	●	1	8.4	8.8	9.6	10.6

DF2XLB

Order Number	RE	DC	APMX	LU	DN	B2	LF	DCON	No. of Flutes	Stock	type	Effective length for inclined angle			
												0.5°	1°	2°	3°
DF2XLBR0050N100	0.5	1	1.5	10	0.94	5.2°	60	4	2	●	1	10.5	11.0	12.0	13.3
DF2XLBR0050N120	0.5	1	1.5	12	0.94	4.6°	60	4	2	●	1	12.6	13.2	14.4	15.9
DF2XLBR0050N200	0.5	1	1.5	20	0.94	3.3°	80	4	2	●	1	21.0	21.9	24	26.6
DF2XLBR0050N300	0.5	1	1.5	30	0.94	2.4°	80	4	2	●	1	31.4	32.8	36.0	
DF2XLBR0050N400	0.5	1	1.5	40	0.94	1.9°	80	4	2	●	1	41.8	43.7		
DF2XLBR0075N080	0.75	1.5	2.3	8	1.44	5.4°	60	4	2	●	1	8.4	8.8	9.6	10.6
DF2XLBR0075N100	0.75	1.5	2.3	10	1.44	4.7°	60	4	2	●	1	10.5	11.0	12.0	13.2
DF2XLBR0075N160	0.75	1.5	2.3	16	1.44	3.4°	80	4	2	●	1	16.8	17.5	19.2	21.2
DF2XLBR0075N300	0.75	1.5	2.3	30	1.44	2.1°	80	4	2	●	1	31.4	32.8	35.9	
DF2XLBR0075N400	0.75	1.5	2.3	40	1.44	1.6°	80	4	2	●	1	41.8	43.7		
DF2XLBR0100N080	1	2	3	8	1.9	4.9°	60	4	2	●	1	8.3	8.7	9.4	10.4
DF2XLBR0100N100	1	2	3	10	1.9	4.2°	60	4	2	●	1	10.4	10.9	11.8	13.0
DF2XLBR0100N120	1	2	3	12	1.9	3.7°	60	4	2	●	1	12.5	13.0	14.2	15.7
DF2XLBR0100N160	1	2	3	16	1.9	2.9°	80	4	2	●	1	16.7	17.4	19.0	
DF2XLBR0100N200	1	2	3	20	1.9	2.5°	80	4	2	●	1	20.9	21.8	23.8	
DF2XLBR0100N250	1	2	3	25	1.9	2°	80	4	2	●	1	26.1	27.2		
DF2XLBR0100N400	1	2	3	40	1.9	1.4°	100	4	2	●	1	41.7	43.5		
DF2XLBR0100N600	1	2	3	60	1.9	0.9°	100	4	2	●	1	62.6			
DF2XLBR0150N160	1.5	3	4.5	16	2.9	1.7°	80	4	2	●	1	16.7	17.3		
DF2XLBR0150N250	1.5	3	4.5	25	2.9	1.2°	80	4	2	●	1	26.1	27.2		
DF2XLBR0150N400	1.5	3	4.5	40	2.9	0.7°	100	4	2	●	1	41.7			
DF2XLBR0150N600	1.5	3	4.5	60	2.9	0.5°	100	4	2	●	1				
DF2XLBR0200N080	2	4	6	8	3.9		80	4	2	●	2				
DF2XLBR0200N200	2	4	6	20	3.9		80	4	2	●	2				
DF2XLBR0200N300	2	4	6	30	3.9		80	4	2	●	2				
DF2XLBR0200N400	2	4	6	40	3.9		100	4	2	●	2				
DF2XLBR0200N600	2	4	6	60	3.9		100	4	2	●	2				
DF2XLBR0300N120	3	6	9	12	5.85		100	6	2	●	2				

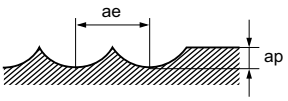
DF2XLB

RECOMMENDED CUTTING CONDITIONS

Work material		Graphite				Copper, Copper alloys			
R RE (mm)	Neck length LU(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)
R0.1	0.5	40000	800	0.01	0.03	40000	800	0.003	0.02
R0.15	2	40000	1200	0.03	0.08	40000	800	0.003	0.03
	3	40000	1200	0.03	0.08	40000	600	0.002	0.03
R0.2	1	40000	1500	0.05	0.15	40000	2000	0.015	0.04
	2	40000	1500	0.05	0.12	40000	1300	0.01	0.04
	3	40000	1300	0.04	0.12	40000	800	0.005	0.04
	4	40000	1300	0.04	0.1	32000	600	0.004	0.04
	8	30000	800	0.03	0.1	—	—	—	—
	12	20000	450	0.03	0.08	—	—	—	—
R0.25	4	40000	1500	0.05	0.15	40000	800	0.01	0.05
	5	38000	1300	0.05	0.15	36000	700	0.008	0.05
	8	30000	1000	0.04	0.12	28000	500	0.002	0.05
R0.3	2	40000	1800	0.07	0.2	40000	1500	0.03	0.06
	4	40000	1500	0.06	0.18	40000	1200	0.02	0.06
	5	40000	1500	0.06	0.17	40000	1100	0.015	0.06
	6	40000	1500	0.06	0.15	40000	1000	0.008	0.06
	8	37000	1200	0.05	0.15	35000	800	0.005	0.06
	10	35000	1000	0.05	0.15	—	—	—	—
	16	22000	530	0.04	0.12	—	—	—	—
R0.4	6	40000	1700	0.08	0.2	40000	1500	0.02	0.08
	8	40000	1700	0.08	0.15	30000	1200	0.008	0.08
R0.5	4	40000	2500	0.12	0.3	40000	2000	0.05	0.1
	6	40000	2500	0.1	0.3	40000	2000	0.03	0.1
	8	40000	2000	0.1	0.25	40000	1800	0.02	0.1
	10	40000	2000	0.1	0.2	33000	1400	0.01	0.1
	12	40000	2000	0.1	0.2	30000	1000	0.007	0.1
	20	30000	1100	0.08	0.2	—	—	—	—
	30	20000	600	0.06	0.15	—	—	—	—
	40	15000	400	0.04	0.12	—	—	—	—
R0.75	8	40000	2800	0.15	0.45	40000	2400	0.07	0.15
	10	40000	2800	0.15	0.45	32000	1800	0.05	0.15
	16	35000	2000	0.15	0.30	20000	900	0.03	0.15
	30	27000	1000	0.10	0.30	—	—	—	—
	40	21000	700	0.08	0.25	—	—	—	—
R1	8	40000	3000	0.23	0.70	40000	3000	0.1	0.2
	10	40000	3000	0.20	0.60	40000	2800	0.08	0.2
	12	35000	2500	0.20	0.60	35000	2300	0.08	0.2
	16	30000	2000	0.20	0.50	30000	1800	0.05	0.2
	20	30000	2000	0.20	0.50	20000	1200	0.04	0.2
	25	25000	1500	0.18	0.45	20000	1000	0.03	0.2
	40	20000	1000	0.15	0.40	—	—	—	—
	60	15000	500	0.10	0.30	—	—	—	—
R1.5	16	28000	3000	0.30	0.90	28000	3000	0.3	0.3
	25	20000	2000	0.25	0.75	20000	2000	0.25	0.3
	40	16000	1500	0.20	0.60	16000	1500	0.2	0.3
	60	14000	1000	0.17	0.45	—	—	—	—
R2	8	24000	3800	0.50	1.50	24000	3800	0.5	0.4
	20	21000	3300	0.50	1.50	21000	3300	0.4	0.4
	30	15000	2000	0.40	1.20	15000	2000	0.3	0.4
	40	13000	1600	0.35	1.00	13000	1600	0.25	0.4
	60	12000	1400	0.30	0.90	12000	1400	0.2	0.4

DF2XLB

Work material		Graphite				Copper, Copper alloys			
R RE (mm)	Neck length LU(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)
R3	12	17000	2800	0.60	2.00	17000	2800	0.6	0.6



- When high machining accuracy is needed, or the workpiece becomes chipped, we recommend lowering the feed rate.
- Use a milling machine dedicated for graphite.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

DF2XLBF

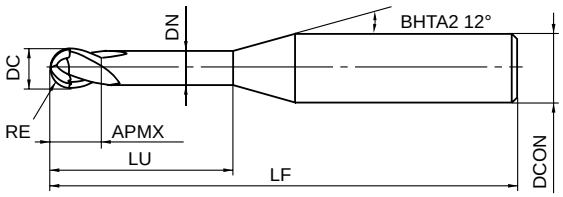
DF END MILLS

Diamond coating end mill, Ball nose, Medium cut length, 2 flute, Long neck, For graphite

Product Information

Work Material

Technical Info >> 1993
ISO13399 Property >> 1966
SYMBOL DESCRIPTIONS >> 664
END MILLS SELECTION CHART >> 668



R	0.3≦RE≦1	1.5≦RE
	±0.005	±0.01
h6	DCON=4	
	0 - 0.008	

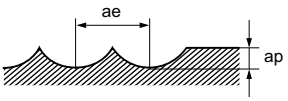
●Inventory maintained in Japan. Unit : mm

Order Number	RE	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	type
DF2XLBFR0030N100	0.3	0.6	0.45	10	0.57	50	4	2	●	1
DF2XLBFR0050N120	0.5	1	1.5	12	0.86	50	4	2	●	1
DF2XLBFR0050N160	0.5	1	1.5	16	0.86	50	4	2	●	1
DF2XLBFR0050N200	0.5	1	1.5	20	0.86	50	4	2	●	1
DF2XLBFR0100N160	1	2	3	16	1.86	50	4	2	●	1
DF2XLBFR0100N200	1	2	3	20	1.86	50	4	2	●	1
DF2XLBFR0150N160	1.5	3	4.5	16	2.86	50	4	2	●	1
DF2XLBFR0150N200	1.5	3	4.5	20	2.86	50	4	2	●	1

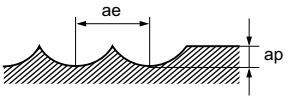
DF2XLBF

RECOMMENDED CUTTING CONDITIONS

Work material			Graphite				Zirconia (Before Sintering)			
Dia. DC(mm)	R RE (mm)	Neck length LU(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)
0.6	R0.3	10	35000	1000	0.05	0.015	26000	600	0.06	0.03
1	R0.5	10	40000	2000	0.10	0.200	26000	600	0.10	0.05
		16	35000	1500	0.09	0.200	26000	600	0.08	0.04
		20	30000	1100	0.08	0.200	26000	600	0.08	0.04
2	R1	16	30000	2000	0.20	0.500	18000	1400	0.06	0.80
		20	30000	2000	0.20	0.500	18000	1200	0.50	0.60
3	R1.5	16	28000	3000	0.30	0.900	15000	1600	0.90	0.90
		20	25000	2500	0.20	0.900	15000	1400	0.60	0.80



Work material			Copper, Copper alloys				Rigid Composite Resin (Composite Resin)			
Dia. DC(mm)	R RE (mm)	Neck length LU(mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Revolution (min-1)	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)
0.6	R0.3	10	30000	600	0.005	0.040	28000	450	0.050	0.050
1	R0.5	10	33000	1400	0.010	0.100	25000	900	0.100	0.100
		16	25000	800	0.007	0.080	25000	700	0.080	0.080
		20	20000	500	0.005	0.050	25000	600	0.080	0.080
2	R1	16	30000	1800	0.050	0.200	25000	2100	0.800	0.800
		20	20000	1200	0.040	0.200	25000	1800	0.500	0.500
3	R1.5	16	28000	3000	0.300	0.300	25000	2400	1.000	1.000
		20	25000	2500	0.200	0.300	25000	2100	0.800	0.800



- When high machining accuracy is needed, or the work materials becomes chipped, we recommend lowering the feed rate.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.
- When drying and machining work materials that contain resin, be careful of tool breakage and mechanical problems (as there is a possibility of blockage caused by cutting chips).
- Use a milling machine dedicated for graphite.

DF3XB

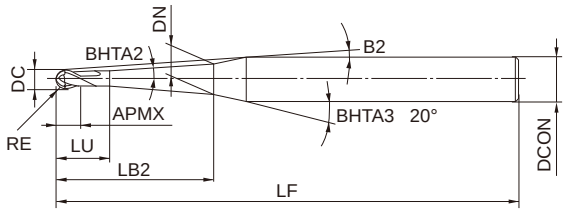
DF END MILLS

Diamond coating end mill, Ball nose, Medium cut length, 3 flute, Taper neck, For graphite

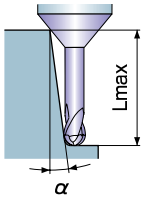
Product Information

Work Material

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 668



R	0.5≦RE≦2
	±0.01
h6	DCON=6
	0 / - 0.008



- α: Inclined angle Lmax: Effective length
- Lmax indicates "0: Not available, blank: No interference".

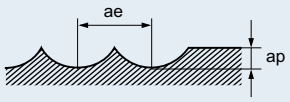
●Inventory maintained in Japan. Unit : mm

Order Number	RE	DC	BHTA2	APMX	LU	LB2	B2	DN	LF	DCON	No. of Flutes	Stock	type	Effective length for inclined angle			
														0.5°	1°	2°	3°
DF3XBR0050L030	0.5	1	0.5°	1.5	3	30	4°	1.42	100	6	3	●	1	30.4	32.1	32.8	34.6
DF3XBR0050L040	0.5	1	0.5°	1.5	3	40	3.2°	1.6	100	6	3	●	1	40.4	41.4	43.6	46
DF3XBR0050L050	0.5	1	0.5°	1.5	3	50	2.6°	1.77	100	6	3	●	1	50.4	51.7	54.4	
DF3XBR0100L040	1	2	0.5°	3	5	40	2.6°	2.52	100	6	3	●	1	40.7	41.7	43.9	
DF3XBR0100L060	1	2	0.5°	3	5	60	1.8°	2.86	130	6	3	●	1	60.7	62.2		
DF3XBR0100L080	1	2	0.5°	3	5	80	1.4°	3.21	130	6	3	●	1	80.7	82.7		
DF3XBR0150L060	1.5	3	0.5°	4.5	7.5	60	1.4°	3.82	130	6	3	●	1	60.8	62.2		
DF3XBR0150L080	1.5	3	0.5°	4.5	7.5	80	1.1°	4.17	130	6	3	●	1	80.8	82.8		
DF3XBR0200L100	2	4	0.5°	6	9	100	0.6°	5.49	160	6	3	●	1	100.8			

DF3XB

RECOMMENDED CUTTING CONDITIONS

Work material		Graphite				Copper, Copper alloys			
R RE (mm)	Neck length LB2(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)
R0.5	30	20000	1100	0.05	0.13	16000	700	0.04	0.13
	40	15000	750	0.04	0.11	12000	480	0.03	0.11
	50	12000	500	0.03	0.10	9600	320	0.02	0.10
R1	40	20000	1800	0.13	0.40	16000	1100	0.10	0.40
	60	15000	900	0.09	0.27	12000	580	0.07	0.27
	80	12000	600	0.07	0.20	9600	380	0.06	0.20
R1.5	60	14000	1700	0.15	0.45	11000	1100	0.12	0.45
	80	12000	1200	0.12	0.35	9600	770	0.10	0.35
R2	100	10000	1100	0.20	0.50	8000	700	0.16	0.50



- When high machining accuracy is needed, or the workpiece becomes chipped, we recommend lowering the feed rate.
- Use a milling machine dedicated for graphite.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

Memo

1MA

LIGHT ALLOY STEEL END MILLS

End mill, Medium cut length, 1 flute

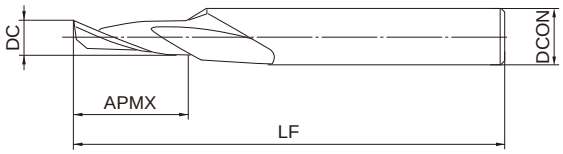
Product Information

HSS 25° Sharp

Work Material

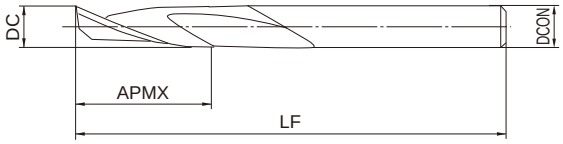
N F M

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 684



Type1

3≦DC≦8
0 - 0.050



Type2

●Inventory maintained in Japan. Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
1MAD0300	3	10	60	8	1	●	1
1MAD0400	4	12	60	8	1	●	1
1MAD0500	5	15	65	8	1	●	1
1MAD0600	6	15	65	8	1	●	1
1MAD0800	8	20	75	8	1	●	2

1LA

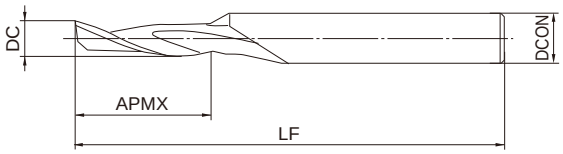
LIGHT ALLOY STEEL END MILLS

End mill, Long cut length, 1 flute

Product Information

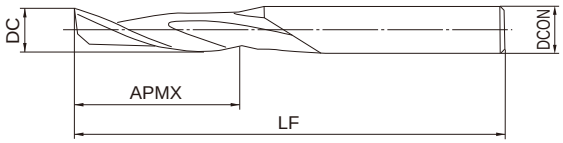
Work Material

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 684



Type1

4≦DC≦12
0
- 0.050



Type2

●Inventory maintained in Japan. Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
1LAD0400	4	18	70	8	1	●	1
1LAD0500	5	20	70	8	1	●	1
1LAD0600	6	20	70	8	1	●	1
1LAD0800	8	30	80	8	1	●	2
1LAD1000	10	35	90	10	1	●	2
1LAD1200	12	45	100	12	1	●	2

VA2SS

VIOLET END MILLS

End mill, Short cut length, 2 flute

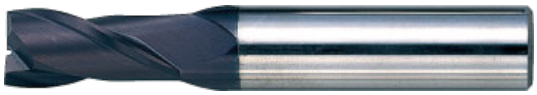
Product Information

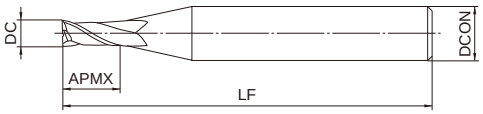
KHA S 30° V Sharp

Work Material

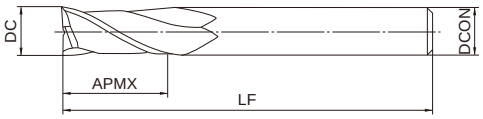
P M S F M

Technical Info >> 1993
ISO13399 Property >> 1966
SYMBOL DESCRIPTIONS >> 664
END MILLS SELECTION CHART >> 684

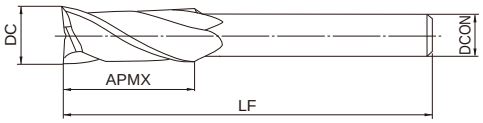




Type1



Type2



Type3

3≦DC≦20
0 - 0.030

●Inventory maintained in Japan. Unit : mm

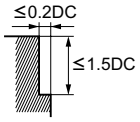
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
VA2SSD0300	3	8	50	6	2	●	1
VA2SSD0400	4	8	60	8	2	●	1
VA2SSD0500	5	10	60	8	2	●	1
VA2SSD0600	6	12	60	8	2	●	1
VA2SSD0700	7	15	65	10	2	●	1
VA2SSD0800	8	15	65	10	2	●	1
VA2SSD0900	9	20	75	10	2	●	1
VA2SSD1000	10	20	75	12	2	●	1
VA2SSD1100	11	22	85	12	2	●	1
VA2SSD1200	12	22	85	12	2	●	2
VA2SSD1300	13	26	90	12	2	●	3
VA2SSD1400	14	26	95	16	2	●	1
VA2SSD1500	15	30	100	16	2	●	1
VA2SSD1600	16	32	100	16	2	●	2
VA2SSD1700	17	34	100	16	2	●	3
VA2SSD1800	18	34	100	16	2	●	3
VA2SSD1900	19	38	120	20	2	●	1
VA2SSD2000	20	38	120	20	2	●	2

VA2SS

RECOMMENDED CUTTING CONDITIONS

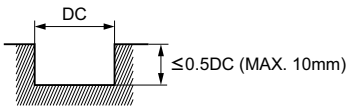
·Side milling

Work material	Structural steel, Cast iron, Carbon steel AISI 1045, AISI No 35 B, AISI 1050		Carbon steel, Alloy steel (20—30HRC) AISI 1055, AISI P20		Alloy steel, Tool steel, Pre-hardened steel (30—35HRC) AISI H13, AISI D2		Austenitic stainless steel, Alloy steel, Tool steel (35—40HRC) AISI 304, AISI 316	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
3	5400	170	4000	125	2700	85	2200	65
4	4300	200	3200	150	2100	100	1800	75
5	3600	210	2700	160	1800	105	1500	80
6	3200	220	2400	165	1600	110	1300	85
8	2400	240	1800	180	1200	120	1000	90
10	1900	260	1400	190	950	130	800	100
12	1600	240	1200	180	800	120	660	90
16	1200	210	900	160	600	105	500	80
20	950	180	720	135	480	90	400	70
25	760	150	570	115	380	75	320	60
30	640	130	480	100	320	65	270	50
40	470	100	350	75	240	50	200	40



·Slotting

Work material	Structural steel, Cast iron, Carbon steel AISI 1045, AISI No 35 B, AISI 1050		Carbon steel, Alloy steel (20—30HRC) AISI 1055, AISI P20		Alloy steel, Tool steel, Pre-hardened steel (30—35HRC) AISI H13, AISI D2		Austenitic stainless steel, Alloy steel, Tool steel (35—40HRC) AISI 304, AISI 316	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
3	3700	110	3000	95	2100	65	1600	50
4	3200	140	2800	130	1800	75	1400	60
5	2900	160	2400	145	1500	80	1200	60
6	2600	170	2100	150	1300	85	1000	70
8	2000	190	1600	160	1000	90	800	70
10	1600	210	1300	180	800	100	640	80
12	1300	190	1100	165	660	90	530	70
16	1000	170	800	140	500	80	400	65
20	720	130	640	120	400	70	320	55
25	570	110	450	90	320	60	230	40
30	480	90	370	75	270	50	190	35
40	360	70	280	60	200	40	140	25



- Supply cutting fluid sufficiently during slot milling. When slotting with dry cut, decrease the revolution and feed rate proportionately by 20 —30%.
- When drilling, please set the feed rate at 1/3 or below of the values above.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

VA2MS

VIOLET END MILLS

End mill, Medium cut length, 2 flute

Product Information

KHA S 30° V Sharp

DC<3 DC≧3

Technical Info >> 1993

ISO13399 Property >> 1966

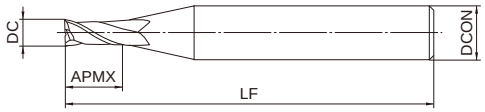
Work Material

P M S F M

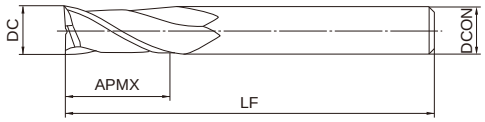
SYMBOL DESCRIPTIONS >> 664

END MILLS SELECTION CHART >> 684

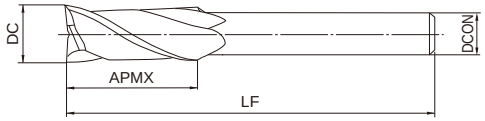
DC≦20	DC>20
0 - 0.030	0 - 0.040



Type1



Type2



Type3

●Inventory maintained in Japan. Unit : mm

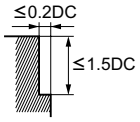
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
VA2MSD0300	3	10	50	6	2	●	1
VA2MSD0400	4	12	60	8	2	●	1
VA2MSD0500	5	15	60	8	2	●	1
VA2MSD0600	6	15	60	8	2	●	1
VA2MSD0700	7	20	65	10	2	●	1
VA2MSD0800	8	20	65	10	2	●	1
VA2MSD0900	9	25	75	10	2	●	1
VA2MSD1000	10	25	75	10	2	●	2
VA2MSD1100	11	30	85	12	2	●	1
VA2MSD1200	12	30	85	12	2	●	2
VA2MSD1300	13	35	90	12	2	●	3
VA2MSD1400	14	35	95	16	2	●	1
VA2MSD1500	15	40	100	16	2	●	1
VA2MSD1600	16	40	100	16	2	●	2
VA2MSD1700	17	40	100	16	2	●	3
VA2MSD1800	18	40	100	16	2	●	3
VA2MSD1900	19	45	120	20	2	●	1
VA2MSD2000	20	45	120	20	2	●	2
VA2MSD2200	22	45	120	20	2	●	3
VA2MSD2400	24	50	140	25	2	●	1
VA2MSD2500	25	50	140	25	2	●	2
VA2MSD2600	26	50	140	25	2	●	3
VA2MSD2800	28	55	145	25	2	●	3
VA2MSD3000	30	55	145	25	2	●	3
VA2MSD3200	32	60	160	32	2	●	2
VA2MSD3500	35	60	160	32	2	●	3
VA2MSD4000	40	65	165	32	2	●	3

VA2MS

RECOMMENDED CUTTING CONDITIONS

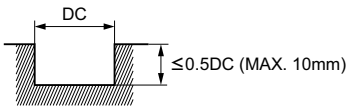
·Side milling

Work material	Structural steel, Cast iron, Carbon steel AISI 1045, AISI No 35 B, AISI 1050		Carbon steel, Alloy steel (20—30HRC) AISI 1055, AISI P20		Alloy steel, Tool steel, Pre-hardened steel (30—35HRC) AISI H13, AISI D2		Austenitic stainless steel, Alloy steel, Tool steel (35—40HRC) AISI 304, AISI 316	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
3	5400	170	4000	125	2700	85	2200	65
4	4300	200	3200	150	2100	100	1800	75
5	3600	210	2700	160	1800	105	1500	80
6	3200	220	2400	165	1600	110	1300	85
8	2400	240	1800	180	1200	120	1000	90
10	1900	260	1400	190	950	130	800	100
12	1600	240	1200	180	800	120	660	90
16	1200	210	900	160	600	105	500	80
20	950	180	720	135	480	90	400	70
25	760	150	570	115	380	75	320	60
30	640	130	480	100	320	65	270	50
40	470	100	350	75	240	50	200	40



·Slotting

Work material	Structural steel, Cast iron, Carbon steel AISI 1045, AISI No 35 B, AISI 1050		Carbon steel, Alloy steel (20—30HRC) AISI 1055, AISI P20		Alloy steel, Tool steel, Pre-hardened steel (30—35HRC) AISI H13, AISI D2		Austenitic stainless steel, Alloy steel, Tool steel (35—40HRC) AISI 304, AISI 316	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
3	3700	110	3000	95	2100	65	1600	50
4	3200	140	2800	130	1800	75	1400	60
5	2900	160	2400	145	1500	80	1200	60
6	2600	170	2100	150	1300	85	1000	70
8	2000	190	1600	160	1000	90	800	70
10	1600	210	1300	180	800	100	640	80
12	1300	190	1100	165	660	90	530	70
16	1000	170	800	140	500	80	400	65
20	720	130	640	120	400	70	320	55
25	570	110	450	90	320	60	230	40
30	480	90	370	75	270	50	190	35
40	360	70	280	60	200	40	140	25



- Supply cutting fluid sufficiently during slot milling. When slotting with dry cut, decrease the revolution and feed rate proportionately by 20 —30%.
- When drilling, please set the feed rate at 1/3 or below of the values above.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

2SS TWO-FLUTE END MILLS

End mill, Short cut length, 2 flute

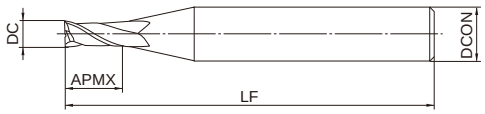
Product Information

CO HSS 30° Sharp DC<3 DC≧3

Work Material

P M N S F M

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 684



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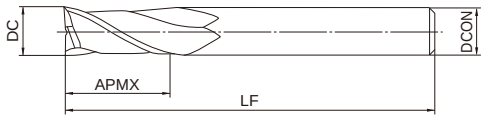
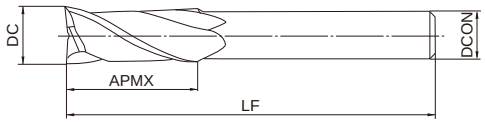


Type2



Type3

DC≦3	DC>3
0 - 0.020	0 - 0.030

●Inventory maintained in Japan. Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
2SSD0050	0.5	0.8	50	6	2	●	1
2SSD0100	1	2	50	6	2	●	1
2SSD0150	1.5	3.5	50	6	2	●	1
2SSD0200	2	5	50	6	2	●	1
2SSD0250	2.5	6	50	6	2	●	1
2SSD0300	3	8	50	6	2	●	1
2SSD0350	3.5	8	60	8	2	●	1
2SSD0400	4	8	60	8	2	●	1
2SSD0450	4.5	10	60	8	2	●	1
2SSD0500	5	10	60	8	2	●	1
2SSD0550	5.5	12	60	8	2	●	1
2SSD0600	6	12	60	8	2	●	1
2SSD0650	6.5	15	65	10	2	●	1
2SSD0700	7	15	65	10	2	●	1
2SSD0750	7.5	15	65	10	2	●	1
2SSD0800	8	15	65	10	2	●	1
2SSD0850	8.5	20	75	10	2	●	1
2SSD0900	9	20	75	10	2	●	1
2SSD0950S10	9.5	20	75	10	2	●	1
2SSD0950S12	9.5	20	75	12	2	●	1
2SSD1000S10	10	20	75	10	2	●	2
2SSD1000S12	10	20	75	12	2	●	1
2SSD1050	10.5	22	85	12	2	●	1

2SS

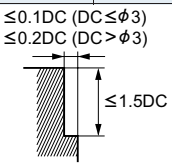
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
2SSD1100	11	22	85	12	2	●	1
2SSD1150	11.5	22	85	12	2	●	1
2SSD1200	12	22	85	12	2	●	2
2SSD1250	12.5	26	90	12	2	●	3
2SSD1300	13	26	90	12	2	●	3
2SSD1350	13.5	26	90	16	2	●	1
2SSD1400	14	26	90	16	2	●	1
2SSD1450	14.5	26	100	16	2	●	1
2SSD1500	15	30	100	16	2	●	1
2SSD1550	15.5	32	100	16	2	●	1
2SSD1600	16	32	100	16	2	●	2
2SSD1650	16.5	32	100	16	2	●	3
2SSD1700	17	34	100	16	2	●	3
2SSD1750	17.5	34	100	16	2	●	3
2SSD1800	18	34	100	16	2	●	3
2SSD1850	18.5	38	115	20	2	●	1
2SSD1900	19	38	115	20	2	●	1
2SSD1950	19.5	38	115	20	2	●	1
2SSD2000	20	38	115	20	2	●	2

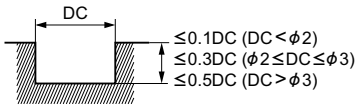
2SS

RECOMMENDED CUTTING CONDITIONS

( ) : Indicates standard feed rate for slotting.

Work material	Structural steel, Carbon steel AISI 1045, AISI 1050		Carbon steel, Alloy steel (20—30HRC) AISI 1055, AISI P20		Alloy steel, Tool steel, Pre-hardened steel (30—35HRC) AISI H13		Austenitic stainless steel AISI 304, AISI 316		Cast iron AISI No 35 B		Aluminium alloy	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
0.5	8000	60(50)	7000	40(35)	4500	30(25)	3500	25(20)	7500	65(55)	16000	120(100)
1	5300	80(65)	4200	50(40)	3000	35(30)	2400	27(22)	4500	85(70)	11000	170(140)
2	3100	85(70)	2600	60(50)	1800	50(40)	1400	30(25)	2700	90(75)	6800	190(150)
3	2300	90(75)	1800	65(55)	1400	55(45)	1100	35(30)	2000	95(80)	4800	240(190)
4	1800	100(85)	1400	70(60)	1100	55(45)	850	35(30)	1600	110(90)	3800	310(250)
5	1600	110(95)	1200	90(75)	900	60(50)	710	40(35)	1300	120(100)	3200	360(290)
6	1400	120(100)	1000	90(75)	780	65(55)	610	50(40)	1100	130(110)	2800	400(320)
8	1100	130(110)	800	95(80)	580	65(55)	470	50(40)	850	140(120)	2200	460(370)
10	860	140(120)	640	100(80)	470	65(55)	380	55(45)	700	160(130)	1800	440(350)
12	720	130(110)	530	95(80)	390	60(50)	310	50(40)	580	140(120)	1600	420(340)
16	540	110(95)	400	85(70)	300	55(45)	230	40(35)	440	120(100)	1200	350(280)
20	430	100(80)	320	70(60)	240	45(38)	190	35(30)	350	100(85)	960	300(240)





- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

S2MD

TWO-FLUTE END MILLS

End mill, Short cut length, 2 flute, KHA Super

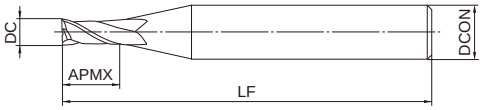
Product Information

KHA S | 30° | Sharp | DC<3 | DC≧3

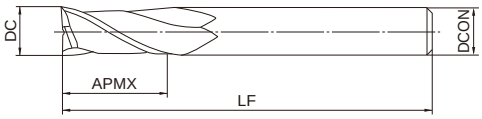
Work Material

P M N S F M

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 684



Type1



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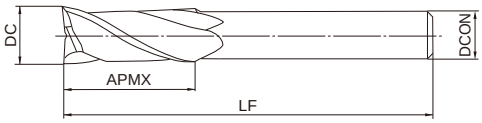


Type3

DC≦3	3<DC≦20	DC>20
0 - 0.020	0 - 0.030	0 - 0.040

●Inventory maintained in Japan. Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
S2MDD0050	0.5	0.8	50	6	2	●	1
S2MDD0100	1	2	50	6	2	●	1
S2MDD0150	1.5	3.5	50	6	2	●	1
S2MDD0200	2	5	50	6	2	●	1
S2MDD0250	2.5	6	50	6	2	●	1
S2MDD0300	3	8	50	6	2	●	1
S2MDD0350	3.5	8	60	8	2	●	1
S2MDD0400	4	8	60	8	2	●	1
S2MDD0450	4.5	10	60	8	2	●	1
S2MDD0500	5	10	60	8	2	●	1
S2MDD0550	5.5	12	60	8	2	●	1
S2MDD0600	6	12	60	8	2	●	1
S2MDD0650	6.5	15	65	10	2	●	1
S2MDD0700	7	15	65	10	2	●	1
S2MDD0750	7.5	15	65	10	2	●	1
S2MDD0800S08	8	15	65	8	2	●	2
S2MDD0800S10	8	15	65	10	2	●	1
S2MDD0850	8.5	20	75	10	2	●	1
S2MDD0900	9	20	75	10	2	●	1
S2MDD0950	9.5	20	75	12	2	●	1
S2MDD1000S10	10	20	75	10	2	●	2
S2MDD1000S12	10	20	75	12	2	●	1
S2MDD1050	10.5	22	85	12	2	●	1

S2MD

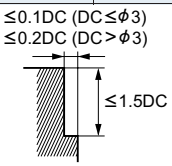
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
S2MDD1100	11	22	85	12	2	●	1
S2MDD1150	11.5	22	85	12	2	●	1
S2MDD1200	12	22	85	12	2	●	2
S2MDD1250	12.5	26	90	12	2	●	3
S2MDD1300	13	26	90	12	2	●	3
S2MDD1350	13.5	26	95	16	2	●	1
S2MDD1400	14	26	95	16	2	●	1
S2MDD1450	14.5	26	100	16	2	●	1
S2MDD1500	15	30	100	16	2	●	1
S2MDD1550	15.5	32	100	16	2	●	1
S2MDD1600	16	32	100	16	2	●	2
S2MDD1650	16.5	32	100	16	2	●	3
S2MDD1700	17	34	100	16	2	●	3
S2MDD1750	17.5	34	100	16	2	●	3
S2MDD1800	18	34	100	16	2	●	3
S2MDD1850	18.5	38	120	20	2	●	1
S2MDD1900	19	38	120	20	2	●	1
S2MDD1950	19.5	38	120	20	2	●	1
S2MDD2000	20	38	120	20	2	●	2

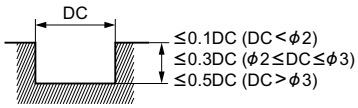
S2MD

RECOMMENDED CUTTING CONDITIONS

( ) : Indicates standard feed rate for slotting.

Work material	Structural steel, Carbon steel AISI 1045, AISI 1050		Carbon steel, Alloy steel (20—30HRC) AISI 1055, AISI P20		Alloy steel, Tool steel, Pre-hardened steel (30—35HRC) AISI H13		Austenitic stainless steel, Alloy steel, Tool steel (35—40HRC) AISI 304, AISI 316		Cast iron AISI No 35 B		Aluminium alloy	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
0.5	14000	100(80)	12000	70(55)	7700	50(40)	6000	40(30)	13000	110(90)	20000	160(130)
1	9000	140(110)	7100	85(70)	5100	60(50)	4100	45(35)	7700	145(115)	19000	290(230)
2	5300	145(115)	4400	100(80)	3100	85(70)	2400	50(40)	4600	150(120)	12000	320(260)
3	3900	150(120)	3100	110(90)	2400	95(75)	1900	60(50)	3400	160(130)	8200	410(330)
4	3100	170(135)	2400	120(95)	1850	95(75)	1450	60(50)	2700	190(150)	6500	530(420)
5	2700	190(150)	2000	150(120)	1500	100(80)	1200	70(55)	2200	200(160)	5400	610(490)
6	2400	200(160)	1700	150(120)	1300	110(90)	1000	85(70)	1900	220(175)	4800	680(540)
8	1900	220(175)	1300	160(130)	990	110(90)	800	85(70)	1450	240(190)	3800	780(620)
10	1500	240(190)	1100	180(145)	800	110(90)	650	90(70)	1200	270(220)	3200	750(600)
12	1250	220(175)	900	160(130)	670	100(80)	540	85(70)	990	240(190)	2700	710(570)
16	940	190(150)	680	145(115)	500	85(70)	400	70(55)	760	200(160)	2000	600(480)
20	750	170(135)	540	120(95)	400	75(60)	320	60(50)	600	170(135)	1600	510(410)





- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

G2MS

TWO-FLUTE END MILLS

End mill, Medium cut length, 2 flute

Product Information

CO HSS 30° G Sharp DC<3 DC≧3

Work Material

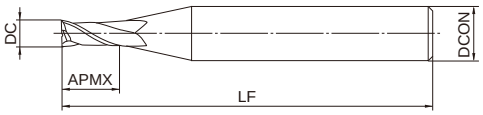
P M S F M

Technical Info >> 1993

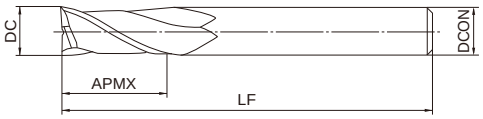
ISO13399 Property >> 1966

SYMBOL DESCRIPTIONS >> 664

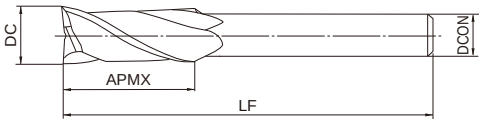
END MILLS SELECTION CHART >> 684



Type1



Type2



Type3

DC≦20	DC>20
0 - 0.030	0 - 0.040

●Inventory maintained in Japan. Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
G2MSD0100	1	3	50	6	2	●	1
G2MSD0150	1.5	4.5	50	6	2	●	1
G2MSD0200	2	6	50	6	2	●	1
G2MSD0250	2.5	7.5	50	6	2	●	1
G2MSD0300	3	10	50	6	2	●	1
G2MSD0350	3.5	12	50	6	2	●	1
G2MSD0400	4	12	50	6	2	●	1
G2MSD0450	4.5	15	55	6	2	●	1
G2MSD0500	5	15	55	6	2	●	1
G2MSD0550	5.5	15	55	6	2	●	1
G2MSD0600	6	15	55	6	2	●	2
G2MSD0650	6.5	20	65	8	2	●	1
G2MSD0700	7	20	65	8	2	●	1
G2MSD0750	7.5	20	65	8	2	●	1
G2MSD0800	8	20	65	8	2	●	2
G2MSD0850	8.5	25	75	10	2	●	1
G2MSD0900	9	25	75	10	2	●	1
G2MSD0950	9.5	25	75	10	2	●	1
G2MSD1000	10	25	75	10	2	●	2
G2MSD1100	11	30	85	12	2	●	1
G2MSD1200	12	30	85	12	2	●	2
G2MSD1300	13	35	90	12	2	●	3
G2MSD1400	14	35	95	16	2	●	1

G2MS

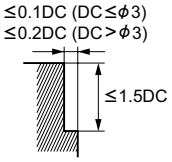
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
G2MSD1500	15	40	100	16	2	●	1
G2MSD1600	16	40	100	16	2	●	2
G2MSD1700	17	40	100	16	2	●	3
G2MSD1800	18	40	100	16	2	●	3
G2MSD1900	19	45	115	20	2	●	1
G2MSD2000	20	45	115	20	2	●	2
G2MSD2100	21	45	115	20	2	●	3
G2MSD2200	22	45	115	20	2	●	3
G2MSD2300	23	50	120	25	2	●	1
G2MSD2400	24	50	120	25	2	●	1
G2MSD2500	25	50	120	25	2	●	2
G2MSD2600	26	50	120	25	2	●	3
G2MSD2700	27	55	125	25	2	●	3
G2MSD2800	28	55	125	25	2	●	3
G2MSD2900	29	55	125	25	2	●	3
G2MSD3000	30	55	125	25	2	●	3
G2MSD3100	31	60	145	25	2	●	3
G2MSD3200	32	60	145	32	2	●	2
G2MSD3300	33	60	145	32	2	●	3
G2MSD3400	34	60	145	32	2	●	3
G2MSD3500	35	60	145	32	2	●	3
G2MSD3600	36	65	150	32	2	●	3
G2MSD3700	37	65	150	32	2	●	3
G2MSD3800	38	65	150	32	2	●	3
G2MSD3900	39	65	150	32	2	●	3
G2MSD4000	40	65	150	32	2	●	3

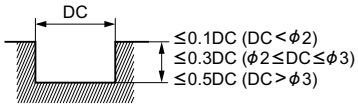
G2MS

RECOMMENDED CUTTING CONDITIONS

( ) : Indicates standard feed rate for slotting.

Work material	Structural steel, Carbon steel AISI 1045, AISI 1050		Carbon steel, Alloy steel (20—30HRC) AISI 1055, AISI P20		Alloy steel, Tool steel, Pre-hardened steel (30—35HRC) AISI P20, AISI H13 AISI D2		Austenitic stainless steel AISI 304, AISI 316		Cast iron AISI No 35 B		Aluminium alloy	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
1	6400	80(65)	5000	50(40)	3600	35(30)	2900	25(20)	5400	85(70)	13000	170(135)
2	3700	85(70)	3100	60(50)	2200	50(40)	1700	30(25)	3200	90(70)	8200	190(150)
3	2800	90(70)	2200	65(50)	1700	55(45)	1300	35(30)	2400	95(75)	5800	240(190)
4	2150	100(80)	1700	70(55)	1300	55(45)	1000	35(30)	1900	110(90)	4600	310(250)
5	1900	115(90)	1450	90(70)	1100	60(50)	850	40(30)	1600	120(95)	3800	360(290)
6	1700	120(95)	1200	90(70)	940	65(50)	730	50(40)	1300	130(105)	3400	400(320)
8	1300	130(105)	960	95(75)	700	65(50)	560	50(40)	1000	140(110)	2600	460(370)
10	1000	145(115)	770	110(90)	560	65(50)	460	55(45)	840	160(130)	2200	430(350)
12	860	130(105)	640	95(75)	470	60(50)	370	50(40)	700	140(110)	1900	420(340)
16	650	115(90)	480	90(70)	360	55(45)	280	40(30)	530	120(95)	1450	350(280)
20	520	95(75)	380	70(55)	290	45(35)	230	35(30)	420	100(80)	1150	300(240)
25	420	85(70)	300	60(50)	230	40(30)	180	30(25)	340	90(70)	910	260(210)
30	350	80(65)	250	55(45)	190	35(30)	145	25(20)	290	85(70)	770	240(190)
40	250	60(50)	180	35(30)	140	25(20)	110	22(18)	220	65(50)	580	190(150)





- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

2MS TWO-FLUTE END MILLS

End mill, Medium cut length, 2 flute

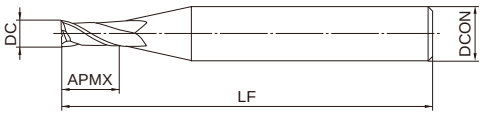
Product Information

CO HSS 30° Sharp DC<3 DC≧3

Work Material

P M N S F M

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 684



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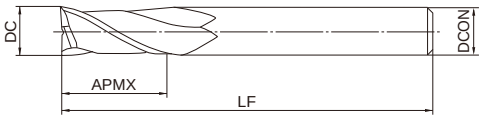

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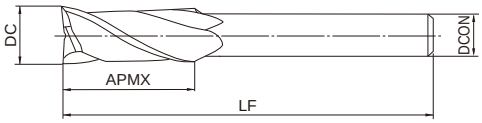


Type3

DC≦3	3<DC≦20	DC>20
0 - 0.020	0 - 0.030	0 - 0.040

●Inventory maintained in Japan. Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
2MSD0100	1	3	50	6	2	●	1
2MSD0150	1.5	4.5	50	6	2	●	1
2MSD0200	2	6	50	6	2	●	1
2MSD0250	2.5	7.5	50	6	2	●	1
2MSD0300	3	10	50	6	2	●	1
2MSD0350	3.5	12	50	6	2	●	1
2MSD0400	4	12	50	6	2	●	1
2MSD0450	4.5	15	55	6	2	●	1
2MSD0500	5	15	55	6	2	●	1
2MSD0550	5.5	15	55	6	2	●	1
2MSD0600	6	15	55	6	2	●	2
2MSD0650	6.5	20	65	8	2	●	1
2MSD0700	7	20	65	8	2	●	1
2MSD0750	7.5	20	65	8	2	●	1
2MSD0800	8	20	65	8	2	●	2
2MSD0850	8.5	25	75	10	2	●	1
2MSD0900	9	25	75	10	2	●	1
2MSD0950	9.5	25	75	10	2	●	1
2MSD1000	10	25	75	10	2	●	2
2MSD1100	11	30	85	12	2	●	1
2MSD1200	12	30	85	12	2	●	2
2MSD1300	13	35	90	12	2	●	3
2MSD1400	14	35	95	16	2	●	1

2MS

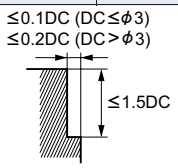
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
2MSD1500	15	40	100	16	2	●	1
2MSD1600	16	40	100	16	2	●	2
2MSD1700	17	40	100	16	2	●	3
2MSD1800	18	40	100	16	2	●	3
2MSD1900	19	45	115	20	2	●	1
2MSD2000	20	45	115	20	2	●	2
2MSD2100	21	45	115	20	2	●	3
2MSD2200	22	45	115	20	2	●	3
2MSD2300	23	50	120	25	2	●	1
2MSD2400	24	50	120	25	2	●	1
2MSD2500	25	50	120	25	2	●	2
2MSD2600	26	50	120	25	2	●	3
2MSD2700	27	55	125	25	2	●	3
2MSD2800	28	55	125	25	2	●	3
2MSD2900	29	55	125	25	2	●	3
2MSD3000	30	55	125	25	2	●	3
2MSD3100	31	60	145	25	2	●	3
2MSD3200	32	60	145	32	2	●	2
2MSD3300	33	60	145	32	2	●	3
2MSD3400	34	60	145	32	2	●	3
2MSD3500	35	60	145	32	2	●	3
2MSD3600	36	65	150	32	2	●	3
2MSD3700	37	65	150	32	2	●	3
2MSD3800	38	65	150	32	2	●	3
2MSD3900	39	65	150	32	2	●	3
2MSD4000	40	65	150	32	2	●	3
2MSD4100	41	70	155	32	2	●	3
2MSD4200S32	42	70	155	32	2	●	3
2MSD4200S42	42	70	155	42	2	●	2
2MSD4500S32	45	70	155	32	2	●	3
2MSD4500S42	45	70	155	42	2	●	3
2MSD4600S32	46	70	155	32	2	●	3
2MSD4600S42	46	70	155	42	2	●	3
2MSD5000S32	50	70	155	32	2	●	3
2MSD5000S42	50	70	155	42	2	●	3
2MSD5500	55	80	175	42	2	●	3
2MSD6000	60	85	185	42	2	●	3

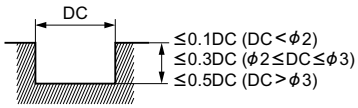
2MS

RECOMMENDED CUTTING CONDITIONS

( ) : Indicates standard feed rate for slotting.

Work material	Structural steel, Carbon steel AISI 1045, AISI 1050		Carbon steel, Alloy steel (20—30HRC) AISI 1055, AISI P20		Alloy steel, Tool steel, Pre-hardened steel (30—35HRC) AISI H13		Austenitic stainless steel AISI 304, AISI 316		Cast iron AISI No 35 B		Aluminium alloy	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
1	5300	65(50)	4200	40(30)	3000	30(25)	2400	22(18)	4500	70(55)	11000	140(110)
2	3100	70(55)	2600	50(40)	1800	40(30)	1400	25(20)	2700	75(60)	6800	160(130)
3	2300	75(60)	1800	55(45)	1400	45(35)	1100	30(25)	2000	80(65)	4800	200(160)
4	1800	85(70)	1400	60(50)	1100	45(35)	850	30(25)	1600	90(70)	3800	260(210)
5	1600	95(75)	1200	75(60)	900	50(40)	710	35(25)	1300	100(80)	3200	300(240)
6	1400	100(80)	1000	75(60)	780	55(45)	610	40(30)	1100	110(90)	2800	330(260)
8	1100	110(90)	800	80(65)	580	55(45)	470	40(30)	850	115(90)	2200	380(300)
10	860	120(95)	640	85(70)	470	55(45)	380	45(35)	700	130(105)	1800	360(290)
12	720	110(90)	530	80(65)	390	50(40)	310	40(30)	580	115(90)	1600	350(280)
16	540	95(75)	400	75(60)	300	45(35)	230	35(28)	440	100(80)	1200	290(230)
20	430	80(65)	320	60(50)	240	38(30)	190	30(25)	350	85(70)	960	250(200)
25	350	70(55)	250	50(40)	190	32(25)	150	25(20)	285	75(60)	760	220(180)
30	290	65(50)	210	45(35)	160	28(22)	120	22(18)	240	70(55)	640	200(160)
40	210	50(40)	150	30(25)	120	22(18)	90	18(15)	180	55(45)	480	160(130)
50	160	40(30)	115	28(22)	90	20(15)	70	15(12)	140	45(35)	380	130(105)
60	130	35(28)	95	25(20)	75	18(15)	55	12(10)	115	40(30)	310	110(90)





- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

2LS TWO-FLUTE END MILLS

End mill, Long cut length, 2 flute

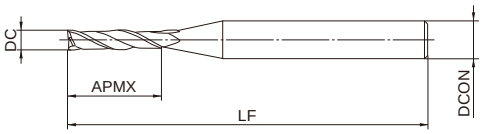
Product Information

CO HSS 30° Sharp DC<3 DC≧3

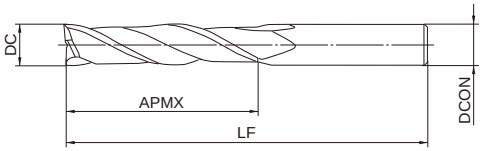
Work Material

P M N S F M

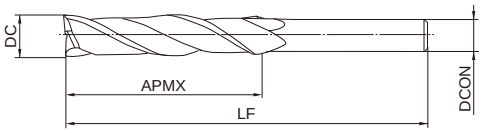
Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 684



Type1



Type2



Type3

DC≦3	3<DC≦20	DC>20
0 - 0.020	0 - 0.030	0 - 0.040

●Inventory maintained in Japan. Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
2LSD0100	1	6	50	6	2	●	1
2LSD0150	1.5	7.5	50	6	2	●	1
2LSD0200	2	10	55	6	2	●	1
2LSD0250	2.5	15	55	6	2	●	1
2LSD0300	3	15	55	6	2	●	1
2LSD0350	3.5	15	55	6	2	●	1
2LSD0400	4	20	55	6	2	●	1
2LSD0450	4.5	20	55	6	2	●	1
2LSD0500	5	25	60	6	2	●	1
2LSD0550	5.5	25	60	6	2	●	1
2LSD0600	6	25	60	6	2	●	2
2LSD0650	6.5	35	75	8	2	●	1
2LSD0700	7	35	75	8	2	●	1
2LSD0750	7.5	35	75	8	2	●	1
2LSD0800	8	35	75	8	2	●	2
2LSD0850	8.5	35	75	10	2	●	1
2LSD0900	9	45	90	10	2	●	1
2LSD0950	9.5	45	90	10	2	●	1
2LSD1000	10	45	90	10	2	●	2
2LSD1050	10.5	55	105	12	2	●	1
2LSD1100	11	55	105	12	2	●	1
2LSD1150	11.5	55	105	12	2	●	1
2LSD1200	12	55	105	12	2	●	2

2LS

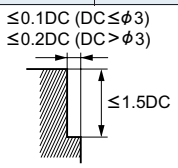
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
2LSD1250	12.5	55	105	12	2	●	3
2LSD1300	13	55	105	12	2	●	3
2LSD1350	13.5	55	110	16	2	●	1
2LSD1400	14	55	110	16	2	●	1
2LSD1450	14.5	65	120	16	2	●	1
2LSD1500	15	65	120	16	2	●	1
2LSD1550	15.5	65	120	16	2	●	1
2LSD1600	16	65	120	16	2	●	2
2LSD1650	16.5	65	120	16	2	●	3
2LSD1700	17	65	120	16	2	●	3
2LSD1750	17.5	65	120	16	2	●	3
2LSD1800	18	65	120	16	2	●	3
2LSD1850	18.5	75	140	20	2	●	1
2LSD1900	19	75	140	20	2	●	1
2LSD1950	19.5	75	140	20	2	●	1
2LSD2000	20	75	140	20	2	●	2
2LSD2100	21	75	140	20	2	●	3
2LSD2200	22	75	140	20	2	●	3
2LSD2300	23	90	160	25	2	●	1
2LSD2400	24	90	160	25	2	●	1
2LSD2500	25	90	160	25	2	●	2
2LSD2600	26	90	160	25	2	●	3
2LSD2700	27	90	160	25	2	●	3
2LSD2800	28	90	160	25	2	●	3
2LSD2900	29	90	160	25	2	●	3
2LSD3000	30	90	160	25	2	●	3
2LSD3100	31	95	180	25	2	●	3
2LSD3200	32	95	180	32	2	●	2
2LSD3300	33	95	180	32	2	●	3
2LSD3400	34	100	185	32	2	●	3
2LSD3500	35	100	185	32	2	●	3
2LSD3600	36	105	190	32	2	●	3
2LSD3700	37	105	190	32	2	●	3
2LSD3800	38	105	190	32	2	●	3
2LSD3900	39	110	195	32	2	●	3
2LSD4000	40	110	195	32	2	●	3

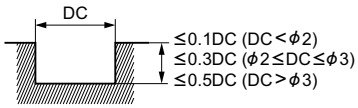
2LS

RECOMMENDED CUTTING CONDITIONS

( ) : Indicates standard feed rate for slotting.

Work material	Structural steel, Carbon steel AISI 1045, AISI 1050		Carbon steel, Alloy steel (20—30HRC) AISI 1055, AISI P20		Alloy steel, Tool steel, Pre-hardened steel (30—35HRC) AISI H13		Austenitic stainless steel AISI 304, AISI 316		Cast iron AISI No 35 B		Aluminium alloy	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
1	4000	35(30)	3200	22(16)	2250	16(15)	1800	12(10)	3400	40(30)	8250	80(60)
2	2300	40(30)	2000	30(20)	1350	20(16)	1000	14(11)	2000	40(35)	5100	90(70)
3	1700	40(35)	1350	30(25)	1000	25(20)	850	16(14)	1500	45(35)	3600	110(90)
4	1350	45(40)	1000	35(30)	800	25(20)	650	16(14)	1200	50(40)	2850	150(120)
5	1200	55(40)	900	40(35)	700	30(22)	550	20(14)	1000	55(45)	2400	170(130)
6	1000	55(45)	750	40(35)	600	30(25)	450	22(16)	850	60(50)	2100	180(145)
8	850	60(50)	600	45(35)	450	30(25)	350	22(16)	650	65(50)	1650	210(165)
10	650	66(55)	480	45(40)	350	30(25)	285	25(20)	550	70(60)	1350	200(160)
12	550	60(50)	400	45(35)	300	30(22)	240	22(16)	450	65(50)	1200	200(155)
16	400	55(40)	300	40(35)	250	25(20)	180	20(15)	330	55(45)	900	160(130)
20	330	45(35)	240	35(30)	180	20(16)	150	16(14)	270	50(40)	720	140(110)
25	260	40(30)	200	30(22)	140	20(15)	110	15(11)	200	40(35)	570	120(100)
30	220	35(30)	150	25(20)	120	15(12)	90	12(10)	180	40(30)	480	110(90)
40	160	30(22)	110	20(15)	90	12(10)	70	10(9)	135	30(25)	360	90(70)
50	120	22(16)	90	15(12)	70	11(9)	55	9(7)	105	25(20)	290	70(60)
60	100	20(15)	70	15(11)	60	10(9)	40	7(6)	90	22(16)	240	60(50)





- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

2MK

TWO-FLUTE END MILLS

End mill, Short cut length, 2 flute, For key ways

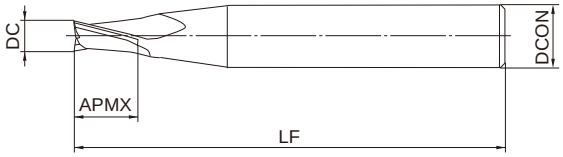
Product Information

CO HSS 15° Sharp

Work Material

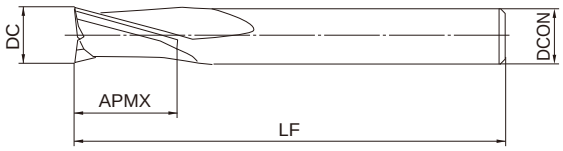
P M N F M

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 684



Type1

2MKP	2MKN	2MKNN
+0.02 0	0 - 0.02	- 0.02 - 0.04



Type2

●Inventory maintained in Japan. Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
2MKND0300	3	5	50	6	2	●	1
2MKND0400	4	6	60	8	2	●	1
2MKND0500	5	8	60	8	2	●	1
2MKND0600	6	8	60	8	2	●	1
2MKND0700	7	10	65	10	2	●	1
2MKND0800	8	10	65	10	2	●	1
2MKND1000	10	15	75	12	2	●	1
2MKND1200	12	18	75	12	2	●	2
2MKND1500	15	22	75	16	2	●	1
2MKNND0300	3	5	50	6	2	●	1
2MKNND0400	4	6	60	8	2	●	1
2MKNND0500	5	8	60	8	2	●	1
2MKNND0600	6	8	60	8	2	●	1
2MKNND0700	7	10	65	10	2	●	1
2MKNND0800	8	10	65	10	2	●	1
2MKNND1000	10	15	75	12	2	●	1
2MKNND1200	12	18	75	12	2	●	2
2MKNND1500	15	22	75	16	2	●	1
2MKNND1800	18	22	80	20	2	●	1
2MKNND2000	20	22	85	20	2	●	2
2MKPD0300	3	5	50	6	2	●	1
2MKPD0400	4	6	60	8	2	●	1
2MKPD0500	5	8	60	8	2	●	1
2MKPD0600	6	8	60	8	2	●	1
2MKPD0700	7	10	65	10	2	●	1
2MKPD0800	8	10	65	10	2	●	1
2MKPD1000	10	15	75	12	2	●	1
2MKPD1200	12	18	75	12	2	●	2

2MK

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
2MKPD1500	15	22	75	16	2	●	1
2MKPD1800	18	22	80	20	2	●	1
2MKPD2000	20	22	85	20	2	●	2

S2SDA

LIGHT ALLOY STEEL END MILLS

End mill, Short cut length, 2 flute, For aluminium alloy

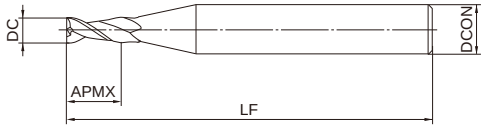
Product Information

KHA S | 37.5° | Sharp

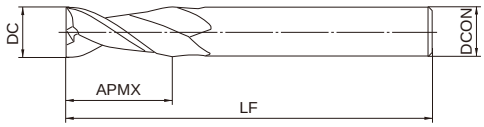
Work Material

N | F | M

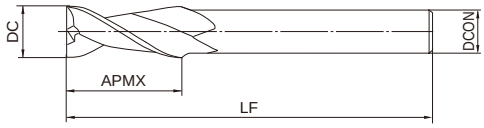
Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 684



Type1



Type2



Type3

DC=3	DC>3
0 - 0.020	0 - 0.030

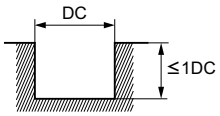
●Inventory maintained in Japan. Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
S2SDAD0300	3	8	50	6	2	●	1
S2SDAD0400	4	8	60	8	2	●	1
S2SDAD0500	5	10	60	8	2	●	1
S2SDAD0600	6	12	60	8	2	●	1
S2SDAD0800	8	15	65	10	2	●	1
S2SDAD1000	10	20	75	10	2	●	2
S2SDAD1200	12	22	85	12	2	●	2
S2SDAD1400	14	26	90	16	2	●	1
S2SDAD1600	16	32	100	16	2	●	2
S2SDAD1800	18	34	100	16	2	●	3
S2SDAD2000	20	38	115	20	2	●	2

S2SDA

RECOMMENDED CUTTING CONDITIONS

Work material	Cast aluminium, Rolled aluminium, aluminium, Magnesium alloy, resin AC, ADC, A5052, A7075	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)
3	8200	410
4	6500	530
6	4800	680
8	3800	780
10	3200	750
12	2700	710
16	2000	600
20	1600	510



- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

VAMH

VIOLET END MILLS

End mill, Medium cut length, 2—4 flute

Product Information

KHA S | 45° (DC=5) | 50° (DC≧6) | V | Gash | DC=5 | DC≦20 | DC≧21

Work Material

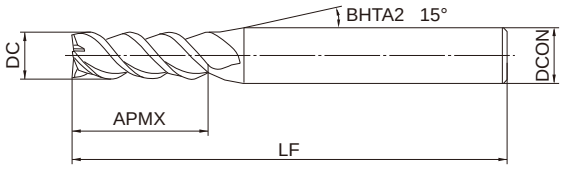
P M S F M

Technical Info >> 1993

ISO13399 Property >> 1966

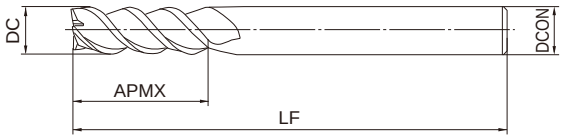
SYMBOL DESCRIPTIONS >> 664

END MILLS SELECTION CHART >> 684



Type1

5≦DC≦30
0
- 0.040



Type2

●Inventory maintained in Japan. Unit : mm

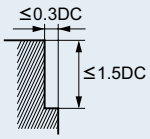
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
VAMHD0500	5	12	65	8	2	●	1
VAMHD0600	6	15	65	8	3	●	1
VAMHD0700	7	20	75	10	3	●	1
VAMHD0800	8	20	75	10	3	●	1
VAMHD0900	9	25	90	10	3	●	1
VAMHD1000	10	25	90	12	3	●	1
VAMHD1100	11	30	95	12	3	●	1
VAMHD1200	12	30	95	12	3	●	2
VAMHD1300	13	35	105	16	3	●	1
VAMHD1400	14	35	105	16	3	●	1
VAMHD1500	15	40	115	16	3	●	1
VAMHD1600	16	40	115	16	3	●	2
VAMHD1800	18	40	125	20	3	●	1
VAMHD2000	20	45	130	20	3	●	2
VAMHD2100	21	45	135	25	4	●	1
VAMHD2200	22	45	135	25	4	●	1
VAMHD2300	23	50	140	25	4	●	1
VAMHD2400	24	50	140	25	4	●	1
VAMHD2500	25	50	140	25	4	●	2
VAMHD2800	28	55	150	32	4	●	1
VAMHD3000	30	55	150	32	4	●	1

VAMH

RECOMMENDED CUTTING CONDITIONS

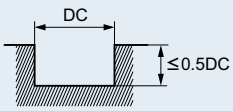
·Side milling

Work material	Structural steel, Cast iron, Carbon steel AISI 1045, AISI No 35 B, AISI 1050		Carbon steel, Alloy steel (20—30HRC) AISI 1055, AISI P20		Alloy steel, Tool steel, Pre-hardened steel (30—35HRC) AISI H13, AISI D2		Austenitic stainless steel, Alloy steel, Tool steel (35—40HRC) AISI 304, AISI 316	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
5	3600	140	2700	100	1800	70	1500	60
6	3200	200	2400	150	1600	100	1300	80
8	2400	220	1800	160	1200	110	1000	90
10	1900	230	1400	170	960	120	800	100
12	1600	240	1200	180	800	120	660	100
16	1200	220	900	160	600	110	500	90
20	950	200	720	150	480	100	400	85
25	760	220	570	170	380	110	320	95
30	640	200	480	150	320	100	270	85



·Slotting

Work material	Structural steel, Cast iron, Carbon steel AISI 1045, AISI No 35 B, AISI 1050		Carbon steel, Alloy steel (20—30HRC) AISI 1055, AISI P20		Alloy steel, Tool steel, Pre-hardened steel (30—35HRC) AISI H13, AISI D2		Austenitic stainless steel, Alloy steel, Tool steel (35—40HRC) AISI 304, AISI 316	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
5	2900	105	2400	75	1500	50	1200	45
6	2600	150	2100	110	1300	75	1000	60
8	2000	165	1600	120	1000	80	800	70
10	1600	170	1300	130	800	90	640	75
12	1300	180	1100	135	660	90	530	75
16	1000	165	800	120	500	80	400	70
20	720	150	640	110	400	75	320	65
25	570	165	450	130	320	80	230	70
30	480	150	370	110	270	75	190	65



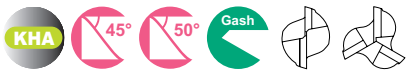
- Supply cutting fluid sufficiently during slot milling. When slotting with dry cut, decrease the revolution and feed rate proportionately by 20 —30%.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

KMH

HIGH HELIX END MILLS

End mill, Medium cut length, 2—3 flute, High helix angle

Product Information



DC=5 DC≧6 DC=5 DC≦20

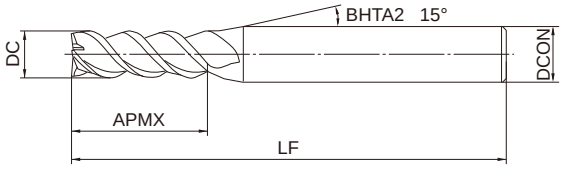
Technical Info >> 1993

ISO13399 Property >> 1966

Work Material

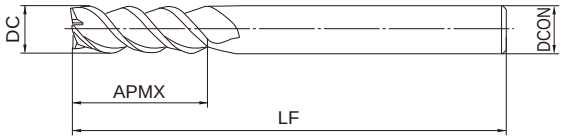
SYMBOL DESCRIPTIONS >> 664

END MILLS SELECTION CHART >> 684



Type1

5≦DC≦20
0 - 0.040



Type2

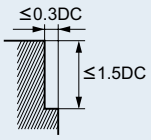
●Inventory maintained in Japan. Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
KMHD0500	5	12	65	8	2	●	1
KMHD0600	6	15	65	8	3	●	1
KMHD0700	7	20	75	10	3	●	1
KMHD0800	8	20	75	10	3	●	1
KMHD0900	9	25	90	10	3	●	1
KMHD1000	10	25	90	12	3	●	1
KMHD1200	12	30	95	12	3	●	2
KMHD1400	14	35	105	16	3	●	1
KMHD1600	16	40	115	16	3	●	2
KMHD2000	20	45	130	20	3	●	2

KMH

RECOMMENDED CUTTING CONDITIONS

Work material	Structural steel, Cast iron, Carbon steel AISI 1045, AISI No 35 B, AISI 1050		Carbon steel, Alloy steel (20—30HRC) AISI 1055, AISI P20		Alloy steel, Tool steel, Pre-hardened steel (30—35HRC) AISI H13, AISI D2		Austenitic stainless steel AISI 304, AISI 316	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
5	1600	65	1200	50	900	30	710	25
6	1400	90	1000	65	780	45	610	35
8	1100	100	800	75	580	50	470	40
10	860	105	640	80	470	55	380	45
12	720	110	530	80	390	55	310	45
16	540	100	400	75	300	50	230	40
20	430	90	320	65	240	50	190	35



- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

VA4MC

VIOLET END MILLS

End mill, Medium cut length, 4 flute

Product Information

KHA S 30° V Sharp

Work Material

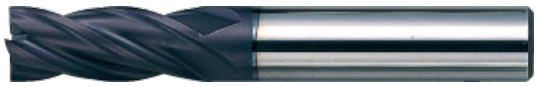
P M S F M

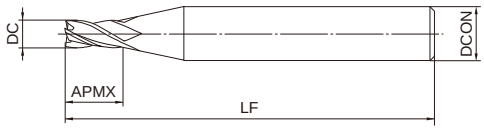
Technical Info >> 1993

ISO13399 Property >> 1966

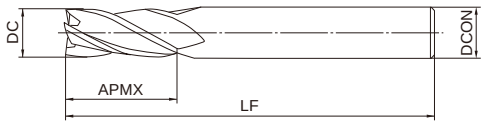
SYMBOL DESCRIPTIONS >> 664

END MILLS SELECTION CHART >> 684

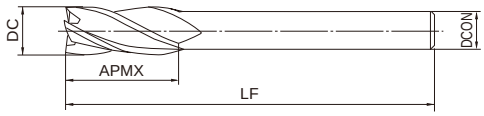




Type1



Type2



Type3

DC≦20	DC>20
0 + 0.030	0 + 0.040

●Inventory maintained in Japan.

Unit : mm

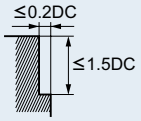
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
VA4MCD0300	3	10	50	6	4	●	1
VA4MCD0400	4	12	60	8	4	●	1
VA4MCD0500	5	15	60	8	4	●	1
VA4MCD0600	6	15	60	8	4	●	1
VA4MCD0700	7	20	65	10	4	●	1
VA4MCD0800	8	20	65	10	4	●	1
VA4MCD0900	9	25	75	10	4	●	1
VA4MCD1000	10	25	75	10	4	●	2
VA4MCD1100	11	30	85	12	4	●	1
VA4MCD1200	12	30	85	12	4	●	2
VA4MCD1300	13	35	90	12	4	●	3
VA4MCD1400	14	35	95	16	4	●	1
VA4MCD1500	15	40	100	16	4	●	1
VA4MCD1600	16	40	100	16	4	●	2
VA4MCD1700	17	40	100	16	4	●	3
VA4MCD1800	18	40	100	16	4	●	3
VA4MCD1900	19	45	115	20	4	●	1
VA4MCD2000	20	45	115	20	4	●	2
VA4MCD2200	22	45	115	20	4	●	3
VA4MCD2400	24	50	120	25	4	●	1
VA4MCD2500	25	50	120	25	4	●	2
VA4MCD2800	28	55	125	25	4	●	3
VA4MCD3000	30	55	125	25	4	●	3

VA4MC

RECOMMENDED CUTTING CONDITIONS

·Side milling

Work material	Structural steel, Cast iron, Carbon steel AISI 1045, AISI No 35 B, AISI 1050		Carbon steel, Alloy steel (20—30HRC) AISI 1055, AISI P20		Alloy steel, Tool steel, Pre-hardened steel (30—35HRC) AISI H13, AISI D2		Austenitic stainless steel, Alloy steel, Tool steel (35—40HRC) AISI 304, AISI 316	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
3	5400	270	4000	200	2700	140	2200	100
4	4300	320	3200	240	2100	160	1800	120
5	3600	340	2700	250	1800	170	1500	130
6	3200	350	2400	260	1600	180	1300	140
8	2400	380	1800	290	1200	190	1000	145
10	1900	420	1400	300	950	210	800	160
12	1600	380	1200	290	800	190	660	145
16	1200	340	900	260	600	170	500	130
20	950	290	720	220	480	140	400	110
25	760	240	570	180	380	120	320	100
30	640	210	480	160	320	100	270	80



- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

S4MD

FOUR-FLUTE END MILLS

End mill, Medium cut length, 4 flute

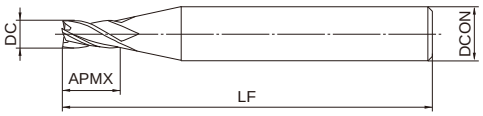
Product Information

KHA S 30° Sharp

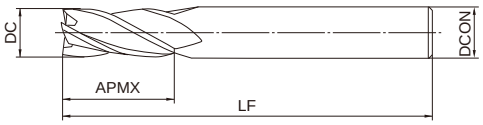
Work Material

P M N S F M

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 684



Type1



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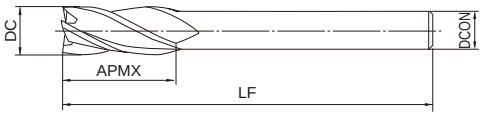


Type3

DC≦20	DC>20
0 + 0.020	0 + 0.030

●Inventory maintained in Japan. Unit : mm

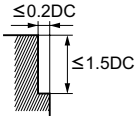
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
S4MDD0250	2.5	10	50	6	4	●	1
S4MDD0300	3	10	50	6	4	●	1
S4MDD0350	3.5	12	60	8	4	●	1
S4MDD0400	4	12	60	8	4	●	1
S4MDD0450	4.5	15	60	8	4	●	1
S4MDD0500	5	15	60	8	4	●	1
S4MDD0550	5.5	15	60	8	4	●	1
S4MDD0600	6	15	60	8	4	●	1
S4MDD0650	6.5	20	65	10	4	●	1
S4MDD0700	7	20	65	10	4	●	1
S4MDD0750	7.5	20	65	10	4	●	1
S4MDD0800	8	20	65	10	4	●	1
S4MDD0850	8.5	25	75	10	4	●	1
S4MDD0900	9	25	75	10	4	●	1
S4MDD0950	9.5	25	75	10	4	●	1
S4MDD1000S10	10	25	75	10	4	●	2
S4MDD1000S12	10	25	75	12	4	●	1
S4MDD1100	11	30	85	12	4	●	1
S4MDD1200	12	30	85	12	4	●	2
S4MDD1300	13	35	90	12	4	●	3
S4MDD1400	14	35	95	16	4	●	1
S4MDD1500	15	40	100	16	4	●	1
S4MDD1600	16	40	100	16	4	●	2
S4MDD1700	17	40	100	16	4	●	3
S4MDD1800	18	40	100	16	4	●	3
S4MDD1900	19	45	115	20	4	●	1
S4MDD2000	20	45	115	20	4	●	2

S4MD

RECOMMENDED CUTTING CONDITIONS

·Side milling

Work material	Structural steel, Carbon steel AISI 1045, AISI 1050		Carbon steel, Alloy steel (20—30HRC) AISI 1055, AISI P20		Alloy steel, Tool steel, Pre-hardened steel (30—35HRC) AISI H13		Austenitic stainless steel, Alloy steel, Tool steel (35—40HRC) AISI 304, AISI 316		Cast iron AISI No 35 B		Aluminium alloy	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
3	3900	240	3100	175	2400	150	1900	95	3400	260	8200	660
4	3100	270	2400	190	1850	150	1450	95	2700	300	6500	850
5	2700	300	2000	240	1500	160	1200	110	2200	320	5400	980
6	2400	320	1700	240	1300	175	1000	135	1900	350	4800	1100
8	1900	350	1300	260	990	175	800	135	1450	380	3800	1250
10	1500	380	1100	290	800	175	650	145	1200	430	3200	1200
12	1250	350	900	260	670	160	540	135	990	380	2700	1100
16	940	300	680	230	500	135	400	110	760	320	2000	960



- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

G4MC

FOUR-FLUTE END MILLS

End mill, Medium cut length, 4 flute, Center cutting

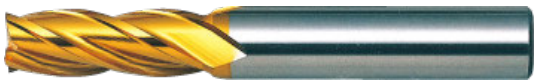
Product Information

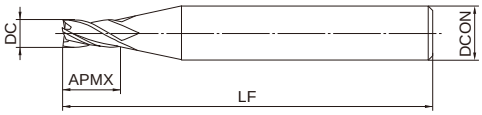
CO HSS 30° G Sharp

Work Material

P M S F M

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 684





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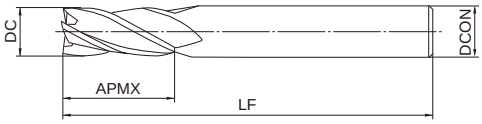

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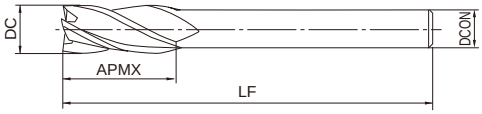


Type3

DC≦20	DC>20
0 + 0.030	0 + 0.040

●Inventory maintained in Japan. Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
G4MCD0300	3	10	50	6	4	●	1
G4MCD0350	3.5	12	60	8	4	●	1
G4MCD0400	4	12	60	8	4	●	1
G4MCD0450	4.5	15	60	8	4	●	1
G4MCD0500	5	15	60	8	4	●	1
G4MCD0550	5.5	15	60	8	4	●	1
G4MCD0600	6	15	60	8	4	●	1
G4MCD0650	6.5	20	65	10	4	●	1
G4MCD0700	7	20	65	10	4	●	1
G4MCD0750	7.5	20	65	10	4	●	1
G4MCD0800	8	20	65	10	4	●	1
G4MCD0850	8.5	25	75	10	4	●	1
G4MCD0900	9	25	75	10	4	●	1
G4MCD0950	9.5	25	75	10	4	●	1
G4MCD1000	10	25	75	10	4	●	2
G4MCD1100	11	30	85	12	4	●	1
G4MCD1200	12	30	85	12	4	●	2
G4MCD1300	13	35	90	12	4	●	3
G4MCD1400	14	35	95	16	4	●	1
G4MCD1500	15	40	100	16	4	●	1
G4MCD1600	16	40	100	16	4	●	2
G4MCD1700	17	40	100	16	4	●	3
G4MCD1800	18	40	100	16	4	●	3

G4MC

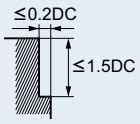
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
G4MCD1900	19	45	115	20	4	●	1
G4MCD2000	20	45	115	20	4	●	2
G4MCD2100	21	45	115	20	4	●	3
G4MCD2200	22	45	115	20	4	●	3
G4MCD2300	23	50	120	25	4	●	1
G4MCD2400	24	50	120	25	4	●	1
G4MCD2500	25	50	120	25	4	●	2
G4MCD2600	26	50	120	25	4	●	3
G4MCD2700	27	55	125	25	4	●	3
G4MCD2800	28	55	125	25	4	●	3
G4MCD2900	29	55	125	25	4	●	3
G4MCD3000	30	55	125	25	4	●	3

G4MC

RECOMMENDED CUTTING CONDITIONS

·Side milling

Work material	Structural steel, Carbon steel AISI 1045, AISI 1050		Carbon steel, Alloy steel (20—30HRC) AISI 1055, AISI P20		Alloy steel, Tool steel, Pre-hardened steel (30—35HRC) AISI H13		Austenitic stainless steel AISI 304, AISI 316		Cast iron AISI No 35 B		Aluminium alloy	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
3	2800	145	2200	105	1700	90	1300	55	2400	150	5800	380
4	2150	160	1700	110	1300	90	1000	55	1900	175	4600	500
5	1900	185	1450	145	1100	95	850	65	1600	190	3800	580
6	1700	190	1200	145	940	105	730	80	1300	210	3400	640
8	1300	210	960	150	700	105	560	80	1000	220	2600	740
10	1000	230	770	175	560	105	460	90	840	260	2200	690
12	860	210	640	150	470	95	370	80	700	220	1900	670
16	650	180	480	145	360	90	280	65	530	190	1450	560
20	520	150	380	110	290	70	230	55	420	160	1150	480
25	420	135	300	95	230	65	180	50	340	145	910	420
30	350	130	250	90	190	55	145	40	290	135	770	380
40	250	95	180	55	140	40	110	35	220	105	580	300
50	190	80	140	55	110	40	85	30	170	90	460	260



- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

4MC

FOUR-FLUTE END MILLS

End mill, Medium cut length, 4 flute, Center cutting

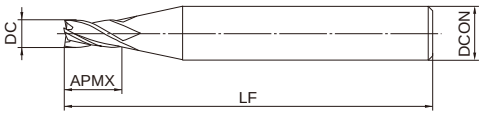
Product Information

CO HSS 30° Sharp

Work Material

P M N S F M

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 684



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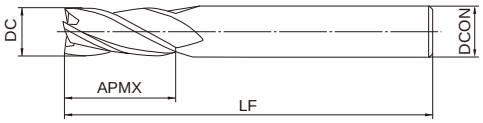

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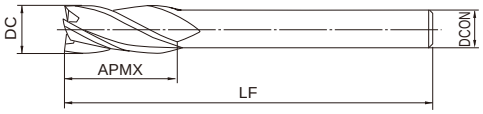


Type3

DC≦20	DC>20
0 + 0.020	0 + 0.030

●Inventory maintained in Japan. Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
4MCD0250	2.5	10	50	6	4	●	1
4MCD0300	3	10	50	6	4	●	1
4MCD0350	3.5	12	60	8	4	●	1
4MCD0400	4	12	60	8	4	●	1
4MCD0450	4.5	15	60	8	4	●	1
4MCD0500	5	15	60	8	4	●	1
4MCD0550	5.5	15	60	8	4	●	1
4MCD0600	6	15	60	8	4	●	1
4MCD0650	6.5	20	65	10	4	●	1
4MCD0700	7	20	65	10	4	●	1
4MCD0750	7.5	20	65	10	4	●	1
4MCD0800	8	20	65	10	4	●	1
4MCD0850	8.5	25	75	10	4	●	1
4MCD0900	9	25	75	10	4	●	1
4MCD0950	9.5	25	75	10	4	●	1
4MCD1000	10	25	75	10	4	●	2
4MCD1100	11	30	85	12	4	●	1
4MCD1200	12	30	85	12	4	●	2
4MCD1300	13	35	90	12	4	●	3
4MCD1400	14	35	95	16	4	●	1
4MCD1500	15	40	100	16	4	●	1
4MCD1600	16	40	100	16	4	●	2
4MCD1700	17	40	100	16	4	●	3

4MC

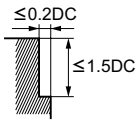
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
4MCD1800	18	40	100	16	4	●	3
4MCD1900	19	45	115	20	4	●	1
4MCD2000	20	45	115	20	4	●	2
4MCD2100	21	45	115	20	4	●	3
4MCD2200	22	45	115	20	4	●	3
4MCD2300	23	50	120	25	4	●	1
4MCD2400	24	50	120	25	4	●	1
4MCD2500	25	50	120	25	4	●	2
4MCD2600	26	50	120	25	4	●	3
4MCD2700	27	55	125	25	4	●	3
4MCD2800	28	55	125	25	4	●	3
4MCD2900	29	55	125	25	4	●	3
4MCD3000	30	55	125	25	4	●	3
4MCD3100	31	60	145	25	4	●	3
4MCD3200	32	60	145	32	4	●	2
4MCD3300	33	60	145	32	4	●	3
4MCD3400	34	60	145	32	4	●	3
4MCD3500	35	60	145	32	4	●	3
4MCD3600	36	65	150	32	4	●	3
4MCD3700	37	65	150	32	4	●	3
4MCD3800	38	65	150	32	4	●	3
4MCD3900	39	65	150	32	4	●	3
4MCD4000	40	65	150	32	4	●	3

4MC

RECOMMENDED CUTTING CONDITIONS

·Side milling

Work material	Structural steel, Carbon steel AISI 1045, AISI 1050		Carbon steel, Alloy steel (20—30HRC) AISI 1055, AISI P20		Alloy steel, Tool steel, Pre-hardened steel (30—35HRC) AISI H13		Austenitic stainless steel AISI 304, AISI 316		Cast iron AISI No 35 B		Aluminium alloy	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
3	2300	105	1800	80	1400	65	1100	45	2000	110	4800	280
4	1800	120	1400	85	1100	65	850	45	1600	125	3800	370
5	1600	135	1200	105	900	70	710	50	1300	140	3200	420
6	1400	140	1000	105	780	80	610	55	1100	155	2800	460
8	1100	155	800	110	580	80	470	55	850	160	2200	530
10	860	170	640	120	470	80	380	65	700	180	1800	500
12	720	155	530	110	390	70	310	55	580	160	1600	490
16	540	135	400	105	300	65	230	50	440	140	1200	410
20	430	110	320	85	240	55	190	45	350	120	960	350
25	350	100	250	70	190	45	150	35	285	105	760	310
30	290	90	210	65	160	40	120	30	240	100	640	280
40	210	70	150	40	120	30	90	25	180	80	480	220



- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

S4JC

FOUR-FLUTE END MILLS

End mill, Semi long cut length, 4 flute

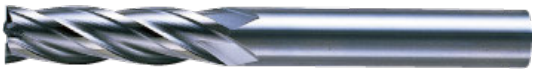
Product Information

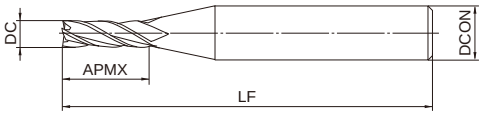
KHA S | 30° | Sharp

Work Material

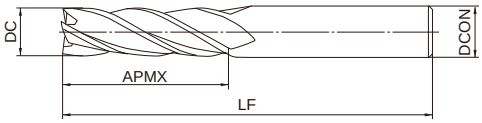
P M N S F M

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 684





Type1



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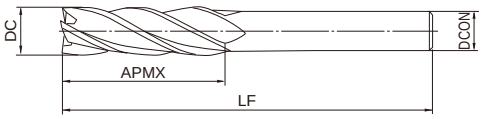


Type3

DC≦20	DC>20
0 + 0.020	0 + 0.030

●Inventory maintained in Japan. Unit : mm

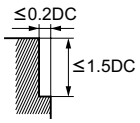
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
S4JCD0300	3	12	60	6	4	●	1
S4JCD0400	4	15	65	8	4	●	1
S4JCD0500	5	20	75	8	4	●	1
S4JCD0600	6	20	75	8	4	●	1
S4JCD0700	7	25	80	10	4	●	1
S4JCD0800	8	25	80	10	4	●	1
S4JCD0900	9	35	90	10	4	●	1
S4JCD1000	10	35	90	10	4	●	2
S4JCD1100	11	45	110	12	4	●	1
S4JCD1200	12	45	110	12	4	●	2
S4JCD1300	13	45	110	12	4	●	3
S4JCD1400	14	55	125	16	4	●	1
S4JCD1500	15	55	125	16	4	●	1
S4JCD1600	16	55	125	16	4	●	2
S4JCD1700	17	55	125	16	4	●	3
S4JCD1800	18	55	125	16	4	●	3
S4JCD1900	19	65	145	20	4	●	1
S4JCD2000	20	65	145	20	4	●	2
S4JCD2500	25	75	165	25	4	●	2
S4JCD3000	30	75	165	25	4	●	3
S4JCD3500	35	85	190	32	4	●	3
S4JCD4000	40	95	200	32	4	●	3

S4JC

RECOMMENDED CUTTING CONDITIONS

·Side milling

Work material	Structural steel, Carbon steel AISI 1045, AISI 1050		Carbon steel, Alloy steel (20—30HRC) AISI 1055, AISI P20		Alloy steel, Tool steel, Pre-hardened steel (30—35HRC) AISI H13		Austenitic stainless steel, Alloy steel, Tool steel (35—40HRC) AISI 304, AISI 316		Cast iron AISI No 35 B		Aluminium alloy	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
3	3900	240	3100	175	2400	150	1900	95	3400	260	8200	660
4	3100	270	2400	190	1850	150	1450	95	2700	300	6500	850
5	2700	300	2000	240	1500	160	1200	110	2200	320	5400	980
6	2400	320	1700	240	1300	175	1000	135	1900	350	4800	1100
8	1900	350	1300	260	990	175	800	135	1450	380	3800	1250
10	1500	380	1100	290	800	175	650	145	1200	430	3200	1200
12	1250	350	900	260	670	160	540	135	990	380	2700	1100
16	940	300	680	230	500	135	400	110	760	320	2000	960



- Use the milling by reducing the feed rate in the table shown above by 20 — 30% in accordance with the cutting type.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

G4LC

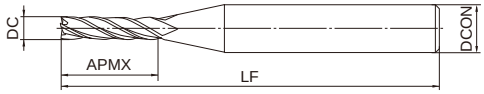
FOUR-FLUTE END MILLS

End mill, Long cut length, 4 flute, Center cutting

Product Information

Work Material

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 684



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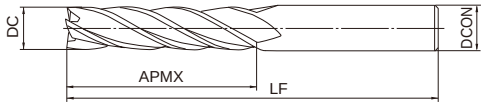

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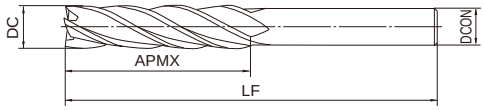


Type3

DC≦20	DC>20
0 + 0.030	0 + 0.040

●Inventory maintained in Japan. Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
G4LCD0300	3	15	55	6	4	●	1
G4LCD0400	4	20	55	8	4	●	1
G4LCD0500	5	25	60	8	4	●	1
G4LCD0600	6	25	60	8	4	●	1
G4LCD0700	7	35	75	10	4	●	1
G4LCD0800	8	35	75	10	4	●	1
G4LCD0900	9	45	90	10	4	●	1
G4LCD1000	10	45	90	10	4	●	2
G4LCD1100	11	55	105	12	4	●	1
G4LCD1200	12	55	105	12	4	●	2
G4LCD1300	13	55	105	12	4	●	3
G4LCD1400	14	55	110	16	4	●	1
G4LCD1500	15	65	120	16	4	●	1
G4LCD1600	16	65	120	16	4	●	2
G4LCD1700	17	65	120	16	4	●	3
G4LCD1800	18	65	120	16	4	●	3
G4LCD1900	19	75	140	20	4	●	1
G4LCD2000	20	75	140	20	4	●	2
G4LCD2100	21	75	140	20	4	●	3
G4LCD2200	22	75	140	20	4	●	3
G4LCD2300	23	90	160	25	4	●	1
G4LCD2400	24	90	160	25	4	●	1
G4LCD2500	25	90	160	25	4	●	2

G4LC

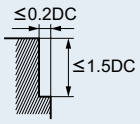
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
G4LCD2600	26	90	160	25	4	●	3
G4LCD2700	27	90	160	25	4	●	3
G4LCD2800	28	90	160	25	4	●	3
G4LCD2900	29	90	160	25	4	●	3
G4LCD3000	30	90	160	25	4	●	3
G4LCD3100	31	95	180	25	4	●	3
G4LCD3200	32	95	180	32	4	●	2
G4LCD3300	33	95	180	32	4	●	3
G4LCD3400	34	100	185	32	4	●	3
G4LCD3500	35	100	185	32	4	●	3
G4LCD3600	36	105	190	32	4	●	3
G4LCD3700	37	105	190	32	4	●	3
G4LCD3800	38	105	190	32	4	●	3
G4LCD3900	39	110	195	32	4	●	3
G4LCD4000	40	110	195	32	4	●	3

G4LC

RECOMMENDED CUTTING CONDITIONS

·Side milling

Work material	Structural steel, Carbon steel AISI 1045, AISI 1050		Carbon steel, Alloy steel (20—30HRC) AISI 1055, AISI P20		Alloy steel, Tool steel, Pre-hardened steel (30—35HRC) AISI H13		Austenitic stainless steel AISI 304, AISI 316		Cast iron AISI No 35 B		Aluminium alloy	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
3	2800	145	2200	105	1700	90	1300	55	2400	150	5800	380
4	2150	160	1700	110	1300	90	1000	55	1900	175	4600	500
5	1900	185	1450	145	1100	95	850	65	1600	190	3800	580
6	1700	190	1200	145	940	105	730	80	1300	210	3400	640
8	1300	210	960	150	700	105	560	80	1000	220	2600	740
10	1000	230	770	175	560	105	460	90	840	260	2200	690
12	860	210	640	150	470	95	370	80	700	220	1900	670
16	650	180	480	145	360	90	280	65	530	190	1450	560
20	520	150	380	110	290	70	230	55	420	160	1150	480
25	420	135	300	95	230	65	180	50	340	145	910	420
30	350	130	250	90	190	55	145	40	290	135	770	380
40	250	95	180	55	140	40	110	35	220	105	580	300
50	190	80	140	55	110	40	85	30	170	90	460	260



- Use the milling by reducing the revolution in the table shown above by 20 — 30% and the feed rate 40 — 50% to match the cutting type.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

4LC

FOUR-FLUTE END MILLS

End mill, Long cut length, 4 flute, Center cutting

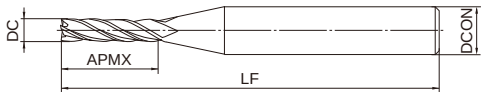
Product Information

CO HSS 30° Sharp

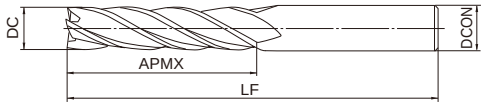
Work Material

P M N S F M

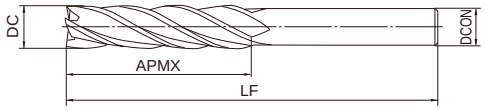
Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 684



Type1



Type2



Type3

DC≦20	DC>20
0 + 0.020	0 + 0.030

●Inventory maintained in Japan. Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
4LCD0300	3	15	55	6	4	●	1
4LCD0400	4	20	55	8	4	●	1
4LCD0500	5	25	60	8	4	●	1
4LCD0600	6	25	60	8	4	●	1
4LCD0700	7	35	75	10	4	●	1
4LCD0800	8	35	75	10	4	●	1
4LCD0900	9	45	90	10	4	●	1
4LCD1000	10	45	90	10	4	●	2
4LCD1100	11	55	105	12	4	●	1
4LCD1200	12	55	105	12	4	●	2
4LCD1300	13	55	105	12	4	●	3
4LCD1400	14	55	110	16	4	●	1
4LCD1500	15	65	120	16	4	●	1
4LCD1600	16	65	120	16	4	●	2
4LCD1700	17	65	120	16	4	●	3
4LCD1800	18	65	120	16	4	●	3
4LCD1900	19	75	140	20	4	●	1
4LCD2000	20	75	140	20	4	●	2
4LCD2100	21	75	140	20	4	●	3
4LCD2200	22	75	140	20	4	●	3
4LCD2300	23	90	160	25	4	●	1
4LCD2400	24	90	160	25	4	●	1
4LCD2500	25	90	160	25	4	●	2

4LC

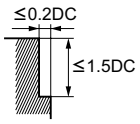
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
4LCD2600	26	90	160	25	4	●	3
4LCD2700	27	90	160	25	4	●	3
4LCD2800	28	90	160	25	4	●	3
4LCD2900	29	90	160	25	4	●	3
4LCD3000	30	90	160	25	4	●	3
4LCD3100	31	95	180	25	4	●	3
4LCD3200	32	95	180	32	4	●	2
4LCD3300	33	95	180	32	4	●	3
4LCD3400	34	100	185	32	4	●	3
4LCD3500	35	100	185	32	4	●	3
4LCD3600	36	105	190	32	4	●	3
4LCD3700	37	105	190	32	4	●	3
4LCD3800	38	105	190	32	4	●	3
4LCD3900	39	110	195	32	4	●	3
4LCD4000	40	110	195	32	4	●	3

4LC

RECOMMENDED CUTTING CONDITIONS

·Side milling

Work material	Structural steel, Carbon steel AISI 1045, AISI 1050		Carbon steel, Alloy steel (20—30HRC) AISI 1055, AISI P20		Alloy steel, Tool steel, Pre-hardened steel (30—35HRC) AISI H13		Austenitic stainless steel AISI 304, AISI 316		Cast iron AISI No 35 B		Aluminium alloy	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
3	2300	105	1800	80	1400	65	1100	45	2000	110	4800	280
4	1800	120	1400	85	1100	65	850	45	1600	125	3800	370
5	1600	135	1200	105	900	70	710	50	1300	140	3200	420
6	1400	140	1000	105	780	80	610	55	1100	155	2800	460
8	1100	155	800	110	580	80	470	55	850	160	2200	530
10	860	170	640	120	470	80	380	65	700	180	1800	500
12	720	155	530	110	390	70	310	55	580	160	1600	490
16	540	135	400	105	300	65	230	50	440	140	1200	410
20	430	110	320	85	240	55	190	45	350	120	960	350
25	350	100	250	70	190	45	150	35	285	105	760	310
30	290	90	210	65	160	40	120	30	240	100	640	280
40	210	70	150	40	120	30	90	25	180	80	480	220



- Use the milling by reducing the revolution in the table shown above by 20 — 30% and the feed rate 40 — 50% to match the cutting type.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

GSFPR

ROUGHING END MILLS

Roughing end mill, Short cut length, 3—6 flute, Fine pitch form

Product Information

CO HSS 30° G

DC≦22 24≦DC≦32 DC≧35

Technical Info >> 1993

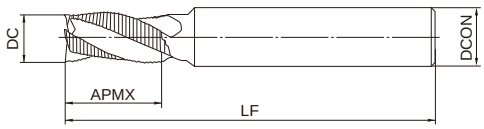
ISO13399 Property >> 1966

Work Material

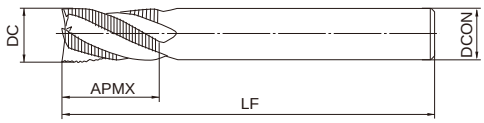
P M S R

SYMBOL DESCRIPTIONS >> 664

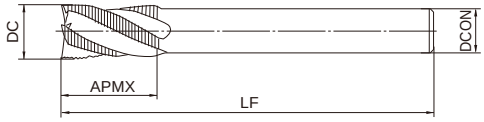
END MILLS SELECTION CHART >> 684



Type1



Type2



Type3

●Inventory maintained in Japan. Unit : mm

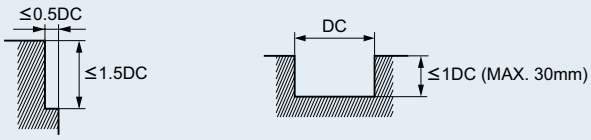
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
GSFPRD0500	5	10	80	6	3	●	1
GSFPRD0600	6	12	80	6	3	●	2
GSFPRD0700	7	17	80	8	3	●	1
GSFPRD0800	8	17	85	8	3	●	2
GSFPRD0900	9	22	100	10	3	●	1
GSFPRD1000	10	22	100	10	3	●	2
GSFPRD1200	12	27	110	12	3	●	2
GSFPRD1300	13	27	110	12	3	●	3
GSFPRD1400	14	27	135	12	3	●	3
GSFPRD1500	15	27	140	16	3	●	1
GSFPRD1600	16	33	140	16	3	●	2
GSFPRD1800	18	33	140	16	3	●	3
GSFPRD1900	19	38	145	20	3	●	1
GSFPRD2000	20	38	145	20	3	●	2
GSFPRD2200	22	38	145	20	3	●	3
GSFPRD2400	24	43	150	25	4	●	1
GSFPRD2500	25	43	150	25	4	●	2
GSFPRD2800	28	43	160	25	4	●	3
GSFPRD3000	30	48	165	25	4	●	3
GSFPRD3200	32	55	175	25	4	●	3
GSFPRD3500	35	55	175	32	6	●	3
GSFPRD4000	40	65	185	32	6	●	3
GSFPRD4500	45	65	200	42	6	●	3
GSFPRD5000	50	75	200	42	6	●	3

GSFPR

RECOMMENDED CUTTING CONDITIONS

( ) : Indicates standard revolution and feed rate for slotting.

Work material	Structural steel, Cast iron, Carbon steel AISI 1045, AISI No 35 B, AISI 1050		Carbon steel, Alloy steel (20—30HRC) AISI 1055, AISI P20		Alloy steel, Tool steel, Pre-hardened steel (30—35HRC) AISI H13, AISI D2		Austenitic stainless steel AISI 304, AISI 316	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
5	1200(900)	50(40)	900(680)	35(25)	730(550)	30(23)	610(460)	25(20)
6	1150(860)	60(45)	860(650)	50(40)	680(510)	35(26)	580(440)	30(23)
8	960(720)	80(60)	720(540)	60(45)	600(450)	50(40)	480(360)	35(26)
10	770(580)	110(85)	580(440)	85(65)	460(350)	60(45)	380(290)	50(40)
12	640(480)	110(85)	480(360)	85(65)	380(290)	65(50)	320(240)	55(40)
16	480(360)	110(85)	360(270)	85(65)	290(220)	65(50)	240(180)	55(40)
20	380(290)	115(85)	290(220)	85(65)	230(170)	65(50)	190(145)	55(40)
25	300(230)	110(85)	230(170)	80(60)	180(135)	60(45)	160(120)	55(40)
30	250(190)	100(75)	190(145)	80(60)	160(120)	60(45)	130(100)	55(40)
40	160(120)	70(55)	120(90)	55(40)	95(70)	40(30)	85(65)	35(26)
50	120(90)	60(45)	90(70)	50(40)	70(55)	35(25)	60(45)	30(23)



- Supply cutting fluid sufficiently during cutting.
- When the diameter exceeds ø30 and the metal removal is less than the quantity shown in the table, the revolution and feed rate may be increased proportionately by 10 —40%.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

VASFPR

VIOLET END MILLS

Roughing end mill, Short cut length, 4—6 flute, Fine pitch form

Product Information

KHA S 30° V

DC≦24 25≦DC≦32 DC≧35

Technical Info >> 1993

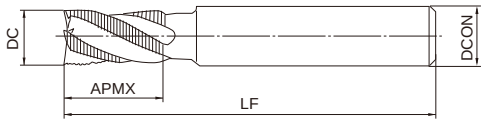
ISO13399 Property >> 1966

Work Material

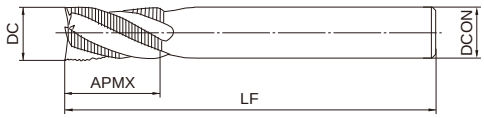
P M S R

SYMBOL DESCRIPTIONS >> 664

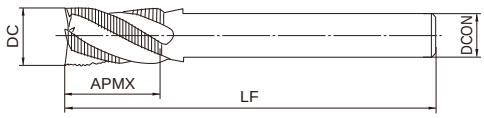
END MILLS SELECTION CHART >> 684



Type1



Type2



Type3

●Inventory maintained in Japan. Unit : mm

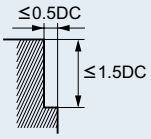
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
VASFPRD0500	5	10	80	6	4	●	1
VASFPRD0600	6	12	80	6	4	●	2
VASFPRD0700	7	17	80	8	4	●	1
VASFPRD0800	8	17	85	8	4	●	2
VASFPRD0900	9	22	100	10	4	●	1
VASFPRD1000	10	22	100	10	4	●	2
VASFPRD1200	12	27	110	12	4	●	2
VASFPRD1400	14	27	110	12	4	●	3
VASFPRD1500	15	27	125	16	4	●	1
VASFPRD1600	16	33	125	16	4	●	2
VASFPRD1800	18	33	125	16	4	●	3
VASFPRD2000	20	38	145	20	4	●	2
VASFPRD2200	22	38	145	20	4	●	3
VASFPRD2400	24	43	150	25	4	●	1
VASFPRD2500	25	43	150	25	5	●	2
VASFPRD2800	28	43	160	25	5	●	3
VASFPRD3000	30	48	165	25	5	●	3
VASFPRD3200	32	55	175	25	5	●	3
VASFPRD3500	35	55	175	32	6	●	3
VASFPRD4000	40	65	185	32	6	●	3
VASFPRD4500	45	65	200	42	6	●	3
VASFPRD5000	50	75	200	42	6	●	3

VASFPR

RECOMMENDED CUTTING CONDITIONS

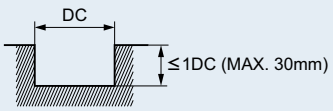
·Side milling

Work material	Structural steel, Cast iron, Carbon steel AISI 1045, AISI No 35 B, AISI 1050		Carbon steel, Alloy steel (20—30HRC) AISI 1055, AISI P20		Alloy steel, Tool steel, Pre-hardened steel (30—35HRC) AISI H13, AISI D2		Austenitic stainless steel, Alloy steel, Tool steel (35—40HRC) AISI 304, AISI 316	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
5	2800	140	2200	120	1500	80	1300	70
6	2600	180	2000	140	1400	90	1200	80
8	2200	230	1700	180	1200	130	990	100
10	1750	330	1350	250	950	160	800	130
12	1450	330	1100	260	800	180	660	140
16	1100	330	850	260	600	180	500	140
20	880	340	680	260	480	180	400	140
25	700	330	540	250	380	170	320	140
30	580	300	450	230	320	170	270	140
40	350	210	270	170	190	120	160	100
50	250	170	190	130	130	90	110	75



·Slotting

Work material	Structural steel, Cast iron, Carbon steel AISI 1045, AISI No 35 B, AISI 1050		Carbon steel, Alloy steel (20—30HRC) AISI 1055, AISI P20		Alloy steel, Tool steel, Pre-hardened steel (30—35HRC) AISI H13, AISI D2		Austenitic stainless steel, Alloy steel, Tool steel (35—40HRC) AISI 304, AISI 316	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
5	2100	100	1650	80	1150	50	960	35
6	2000	130	1550	100	1050	60	900	45
8	1600	160	1300	130	920	90	760	60
10	1300	220	1000	175	730	110	610	80
12	1050	230	850	190	610	130	500	85
16	800	230	640	190	460	130	380	85
20	640	230	510	180	370	130	300	85
25	510	200	410	160	290	110	240	80
30	420	190	320	140	210	90	180	75
40	280	140	210	110	140	70	120	60
50	190	110	150	90	95	55	85	45



- Supply cutting fluid sufficiently during cutting. When slotting with dry cut, decrease the revolution and feed rate proportionately by 20—50%.
- For smaller depths and widths of cut, the revolution may be increased by 10 — 20% and the feed rate by 10 —40%.
- When drilling, please set the feed rate at 1/3 or below of the values above.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

VAMFPR

VIOLET END MILLS

Roughing end mill, Medium cut length, 4—6 flute, Fine pitch form

Product Information

KHA S 30° V

DC≦20 22≦DC≦28 DC≧30

Technical Info >> 1993

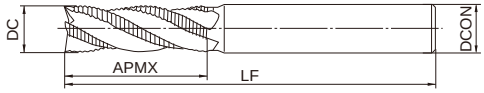
ISO13399 Property >> 1966

Work Material

P M S R

SYMBOL DESCRIPTIONS >> 664

END MILLS SELECTION CHART >> 684



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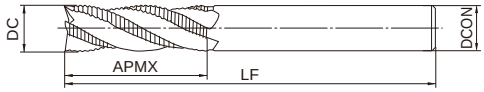

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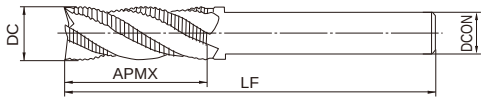


Type3

●Inventory maintained in Japan. Unit : mm

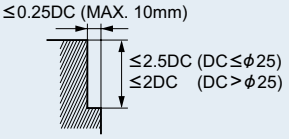
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
VAMFPRD0500	5	15	80	6	4	●	1
VAMFPRD0600	6	17	80	6	4	●	2
VAMFPRD0700	7	22	80	8	4	●	1
VAMFPRD0800	8	28	85	8	4	●	2
VAMFPRD0900	9	28	95	10	4	●	1
VAMFPRD1000	10	34	100	10	4	●	2
VAMFPRD1200	12	40	110	12	4	●	2
VAMFPRD1400	14	40	110	12	4	●	3
VAMFPRD1500	15	40	120	16	4	●	1
VAMFPRD1600	16	48	125	16	4	●	2
VAMFPRD1800	18	48	125	16	4	●	3
VAMFPRD2000	20	57	145	20	4	●	2
VAMFPRD2200	22	57	145	20	5	●	3
VAMFPRD2400	24	68	150	25	5	●	1
VAMFPRD2500	25	68	150	25	5	●	2
VAMFPRD2800	28	68	160	25	5	●	3
VAMFPRD3000	30	68	165	25	6	●	3
VAMFPRD3200	32	80	175	32	6	●	2
VAMFPRD3500	35	80	175	32	6	●	3
VAMFPRD4000	40	94	185	32	6	●	3
VAMFPRD4500	45	94	200	42	6	●	3
VAMFPRD5000	50	113	200	42	6	●	3

VAMFPR

RECOMMENDED CUTTING CONDITIONS

·Side milling

Work material	Structural steel, Cast iron, Carbon steel AISI 1045, AISI No 35 B, AISI 1050		Carbon steel, Alloy steel (20—30HRC) AISI 1055, AISI P20		Alloy steel, Tool steel, Pre-hardened steel (30—35HRC) AISI H13, AISI D2		Austenitic stainless steel, Alloy steel, Tool steel (35—40HRC) AISI 304, AISI 316	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
5	2600	90	2000	70	1400	50	1200	40
6	2500	100	1900	90	1300	50	1100	50
8	2000	170	1600	130	1100	90	930	80
10	1650	220	1300	170	900	100	750	90
12	1400	260	1000	210	750	140	620	120
16	1000	290	800	230	560	160	470	130
20	830	300	640	230	450	160	380	130
25	660	290	510	220	360	160	300	130
30	550	270	420	210	300	140	250	130
40	330	180	250	140	180	100	150	90
50	240	160	180	120	120	80	100	70



- Supply cutting fluid sufficiently during cutting. When slotting with dry cut, decrease the revolution and feed rate proportionately by 20—50%.
- When the diameter exceeds ø30 and the metal removal is less than the quantity shown in the table, the revolution and feed rate may be increased proportionately by 10—40%.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

VAMR

VIOLET END MILLS

Roughing end mill, Medium cut length, 4—6 flute

Product Information

KHA S 30° V

DC≦15 16≦DC≦26 28≦DC≦32 DC≧35

Technical Info >> 1993

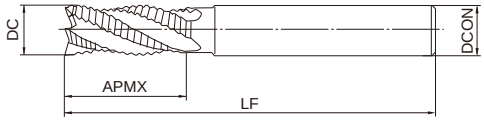
ISO13399 Property >> 1966

Work Material

P M S R

SYMBOL DESCRIPTIONS >> 664

END MILLS SELECTION CHART >> 684



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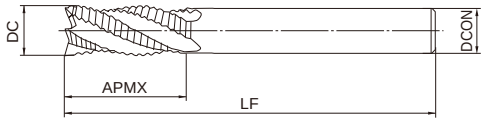

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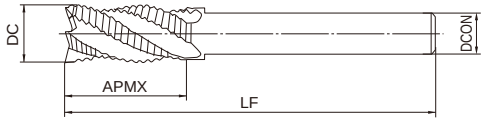


Type3

●Inventory maintained in Japan. Unit : mm

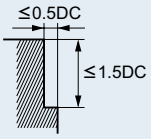
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
VAMRD0500	5	15	60	6	4	●	1
VAMRD0600	6	15	60	6	4	●	2
VAMRD0700	7	20	70	8	4	●	1
VAMRD0800	8	20	70	8	4	●	2
VAMRD0900	9	25	80	10	4	●	1
VAMRD1000	10	25	80	10	4	●	2
VAMRD1100	11	30	110	12	4	●	1
VAMRD1200	12	30	110	12	4	●	2
VAMRD1300	13	35	115	12	4	●	3
VAMRD1400	14	35	135	16	4	●	1
VAMRD1500	15	40	140	16	4	●	1
VAMRD1600	16	40	140	16	4	●	2
VAMRD1700	17	40	140	16	4	●	3
VAMRD1800	18	40	140	16	4	●	3
VAMRD1900	19	45	145	20	4	●	1
VAMRD2000	20	45	145	20	4	●	2
VAMRD2200	22	45	145	20	4	●	3
VAMRD2400	24	50	150	25	4	●	1
VAMRD2500	25	50	150	25	4	●	2
VAMRD2600	26	50	150	25	4	●	3
VAMRD2800	28	55	160	25	5	●	3
VAMRD3000	30	55	165	25	5	●	3
VAMRD3200	32	60	175	32	5	●	2
VAMRD3500	35	60	175	32	6	●	3
VAMRD4000	40	65	185	32	6	●	3
VAMRD4500	45	70	200	42	6	●	3
VAMRD5000	50	70	200	42	6	●	3

VAMR

RECOMMENDED CUTTING CONDITIONS

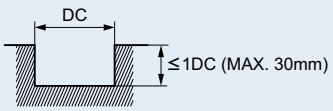
·Side milling

Work material	Structural steel, Cast iron, Carbon steel AISI 1045, AISI No 35 B, AISI 1050		Carbon steel, Alloy steel (20—30HRC) AISI 1055, AISI P20		Alloy steel, Tool steel, Pre-hardened steel (30—35HRC) AISI H13, AISI D2		Austenitic stainless steel, Alloy steel, Tool steel (35—40HRC) AISI 304, AISI 316	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
5	2400	120	1800	90	1200	60	1000	50
6	2200	155	1700	120	1100	70	930	65
8	1800	200	1400	140	950	100	780	85
10	1500	250	1100	200	810	125	680	100
12	1250	270	960	220	680	160	560	120
16	930	270	720	220	510	160	430	120
20	750	290	580	220	410	160	340	120
25	600	270	460	210	320	140	270	120
30	490	250	380	200	270	140	230	120
40	300	180	230	140	160	105	140	90
50	210	140	160	110	110	80	90	65



·Slotting

Work material	Structural steel, Cast iron, Carbon steel AISI 1045, AISI No 35 B, AISI 1050		Carbon steel, Alloy steel (20—30HRC) AISI 1055, AISI P20		Alloy steel, Tool steel, Pre-hardened steel (30—35HRC) AISI H13, AISI D2		Austenitic stainless steel, Alloy steel, Tool steel (35—40HRC) AISI 304, AISI 316	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
5	1800	85	1350	60	920	40	740	25
6	1700	110	1300	85	830	45	700	35
8	1300	140	1050	100	730	70	600	50
10	1100	170	810	140	620	85	520	60
12	900	190	740	160	520	115	420	75
16	680	190	540	160	390	115	330	75
20	550	195	440	150	320	115	260	75
25	440	170	350	135	240	90	200	70
30	350	160	270	120	180	75	155	65
40	240	120	180	90	120	60	105	55
50	260	90	125	75	80	50	70	40



- Supply cutting fluid sufficiently during cutting. When slotting with dry cut, decrease the revolution and feed rate proportionately by 20—50%.
- When the diameter exceeds ø30 and the metal removal is less than the quantity shown in the table, the revolution and feed rate may be increased proportionately by 10—40%.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

VAJR

VIOLET END MILLS

Roughing end mill, Semi long cut length, 4—6 flute

Product Information

KHA S 30° V

DC≦15 16≦DC≦25 DC=30 DC≧35

Technical Info >> 1993

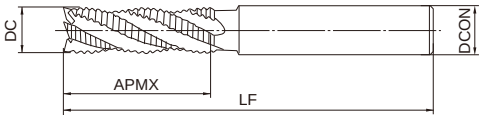
ISO13399 Property >> 1966

Work Material

P M S R

SYMBOL DESCRIPTIONS >> 664

END MILLS SELECTION CHART >> 684



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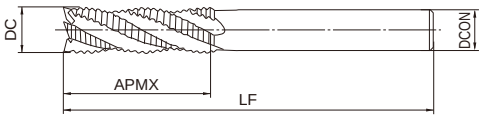

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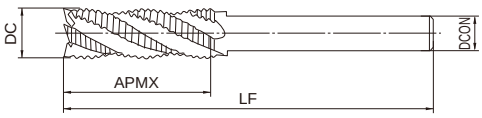


Type3

●Inventory maintained in Japan. Unit : mm

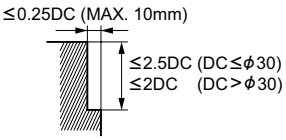
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
VAJRD1000	10	35	90	10	4	●	2
VAJRD1200	12	45	125	12	4	●	2
VAJRD1400	14	45	145	16	4	●	1
VAJRD1500	15	55	155	16	4	●	1
VAJRD1600	16	55	155	16	4	●	2
VAJRD1800	18	55	155	16	4	●	3
VAJRD2000	20	65	165	20	4	●	2
VAJRD2500	25	75	175	25	4	●	2
VAJRD3000S25	30	75	185	25	5	●	3
VAJRD3000S32	30	75	185	32	5	●	1
VAJRD3500	35	85	200	32	6	●	3
VAJRD4000	40	85	205	42	6	●	1
VAJRD4500	45	105	235	42	6	●	3
VAJRD5000	50	105	235	42	6	●	3

VAJR

RECOMMENDED CUTTING CONDITIONS

·Side milling

Work material	Structural steel, Cast iron, Carbon steel AISI 1045, AISI No 35 B, AISI 1050		Carbon steel, Alloy steel (20—30HRC) AISI 1050, AISI 1055		Alloy steel, Tool steel, Pre-hardened steel (30—35HRC) AISI P20, AISI H13, AISI D2		Austenitic stainless steel, Alloy steel, Tool steel (35—40HRC) AISI 304, AISI 316	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
10	1400	170	1100	130	760	80	640	65
12	1200	170	900	130	640	90	530	80
16	870	170	680	130	480	90	400	80
20	700	170	540	130	380	90	320	80
25	560	170	430	120	300	90	260	80
30	460	155	360	120	260	80	220	65
40	280	105	220	90	150	65	130	65
50	200	90	150	65	100	50	90	40



VALR

VIOLET END MILLS

Roughing end mill, Long cut length, 4—6 flute

Product Information

KHA S 30° V

10≦DC ≦25 28≦DC ≦32 DC≧35

Technical Info >> 1993

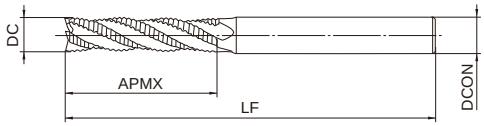
ISO13399 Property >> 1966

Work Material

P M S R

SYMBOL DESCRIPTIONS >> 664

END MILLS SELECTION CHART >> 684



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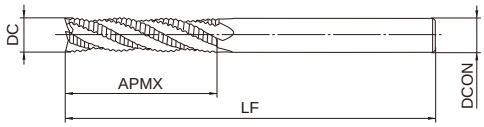

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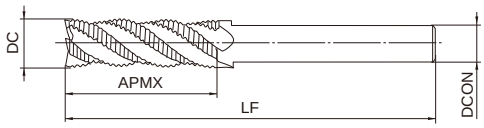


Type3

●Inventory maintained in Japan. Unit : mm

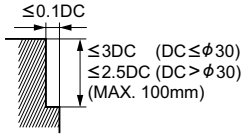
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
VALRD1000	10	45	110	10	4	●	2
VALRD1200	12	50	130	12	4	●	2
VALRD1400	14	55	155	16	4	●	1
VALRD1500	15	65	165	16	4	●	1
VALRD1600	16	65	165	16	4	●	2
VALRD1800	18	65	165	16	4	●	3
VALRD2000	20	75	175	20	4	●	2
VALRD2200	22	75	175	20	4	●	3
VALRD2400	24	85	185	25	4	●	1
VALRD2500	25	90	190	25	4	●	2
VALRD2800	28	90	190	25	5	●	3
VALRD3000	30	90	200	25	5	●	3
VALRD3200	32	95	210	32	5	●	2
VALRD3500	35	100	215	32	6	●	3
VALRD4000	40	110	230	32	6	●	3
VALRD4500	45	120	250	42	6	●	3
VALRD5000	50	120	250	42	6	●	3

VALR

RECOMMENDED CUTTING CONDITIONS

·Side milling

Work material	Structural steel, Cast iron, Carbon steel AISI 1045, AISI No 35 B, AISI 1050		Carbon steel, Alloy steel (20—30HRC) AISI 1055, AISI P20		Alloy steel, Tool steel, Pre-hardened steel (30—35HRC) AISI H13, AISI D2		Austenitic stainless steel, Alloy steel, Tool steel (35—40HRC) AISI 304, AISI 316	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
10	1000	75	700	55	480	40	400	30
12	850	90	630	70	440	50	370	40
16	700	100	540	80	380	55	320	45
20	560	100	430	80	300	55	260	50
25	450	100	340	75	240	55	210	50
30	370	100	290	75	200	50	170	45
40	260	80	200	60	135	45	120	40
50	180	65	140	50	90	35	80	30



- Supply cutting fluid sufficiently during cutting. When slotting with dry cut, decrease the revolution and feed rate proportionately by 20—50%.
- When the diameter exceeds ø30 and the metal removal is less than the quantity shown in the table, the revolution and feed rate may be increased proportionately by 10—40%.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

SR ROUGHING END MILLS

Roughing end mill, Short cut length, 4—6 flute

Product Information

CO HSS 30°

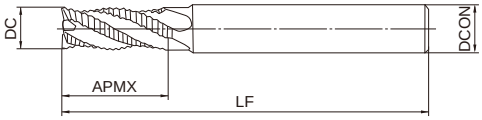
DC≦25 28≦DC≦32 DC≧35

Technical Info >> 1993 ISO13399 Property >> 1966

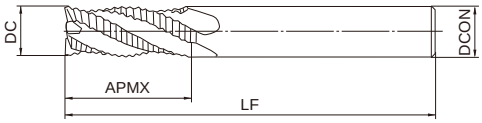
Work Material

P M N S R

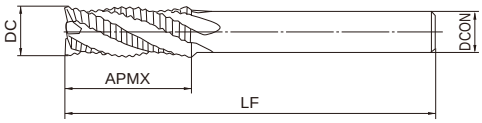
SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 684



Type1



Type2



Type3

●Inventory maintained in Japan. Unit : mm

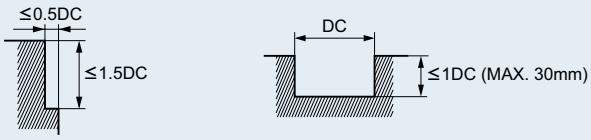
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
SRD1000	10	22	75	10	4	●	2
SRD1200	12	27	85	12	4	●	2
SRD1300	13	27	85	12	4	●	3
SRD1400	14	27	90	16	4	●	1
SRD1500	15	27	95	16	4	●	1
SRD1600	16	33	100	16	4	●	2
SRD1800	18	33	100	16	4	●	3
SRD1900	19	38	110	20	4	●	1
SRD2000	20	38	110	20	4	●	2
SRD2200	22	38	110	20	4	●	3
SRD2500	25	43	125	25	4	●	2
SRD2800	28	43	125	25	5	●	3
SRD3000	30	48	130	25	5	●	3
SRD3200	32	55	145	32	5	●	2
SRD3500	35	55	145	32	6	●	3
SRD4000	40	65	165	32	6	●	3

SR

RECOMMENDED CUTTING CONDITIONS

( ) : Indicates standard revolution and feed rate for slotting.

Work material	Structural steel, Cast iron, Carbon steel AISI 1045, AISI No 35 B, AISI 1050		Carbon steel, Alloy steel (20—30HRC) AISI 1055, AISI P20		Alloy steel, Tool steel, Pre-hardened steel (30—35HRC) AISI H13, AISI D2		Austenitic stainless steel AISI 304, AISI 316	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
5	1000(750)	40(30)	760(570)	30(25)	610(460)	25(20)	510(380)	20(15)
6	960(720)	50(40)	720(540)	40(30)	570(430)	30(25)	480(360)	25(20)
8	800(600)	65(50)	600(450)	50(40)	500(380)	40(30)	400(300)	30(25)
10	640(480)	90(70)	480(360)	70(55)	380(290)	50(40)	320(240)	40(30)
12	530(400)	90(70)	400(300)	70(55)	320(240)	55(40)	270(200)	45(35)
16	400(300)	90(70)	300(230)	70(55)	240(180)	55(40)	200(150)	45(35)
20	320(240)	95(70)	240(180)	70(55)	190(140)	55(40)	160(120)	45(35)
25	250(190)	90(70)	190(140)	65(50)	150(110)	50(40)	130(100)	45(35)
30	210(160)	85(65)	160(120)	65(50)	130(100)	50(40)	110(85)	45(35)
40	135(100)	60(45)	100(75)	45(40)	80(60)	35(26)	70(55)	30(25)
50	100(75)	50(40)	75(55)	40(30)	60(45)	30(23)	50(40)	25(20)



- Supply cutting fluid sufficiently during cutting.
- When the diameter exceeds ø30 and the metal removal is less than the quantity shown in the table, the revolution and feed rate may be increased proportionately by 10 —40%.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

GMR

ROUGHING END MILLS

Roughing end mill, Medium cut length, 4—6 flute

Product Information

CO HSS 30° G

DC≦15 16≦DC≦26 28≦DC≦32 DC≧35

Technical Info >> 1993

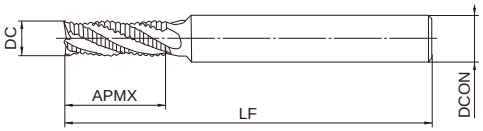
ISO13399 Property >> 1966

Work Material

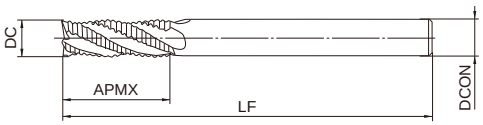
P M S R

SYMBOL DESCRIPTIONS >> 664

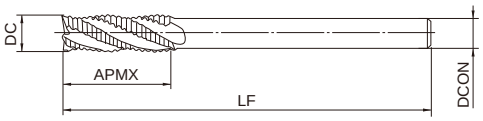
END MILLS SELECTION CHART >> 684



Type1



Type2



Type3

●Inventory maintained in Japan. Unit : mm

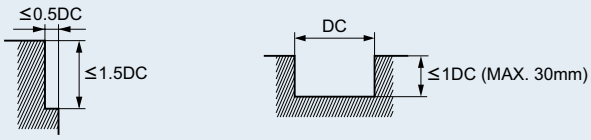
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
GMRD0500	5	15	60	6	4	●	1
GMRD0600	6	15	60	6	4	●	2
GMRD0700	7	20	70	8	4	●	1
GMRD0800	8	20	70	8	4	●	2
GMRD0900	9	25	80	10	4	●	1
GMRD1000	10	25	80	10	4	●	2
GMRD1100	11	30	110	12	4	●	1
GMRD1200	12	30	110	12	4	●	2
GMRD1300	13	35	115	12	4	●	3
GMRD1400	14	35	135	16	4	●	1
GMRD1500	15	40	140	16	4	●	1
GMRD1600	16	40	140	16	4	●	2
GMRD1700	17	40	140	16	4	●	3
GMRD1800	18	40	140	16	4	●	3
GMRD1900	19	45	145	20	4	●	1
GMRD2000	20	45	145	20	4	●	2
GMRD2200	22	45	145	20	4	●	3
GMRD2400	24	50	150	25	4	●	1
GMRD2500	25	50	150	25	4	●	2
GMRD2600	26	50	150	25	4	●	3
GMRD2800	28	55	160	25	5	●	3
GMRD3000	30	55	165	25	5	●	3
GMRD3200	32	60	175	32	5	●	2
GMRD3500	35	60	175	32	6	●	3
GMRD4000	40	65	185	32	6	●	3
GMRD4500	45	70	200	42	6	●	3
GMRD5000	50	70	200	42	6	●	3

GMR

RECOMMENDED CUTTING CONDITIONS

( ) : Indicates standard revolution and feed rate for slotting.

Work material	Structural steel, Cast iron, Carbon steel AISI 1045, AISI No 35 B, AISI 1050		Carbon steel, Alloy steel (20—30HRC) AISI 1055, AISI P20		Alloy steel, Tool steel, Pre-hardened steel (30—35HRC) AISI H13, AISI D2		Austenitic stainless steel AISI 304, AISI 316	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
5	1200(900)	50(40)	900(680)	35(25)	730(550)	30(23)	610(460)	25(20)
6	1150(860)	60(45)	860(650)	50(40)	680(510)	35(26)	580(440)	30(23)
8	960(720)	80(60)	720(540)	60(45)	600(450)	50(40)	480(360)	35(26)
10	770(580)	110(85)	580(440)	85(65)	460(350)	60(45)	380(290)	50(40)
12	640(480)	110(85)	480(360)	85(65)	380(290)	65(50)	320(240)	55(40)
16	480(360)	110(85)	360(270)	85(65)	290(220)	65(50)	240(180)	55(40)
20	380(290)	115(85)	290(220)	85(65)	230(170)	65(50)	190(145)	55(40)
25	300(230)	110(85)	230(170)	80(60)	180(135)	60(45)	160(120)	55(40)
30	250(190)	100(75)	190(145)	80(60)	160(120)	60(45)	130(100)	55(40)
40	160(120)	70(55)	120(90)	55(40)	95(70)	40(30)	85(65)	35(26)
50	120(90)	60(45)	90(70)	50(40)	70(55)	35(25)	60(45)	30(23)



- Supply cutting fluid sufficiently during cutting.
- When the diameter exceeds ø30 and the metal removal is less than the quantity shown in the table, the revolution and feed rate may be increased proportionately by 10 —40%.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

MR

ROUGHING END MILLS

Roughing end mill, Medium cut length, 4—6 flute

Product Information

CO HSS 30°

DC≦15 16≦DC≦26 28≦DC≦32 DC≧35

Technical Info >> 1993

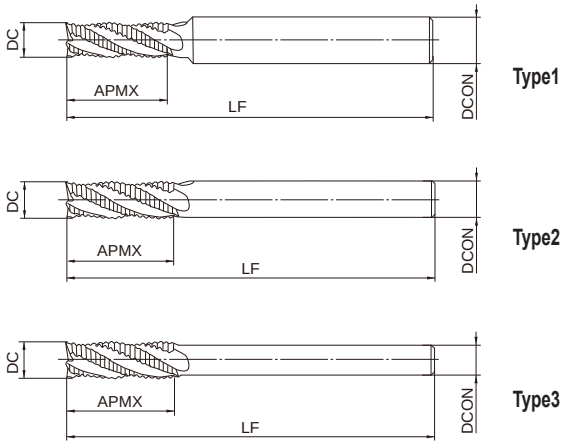
ISO13399 Property >> 1966

Work Material

P M N S R

SYMBOL DESCRIPTIONS >> 664

END MILLS SELECTION CHART >> 684



●Inventory maintained in Japan. Unit : mm

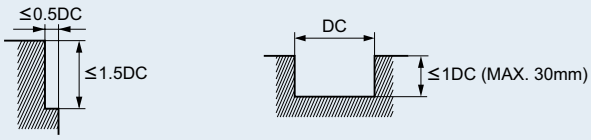
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
MRD0500	5	15	60	6	4	●	1
MRD0600	6	15	60	6	4	●	2
MRD0700	7	20	70	8	4	●	1
MRD0800	8	20	70	8	4	●	2
MRD0900	9	25	80	10	4	●	1
MRD1000	10	25	80	10	4	●	2
MRD1100	11	30	110	12	4	●	1
MRD1200	12	30	110	12	4	●	2
MRD1300	13	35	115	12	4	●	3
MRD1400	14	35	135	16	4	●	1
MRD1500	15	40	140	16	4	●	1
MRD1600	16	40	140	16	4	●	2
MRD1700	17	40	140	16	4	●	3
MRD1800	18	40	140	16	4	●	3
MRD1900	19	45	145	20	4	●	1
MRD2000	20	45	145	20	4	●	2
MRD2200	22	45	145	20	4	●	3
MRD2400	24	50	150	25	4	●	1
MRD2500	25	50	150	25	4	●	2
MRD2600	26	50	150	25	4	●	3
MRD2800	28	55	160	25	5	●	3
MRD3000S25	30	55	165	25	5	●	3
MRD3000S32	30	55	165	32	5	●	1
MRD3200	32	60	175	32	5	●	2
MRD3500	35	60	175	32	6	●	3
MRD4000S32	40	65	185	32	6	●	3
MRD4000S42	40	65	185	42	6	●	1
MRD4500	45	70	200	42	6	●	3
MRD5000	50	70	200	42	6	●	3

MR

RECOMMENDED CUTTING CONDITIONS

( ) : Indicates standard revolution and feed rate for slotting.

Work material	Structural steel, Cast iron, Carbon steel AISI 1045, AISI No 35 B, AISI 1050		Carbon steel, Alloy steel (20—30HRC) AISI 1055, AISI P20		Alloy steel, Tool steel, Pre-hardened steel (30—35HRC) AISI H13, AISI D2		Austenitic stainless steel AISI 304, AISI 316	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
5	1000(750)	40(30)	760(570)	30(25)	610(460)	25(20)	510(380)	20(15)
6	960(720)	50(40)	720(540)	40(30)	570(430)	30(25)	480(360)	25(20)
8	800(600)	65(50)	600(450)	50(40)	500(380)	40(30)	400(300)	30(25)
10	640(480)	90(70)	480(360)	70(55)	380(290)	50(40)	320(240)	40(30)
12	530(400)	90(70)	400(300)	70(55)	320(240)	55(40)	270(200)	45(35)
16	400(300)	90(70)	300(230)	70(55)	240(180)	55(40)	200(150)	45(35)
20	320(240)	95(70)	240(180)	70(55)	190(140)	55(40)	160(120)	45(35)
25	250(190)	90(70)	190(140)	65(50)	150(110)	50(40)	130(100)	45(35)
30	210(160)	85(65)	160(120)	65(50)	130(100)	50(40)	110(85)	45(35)
40	135(100)	60(45)	100(75)	45(40)	80(60)	35(26)	70(55)	30(25)
50	100(75)	50(40)	75(55)	40(30)	60(45)	30(23)	50(40)	25(20)



- Supply cutting fluid sufficiently during cutting.
- When the diameter exceeds ø30 and the metal removal is less than the quantity shown in the table, the revolution and feed rate may be increased proportionately by 10 —40%.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

JR

ROUGHING END MILLS

Roughing end mill, Semi long cut length, 4—6 flute

Product Information

CO HSS 30°

DC≦15 16≦DC≦25 28≦DC≦32 DC≧35

Technical Info >> 1993

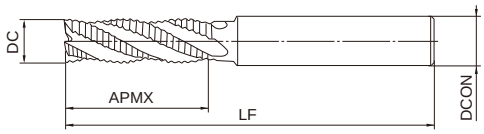
ISO13399 Property >> 1966

Work Material

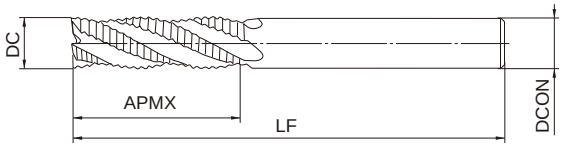
P M N S R

SYMBOL DESCRIPTIONS >> 664

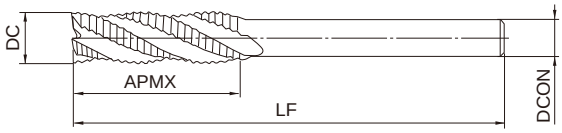
END MILLS SELECTION CHART >> 684



Type1



Type2



Type3

●Inventory maintained in Japan. Unit : mm

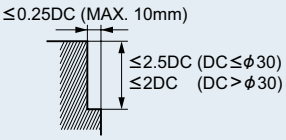
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
JRD1000	10	35	90	10	4	●	2
JRD1200	12	45	125	12	4	●	2
JRD1400	14	45	145	16	4	●	1
JRD1500	15	55	155	16	4	●	1
JRD1600	16	55	155	16	4	●	2
JRD1800	18	55	155	16	4	●	3
JRD2000	20	65	165	20	4	●	2
JRD2200	22	65	165	20	4	●	3
JRD2400	24	65	165	25	4	●	1
JRD2500	25	75	175	25	4	●	2
JRD2800	28	75	180	25	5	●	3
JRD3000S25	30	75	185	25	5	●	3
JRD3000S32	30	75	185	32	5	●	1
JRD3200	32	75	190	32	5	●	2
JRD3500	35	85	200	32	6	●	3
JRD4000S32	40	85	205	32	6	●	3
JRD4000S42	40	85	205	42	6	●	1
JRD4500	45	105	235	42	6	●	3
JRD5000	50	105	235	42	6	●	3

JR

RECOMMENDED CUTTING CONDITIONS

( ) : Indicates standard revolution and feed rate for slotting.

Work material	Structural steel, Cast iron, Carbon steel AISI 1045, AISI No 35 B, AISI 1050		Carbon steel, Alloy steel (20—30HRC) AISI 1055, AISI P20		Alloy steel, Tool steel, Pre-hardened steel (30—35HRC) AISI H13, AISI D2		Austenitic stainless steel AISI 304, AISI 316	
Dia. DC(mm)	Revolution (min-1)	Feed rate (mm/min)	Revolution (min-1)	Feed rate (mm/min)	Revolution (min-1)	Feed rate (mm/min)	Revolution (min-1)	Feed rate (mm/min)
5	850(640)	30(25)	650(490)	25(20)	520(400)	20(15)	440(325)	15(12)
6	820(610)	40(30)	600(460)	30(25)	490(370)	25(20)	410(300)	20(15)
8	680(500)	50(40)	500(390)	40(30)	430(330)	30(25)	350(260)	25(20)
10	550(400)	70(55)	400(300)	55(40)	325(250)	40(30)	270(200)	30(25)
12	450(350)	70(55)	350(260)	55(40)	270(200)	40(30)	230(170)	35(25)
16	350(250)	70(55)	260(200)	55(40)	200(150)	40(30)	170(130)	35(25)
20	280(200)	70(55)	200(150)	55(40)	160(120)	40(30)	140(100)	35(25)
25	210(160)	70(55)	160(120)	50(40)	130(100)	40(30)	110(85)	35(25)
30	180(140)	65(50)	140(100)	50(40)	110(85)	40(30)	100(70)	35(25)
40	120(90)	45(35)	85(65)	35(30)	70(50)	30(20)	60(50)	25(20)
50	90(65)	40(30)	65(50)	30(25)	50(40)	25(20)	50(35)	20(15)



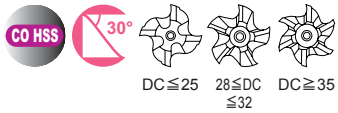
- Supply cutting fluid sufficiently during cutting.
- When the diameter exceeds ø30 and the metal removal is less than the quantity shown in the table, the revolution and feed rate may be increased proportionately by 10 —40%.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

LR

ROUGHING END MILLS

Roughing end mill, Long cut length, 4—6 flute

Product Information



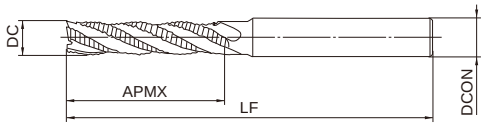
Technical Info >> 1993

ISO13399 Property >> 1966

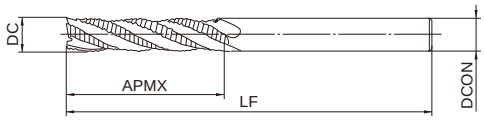
Work Material

SYMBOL DESCRIPTIONS >> 664

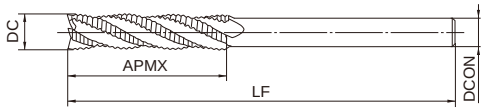
END MILLS SELECTION CHART >> 684



Type1



Type2



Type3

●Inventory maintained in Japan. Unit : mm

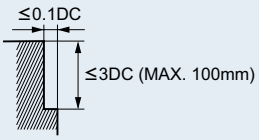
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	type
LRD1000	10	45	110	10	4	●	2
LRD1200	12	50	130	12	4	●	2
LRD1400	14	55	155	16	4	●	1
LRD1500	15	65	165	16	4	●	1
LRD1600	16	65	165	16	4	●	2
LRD1800	18	65	165	16	4	●	3
LRD2000	20	75	175	20	4	●	2
LRD2200	22	75	175	20	4	●	3
LRD2400	24	85	185	25	4	●	1
LRD2500	25	90	190	25	4	●	2
LRD2800	28	90	190	25	5	●	3
LRD3000S25	30	90	200	25	5	●	3
LRD3000S32	30	90	200	32	5	●	1
LRD3200	32	95	210	32	5	●	2
LRD3500	35	100	215	32	6	●	3
LRD4000S32	40	110	230	32	6	●	3
LRD4000S42	40	110	230	42	6	●	1
LRD4500	45	120	250	42	6	●	3
LRD5000	50	120	250	42	6	●	3

LR

RECOMMENDED CUTTING CONDITIONS

( ) : Indicates standard revolution and feed rate for slotting.

Work material	Structural steel, Cast iron, Carbon steel AISI 1045, AISI No 35 B, AISI 1050		Carbon steel, Alloy steel (20—30HRC) AISI 1055, AISI P20		Alloy steel, Tool steel, Pre-hardened steel (30—35HRC) AISI H13, AISI D2		Austenitic stainless steel AISI 304, AISI 316	
Dia. DC(mm)	Revolution (min-1)	Feed rate (mm/min)	Revolution (min-1)	Feed rate (mm/min)	Revolution (min-1)	Feed rate (mm/min)	Revolution (min-1)	Feed rate (mm/min)
5	750(560)	25(20)	570(430)	20(15)	460(350)	15(12)	380(290)	12(10)
6	720(540)	30(25)	540(400)	25(20)	460(325)	18(15)	360(270)	15(12)
8	600(450)	40(30)	450(340)	30(25)	380(290)	25(18)	300(230)	18(15)
10	480(360)	55(45)	360(270)	45(35)	290(220)	30(25)	240(180)	25(18)
12	400(300)	55(45)	300(230)	45(35)	240(180)	35(25)	200(150)	30(20)
16	300(250)	55(45)	230(170)	45(35)	180(135)	35(25)	150(110)	30(20)
20	240(180)	60(45)	180(140)	45(35)	150(100)	35(25)	120(90)	30(20)
25	190(150)	55(45)	140(100)	40(30)	110(80)	30(25)	100(75)	30(20)
30	160(120)	50(40)	120(90)	40(30)	100(75)	30(25)	85(65)	30(20)
40	100(75)	35(30)	75(60)	30(25)	60(45)	20(15)	50(40)	20(15)
50	75(60)	30(25)	60(40)	25(20)	45(35)	20(14)	40(30)	15(12)



- Supply cutting fluid sufficiently during cutting.
- When the diameter exceeds ø30 and the metal removal is less than the quantity shown in the table, the revolution and feed rate may be increased proportionately by 10 —40%.
- If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

Memo

GBE

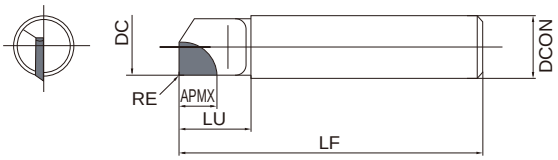
CBN END MILLS

Single flute

Product Information

Work Material

Technical Info >> 1993
ISO13399 Property >> 1966
SYMBOL DESCRIPTIONS >> 664
END MILLS SELECTION CHART >> 688



Type1

●Inventory maintained in Japan. Unit : mm

Order Number	No. of Flutes	MB730	DC	RE	LF	DCON	LU	APMX	type
GBE06S0640	1	●	6	0.5	40	6	8	3.5	1
GBE08S0845	1	●	8	0.5	45	8	13	6	1
GBE10S1050	1	●	10	0.5	50	10	13	6	1
GBE12S1255	1	●	12	0.5	55	12	13	6	1

GBE

RECOMMENDED CUTTING CONDITIONS

Work material		Hardness	Insert Grade	Cutting Speed (m/min)	Feed per Revolution (mm/rev)	Depth of cut (mm)
H	Hardened Steel	45—68HRC	MB730	140(80—200)	0.08(0.02—0.15)	≦0.5
	Hardened Steel	45—68HRC	MB730	100(60—150)	0.06(0.02—0.10)	≦0.5

CBN2XLB

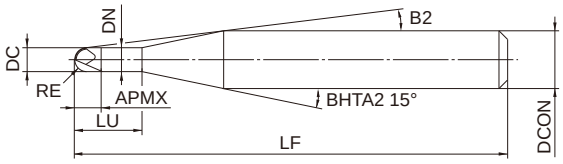
CBN END MILLS

Ball nose, Short cut length, 2 flute, Long neck

Product Information

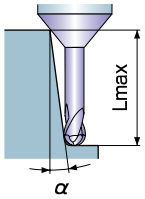
Work Material

Technical Info >> 1993
ISO13399 Property >> 1966
SYMBOL DESCRIPTIONS >> 664
END MILLS SELECTION CHART >> 688



Type1

R	0.2≦RE≦1
	±0.005
h5	4≦DCON≦6
	0 - 0.005



- α: Inclined angle Lmax: Effective length
- Lmax indicates "0: Not available, blank: No interference".

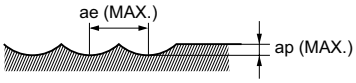
●Inventory maintained in Japan. Unit : mm

Order Number	RE	DC	APMX	LU	DN	B2	LF	DCON	No. of Flutes	Stock	type	Effective length for inclined angle			
												0.5°	1°	2°	3°
CBN2XLBR0020N010S04	0.2	0.4	0.3	1	0.36	13.4°	51	4	2	●	1	1	1	1.1	1.2
CBN2XLBR0020N010S06	0.2	0.4	0.3	1	0.36	13.9°	51	6	2	●	1	1	1	1.1	1.2
CBN2XLBR0020N016S04	0.2	0.4	0.3	1.6	0.36	12.4°	51	4	2	●	1	1.6	1.7	1.8	2
CBN2XLBR0020N016S06	0.2	0.4	0.3	1.6	0.36	13.3°	51	6	2	●	1	1.6	1.7	1.8	2
CBN2XLBR0030N009S06	0.3	0.6	0.4	0.9	0.56	14.1°	62	6	2	●	1	0.9	0.9	1	1.1
CBN2XLBR0030N015S04	0.3	0.6	0.5	1.5	0.56	12.6°	51	4	2	●	1	1.5	1.6	1.7	1.8
CBN2XLBR0030N015S06	0.3	0.6	0.5	1.5	0.56	13.4°	51	6	2	●	1	1.5	1.6	1.7	1.8
CBN2XLBR0030N024S04	0.3	0.6	0.5	2.4	0.56	11.3°	51	4	2	●	1	2.5	2.6	2.7	2.9
CBN2XLBR0030N024S06	0.3	0.6	0.5	2.4	0.56	12.5°	51	6	2	●	1	2.5	2.6	2.7	2.9
CBN2XLBR0040N010S06	0.4	0.8	0.5	1	0.76	14.1°	62	6	2	●	1	1	1	1.1	1.2
CBN2XLBR0040N020S04	0.4	0.8	0.6	2	0.76	11.8°	51	4	2	●	1	2	2.1	2.3	2.4
CBN2XLBR0040N020S06	0.4	0.8	0.6	2	0.76	12.9°	51	6	2	●	1	2	2.1	2.3	2.4
CBN2XLBR0040N032S04	0.4	0.8	0.6	3.2	0.76	10.3°	51	4	2	●	1	3.3	3.4	3.6	3.9
CBN2XLBR0040N032S06	0.4	0.8	0.6	3.2	0.76	11.7°	51	6	2	●	1	3.3	3.4	3.6	3.9
CBN2XLBR0050N011S06	0.5	1	0.6	1.1	0.94	14.1°	62	6	2	●	1	1.1	1.1	1.2	1.2
CBN2XLBR0050N025S04	0.5	1	0.8	2.5	0.94	11°	51	4	2	●	1	2.6	2.7	2.8	3
CBN2XLBR0050N025S06	0.5	1	0.8	2.5	0.94	12.3°	51	6	2	●	1	2.6	2.7	2.8	3
CBN2XLBR0050N040S04	0.5	1	0.8	4	0.94	9.3°	51	4	2	●	1	4.1	4.3	4.6	4.9
CBN2XLBR0050N040S06	0.5	1	0.8	4	0.94	11°	51	6	2	●	1	4.1	4.3	4.6	4.9
CBN2XLBR0075N038S04	0.75	1.5	1.1	3.8	1.44	9.1°	52	4	2	●	1	3.9	4.1	4.3	4.6
CBN2XLBR0075N038S06	0.75	1.5	1.1	3.8	1.44	11°	52	6	2	●	1	3.9	4.1	4.3	4.6
CBN2XLBR0075N060S04	0.75	1.5	1.1	6	1.44	7.1°	52	4	2	●	1	6.2	6.4	6.8	7.3
CBN2XLBR0075N060S06	0.75	1.5	1.1	6	1.44	9.3°	52	6	2	●	1	6.2	6.4	6.8	7.3
CBN2XLBR0100N017S06	1	2	1.2	1.7	1.9	13.6°	62	6	2	●	1	1.7	1.7	1.8	1.9
CBN2XLBR0100N050S04	1	2	1.5	5	1.9	7.3°	52	4	2	●	1	5.1	5.3	5.6	6
CBN2XLBR0100N050S06	1	2	1.5	5	1.9	9.8°	52	6	2	●	1	5.1	5.3	5.6	6
CBN2XLBR0100N080S04	1	2	1.5	8	1.9	5.3°	52	4	2	●	1	8.2	8.5	9	9.7
CBN2XLBR0100N080S06	1	2	1.5	8	1.9	7.9°	52	6	2	●	1	8.2	8.5	9	9.7

CBN2XLB

RECOMMENDED CUTTING CONDITIONS

Work material	Hardened steel (45— 55HRC) AISI H13				Hardened steel (55— 62HRC) AISI D2				Hardened steel (62— 70HRC) AISI W1, AISI M2			
R RE (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)
R0.2	50000	1500	0.006	0.01	50000	1200	0.006	0.01	50000	1200	0.004	0.008
R0.3	50000	2000	0.01	0.02	50000	1500	0.01	0.02	50000	1500	0.008	0.015
R0.4	50000	3000	0.02	0.05	50000	2000	0.02	0.04	50000	2000	0.015	0.03
R0.5	50000	3000	0.03	0.06	50000	2000	0.03	0.05	50000	2000	0.02	0.03
R0.75	50000	3500	0.04	0.08	50000	2500	0.03	0.06	50000	2500	0.02	0.04
R1	50000	4000	0.05	0.1	50000	3000	0.04	0.07	50000	3000	0.03	0.05



- If the depth of cut is shallow, the revolution and feed rate can be increased.
- Oil mist coolant is recommended.
- Cutting condition may be considerably different due to the overhang (milling depth), depth of cut, and machine tools. Please see the above table as a standard.

CBN2XLRB

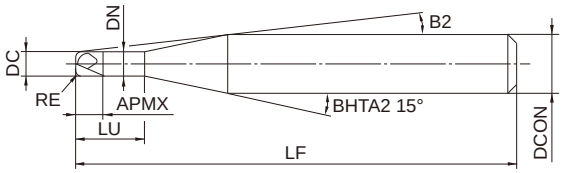
CBN END MILLS

Corner radius end mill, Medium cut length, 2 flute, Long neck

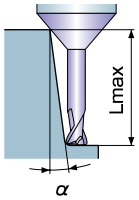
Product Information

Work Material

Technical Info >> 1993
ISO13399 Property >> 1966
SYMBOL DESCRIPTIONS >> 664
END MILLS SELECTION CHART >> 688



R	0.05≦RE≦0.5
	±0.005
	0.5≦DC≦2
	0 / - 0.010
h5	DCON=4
	0 / - 0.005



- α: Inclined angle Lmax: Effective length
- Lmax indicates "0: Not available, blank: No interference".

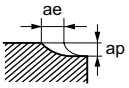
●Inventory maintained in Japan. Unit : mm

Order Number	RE	DC	APMX	LU	DN	B2	LF	DCON	No. of Flutes	Stock	type	Effective length for inclined angle			
												0.5°	1°	2°	3°
CBN2XLRBD0050R005N02	0.05	0.5	0.3	2	0.46	11.6°	51	4	2	●	1	2.1	2.1	2.3	2.5
CBN2XLRBD0050R005N03	0.05	0.5	0.3	3	0.46	10.4°	51	4	2	●	1	3.1	3.2	3.5	3.7
CBN2XLRBD0050R010N02	0.1	0.5	0.3	2	0.46	11.7°	51	4	2	●	1	2.1	2.1	2.3	2.5
CBN2XLRBD0050R010N03	0.1	0.5	0.3	3	0.46	10.5°	51	4	2	●	1	3.1	3.2	3.4	3.7
CBN2XLRBD0100R005N03	0.05	1	0.6	3	0.94	9.7°	51	4	2	●	1	3.2	3.4	3.7	4
CBN2XLRBD0100R005N05	0.05	1	0.6	5	0.94	7.9°	51	4	2	●	1	5.3	5.6	6	6.5
CBN2XLRBD0100R010N03	0.1	1	0.6	3	0.94	9.7°	51	4	2	●	1	3.2	3.4	3.6	4
CBN2XLRBD0100R010N05	0.1	1	0.6	5	0.94	8°	51	4	2	●	1	5.3	5.6	6	6.5
CBN2XLRBD0100R020N03	0.2	1	0.6	3	0.94	9.8°	51	4	2	●	1	3.2	3.4	3.5	4
CBN2XLRBD0100R020N05	0.2	1	0.6	5	0.94	8°	51	4	2	●	1	5.3	5.6	6	6.5
CBN2XLRBD0100R030N03	0.3	1	0.6	3	0.94	9.9°	51	4	2	●	1	3.2	3.4	3.4	4
CBN2XLRBD0100R030N05	0.3	1	0.6	5	0.94	8.1°	51	4	2	●	1	5.3	5.6	6	6.5
CBN2XLRBD0150R010N05	0.1	1.5	0.9	5	1.44	7.3°	52	4	2	●	1	5.3	5.6	6	6.5
CBN2XLRBD0150R010N08	0.1	1.5	0.9	8	1.44	5.6°	52	4	2	●	1	8.5	8.8	9.5	10.2
CBN2XLRBD0150R020N05	0.2	1.5	0.9	5	1.44	7.3°	52	4	2	●	1	5.3	5.6	6	6.5
CBN2XLRBD0150R020N08	0.2	1.5	0.9	8	1.44	5.6°	52	4	2	●	1	8.5	8.8	9.5	10.2
CBN2XLRBD0150R030N05	0.3	1.5	0.9	5	1.44	7.4°	52	4	2	●	1	5.3	5.6	6	6.5
CBN2XLRBD0150R030N08	0.3	1.5	0.9	8	1.44	5.7°	52	4	2	●	1	8.5	8.8	9.5	10.2
CBN2XLRBD0200R010N06	0.1	2	1.2	6	1.9	5.9°	52	4	2	●	1	6.3	6.6	7.1	7.6
CBN2XLRBD0200R010N10	0.1	2	1.2	10	1.9	4.2°	52	4	2	●	1	10.5	10.9	11.7	12.6
CBN2XLRBD0200R020N06	0.2	2	1.2	6	1.9	5.9°	52	4	2	●	1	6.3	6.6	7.1	7.6
CBN2XLRBD0200R020N10	0.2	2	1.2	10	1.9	4.2°	52	4	2	●	1	10.5	10.9	11.7	12.6
CBN2XLRBD0200R030N06	0.3	2	1.2	6	1.9	6°	52	4	2	●	1	6.3	6.6	7	7.6
CBN2XLRBD0200R030N10	0.3	2	1.2	10	1.9	4.2°	52	4	2	●	1	10.5	10.8	11.6	12.6
CBN2XLRBD0200R050N06	0.5	2	1.2	6	1.9	6.1°	52	4	2	●	1	6.3	6.5	7	7.5
CBN2XLRBD0200R050N10	0.5	2	1.2	10	1.9	4.3°	52	4	2	●	1	10.5	10.8	11.6	12.5

CBN2XLRB

RECOMMENDED CUTTING CONDITIONS

Work material	Hardened steel (45— 55HRC) AISI H13				Hardened steel (55— 62HRC) AISI D2				Hardened steel (62— 70HRC) AISI W1, AISI M2			
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)
0.5	50000	750	0.01	0.2	50000	600	0.01	0.1	40000	400	0.005	0.06
1	38000	1100	0.02	0.3	38000	760	0.01	0.2	25000	400	0.01	0.1
1.5	25000	900	0.03	0.5	25000	700	0.02	0.4	17000	340	0.02	0.2
2	20000	800	0.04	0.7	20000	600	0.03	0.6	12000	300	0.02	0.3



- If the depth of cut is shallow, the revolution and feed rate can be increased.
- Oil mist coolant is recommended.
- Cutting condition may be considerably different due to the overhang (milling depth), depth of cut, and machine tools. Please see the above table as a standard.

CE4SRB

Ceramic End Mills

Corner radius end mill, short cut length, 4 flute

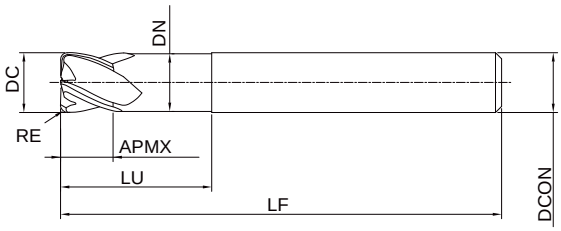
Product Information

Ceramic 30°

Work Material

S

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 688



Type1

R	DC≦12		
	±0.02		
	DC=6	DC=8,10	DC=12
	- 0.008 - 0.028	- 0.009 - 0.029	- 0.011 - 0.031
h6	DC=6	DC=8,10	DC=12
	0 - 0.008	0 - 0.009	0 - 0.011

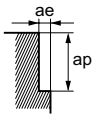
●Inventory maintained in Japan. Unit : mm

Order Number	DC	RE	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	type
CE4SRBD0600R050	6	0.5	4.5	12	5.85	50	6	4	●	1
CE4SRBD0800R100	8	1	6	16	7.85	60	8	4	●	1
CE4SRBD1000R100	10	1	7.5	20	9.7	65	10	4	●	1
CE4SRBD1200R150	12	1.5	9	24	11.7	70	12	4	●	1

RECOMMENDED CUTTING CONDITIONS

·Side milling

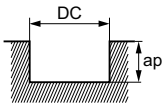
Work material	Heat resistant alloys Inconel718			
Dia. DC(mm)	Cutting speed (m/min)	Feed per Tooth (mm/tooth)	Depth of cut ap(mm)	Depth of cut ae(mm)
6	≧350	≦0.06	≦4.5	≦1.2
8	≧350	≦0.06	≦6.0	≦1.6
10	≧350	≦0.06	≦7.5	≦2.0
12	≧350	≦0.06	≦9.0	≦2.4



CE4SRB

·Slotting

Work material	Heat resistant alloys Inconel718		
Dia. DC(mm)	Cutting speed (m/min)	Feed per Tooth (mm/tooth)	Depth of cut ap(mm)
6	≧350	≦0.03	≦1.0
8	≧350	≦0.03	≦1.5
10	≧350	≦0.03	≦2.0
12	≧350	≦0.03	≦2.5



- The outermost layer of the material may be affected by heat. Ensure a minimum of 0.3mm final machining allowance remains.
- The recommended ramping angle is 1.5 degree. When conducting ramping it is recommended to reduce the feed rate by 50% from the cutting conditions shown.
- Gradually increase the width of cut (ae) starting from 0.05D.

CE6SRB

Ceramic End Mills

Corner radius end mill, short cut length, 6 flute

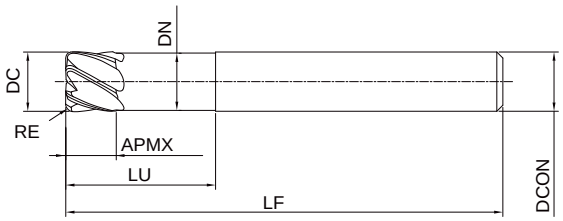
Product Information

Ceramic 30°

Work Material

S

Technical Info >> 1993
ISO13399 Property >> 1966
SYMBOL DESCRIPTIONS >> 664
END MILLS SELECTION CHART >> 688



R	DC≦12		
	±0.02		
	DC=6	DC=8,10	DC=12
	- 0.008 - 0.028	- 0.009 - 0.029	- 0.011 - 0.031
h6	DC=6	DC=8,10	DC=12
	0 - 0.008	0 - 0.009	0 - 0.011

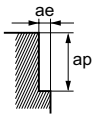
●Inventory maintained in Japan. Unit : mm

Order Number	DC	RE	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	type
CE6SRBD0600R050	6	0.5	4.5	12	5.85	50	6	6	●	1
CE6SRBD0800R100	8	1	6	16	7.85	60	8	6	●	1
CE6SRBD1000R100	10	1	7.5	20	9.7	65	10	6	●	1
CE6SRBD1200R150	12	1.5	9	24	11.7	70	12	6	●	1

RECOMMENDED CUTTING CONDITIONS

·Side milling

Work material	Heat resistant alloys Inconel718			
Dia. DC(mm)	Cutting speed (m/min)	Feed per Tooth (mm/tooth)	Depth of cut ap(mm)	Depth of cut ae(mm)
6	≧350	≦0.06	≦4.5	≦1.2
8	≧350	≦0.06	≦6.0	≦1.6
10	≧350	≦0.06	≦7.5	≦2.0
12	≧350	≦0.06	≦9.0	≦2.4



- The outermost layer of the material may be affected by heat. Ensure a minimum of 0.3mm final machining allowance remains.
- The recommended ramping angle is 1.5 degree. When conducting ramping it is recommended to reduce the feed rate by 50% from the cutting conditions shown.
- Gradually increase the width of cut (ae) starting from 0.05DC.

Memo

IDENTIFICATION

iMX END MILL SERIES

HEAD

IMX12 C 4 HV 120 R100 12 S

① ② ③ ④ ⑤ ⑥ ⑦ ⑧

② Basic configurations

S	Square
C	Corner radius
B	Ball nose
R	Roughing
CH	Chamfer

④ Specifications

H	High helix
V	Vibration controle
F	For High Efficiency Machining
A	For Machining of Aluminium Alloys
D	Multi-task corner radius
F	Fine pitch (Roughing)
T	Taper
L	Inclined

⑥ Dia.

ex.
R050 → 0.5mm
R100 → 1mm

⑧ Coolant hole

S	Peripheral(Side)
E	End
C	End cutting edge(Center)
None	without hole

① Series Description•Fastening size

IMX10	For 10mm
IMX12	For 12mm
IMX16	For 16mm
IMX20	For 20mm
IMX25	For 25mm

③ No. of Flutes

ex.
4 → 4 flute

⑤ Dia.

ex.
120 → 12mm

⑦ Flute length

ex.
12 → 12.∗mm
(Truncate decimal places)

CARBIDE HOLDER

IMX12 - U 12 N017 L080 C

① ② ③ ④ ⑤ ⑥ ⑦

②

Hyphen Indicates these are holders.

③ Figure

U	Undercut
S	Straight
G	Highly rigid straight
A	1° Taper neck

⑥ Overall Length

ex.
L080 → 80mm

① Series Description•Fastening size

IMX10	For 10mm
IMX12	For 12mm
IMX16	For 16mm
IMX20	For 20mm
IMX25	For 25mm

④ Shank diameter

ex.
12 → 12mm

⑤ Neck Length

ex.
N017 → 17.∗mm
(Truncate decimal places)

⑦ Tool material

C	CARBIDE
S	STEEL

RUN-OUT ACCURACY AND HEAD EXCHANGE ACCURACY

Unit : mm

Dia. DC	Run-out accuracy for the peripheral cutting edge	Head exchange accuracy (Axial)
<ø25	0.015	±0.02
≥ø25	0.020	

CORRECTION FACTOR BY OVERHANG LENGTH (SIDE MILLING)

Use by multiplying the recommended cutting condition on the next page by the correction factor by overhang length.
Refer to each recommended condition for the long cutting and offset type.

Work material	Carbon steel, Alloy steel, Mild Steel, Copper, Copper alloys AISI 1045, AISI 4140, ASTM A36, AISI 1010				Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT				Austenitic stainless steel, Ferritic, Precipitation hardening stainless steel, Titanium alloy AISI 304, AISI 316, AISI 304LN, AISI 316LN, AISI 410, AISI 430, AISI 431, AISI 420J2, Ti-6Al-4V			
L/D	Cutting Speed (m/min)	Main Spindle Revolution (min^{-1})	Feed per Tooth (mm/t.)	Cutting Width ae (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min^{-1})	Feed per Tooth (mm/t.)	Cutting Width ae (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min^{-1})	Feed per Tooth (mm/t.)	Cutting Width ae (mm)
2	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
3	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
4	80%	80%	90%	70%	80%	80%	90%	70%	80%	80%	90%	70%
5	60%	60%	80%	40%	60%	60%	80%	40%	60%	60%	80%	40%
6	50%	50%	70%	30%	50%	50%	70%	30%	50%	50%	70%	30%
7	40%	40%	70%	20%	40%	40%	70%	20%	30%	30%	60%	20%
8	40%	40%	60%	10%	40%	40%	60%	10%	30%	30%	50%	10%
9	30%	30%	60%	10%	30%	30%	60%	10%	20%	20%	50%	10%

Work material	Precipitation hardening stainless steel, Cobalt chromium alloy AISI 630, AISI 631				Heat resistant alloys Inconel718			
L/D	Cutting Speed (m/min)	Main Spindle Revolution (min^{-1})	Feed per Tooth (mm/t.)	Cutting Width ae (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min^{-1})	Feed per Tooth (mm/t.)	Cutting Width ae (mm)
2	100%	100%	100%	100%	100%	100%	100%	100%
3	100%	100%	100%	100%	100%	100%	100%	100%
4	80%	80%	90%	70%	80%	80%	90%	70%
5	60%	60%	80%	40%	60%	60%	80%	40%
6	50%	50%	70%	30%	50%	50%	70%	30%
7	30%	30%	60%	20%	30%	30%	60%	20%
8	30%	30%	50%	10%	30%	30%	50%	10%
9	20%	20%	50%	10%	20%	20%	50%	10%

iMX-S3HV

iMX END MILL SERIES

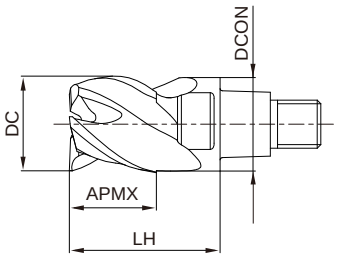
Square head, 3 flute, Irregular helix

Product Information

Work Material

Technical Info >> 1993
ISO13399 Property >> 1966
SYMBOL DESCRIPTIONS >> 664
END MILLS SELECTION CHART >> 690

DC≦12	DC>12
0 - 0.020	0 - 0.030



Type1

Unit : mm

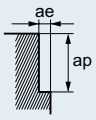
Order Number	DC	APMX	LH	DCON	No. of Flutes	EP7020	type
IMX10S3HV10008	10	8	16	9.7	3	●	2
IMX12S3HV12010	12	10.1	19	11.7	3	●	1
IMX16S3HV16013	16	13.3	24	15.5	3	●	1
IMX20S3HV20017	20	17	30	19.5	3	●	1
IMX25S3HV25021	25	21	37.5	24.5	3	●	1

iMX-S3HV

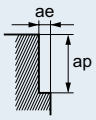
RECOMMENDED CUTTING CONDITIONS

·Side milling

Work material	Carbon steel, Alloy steel, Mild Steel, Copper, Copper alloys AISI 1045, AISI 4140, ASTM A36, AISI 1010						Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT						Austenitic stainless steel, Ferritic and Martensitic stainless steel, Titanium alloys AISI 304, AISI 316, AISI 304LN, AISI 316LN, AISI 410, AISI 430, AISI 431, AISI 420J2, Ti-6Al-4V					
Dia. DC(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)	Width of cut ae(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)	Width of cut ae(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)	Width of cut ae(mm)
10	150	4800	0.09	1300	8	2	120	3800	0.06	680	8	2	100	3200	0.075	720	8	2
12	150	4000	0.09	1100	9.6	2.4	120	3200	0.065	620	9.6	2.4	100	2700	0.08	650	9.6	2.4
16	150	3000	0.1	900	12.8	3.2	120	2400	0.075	540	12.8	3.2	100	2000	0.09	540	12.8	3.2
20	150	2400	0.1	720	16	4	120	1900	0.075	430	16	4	100	1600	0.09	430	16	4
25	150	1900	0.12	680	20	5	120	1500	0.075	340	20	5	100	1300	0.09	350	20	5



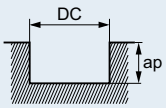
Work material	Precipitation hardening stainless steel, Cobalt chromium alloy AISI 630, AISI 631						Heat resistant alloys Inconel718					
Dia. DC(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)	Width of cut ae(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)	Width of cut ae(mm)
10	75	2400	0.06	430	8	2	40	1300	0.04	160	8	1
12	75	2000	0.065	390	9.6	2.4	40	1100	0.045	150	9.6	1.2
16	75	1500	0.075	340	12.8	3.2	40	800	0.05	120	12.8	1.6
20	75	1200	0.075	270	16	4	40	640	0.05	96	16	2
25	75	950	0.075	210	20	5	40	510	0.05	77	20	2.5



- For stainless steel, titanium alloy and heat resistant alloy, the use of water-soluble coolant is effective.
- If the depth of cut is shallow, the revolution and feed rate can be increased.
- The irregular helix flute end mill has a large effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abnormal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.

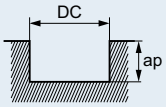
·Slotting

Work material	Carbon steel, Alloy steel, Mild Steel, Copper, Copper alloys AISI 1045, AISI 4140, ASTM A36, AISI 1010					Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT					Austenitic stainless steel, Ferritic and Martensitic stainless steel, Titanium alloys AISI 304, AISI 316, AISI 304LN, AISI 316LN, AISI 410, AISI 430, AISI 431, AISI 420J2, Ti-6Al-4V				
Dia. DC(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)
10	100	3200	0.04	380	5	80	2500	0.03	230	5	75	2400	0.03	200	5
12	100	2700	0.05	410	6	80	2100	0.04	250	6	75	2000	0.04	240	6
16	100	2000	0.07	420	8	80	1600	0.05	240	8	75	1500	0.06	270	8
20	100	1600	0.07	340	10	80	1300	0.05	200	10	75	1200	0.06	220	10
25	100	1300	0.08	310	12	80	1000	0.05	150	12	75	950	0.06	170	12



iMX-S3HV

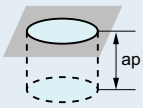
Work material	Precipitation hardening stainless steel, Cobalt chromium alloy AISI 630, AISI 631					Heat resistant alloys Inconel718				
Dia. DC(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)
10	60	1900	0.025	100	5	30	950	0.02	57	2
12	60	1600	0.035	170	6	30	800	0.03	72	2.4
16	60	1200	0.05	180	8	30	600	0.05	90	3.2
20	60	950	0.05	140	10	30	480	0.05	72	4
25	60	760	0.05	110	12	30	380	0.05	57	5



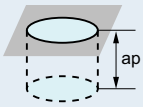
- For stainless steel, titanium alloy and heat resistant alloy, the use of water-soluble coolant is effective.
- If the depth of cut is shallow, the revolution and feed rate can be increased.
- The irregular helix flute end mill has a large effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abnormal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.

·Plunging

Work material	Carbon steel, Alloy steel, Mild Steel, Copper, Copper alloys AISI 1045, AISI 4140, ASTM A36, AISI 1010						Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT						Austenitic stainless steel, Ferritic and Martensitic stainless steel, Titanium alloys AISI 304, AISI 316, AISI 304LN, AISI 316LN, AISI 410, AISI 430, AISI 431, AISI 420J2, Ti-6Al-4V					
Dia. DC(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Revolution (mm/rev)	Table Feed (mm/min)	Depth (mm)	Step ap2(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Revolution (mm/rev)	Table Feed (mm/min)	Depth (mm)	Step ap2(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Revolution (mm/rev)	Table Feed (mm/min)	Depth (mm)	Step ap2(mm)
10	100	3200	0.14	450	5	2.5	70	2200	0.09	200	5	2	60	1900	0.03	57	5	0.6
12	100	2700	0.14	380	6	2.5	70	1900	0.09	170	6	2	60	1600	0.03	48	6	0.6
16	100	2000	0.14	280	8	2.5	70	1400	0.09	130	8	2	60	1200	0.03	36	8	0.6
20	100	1600	0.14	220	10	2.5	70	1100	0.09	99	10	2	60	950	0.03	29	10	0.6
25	100	1300	0.14	180	12.5	2.5	70	890	0.09	80	12.5	2	60	760	0.03	23	12.5	0.6



Work material	Precipitation hardening stainless steel, Cobalt chromium alloy AISI 630, AISI 631					
Dia. DC(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Revolution (mm/rev)	Table Feed (mm/min)	Depth (mm)	Step ap2(mm)
10	40	1300	0.03	39	5	0.6
12	40	1100	0.03	33	6	0.6
16	40	800	0.03	24	8	0.6
20	40	640	0.03	19	10	0.6
25	40	510	0.03	15	12.5	0.6



- For stainless steel, titanium alloy and heat resistant alloy, the use of water-soluble coolant is effective.
- The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abnormal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.

iMX-S4HV

iMX END MILL SERIES

Square head, 4 flute, Irregular helix

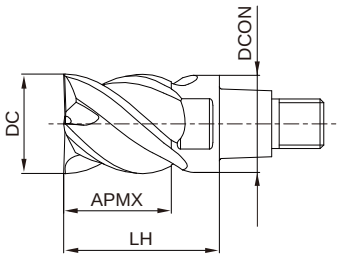
Product Information

UWC 42° 45° Gash

Work Material

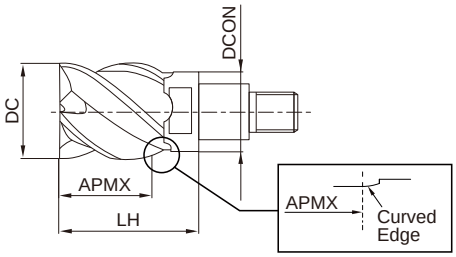
P M S F M

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 690



Type1

DC≦12	DC>12
0 - 0.020	0 - 0.030



Type2

(Type 2 is offset type.) Unit: mm

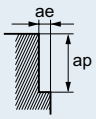
Order Number	DC	APMX	LH	DCON	No. of Flutes	EP7020	type
IMX10S4HV10010	10	10	16	9.7	4	●	2
IMX10S4HV12012	12	12.5	19	9.7	4	●	3
IMX12S4HV12012	12	12	19	11.7	4	●	2
IMX12S4HV14014	14	14.5	22.5	11.7	4	●	3
IMX16S4HV16016	16	16	24	15.5	4	●	2
IMX16S4HV18018	18	18.5	27	15.5	4	●	3
IMX20S4HV20021	20	21	30	19.5	4	●	1
IMX20S4HV22023	22	23	33	19.5	4	●	3
IMX25S4HV25026	25	26	37.5	24.5	4	●	1
IMX25S4HV28029	28	29	41.5	24.5	4	●	3
IMX25S4HV30031	30	31	43.5	24.5	4	●	3
IMX25S4HV32033	32	33	45.5	24.5	4	●	3

iMX-S4HV

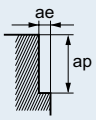
RECOMMENDED CUTTING CONDITIONS

·Side milling

Work material	Carbon steel, Alloy steel, Mild Steel, Copper, Copper alloys AISI 1045, AISI 4140, ASTM A36, AISI 1010						Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT						Austenitic stainless steel, Ferritic and Martensitic stainless steel, Titanium alloys AISI 304, AISI 316, AISI 304LN, AISI 316LN, AISI 410, AISI 430, AISI 431, AISI 420J2, Ti-6Al-4V					
Dia. DC(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)	Width of cut ae(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)	Width of cut ae(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)	Width of cut ae(mm)
10	150	4800	0.09	1700	10	2	120	3800	0.06	910	10	2	100	3200	0.075	960	10	2
12	150	4000	0.09	1400	12	2.4	120	3200	0.065	830	12	2.4	100	2700	0.08	860	12	2.4
16	150	3000	0.1	1200	16	3.2	120	2400	0.075	720	16	3.2	100	2000	0.09	720	16	3.2
20	150	2400	0.1	960	20	4	120	1900	0.075	570	20	4	100	1600	0.09	580	20	4
25	150	1900	0.12	910	25	5	120	1500	0.075	450	25	5	100	1300	0.09	470	25	5



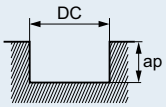
Work material	Precipitation hardening stainless steel, Cobalt chromium alloy AISI 630, AISI 631						Heat resistant alloys Inconel718					
Dia. DC(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)	Width of cut ae(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)	Width of cut ae(mm)
10	75	2400	0.06	580	10	2	40	1300	0.04	210	10	1
12	75	2000	0.065	520	12	2.4	40	1100	0.045	200	12	1.2
16	75	1500	0.075	450	16	3.2	40	800	0.05	160	16	1.6
20	75	1200	0.075	360	20	4	40	640	0.05	130	20	2
25	75	950	0.075	290	25	5	40	510	0.05	100	25	2.5



- For stainless steel, titanium alloy and heat resistant alloy, the use of water-soluble coolant is effective.
- If the depth of cut is shallow, the revolution and feed rate can be increased.
- The irregular helix flute end mill has a large effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abnormal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.

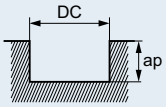
·Slotting

Work material	Carbon steel, Alloy steel, Mild Steel, Copper, Copper alloys AISI 1045, AISI 4140, ASTM A36, AISI 1010					Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT					Austenitic stainless steel, Ferritic and Martensitic stainless steel, Titanium alloys AISI 304, AISI 316, AISI 304LN, AISI 316LN, AISI 410, AISI 430, AISI 431, AISI 420J2, Ti-6Al-4V				
Dia. DC(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)
10	100	3200	0.04	510	5	80	2500	0.03	300	5	75	2400	0.03	290	5
12	100	2700	0.05	540	6	80	2100	0.04	340	6	75	2000	0.04	320	6
16	100	2000	0.07	560	8	80	1600	0.05	320	8	75	1500	0.06	360	8
20	100	1600	0.07	450	10	80	1300	0.05	260	10	75	1200	0.06	290	10
25	100	1300	0.08	420	12	80	1000	0.05	200	12	75	950	0.06	230	12



iMX-S4HV

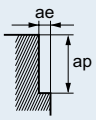
Work material	Precipitation hardening stainless steel, Cobalt chromium alloy AISI 630, AISI 631					Heat resistant alloys Inconel718				
Dia. DC(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)
10	60	1900	0.025	190	5	30	950	0.02	76	2
12	60	1600	0.035	220	6	30	800	0.03	96	2.4
16	60	1200	0.05	240	8	30	600	0.05	120	3.2
20	60	950	0.05	190	10	30	480	0.05	96	4
25	60	760	0.05	150	12	30	380	0.05	76	5



- For stainless steel, titanium alloy and heat resistant alloy, the use of water-soluble coolant is effective.
- If the depth of cut is shallow, the revolution and feed rate can be increased.
- The irregular helix flute end mill has a large effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abnormal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.

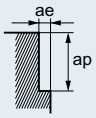
·Side milling (Offset type)

Work material		Carbon steel, Alloy steel, Mild Steel, Copper, Copper alloys AISI 1045, AISI 4140, ASTM A36, AISI 1010						Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT						Austenitic stainless steel, Ferritic and Martensitic stainless steel, Titanium alloys AISI 304, AISI 316, AISI 304LN, AISI 316LN, AISI 410, AISI 430, AISI 431, AISI 420J2, Ti-6Al-4V					
L/D	Dia. DC(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)	Width of cut ae(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)	Width of cut ae(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)	Width of cut ae(mm)
≦3	12	150	4000	0.09	1400	12	1.2	120	3200	0.06	770	12	1.2	100	2700	0.075	810	12	1.2
	14	150	3400	0.09	1200	14	1.4	120	2700	0.065	700	14	1.4	100	2300	0.08	740	14	1.4
	18	150	2700	0.1	1100	18	1.8	120	2100	0.075	630	18	1.8	100	1800	0.09	650	18	1.8
	22	150	2200	0.1	880	22	2.2	120	1700	0.075	510	22	2.2	100	1400	0.09	500	22	2.2
	28	150	1700	0.12	820	28	2.8	120	1400	0.075	420	28	2.8	100	1100	0.09	400	28	2.8
	30	150	1600	0.12	770	30	3	120	1300	0.075	390	30	3	100	1100	0.09	400	30	3
	32	150	1500	0.12	720	32	3.2	120	1200	0.075	360	32	3.2	100	990	0.09	360	32	3.2
5	12	90	2400	0.07	670	12	0.5	70	1900	0.05	380	12	0.5	60	1600	0.06	380	12	0.5
	14	90	2000	0.07	560	14	0.6	70	1600	0.05	320	14	0.6	60	1400	0.06	340	14	0.6
	18	90	1600	0.08	510	18	0.7	70	1200	0.06	290	18	0.7	60	1100	0.07	310	18	0.7
	22	90	1300	0.08	420	22	0.9	70	1000	0.06	240	22	0.9	60	870	0.07	240	22	0.9
	28	90	1000	0.1	400	28	1.1	70	800	0.06	190	28	1.1	60	680	0.07	190	28	1.1
	30	90	950	0.1	380	30	1.2	70	740	0.06	180	30	1.2	60	640	0.07	180	30	1.2
	32	90	900	0.1	360	32	1.3	70	700	0.06	170	32	1.3	60	600	0.07	170	32	1.3
7	12	60	1600	0.06	380	12	0.2	50	1300	0.04	210	12	0.2	32	850	0.05	170	12	0.2
	14	60	1400	0.06	340	14	0.3	50	1100	0.05	220	14	0.3	32	730	0.06	180	14	0.3
	18	60	1100	0.07	310	18	0.4	50	880	0.05	180	18	0.4	32	570	0.06	140	18	0.4
	22	60	870	0.07	240	22	0.4	50	720	0.05	140	22	0.4	32	460	0.06	110	22	0.4
	28	60	680	0.08	220	28	0.6	50	570	0.05	110	28	0.6	32	360	0.06	86	28	0.6
	30	60	640	0.08	200	30	0.6	50	530	0.05	110	30	0.6	32	340	0.06	82	30	0.6
	32	60	600	0.08	190	32	0.6	50	500	0.05	100	32	0.6	32	320	0.06	77	32	0.6



iMX-S4HV

Work material		Precipitation hardening stainless steel, Cobalt chromium alloy AISI 630, AISI 631						Heat resistant alloys Inconel718					
L/D	Dia. DC(mm)	Cutting speed (m/min)	Revolution (min⁻¹)	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)	Width of cut ae(mm)	Cutting speed (m/min)	Revolution (min⁻¹)	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)	Width of cut ae(mm)
≦3	12	75	2000	0.06	480	12	1.2	30	800	0.04	130	12	0.9
	14	75	1700	0.065	440	14	1.4	30	680	0.045	120	14	1.1
	18	75	1300	0.075	390	18	1.8	40	710	0.05	140	18	1.4
	22	75	1100	0.075	330	22	2.2	40	580	0.05	120	22	1.7
	28	75	850	0.075	260	28	2.8	40	450	0.05	90	28	2.1
	30	75	800	0.075	240	30	3	40	420	0.05	84	30	2.3
	32	75	750	0.075	230	32	3.2	40	400	0.05	80	32	2.4
5	12	50	1300	0.05	260	12	0.5	10	270	0.03	32	12	0.4
	14	50	1100	0.05	220	14	0.6	10	230	0.04	37	14	0.4
	18	50	880	0.06	210	18	0.7	19	340	0.04	54	18	0.6
	22	50	720	0.06	170	22	0.9	19	270	0.04	43	22	0.7
	28	50	570	0.06	140	28	1.1	19	220	0.04	35	28	0.8
	30	50	530	0.06	130	30	1.2	19	200	0.04	32	30	0.9
	32	50	500	0.06	120	32	1.3	19	190	0.04	30	32	1.0
7	12	24	640	0.04	100	12	0.2	–	–	–	–	–	–
	14	24	550	0.05	110	14	0.3	–	–	–	–	–	–
	18	24	420	0.05	84	18	0.4	–	–	–	–	–	–
	22	24	350	0.05	70	22	0.4	–	–	–	–	–	–
	28	24	270	0.05	54	28	0.6	–	–	–	–	–	–
	30	24	250	0.05	50	30	0.6	–	–	–	–	–	–
	32	24	240	0.05	48	32	0.6	–	–	–	–	–	–



iMX-S4HV

iMX END MILL SERIES

Square head, Long cutting edge, 4 flute, Irregular helix

Product Information

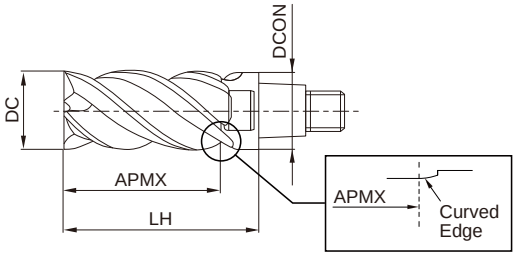
UWC 42° 45° Gash

Work Material

P M S F M

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 690

DC>12
0 - 0.030



Type1

Unit: mm

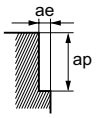
Order Number	DC	APMX	LH	DCON	No. of Flutes	EP7020	type
IMX16S4HV16032	16	32	40	15.5	4	●	1
IMX20S4HV20040	20	40	50	19.5	4	●	1

iMX-S4HV

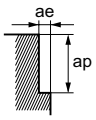
RECOMMENDED CUTTING CONDITIONS

·Side milling

Work material		Carbon steel, Alloy steel, Mild Steel, Copper, Copper alloys AISI 1045, AISI 4140, ASTM A36, AISI 1010						Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT						Austenitic stainless steel, Ferritic and Martensitic stainless steel, Titanium alloys AISI 304, AISI 316, AISI 304LN, AISI 316LN, AISI 410, AISI 430, AISI 431, AISI 420J2, Ti-6Al-4V					
L/D	Dia. DC(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)	Width of cut ae(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)	Width of cut ae(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)	Width of cut ae(mm)
4	16	100	2000	0.09	720	32	0.8	80	1600	0.07	450	32	0.8	60	1200	0.08	380	32	0.8
	20	100	1600	0.09	580	40	1	80	1300	0.07	360	40	1	60	950	0.08	300	40	1
6	16	60	1200	0.07	340	32	0.8	50	990	0.05	200	32	0.8	40	800	0.06	190	32	0.8
	20	60	950	0.07	270	40	1	50	800	0.05	160	40	1	40	640	0.06	150	40	1



Work material		Precipitation hardening stainless steel, Cobalt chromium alloy AISI 630, AISI 631						Heat resistant alloys Inconel718					
L/D	Dia. DC(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)	Width of cut ae(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)	Width of cut ae(mm)
4	16	50	990	0.07	280	32	0.8	30	600	0.05	120	32	0.4
	20	50	800	0.07	220	40	1	30	480	0.05	96	40	0.5
6	16	30	600	0.05	120	32	0.8	20	400	0.04	64	32	0.4
	20	30	480	0.05	96	40	1	20	320	0.04	51	40	0.5



- For stainless steel, titanium alloy and heat resistant alloy, the use of water-soluble coolant is effective.
- If the depth of cut is shallow, the revolution and feed rate can be increased.
- The irregular helix flute end mill has a large effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abnormal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.
- The length of the long cutting type is 2 times that of the standard head. L/D demonstrates +1 when installed to a holder of the same size.

iMX-S4HV-S

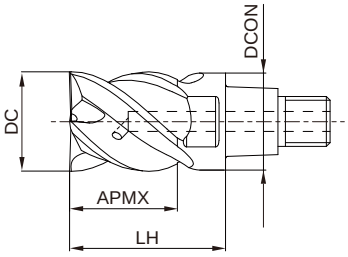
iMX END MILL SERIES

Square head, 4 flute, Irregular helix, With coolant hole

Product Information

Work Material

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 690



Type1

DC≦12	DC>12
0 - 0.020	0 - 0.030

(Peripheral cutting edge with coolant hole) Unit: mm

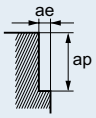
Order Number	DC	APMX	LH	DCON	No. of Flutes	EP7020	type
IMX10S4HV10010S	10	10	16	9.7	4	●	2
IMX12S4HV12012S	12	12	19	11.7	4	●	2
IMX16S4HV16016S	16	16	24	15.5	4	●	2
IMX20S4HV20021S	20	21	30	19.5	4	●	1
IMX25S4HV25026S	25	26	37.5	24.5	4	●	1

iMX-S4HV-S

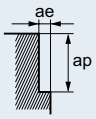
RECOMMENDED CUTTING CONDITIONS

·Side milling

Work material	Carbon steel, Alloy steel, Mild Steel, Copper, Copper alloys AISI 1045, AISI 4140, ASTM A36, AISI 1010						Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT						Austenitic stainless steel, Ferritic and Martensitic stainless steel, Titanium alloys AISI 304, AISI 316, AISI 304LN, AISI 316LN, AISI 410, AISI 430, AISI 431, AISI 420J2, Ti-6Al-4V					
Dia. DC(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)	Width of cut ae(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)	Width of cut ae(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)	Width of cut ae(mm)
10	150	4800	0.09	1700	10	2	120	3800	0.06	910	10	2	100	3200	0.075	960	10	2
12	150	4000	0.09	1400	12	2.4	120	3200	0.065	830	12	2.4	100	2700	0.08	860	12	2.4
16	150	3000	0.1	1200	16	3.2	120	2400	0.075	720	16	3.2	100	2000	0.09	720	16	3.2
20	150	2400	0.1	960	20	4	120	1900	0.075	570	20	4	100	1600	0.09	580	20	4
25	150	1900	0.12	910	25	5	120	1500	0.075	450	25	5	100	1300	0.09	470	25	5



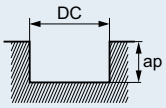
Work material	Precipitation hardening stainless steel, Cobalt chromium alloy AISI 630, AISI 631						Heat resistant alloys Inconel718					
Dia. DC(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)	Width of cut ae(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)	Width of cut ae(mm)
10	75	2400	0.06	580	10	2	40	1300	0.04	210	10	1
12	75	2000	0.065	520	12	2.4	40	1100	0.045	200	12	1.2
16	75	1500	0.075	450	16	3.2	40	800	0.05	160	16	1.6
20	75	1200	0.075	360	20	4	40	640	0.05	130	20	2
25	75	950	0.075	290	25	5	40	510	0.05	100	25	2.5



- For stainless steel, titanium alloy and heat resistant alloy, the use of water-soluble coolant is effective.
- If the depth of cut is shallow, the revolution and feed rate can be increased.
- The irregular helix flute end mill has a large effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abnormal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.

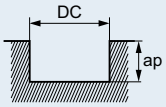
·Slotting

Work material	Carbon steel, Alloy steel, Mild Steel, Copper, Copper alloys AISI 1045, AISI 4140, ASTM A36, AISI 1010					Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT					Austenitic stainless steel, Ferritic and Martensitic stainless steel, Titanium alloys AISI 304, AISI 316, AISI 304LN, AISI 316LN, AISI 410, AISI 430, AISI 431, AISI 420J2, Ti-6Al-4V				
Dia. DC(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)
10	100	3200	0.04	510	5	80	2500	0.03	300	5	75	2400	0.03	290	5
12	100	2700	0.05	540	6	80	2100	0.04	340	6	75	2000	0.04	320	6
16	100	2000	0.07	560	8	80	1600	0.05	320	8	75	1500	0.06	360	8
20	100	1600	0.07	450	10	80	1300	0.05	260	10	75	1200	0.06	290	10
25	100	1300	0.08	420	12	80	1000	0.05	200	12	75	950	0.06	230	12



iMX-S4HV-S

Work material	Precipitation hardening stainless steel, Cobalt chromium alloy AISI 630, AISI 631					Heat resistant alloys Inconel718				
Dia. DC(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)
10	60	1900	0.025	190	5	30	950	0.02	76	2
12	60	1600	0.035	220	6	30	800	0.03	96	2.4
16	60	1200	0.05	240	8	30	600	0.05	120	3.2
20	60	950	0.05	190	10	30	480	0.05	96	4
25	60	760	0.05	150	12	30	380	0.05	76	5



- For stainless steel, titanium alloy and heat resistant alloy, the use of water-soluble coolant is effective.
- If the depth of cut is shallow, the revolution and feed rate can be increased.
- The irregular helix flute end mill has a large effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abnormal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.

iMX-S3A

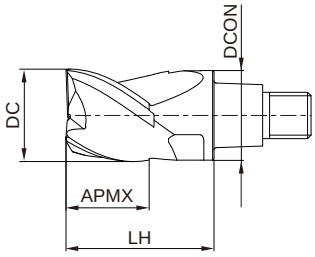
iMX END MILL SERIES

Square head, 3 flute, For aluminium alloy

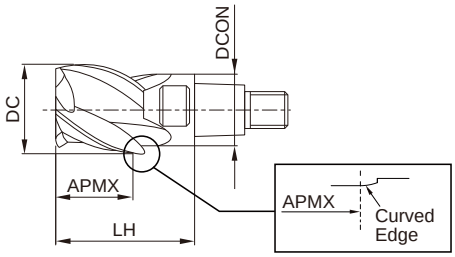
Product Information

Work Material

Technical Info >> 1993
ISO13399 Property >> 1966
SYMBOL DESCRIPTIONS >> 664
END MILLS SELECTION CHART >> 690



Type1



Type2

DC≦12	DC>12
0 - 0.020	0 - 0.030

(Type 2 is offset type.) Unit: mm

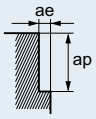
Order Number	DC	APMX	LH	DCON	No. of Flutes	ET2020	type
IMX10S3A10008	10	8	16	9.7	3	●	1
IMX10S3A12010	12	10.1	19	9.7	3	●	3
IMX12S3A12010	12	10.1	19	11.7	3	●	1
IMX12S3A14011	14	11.7	22.5	11.7	3	●	3
IMX16S3A16013	16	13.3	24	15.5	3	●	1
IMX16S3A18014	18	14.9	27	15.5	3	●	3
IMX20S3A20017	20	17	30	19.5	3	●	1
IMX20S3A22018	22	18.6	33	19.5	3	●	3
IMX25S3A25021	25	21	37.5	24.5	3	●	1
IMX25S3A28023	28	23.4	41.5	24.5	3	●	3

iMX-S3A

RECOMMENDED CUTTING CONDITIONS

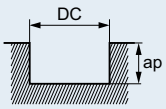
·Side milling

Work material	Aluminium alloy A6061, A7075					
Dia. DC(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut ap(mm)	Width of cut ae(mm)
10	500	16000	0.117	5600	8	3
12	500	13000	0.118	4600	9.6	3.6
16	500	10000	0.153	4600	12.8	4.8
20	500	8000	0.175	4200	16	6
25	500	6000	0.211	3800	20	7.5



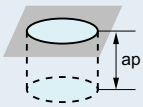
·Slotting

Work material	Aluminium alloy A6061, A7075				
Dia. DC(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut ap(mm)
10	500	16000	0.068	3300	5
12	500	13000	0.072	2800	6
16	500	10000	0.093	2800	8
20	500	8000	0.108	2600	10
25	500	6000	0.127	2300	12.5



·Plunging

Work material	Aluminium alloy A6061, A7075					
Dia. DC(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Revolution (mm/rev)	Table Feed (mm/min)	Depth of cut Depth ap(mm)	Step ap2(mm)
10	300	9600	0.100	960	5	3
12	300	8000	0.100	800	6.0	2.5
16	300	6000	0.100	600	8.0	2.5
20	300	4800	0.100	480	10	3
25	300	3800	0.100	380	13	2.5

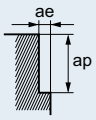


- The use of water-soluble coolant is recommended.
- Vibration may occur if the rigidity of machine or work piece is low. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.

iMX-S3A

·Side milling (Offset type)

Work material		Aluminium alloy A6061, A7075					
L/D	Dia. DC(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut ap(mm)	Width of cut ae(mm)
≦3	12	500	13000	0.117	4600	9.6	2.4
	14	500	11000	0.118	3900	11.2	2.8
	18	500	8800	0.153	4000	14.4	3.6
	22	500	7200	0.175	3800	17.6	4.4
	28	500	5700	0.211	3600	22.4	5.6
5	12	300	8000	0.09	2200	9.6	1.0
	14	300	6800	0.09	1800	11.2	1.1
	18	300	5300	0.12	1900	14.4	1.4
	22	300	4300	0.14	1800	17.6	1.8
	28	300	3400	0.17	1700	22.4	2.2
7	12	200	5300	0.08	1300	9.6	0.5
	14	200	4500	0.08	1100	11.2	0.6
	18	200	3500	0.11	1200	14.4	0.7
	22	200	2900	0.12	1000	17.6	0.9
	28	200	2300	0.15	1000	22.4	1.1



- The use of water-soluble coolant is recommended.
- Vibration may occur if the rigidity of machine or work piece is low. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.

iMX-R4F

iMX END MILL SERIES

Roughing head, 4 flute

Product Information

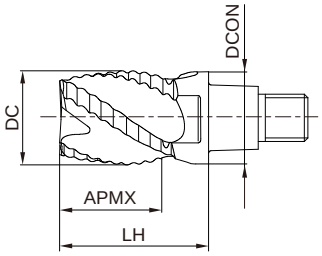
Work Material

Technical Info >> 1993

ISO13399 Property >> 1966

SYMBOL DESCRIPTIONS >> 664

END MILLS SELECTION CHART >> 690



Type1

Unit : mm

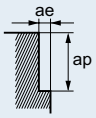
Order Number	DC	APMX	LH	DCON	No. of Flutes	EP7020	type
IMX10R4F10010	10	10.5	16	9.7	4	●	1
IMX12R4F12012	12	12.5	19	11.7	4	●	1
IMX16R4F16016	16	16.5	24	15.5	4	●	1
IMX20R4F20021	20	21	30	19.5	4	●	1
IMX25R4F25026	25	26	37.5	24.5	4	●	1

iMX-R4F

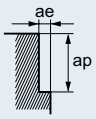
RECOMMENDED CUTTING CONDITIONS

·Side milling

Work material	Carbon steel, Alloy steel, Mild Steel, Copper, Copper alloys AISI 1045, AISI 4140, ASTM A36, AISI 1010						Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT						Austenitic stainless steel, Ferritic and Martensitic stainless steel, Titanium alloys AISI 304, AISI 316, AISI 304LN, AISI 316LN, AISI 410, AISI 430, AISI 431, AISI 420J2, Ti-6Al-4V					
Dia. DC(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)	Width of cut ae(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)	Width of cut ae(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)	Width of cut ae(mm)
10	150	4800	0.045	860	8	4	120	3800	0.03	460	8	4	100	3200	0.038	480	8	4
12	150	4000	0.045	720	9.6	4.8	120	3200	0.033	420	9.6	4.8	100	2700	0.04	430	9.6	4.8
16	150	3000	0.05	600	12.8	6.4	120	2400	0.038	360	12.8	6.4	100	2000	0.045	360	12.8	6.4
20	150	2400	0.05	480	16	8	120	1900	0.038	290	16	8	100	1600	0.045	290	16	8
25	150	1900	0.06	460	20	10	120	1500	0.038	230	20	10	100	1300	0.045	230	20	10



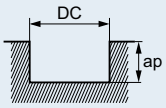
Work material	Precipitation hardening stainless steel, Cobalt chromium alloy AISI 630, AISI 631						Heat resistant alloys Inconel718					
Dia. DC(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)	Width of cut ae(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)	Width of cut ae(mm)
10	75	2400	0.030	290	8	4	40	1300	0.04	210	8	1
12	75	2000	0.033	260	9.6	4.8	40	1100	0.045	200	9.6	1.2
16	75	1500	0.04	230	12.8	6.4	40	800	0.050	160	12.8	1.6
20	75	1200	0.04	180	16	8	40	640	0.050	130	16	2
25	75	950	0.04	140	20	10	40	510	0.050	100	20	3



- For stainless steel, titanium alloy and heat resistant alloy, the use of water-soluble coolant is effective.
- If the depth of cut is shallow, the revolution and feed rate can be increased.
- Vibration may occur if the rigidity of machine or work piece is low. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.

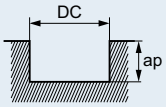
·Slotting

Work material	Carbon steel, Alloy steel, Mild Steel, Copper, Copper alloys AISI 1045, AISI 4140, ASTM A36, AISI 1010					Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT					Austenitic stainless steel, Ferritic and Martensitic stainless steel, Titanium alloys AISI 304, AISI 316, AISI 304LN, AISI 316LN, AISI 410, AISI 430, AISI 431, AISI 420J2, Ti-6Al-4V				
Dia. DC(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)
10	100	3200	0.04	510	5	80	2500	0.03	300	5	60	1900	0.02	150	4
12	100	2700	0.045	490	6	80	2100	0.032	270	6	60	1600	0.025	160	5
16	100	2000	0.05	400	8	80	1600	0.038	240	8	60	1200	0.03	140	6
20	100	1600	0.05	320	10	80	1300	0.038	200	10	60	950	0.034	130	8
25	100	1300	0.06	310	12	80	1000	0.038	150	12	60	760	0.034	100	10



iMX-R4F

Work material	Precipitation hardening stainless steel, Cobalt chromium alloy AISI 630, AISI 631				
Dia. DC(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)
10	40	1300	0.016	83	4
12	40	1100	0.02	88	4.8
16	40	800	0.024	77	6.4
20	40	640	0.027	70	8
25	40	510	0.027	55	10



- For stainless steel, titanium alloy and heat resistant alloy, the use of water-soluble coolant is effective.
- If the depth of cut is shallow, the revolution and feed rate can be increased.
- Vibration may occur if the rigidity of machine or work piece is low. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.

iMX-B4HV

iMX END MILL SERIES

Ball nose head, 4 flute, Irregular helix

Product Information

UWC 45°

Work Material

P M S F M

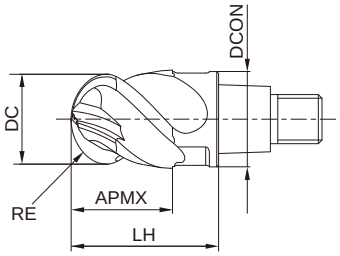
Technical Info >> 1993

ISO13399 Property >> 1966

SYMBOL DESCRIPTIONS >> 664

END MILLS SELECTION CHART >> 690

R	DC≦12	DC>12
	±0.010	±0.020
	DC≦12	DC>12
	0 - 0.020	0 - 0.030



Type1

Unit : mm

Order Number	RE	DC	APMX	LH	DCON	No. of Flutes	EP7020	type
IMX10B4HV10010	5	10	10.5	16	9.7	4	●	1
IMX12B4HV12012	6	12	12.5	19	11.7	4	●	1
IMX16B4HV16016	8	16	16.5	24	15.5	4	●	1
IMX20B4HV20021	10	20	21	30	19.5	4	●	1
IMX25B4HV25026	12.5	25	26	37.5	24.5	4	●	1

iMX-B4HV

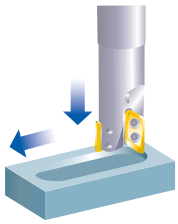
Holder Type	Cutting Edge Diameter **DC** (mm)	Insert Corner R **RE** (mm)	Ramping		Helical Milling (Blind Hole, Flat Bottom)				Helical Milling	
			Maximum Ramping Angle **RMPX**	Minimum Distance **L** ∗1 (mm)	Maximum Hole Diameter **DH max.** (mm)	Maximum Pitch **P max.** (mm)	Minimum Hole Diameter **DH min.** (mm)	Maximum Pitch **P max.** (mm)	Minimum Hole Diameter **DH min.** (mm)	Maximum Pitch **P max.** (mm)
B type	20	4	17.5°	47	31.5	10	31.8	10	22	1
		5	16.6°	71	29.5	6	31.1	7	22	1
	25	4	15.1°	55	41.5	10	41.4	10	31.7	5
		5	13.7°	61	39.5	9	40.6	9	31.7	5
	28	4	14.1°	59	47.5	10	47.2	10	36	6
		5	13°	65	45.5	9	46.4	9	36	5
	32	4	12.7°	66	55.5	10	55.1	10	45.5	9
		5	12°	70	53.5	9	54.3	9	45.5	8
	35	4	10.8°	78	61.5	10	61	10	50	8
		5	10.2°	83	59.5	9	60.2	9	50	8
	40	4	8.8°	96	71.1	10	70.9	10	61.5	10
		5	8.2°	103	69.1	9	70.1	9	61.5	9
	50	4	6.3°	135	91.1	10	90.6	10	81.3	10
		5	5.8°	146	89.1	9	89.8	9	81.3	9
	63	4	4.6°	184	117.1	10	116.6	10	107.4	10
		5	4.2°	202	115.1	9	115.7	9	107.3	9
	80	4	3.4°	250	151.1	10	150.5	10	141.4	10
		5	3.1°	274	149.1	9	149.6	9	141.4	9
	100	4	2.6°	326	191.1	10	190.5	10	181.4	10
		5	2.4°	354	189.1	9	189.6	9	181.4	9
	125	4	2°	424	241.1	10	240.5	10	231.4	10
		5	1.8°	471	239.1	9	239.6	9	229.9	9

(Note 1) The recommended ramping feed is 0.05mm/tooth or under.
∗1) Using the maximum ramping angle, the distance to reach the maximum depth of cut is as follows:
L= (maximum depth of cut APMX/tan α). Maximum depth of cut A type is 15.5mm, B type is 14.8mm.
∗2) Corner radius of 1.2mm. For other corner radii, use the following formula. {(cutting edge diameter DC)–(corner radius RE)–0.25}×2
∗3) Corner radius of 2.4mm. For other corner radii, use the following formula. {(cutting edge diameter DC)–(corner radius RE)–0.25}×2
∗4) Corner radius of 3.2mm. For other corner radii, use the following formula. {(cutting edge diameter DC)–(corner radius RE)–0.25}×2

Max.Drilling Depth (Aluminium Alloy)

Type	Insert Corner R **RE** (mm)	Max.Drilling Depth (mm)					
		Cutting Edge Diameter **DC**					
		ϕ20	**ϕ25**	**ϕ28**	**ϕ32**	**ϕ35**	**ϕ40–ϕ125**
A type	0.4	5.3	5.2	5.2	5.2	5.3	5.3
	0.8	5.3	5.2	5.2	5.2	5.3	5.3
	1.2	5.3	5.2	5.2	5.2	5.3	5.3
	1.6	4.8	4.6	4.7	4.7	4.9	4.8
	2.0	4.8	4.6	4.7	4.7	4.9	4.8
	2.4	4.8	4.6	4.7	4.7	4.9	4.8
	3.0	4.3	3.7	4.2	4.2	4.4	4.4
	3.2	4.3	3.7	4.2	4.2	4.4	4.4
B type	4.0	3.7	2.7	3.7	3.6	3.8	3.8
	5.0	3.4	2.3	3.3	3.3	3.5	3.5

AXD4000 can be effectively used for pocket machining without the need for a prepared hole.



iMX-B4HV-E

iMX END MILL SERIES

Ball nose head, 4 flute, Irregular helix, With coolant hole

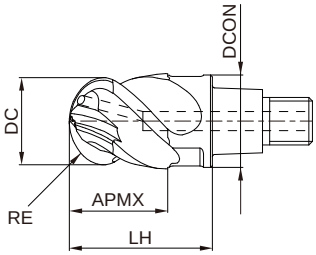
Product Information

Work Material

P M S F M

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 690

	DC≦12	DC>12
R	±0.010	±0.020
	DC≦12	DC>12
	0 - 0.020	0 - 0.030



Type1

●Inventory maintained in Japan. (Peripheral cutting Edge with Coolant Hole) Unit: mm

Order Number	RE	DC	APMX	LH	DCON	No. of Flutes	EP7020	type
IMX10B4HV10010E	5	10	10.5	16	9.7	4	●	1
IMX12B4HV12012E	6	12	12.5	19	11.7	4	●	1
IMX16B4HV16016E	8	16	16.5	24	15.5	4	●	1
IMX20B4HV20021E	10	20	21	30	19.5	4	●	1
IMX25B4HV25026E	12.5	25	26	37.5	24.5	4	●	1

iMX-B4HV-E

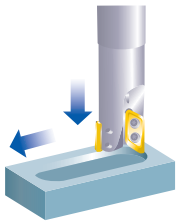
Holder Type	Cutting Edge Diameter **DC** (mm)	Insert Corner R **RE** (mm)	Ramping		Helical Milling (Blind Hole, Flat Bottom)				Helical Milling	
			Maximum Ramping Angle **RMPX**	Minimum Distance **L** ∗1 (mm)	Maximum Hole Diameter **DH max.** (mm)	Maximum Pitch **P max.** (mm)	Minimum Hole Diameter **DH min.** (mm)	Maximum Pitch **P max.** (mm)	Minimum Hole Diameter **DH min.** (mm)	Maximum Pitch **P max.** (mm)
B type	20	4	17.5°	47	31.5	10	31.8	10	22	1
		5	16.6°	71	29.5	6	31.1	7	22	1
	25	4	15.1°	55	41.5	10	41.4	10	31.7	5
		5	13.7°	61	39.5	9	40.6	9	31.7	5
	28	4	14.1°	59	47.5	10	47.2	10	36	6
		5	13°	65	45.5	9	46.4	9	36	5
	32	4	12.7°	66	55.5	10	55.1	10	45.5	9
		5	12°	70	53.5	9	54.3	9	45.5	8
	35	4	10.8°	78	61.5	10	61	10	50	8
		5	10.2°	83	59.5	9	60.2	9	50	8
	40	4	8.8°	96	71.1	10	70.9	10	61.5	10
		5	8.2°	103	69.1	9	70.1	9	61.5	9
	50	4	6.3°	135	91.1	10	90.6	10	81.3	10
		5	5.8°	146	89.1	9	89.8	9	81.3	9
	63	4	4.6°	184	117.1	10	116.6	10	107.4	10
		5	4.2°	202	115.1	9	115.7	9	107.3	9
	80	4	3.4°	250	151.1	10	150.5	10	141.4	10
		5	3.1°	274	149.1	9	149.6	9	141.4	9
	100	4	2.6°	326	191.1	10	190.5	10	181.4	10
		5	2.4°	354	189.1	9	189.6	9	181.4	9
	125	4	2°	424	241.1	10	240.5	10	231.4	10
		5	1.8°	471	239.1	9	239.6	9	229.9	9

(Note 1) The recommended ramping feed is 0.05mm/tooth or under.
∗1) Using the maximum ramping angle, the distance to reach the maximum depth of cut is as follows:
L= (maximum depth of cut APMX/tan α). Maximum depth of cut A type is 15.5mm, B type is 14.8mm.
∗2) Corner radius of 1.2mm. For other corner radii, use the following formula. {(cutting edge diameter DC)–(corner radius RE)–0.25}×2
∗3) Corner radius of 2.4mm. For other corner radii, use the following formula. {(cutting edge diameter DC)–(corner radius RE)–0.25}×2
∗4) Corner radius of 3.2mm. For other corner radii, use the following formula. {(cutting edge diameter DC)–(corner radius RE)–0.25}×2

Max.Drilling Depth (Aluminium Alloy)

Type	Insert Corner R **RE** (mm)	Max.Drilling Depth (mm)					
		Cutting Edge Diameter **DC**					
		ϕ20	**ϕ25**	**ϕ28**	**ϕ32**	**ϕ35**	**ϕ40–ϕ125**
A type	0.4	5.3	5.2	5.2	5.2	5.3	5.3
	0.8	5.3	5.2	5.2	5.2	5.3	5.3
	1.2	5.3	5.2	5.2	5.2	5.3	5.3
	1.6	4.8	4.6	4.7	4.7	4.9	4.8
	2.0	4.8	4.6	4.7	4.7	4.9	4.8
	2.4	4.8	4.6	4.7	4.7	4.9	4.8
	3.0	4.3	3.7	4.2	4.2	4.4	4.4
	3.2	4.3	3.7	4.2	4.2	4.4	4.4
B type	4.0	3.7	2.7	3.7	3.6	3.8	3.8
	5.0	3.4	2.3	3.3	3.3	3.5	3.5

AXD4000 can be effectively used for pocket machining without the need for a prepared hole.



iMX-B6HV

iMX END MILL SERIES

Ball nose head, 6 flute, Irregular helix

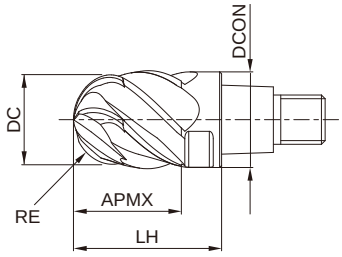
Product Information

Work Material

P M S F M

Technical Info >> 1993
ISO13399 Property >> 1966
SYMBOL DESCRIPTIONS >> 664
END MILLS SELECTION CHART >> 690

	DC≦12	DC>12
R	±0.010	±0.020
	DC≦12	DC>12
	0 - 0.020	0 - 0.030



Type1

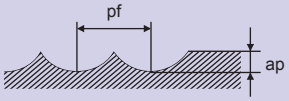
Unit : mm

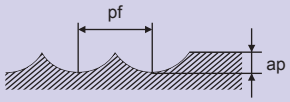
Order Number	RE	DC	APMX	LH	DCON	No. of Flutes	EP7020	type
IMX10B6HV10010	5	10	10.5	16	9.7	6	●	1
IMX12B6HV12012	6	12	12.5	19	11.7	6	●	1
IMX16B6HV16016	8	16	16.5	24	15.5	6	●	1
IMX20B6HV20021	10	20	21	30	19.5	6	●	1
IMX25B6HV25026	12.5	25	26	37.5	24.5	6	●	1

iMX-B6HV

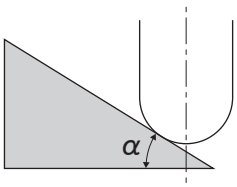
RECOMMENDED CUTTING CONDITIONS

Shoulder milling

Work material		Carbon steel, Alloy steel, Mild Steel, Pre-hardened steel AISI 1045, AISI 4140, AISI 4340, ASTM A36, AISI 1010, AISI P21, AISI P20										Austenitic stainless steel, Ferritic, Precipitation hardening stainless steel, Cobalt chromium alloy, Titanium alloy AISI 304, AISI 316, AISI 431, AISI 420J2, AISI 630, AISI 631, Ti-6Al-4V									
Inclination angle		α≤15°				α>15°				Depth of cut	Pick Feed	α≤15°				α>15°				Depth of cut	Pick Feed
Dia DC (mm)	Radius of Ball Nose RE (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min-1)	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	Cutting Speed (m/min)	Main Spindle Revolution (min-1)	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	ap (mm)	pf (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min-1)	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	Cutting Speed (m/min)	Main Spindle Revolution (min-1)	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	ap (mm)	pf (mm)
10	**5**	300	9600	0.106	6100	200	6400	0.07	2700	0.5	2	225	7200	0.105	4500	150	4800	0.067	1900	0.5	2
12	**6**	300	8000	0.125	6000	200	5300	0.085	2700	0.6	2.4	225	6000	0.125	4500	150	4000	0.08	1900	0.6	2.4
16	**8**	300	6000	0.134	4800	200	4000	0.088	2100	0.8	3.2	225	4500	0.14	3700	150	3000	0.09	1600	0.8	3.2
20	**10**	300	4800	0.156	4500	200	3200	0.1	1900	1	4	225	3600	0.16	3400	150	2400	0.105	1500	1	4
25	**12.5**	300	3800	0.16	3600	200	2500	0.1	1500	1.2	5	225	2900	0.16	2800	150	1900	0.105	1200	1.2	5
Depth of cut		 DC:Dia.																			

Work material		Heat resistant alloys Inconel718									
Inclination angle		α≤15°				α>15°				Depth of cut	Pick Feed
Dia DC (mm)	Radius of Ball Nose RE (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min-1)	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	Cutting Speed (m/min)	Main Spindle Revolution (min-1)	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	ap (mm)	pf (mm)
10	**5**	60	1900	0.055	630	40	1300	0.035	270	0.5	1
12	**6**	60	1600	0.055	520	40	1100	0.035	220	0.6	1.2
16	**8**	60	1200	0.062	450	40	800	0.04	190	0.8	1.6
20	**10**	60	1000	0.062	370	40	640	0.04	150	1	2
25	**12.5**	60	760	0.062	300	40	510	0.04	120	1.2	2.5
Depth of cut		 DC:Dia.									

1) For stainless steel, titanium alloy and heat resistant alloy, the use of water-soluble coolant is effective.
2) If the depth of cut is shallow, the revolution and feed rate can be increased.
3) The irregular helix flute end mill has a large effect on controlling vibration when compared to standard end mills.
However, if the rigidity of the machine or the workpiece installation is poor, vibration or abnormal sound can occur.
In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.
4) α is the inclination angle of the machined surface.



iMX-C4HV

iMX END MILL SERIES

Corner radius head, 4 flute, Irregular helix, Long cutting edge

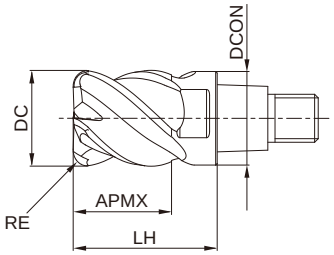
Product Information

UWC 42° 45°

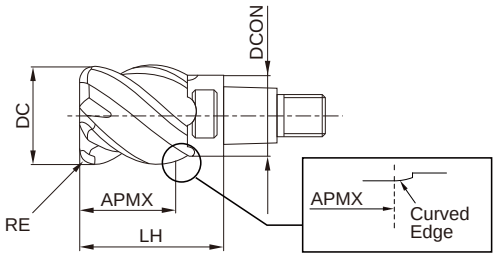
Work Material

P M S F M

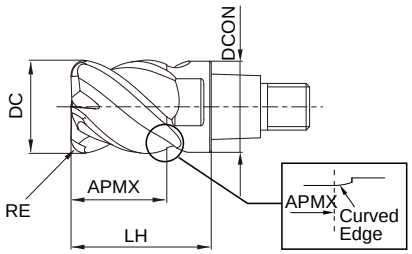
Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 690



Type1



Type2



Type3

±0.020	
DC≦12	DC>12
0 - 0.020	0 - 0.030

(Type 2 is offset type.) Unit: mm

Order Number	DC	RE	APMX	LH	DCON	No. of Flutes	EP7020	type
IMX10C4HV100R03010	10	0.3	10	16	9.7	4	●	2
IMX10C4HV100R05010	10	0.5	10	16	9.7	4	●	3
IMX10C4HV100R10010	10	1	10	16	9.7	4	●	3
IMX10C4HV100R15010	10	1.5	10	16	9.7	4	●	3
IMX10C4HV100R20010	10	2	10	16	9.7	4	●	3
IMX10C4HV100R25010	10	2.5	10	16	9.7	4	●	3
IMX10C4HV100R30010	10	3	10	16	9.7	4	●	3
IMX10C4HV110R05011	11	0.5	11.5	18	9.7	4	●	3
IMX10C4HV110R10011	11	1	11.5	18	9.7	4	●	3
IMX10C4HV120R03012	12	0.3	12.5	19	9.7	4	●	3
IMX10C4HV120R05012	12	0.5	12.5	19	9.7	4	●	3
IMX10C4HV120R10012	12	1	12.5	19	9.7	4	●	3
IMX10C4HV120R20012	12	2	12.5	19	9.7	4	●	3
IMX12C4HV120R03012	12	0.3	12	19	11.7	4	●	2
IMX12C4HV120R05012	12	0.5	12	19	11.7	4	●	3
IMX12C4HV120R10012	12	1	12	19	11.7	4	●	3
IMX12C4HV120R15012	12	1.5	12	19	11.7	4	●	3
IMX12C4HV120R20012	12	2	12	19	11.7	4	●	3
IMX12C4HV120R25012	12	2.5	12	19	11.7	4	●	3

iMX-C4HV

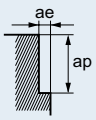
Order Number	DC	RE	APMX	LH	DCON	No. of Flutes	EP7020	type
IMX12C4HV120R30012	12	3	12	19	11.7	4	●	3
IMX12C4HV120R40012	12	4	12	19	11.7	4	●	3
IMX12C4HV130R05013	13	0.5	13.5	21.5	11.7	4	●	3
IMX12C4HV130R10013	13	1	13.5	21.5	11.7	4	●	3
IMX12C4HV140R03014	14	0.3	14.5	22.5	11.7	4	●	3
IMX12C4HV140R05014	14	0.5	14.5	22.5	11.7	4	●	3
IMX12C4HV140R10014	14	1	14.5	22.5	11.7	4	●	3
IMX12C4HV140R20014	14	2	14.5	22.5	11.7	4	●	3
IMX16C4HV160R03016	16	0.3	16	24	15.5	4	●	2
IMX16C4HV160R05016	16	0.5	16	24	15.5	4	●	2
IMX16C4HV160R10016	16	1	16	24	15.5	4	●	3
IMX16C4HV160R15016	16	1.5	16	24	15.5	4	●	3
IMX16C4HV160R20016	16	2	16	24	15.5	4	●	3
IMX16C4HV160R25016	16	2.5	16	24	15.5	4	●	3
IMX16C4HV160R30016	16	3	16	24	15.5	4	●	3
IMX16C4HV160R40016	16	4	16	24	15.5	4	●	3
IMX16C4HV160R50016	16	5	16	24	15.5	4	●	3
IMX16C4HV170R05017	17	0.5	17.5	26	15.5	4	●	3
IMX16C4HV170R10017	17	1	17.5	26	15.5	4	●	3
IMX16C4HV180R03018	18	0.3	18.5	27	15.5	4	●	3
IMX16C4HV180R05018	18	0.5	18.5	27	15.5	4	●	3
IMX16C4HV180R10018	18	1	18.5	27	15.5	4	●	3
IMX16C4HV180R20018	18	2	18.5	27	15.5	4	●	3
IMX16C4HV180R30018	18	3	18.5	27	15.5	4	●	3
IMX20C4HV200R03020	20	0.3	20	30	19.5	4	●	2
IMX20C4HV200R05021	20	0.5	21	30	19.5	4	●	1
IMX20C4HV200R10021	20	1	21	30	19.5	4	●	1
IMX20C4HV200R15021	20	1.5	21	30	19.5	4	●	1
IMX20C4HV200R20021	20	2	21	30	19.5	4	●	1
IMX20C4HV200R25021	20	2.5	21	30	19.5	4	●	1
IMX20C4HV200R30021	20	3	21	30	19.5	4	●	1
IMX20C4HV200R40021	20	4	21	30	19.5	4	●	1
IMX20C4HV200R50021	20	5	21	30	19.5	4	●	1
IMX20C4HV200R60020	20	6	20	30	19.5	4	●	2
IMX20C4HV200R63521	20	6.35	21	30	19.5	4	●	1
IMX20C4HV220R05023	22	0.5	23	33	19.5	4	●	3
IMX20C4HV220R10023	22	1	23	33	19.5	4	●	3
IMX20C4HV220R20023	22	2	23	33	19.5	4	●	3
IMX20C4HV220R30023	22	3	23	33	19.5	4	●	3
IMX25C4HV250R10026	25	1	26	37.5	24.5	4	●	1
IMX25C4HV250R20026	25	2	26	37.5	24.5	4	●	1
IMX25C4HV250R30026	25	3	26	37.5	24.5	4	●	1
IMX25C4HV250R40026	25	4	26	37.5	24.5	4	●	1
IMX25C4HV250R50026	25	5	26	37.5	24.5	4	●	1
IMX25C4HV250R60025	25	6	25	37.5	24.5	4	●	2
IMX25C4HV250R63526	25	6.35	26	37.5	24.5	4	●	1
IMX25C4HV280R10029	28	1	29	41.5	24.5	4	●	3
IMX25C4HV280R30029	28	3	29	41.5	24.5	4	●	3

iMX-C4HV

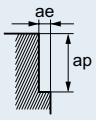
RECOMMENDED CUTTING CONDITIONS

·Side milling

Work material	Carbon steel, Alloy steel, Mild Steel, Copper, Copper alloys AISI 1045, AISI 4140, ASTM A36, AISI 1010						Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT						Austenitic stainless steel, Ferritic and Martensitic stainless steel, Titanium alloys AISI 304, AISI 316, AISI 304LN, AISI 316LN, AISI 410, AISI 430, AISI 431, AISI 420J2, Ti-6Al-4V					
Dia. DC(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)	Width of cut ae(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)	Width of cut ae(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)	Width of cut ae(mm)
10	150	4800	0.09	1700	10	2	120	3800	0.06	910	10	2	100	3200	0.075	960	10	2
12	150	4000	0.09	1400	12	2.4	120	3200	0.065	830	12	2.4	100	2700	0.08	860	12	2.4
16	150	3000	0.1	1200	16	3.2	120	2400	0.075	720	16	3.2	100	2000	0.09	720	16	3.2
20	150	2400	0.1	960	20	4	120	1900	0.075	570	20	4	100	1600	0.09	580	20	4
25	150	1900	0.12	910	25	5	120	1500	0.075	450	25	5	100	1300	0.09	470	25	5



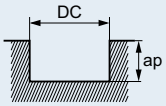
Work material	Precipitation hardening stainless steel, Cobalt chromium alloy AISI 630, AISI 631						Heat resistant alloys Inconel718					
Dia. DC(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)	Width of cut ae(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)	Width of cut ae(mm)
10	75	2400	0.06	580	10	2	40	1300	0.04	210	10	1
12	75	2000	0.065	520	12	2.4	40	1100	0.045	200	12	1.2
16	75	1500	0.075	450	16	3.2	40	800	0.05	160	16	1.6
20	75	1200	0.075	360	20	4	40	640	0.05	130	20	2
25	75	950	0.075	290	25	5	40	510	0.05	100	25	2.5



- For stainless steel, titanium alloy and heat resistant alloy, the use of water-soluble coolant is effective.
- If the depth of cut is shallow, the revolution and feed rate can be increased.
- The irregular helix flute end mill has a large effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abnormal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.

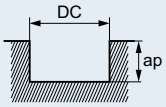
·Slotting

Work material	Carbon steel, Alloy steel, Mild Steel, Copper, Copper alloys AISI 1045, AISI 4140, ASTM A36, AISI 1010					Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT					Austenitic stainless steel, Ferritic and Martensitic stainless steel, Titanium alloys AISI 304, AISI 316, AISI 304LN, AISI 316LN, AISI 410, AISI 430, AISI 431, AISI 420J2, Ti-6Al-4V				
Dia. DC(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)
10	100	3200	0.04	510	5	80	2500	0.03	300	5	75	2400	0.03	290	5
12	100	2700	0.05	540	6	80	2100	0.04	340	6	75	2000	0.04	320	6
16	100	2000	0.07	560	8	80	1600	0.05	320	8	75	1500	0.06	360	8
20	100	1600	0.07	450	10	80	1300	0.05	260	10	75	1200	0.06	290	10
25	100	1300	0.08	420	12	80	1000	0.05	200	12	75	950	0.06	230	12



iMX-C4HV

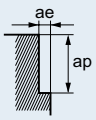
Work material	Precipitation hardening stainless steel, Cobalt chromium alloy AISI 630, AISI 631					Heat resistant alloys Inconel718				
Dia. DC(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)
10	60	1900	0.025	190	5	30	950	0.02	76	2
12	60	1600	0.035	220	6	30	800	0.03	96	2.4
16	60	1200	0.05	240	8	30	600	0.05	120	3.2
20	60	950	0.05	190	10	30	480	0.05	96	4
25	60	760	0.05	150	12	30	380	0.05	76	5



- For stainless steel, titanium alloy and heat resistant alloy, the use of water-soluble coolant is effective.
- If the depth of cut is shallow, the revolution and feed rate can be increased.
- The irregular helix flute end mill has a large effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abnormal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.

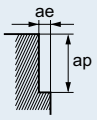
·Side milling (Offset type)

Work material		Carbon steel, Alloy steel, Mild Steel, Copper, Copper alloys AISI 1045, AISI 4140, ASTM A36, AISI 1010						Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT						Austenitic stainless steel, Ferritic and Martensitic stainless steel, Titanium alloys AISI 304, AISI 316, AISI 304LN, AISI 316LN, AISI 410, AISI 430, AISI 431, AISI 420J2, Ti-6Al-4V					
L/D	Dia. DC(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)	Width of cut ae(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)	Width of cut ae(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)	Width of cut ae(mm)
≦3	12	150	4000	0.09	1400	12	1.2	120	3200	0.06	770	12	1.2	100	2700	0.075	810	12	1.2
	14	150	3400	0.09	1200	14	1.4	120	2700	0.065	700	14	1.4	100	2300	0.08	740	14	1.4
	18	150	2700	0.1	1100	18	1.8	120	2100	0.075	630	18	1.8	100	1800	0.09	650	18	1.8
	22	150	2200	0.1	880	22	2.2	120	1700	0.075	510	22	2.2	100	1400	0.09	500	22	2.2
	28	150	1700	0.12	820	28	2.8	120	1400	0.075	420	28	2.8	100	1100	0.09	400	28	2.8
	30	150	1600	0.12	770	30	3	120	1300	0.075	390	30	3	100	1100	0.09	400	30	3
	32	150	1500	0.12	720	32	3.2	120	1200	0.075	360	32	3.2	100	990	0.09	360	32	3.2
5	12	90	2400	0.07	670	12	0.5	70	1900	0.05	380	12	0.5	60	1600	0.06	380	12	0.5
	14	90	2000	0.07	560	14	0.6	70	1600	0.05	320	14	0.6	60	1400	0.06	340	14	0.6
	18	90	1600	0.08	510	18	0.7	70	1200	0.06	290	18	0.7	60	1100	0.07	310	18	0.7
	22	90	1300	0.08	420	22	0.9	70	1000	0.06	240	22	0.9	60	870	0.07	240	22	0.9
	28	90	1000	0.1	400	28	1.1	70	800	0.06	190	28	1.1	60	680	0.07	190	28	1.1
	30	90	950	0.1	380	30	1.2	70	740	0.06	180	30	1.2	60	640	0.07	180	30	1.2
	32	90	900	0.1	360	32	1.3	70	700	0.06	170	32	1.3	60	600	0.07	170	32	1.3
7	12	60	1600	0.06	380	12	0.2	50	1300	0.04	210	12	0.2	32	850	0.05	170	12	0.2
	14	60	1400	0.06	340	14	0.3	50	1100	0.05	220	14	0.3	32	730	0.06	180	14	0.3
	18	60	1100	0.07	310	18	0.4	50	880	0.05	180	18	0.4	32	570	0.06	140	18	0.4
	22	60	870	0.07	240	22	0.4	50	720	0.05	140	22	0.4	32	460	0.06	110	22	0.4
	28	60	680	0.08	220	28	0.6	50	570	0.05	110	28	0.6	32	360	0.06	86	28	0.6
	30	60	640	0.08	200	30	0.6	50	530	0.05	110	30	0.6	32	340	0.06	82	30	0.6
	32	60	600	0.08	190	32	0.6	50	500	0.05	100	32	0.6	32	320	0.06	77	32	0.6



iMX-C4HV

Work material		Precipitation hardening stainless steel, Cobalt chromium alloy AISI 630, AISI 631						Heat resistant alloys Inconel718					
L/D	Dia. DC(mm)	Cutting speed (m/min)	Revolution (min-1)	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)	Width of cut ae(mm)	Cutting speed (m/min)	Revolution (min-1)	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)	Width of cut ae(mm)
≦3	12	75	2000	0.06	480	12	1.2	30	800	0.04	130	12	0.9
	14	75	1700	0.065	440	14	1.4	30	680	0.045	120	14	1.1
	18	75	1300	0.075	390	18	1.8	40	710	0.05	140	18	1.4
	22	75	1100	0.075	330	22	2.2	40	580	0.05	120	22	1.7
	28	75	850	0.075	260	28	2.8	40	450	0.05	90	28	2.1
	30	75	800	0.075	240	30	3	40	420	0.05	84	30	2.3
	32	75	750	0.075	230	32	3.2	40	400	0.05	80	32	2.4
5	12	50	1300	0.05	260	12	0.5	10	270	0.03	32	12	0.4
	14	50	1100	0.05	220	14	0.6	10	230	0.04	37	14	0.4
	18	50	880	0.06	210	18	0.7	19	340	0.04	54	18	0.6
	22	50	720	0.06	170	22	0.9	19	270	0.04	43	22	0.7
	28	50	570	0.06	140	28	1.1	19	220	0.04	35	28	0.8
	30	50	530	0.06	130	30	1.2	19	200	0.04	32	30	0.9
	32	50	500	0.06	120	32	1.3	19	190	0.04	30	32	1.0
7	12	24	640	0.04	100	12	0.2	–	–	–	–	–	–
	14	24	550	0.05	110	14	0.3	–	–	–	–	–	–
	18	24	420	0.05	84	18	0.4	–	–	–	–	–	–
	22	24	350	0.05	70	22	0.4	–	–	–	–	–	–
	28	24	270	0.05	54	28	0.6	–	–	–	–	–	–
	30	24	250	0.05	50	30	0.6	–	–	–	–	–	–
	32	24	240	0.05	48	32	0.6	–	–	–	–	–	–



iMX-C4HV

iMX END MILL SERIES

Corner radius head, 4 flute, Irregular helix, Long cutting edge

Product Information

Work Material

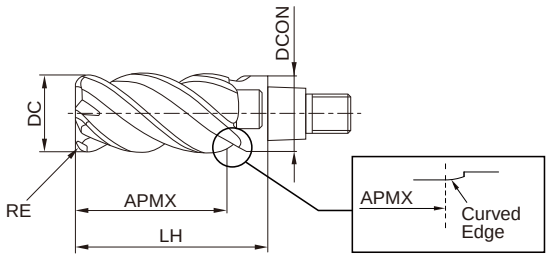
Technical Info >> 1993

ISO13399 Property >> 1966

SYMBOL DESCRIPTIONS >> 664

END MILLS SELECTION CHART >> 690

R	±0.020
DC>12	0 - 0.030



Type1

Unit: mm

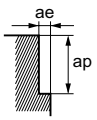
Order Number	DC	RE	APMX	LH	DCON	No. of Flutes	EP7020	type
IMX16C4HV160R10032	16	1	32	40	15.5	4	●	1
IMX16C4HV160R30032	16	3	32	40	15.5	4	●	1
IMX20C4HV200R10040	20	1	40	50	19.5	4	●	1
IMX20C4HV200R30040	20	3	40	50	19.5	4	●	1

iMX-C4HV

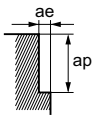
RECOMMENDED CUTTING CONDITIONS

·Side milling

Work material		Carbon steel, Alloy steel, Mild Steel, Copper, Copper alloys AISI 1045, AISI 4140, ASTM A36, AISI 1010						Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT						Austenitic stainless steel, Ferritic and Martensitic stainless steel, Titanium alloys AISI 304, AISI 316, AISI 304LN, AISI 316LN, AISI 410, AISI 430, AISI 431, AISI 420J2, Ti-6Al-4V					
L/D	Dia. DC(mm)	Cutting speed (m/min)	Revolution (min-1)	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)	Width of cut ae(mm)	Cutting speed (m/min)	Revolution (min-1)	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)	Width of cut ae(mm)	Cutting speed (m/min)	Revolution (min-1)	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)	Width of cut ae(mm)
4	16	100	2000	0.09	720	32	0.8	80	1600	0.07	450	32	0.8	60	1200	0.08	380	32	0.8
	20	100	1600	0.09	580	40	1	80	1300	0.07	360	40	1	60	950	0.08	300	40	1
6	16	60	1200	0.07	340	32	0.8	50	990	0.05	200	32	0.8	40	800	0.06	190	32	0.8
	20	60	950	0.07	270	40	1	50	800	0.05	160	40	1	40	640	0.06	150	40	1



Work material		Precipitation hardening stainless steel, Cobalt chromium alloy AISI 630, AISI 631						Heat resistant alloys Inconel718					
L/D	Dia. DC(mm)	Cutting speed (m/min)	Revolution (min-1)	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)	Width of cut ae(mm)	Cutting speed (m/min)	Revolution (min-1)	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)	Width of cut ae(mm)
4	16	50	990	0.07	280	32	0.8	30	600	0.05	120	32	0.4
	20	50	800	0.07	220	40	1	30	480	0.05	96	40	0.5
6	16	30	600	0.05	120	32	0.8	20	400	0.04	64	32	0.4
	20	30	480	0.05	96	40	1	20	320	0.04	51	40	0.5



- For stainless steel, titanium alloy and heat resistant alloy, the use of water-soluble coolant is effective.
- If the depth of cut is shallow, the revolution and feed rate can be increased.
- The irregular helix flute end mill has a large effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abnormal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.
- The length of the long cutting type is 2 times that of the standard head. L/D demonstrates +1 when installed to a holder of the same size.

iMX-C4HV-S

iMX END MILL SERIES

Corner radius head, 4 flute, Irregular helix, Long cutting edge, With coolant hole

Product Information

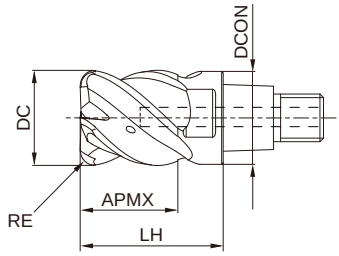
Work Material

Technical Info >> 1993

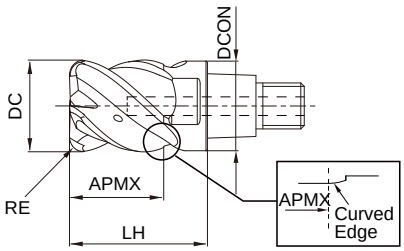
ISO13399 Property >> 1966

SYMBOL DESCRIPTIONS >> 664

END MILLS SELECTION CHART >> 690



Type1



Type2

R		
	±0.020	
	DC≦12	DC>12
	0 - 0.020	0 - 0.030

(Peripheral cutting edge with coolant hole) Unit: mm

Order Number	DC	RE	APMX	LH	DCON	No. of Flutes	EP7020	type
IMX10C4HV100R03010S	10	0.3	10	16	9.7	4	●	2
IMX10C4HV100R05010S	10	0.5	10	16	9.7	4	●	2
IMX10C4HV100R10010S	10	1	10	16	9.7	4	●	2
IMX10C4HV100R15010S	10	1.5	10	16	9.7	4	●	2
IMX10C4HV100R20010S	10	2	10	16	9.7	4	●	2
IMX10C4HV100R30010S	10	3	10	16	9.7	4	●	2
IMX12C4HV120R03012S	12	0.3	12	19	11.7	4	●	2
IMX12C4HV120R05012S	12	0.5	12	19	11.7	4	●	2
IMX12C4HV120R10012S	12	1	12	19	11.7	4	●	2
IMX12C4HV120R15012S	12	1.5	12	19	11.7	4	●	2
IMX12C4HV120R20012S	12	2	12	19	11.7	4	●	2
IMX12C4HV120R30012S	12	3	12	19	11.7	4	●	2
IMX12C4HV120R40012S	12	4	12	19	11.7	4	●	2
IMX16C4HV160R05016S	16	0.5	16	24	15.5	4	●	2
IMX16C4HV160R10016S	16	1	16	24	15.5	4	●	2
IMX16C4HV160R15016S	16	1.5	16	24	15.5	4	●	2
IMX16C4HV160R20016S	16	2	16	24	15.5	4	●	2
IMX16C4HV160R30016S	16	3	16	24	15.5	4	●	2
IMX16C4HV160R40016S	16	4	16	24	15.5	4	●	2
IMX20C4HV200R05020S	20	0.5	20	30	19.5	4	●	2
IMX20C4HV200R10021S	20	1	21	30	19.5	4	●	1
IMX20C4HV200R15020S	20	1.5	20	30	19.5	4	●	2
IMX20C4HV200R20020S	20	2	20	30	19.5	4	●	2
IMX20C4HV200R30020S	20	3	20	30	19.5	4	●	2
IMX20C4HV200R40020S	20	4	20	30	19.5	4	●	2
IMX20C4HV200R60020S	20	6	20	30	19.5	4	●	2
IMX20C4HV200R63520S	20	6.35	20	30	19.5	4	●	2
IMX25C4HV250R10026S	25	1	26	37.5	24.5	4	●	1

iMX-C4HV-S

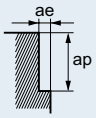
Order Number	DC	RE	APMX	LH	DCON	No. of Flutes	EP7020	type
IMX25C4HV250R15025S	25	1.5	25	37.5	24.5	4	●	2
IMX25C4HV250R20025S	25	2	25	37.5	24.5	4	●	2
IMX25C4HV250R30025S	25	3	25	37.5	24.5	4	●	2
IMX25C4HV250R40025S	25	4	25	37.5	24.5	4	●	2
IMX25C4HV250R60025S	25	6	25	37.5	24.5	4	●	2
IMX25C4HV250R63525S	25	6.35	25	37.5	24.5	4	●	2

iMX-C4HV-S

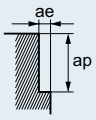
RECOMMENDED CUTTING CONDITIONS

·Side milling

Work material	Carbon steel, Alloy steel, Mild Steel, Copper, Copper alloys AISI 1045, AISI 4140, ASTM A36, AISI 1010						Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT						Austenitic stainless steel, Ferritic and Martensitic stainless steel, Titanium alloys AISI 304, AISI 316, AISI 304LN, AISI 316LN, AISI 410, AISI 430, AISI 431, AISI 420J2, Ti-6Al-4V					
Dia. DC(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)	Width of cut ae(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)	Width of cut ae(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)	Width of cut ae(mm)
10	150	4800	0.09	1700	10	2	120	3800	0.06	910	10	2	100	3200	0.075	960	10	2
12	150	4000	0.09	1400	12	2.4	120	3200	0.065	830	12	2.4	100	2700	0.08	860	12	2.4
16	150	3000	0.1	1200	16	3.2	120	2400	0.075	720	16	3.2	100	2000	0.09	720	16	3.2
20	150	2400	0.1	960	20	4	120	1900	0.075	570	20	4	100	1600	0.09	580	20	4
25	150	1900	0.12	910	25	5	120	1500	0.075	450	25	5	100	1300	0.09	470	25	5



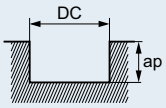
Work material	Precipitation hardening stainless steel, Cobalt chromium alloy AISI 630, AISI 631						Heat resistant alloys Inconel718					
Dia. DC(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)	Width of cut ae(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)	Width of cut ae(mm)
10	75	2400	0.06	580	10	2	40	1300	0.04	210	10	1
12	75	2000	0.065	520	12	2.4	40	1100	0.045	200	12	1.2
16	75	1500	0.075	450	16	3.2	40	800	0.05	160	16	1.6
20	75	1200	0.075	360	20	4	40	640	0.05	130	20	2
25	75	950	0.075	290	25	5	40	510	0.05	100	25	2.5



- For stainless steel, titanium alloy and heat resistant alloy, the use of water-soluble coolant is effective.
- If the depth of cut is shallow, the revolution and feed rate can be increased.
- The irregular helix flute end mill has a large effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abnormal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.

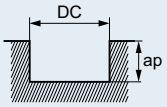
·Slotting

Work material	Carbon steel, Alloy steel, Mild Steel, Copper, Copper alloys AISI 1045, AISI 4140, ASTM A36, AISI 1010					Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT					Austenitic stainless steel, Ferritic and Martensitic stainless steel, Titanium alloys AISI 304, AISI 316, AISI 304LN, AISI 316LN, AISI 410, AISI 430, AISI 431, AISI 420J2, Ti-6Al-4V				
Dia. DC(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)
10	100	3200	0.04	510	5	80	2500	0.03	300	5	75	2400	0.03	290	5
12	100	2700	0.05	540	6	80	2100	0.04	340	6	75	2000	0.04	320	6
16	100	2000	0.07	560	8	80	1600	0.05	320	8	75	1500	0.06	360	8
20	100	1600	0.07	450	10	80	1300	0.05	260	10	75	1200	0.06	290	10
25	100	1300	0.08	420	12	80	1000	0.05	200	12	75	950	0.06	230	12



iMX-C4HV-S

Work material	Precipitation hardening stainless steel, Cobalt chromium alloy AISI 630, AISI 631					Heat resistant alloys Inconel718				
Dia. DC(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)
10	60	1900	0.025	190	5	30	950	0.02	76	2
12	60	1600	0.035	220	6	30	800	0.03	96	2.4
16	60	1200	0.05	240	8	30	600	0.05	120	3.2
20	60	950	0.05	190	10	30	480	0.05	96	4
25	60	760	0.05	150	12	30	380	0.05	76	5



- For stainless steel, titanium alloy and heat resistant alloy, the use of water-soluble coolant is effective.
- If the depth of cut is shallow, the revolution and feed rate can be increased.
- The irregular helix flute end mill has a large effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abnormal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.

iMX-C6HV

iMX END MILL SERIES

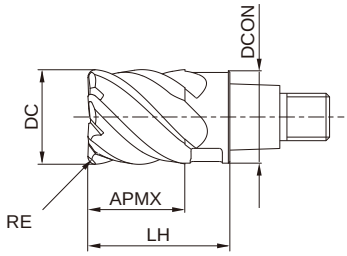
Corner radius head, 6 flute, Irregular helix

Product Information

Work Material

Technical Info >> 1993
ISO13399 Property >> 1966
SYMBOL DESCRIPTIONS >> 664
END MILLS SELECTION CHART >> 690

R	±0.020
DC≦12	0 - 0.020



Type1

Unit : mm

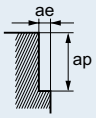
Order Number	DC	RE	APMX	LH	DCON	No. of Flutes	EP7020	type
IMX10C6HV100R05010	10	0.5	10	16	9.7	6	●	1
IMX10C6HV100R10010	10	1	10	16	9.7	6	●	1
IMX12C6HV120R10012	12	1	12	19	11.7	6	●	1

iMX-C6HV

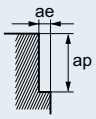
RECOMMENDED CUTTING CONDITIONS

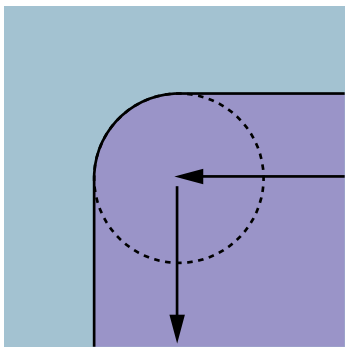
·Side milling

Work material	Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT						Austenitic stainless steel, Ferritic and Martensitic stainless steel, Titanium alloys AISI 304, AISI 316, AISI 304LN, AISI 316LN, AISI 410, AISI 430, AISI 431, AISI 420J2, Ti-6Al-4V						Precipitation hardening stainless steel, Cobalt chromium alloy AISI 630, AISI 631					
Dia. DC(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut ap(mm)	Width of cut ae(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut ap(mm)	Width of cut ae(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut ap(mm)	Width of cut ae(mm)
10	200	6400	0.07	2700	10	1	150	4800	0.07	2000	10	1	100	3200	0.07	1300	10	1
12	200	5300	0.085	2700	12	1.2	150	4000	0.085	2000	12	1.2	100	2700	0.085	1400	12	1.2
16	200	4000	0.07	2800	16	0.64	150	3000	0.088	2600	16	0.64	100	2000	0.07	1400	16	0.64
20	200	3200	0.08	3100	20	0.8	150	2400	0.1	2900	20	0.8	100	1600	0.08	1500	20	0.8
25	200	2500	0.08	2400	25	1	150	1900	0.1	2300	25	1	100	1300	0.08	1200	25	1



Work material	Heat resistant alloys Inconel718					
Dia. DC(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut ap(mm)	Width of cut ae(mm)
10	40	1300	0.033	260	10	0.5
12	40	1100	0.035	230	12	0.6
16	40	800	0.038	300	16	0.64
20	40	640	0.04	310	20	0.8
25	40	510	0.04	240	25	1





- The irregular helix flute end mill has a large effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abnormal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.
- For stainless steel, titanium alloy and heat resistant alloy, the use of water-soluble coolant is effective.
- If the depth of cut is shallow, the revolution and feed rate can be increased.

iMX-C10HV

iMX END MILL SERIES

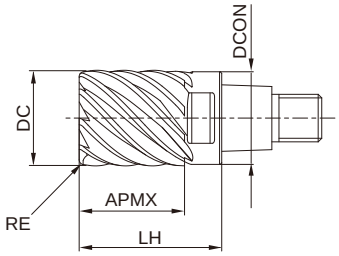
Corner radius head, 10 flute, Irregular helix

Product Information

Work Material

Technical Info >> 1993
ISO13399 Property >> 1966
SYMBOL DESCRIPTIONS >> 664
END MILLS SELECTION CHART >> 690

R	±0.020
	0 - 0.030



Type1

Unit : mm

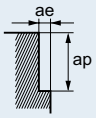
Order Number	DC	RE	APMX	LH	DCON	No. of Flutes	EP7020	type
IMX16C10HV160R10016	16	1	16	24	15.5	10	●	1

iMX-C10HV

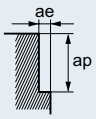
RECOMMENDED CUTTING CONDITIONS

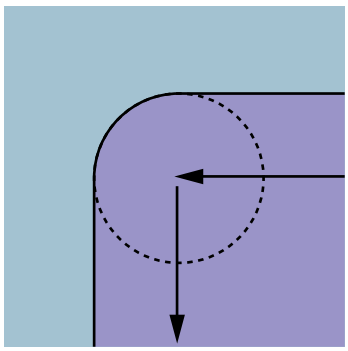
·Side milling

Work material	Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT						Austenitic stainless steel, Ferritic and Martensitic stainless steel, Titanium alloys AISI 304, AISI 316, AISI 304LN, AISI 316LN, AISI 410, AISI 430, AISI 431, AISI 420J2, Ti-6Al-4V						Precipitation hardening stainless steel, Cobalt chromium alloy AISI 630, AISI 631					
Dia. DC(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut ap(mm)	Width of cut ae(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut ap(mm)	Width of cut ae(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut ap(mm)	Width of cut ae(mm)
10	200	6400	0.07	2700	10	1	150	4800	0.07	2000	10	1	100	3200	0.07	1300	10	1
12	200	5300	0.085	2700	12	1.2	150	4000	0.085	2000	12	1.2	100	2700	0.085	1400	12	1.2
16	200	4000	0.07	2800	16	0.64	150	3000	0.088	2600	16	0.64	100	2000	0.07	1400	16	0.64
20	200	3200	0.08	3100	20	0.8	150	2400	0.1	2900	20	0.8	100	1600	0.08	1500	20	0.8
25	200	2500	0.08	2400	25	1	150	1900	0.1	2300	25	1	100	1300	0.08	1200	25	1



Work material	Heat resistant alloys Inconel718					
Dia. DC(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut ap(mm)	Width of cut ae(mm)
10	40	1300	0.033	260	10	0.5
12	40	1100	0.035	230	12	0.6
16	40	800	0.038	300	16	0.64
20	40	640	0.04	310	20	0.8
25	40	510	0.04	240	25	1





- If the machining radius at the corner is the same as the tool radius when using the head with more than 10 flutes, please set the depth of cut and feed rate to half of the above.
- For stainless steel, titanium alloy and heat resistant alloy, the use of water-soluble coolant is effective.
- If the depth of cut is shallow, the revolution and feed rate can be increased.
- The irregular helix flute end mill has a large effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abnormal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.

iMX-C12HV

iMX END MILL SERIES

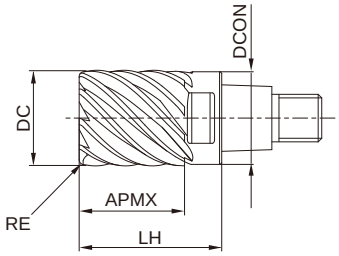
Corner radius head, 12 flute, Irregular helix

Product Information

Work Material

Technical Info >> 1993
ISO13399 Property >> 1966
SYMBOL DESCRIPTIONS >> 664
END MILLS SELECTION CHART >> 690

R	±0.020
DC>12	0 / - 0.030



Type1

Unit : mm

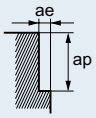
Order Number	DC	RE	APMX	LH	DCON	No. of Flutes	EP7020	type
IMX20C12HV200R10021	20	1	21	30	19.5	12	●	1
IMX25C12HV250R10026	25	1	26	37.5	24.5	12	●	1

iMX-C12HV

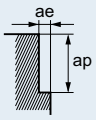
RECOMMENDED CUTTING CONDITIONS

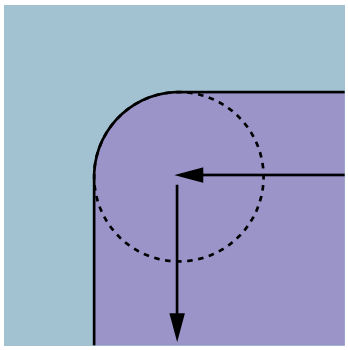
·Side milling

Work material	Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT						Austenitic stainless steel, Ferritic and Martensitic stainless steel, Titanium alloys AISI 304, AISI 316, AISI 304LN, AISI 316LN, AISI 410, AISI 430, AISI 431, AISI 420J2, Ti-6Al-4V						Precipitation hardening stainless steel, Cobalt chromium alloy AISI 630, AISI 631					
Dia. DC(mm)	Cutting speed (m/min)	Main Spindle Revolution (min-1)	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut ap(mm)	Width of cut ae(mm)	Cutting speed (m/min)	Main Spindle Revolution (min-1)	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut ap(mm)	Width of cut ae(mm)	Cutting speed (m/min)	Main Spindle Revolution (min-1)	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut ap(mm)	Width of cut ae(mm)
10	200	6400	0.07	2700	10	1	150	4800	0.07	2000	10	1	100	3200	0.07	1300	10	1
12	200	5300	0.085	2700	12	1.2	150	4000	0.085	2000	12	1.2	100	2700	0.085	1400	12	1.2
16	200	4000	0.07	2800	16	0.64	150	3000	0.088	2600	16	0.64	100	2000	0.07	1400	16	0.64
20	200	3200	0.08	3100	20	0.8	150	2400	0.1	2900	20	0.8	100	1600	0.08	1500	20	0.8
25	200	2500	0.08	2400	25	1	150	1900	0.1	2300	25	1	100	1300	0.08	1200	25	1



Work material	Heat resistant alloys Inconel718					
Dia. DC(mm)	Cutting speed (m/min)	Main Spindle Revolution (min-1)	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut ap(mm)	Width of cut ae(mm)
10	40	1300	0.033	260	10	0.5
12	40	1100	0.035	230	12	0.6
16	40	800	0.038	300	16	0.64
20	40	640	0.04	310	20	0.8
25	40	510	0.04	240	25	1





- If the machining radius at the corner is the same as the tool radius when using the head with more than 10 flutes, please set the depth of cut and feed rate to half of the above.
- For stainless steel, titanium alloy and heat resistant alloy, the use of water-soluble coolant is effective.
- If the depth of cut is shallow, the revolution and feed rate can be increased.
- The irregular helix flute end mill has a large effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abnormal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.

iMX-C4FD-C

iMX END MILL SERIES

With coolant hole Multi-task corner radius end mill for high feed cutting

Product Information

Work Material

P M S H F M

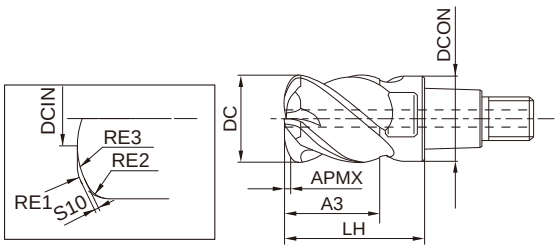
Technical Info >> 1993

ISO13399 Property >> 1966

SYMBOL DESCRIPTIONS >> 664

END MILLS SELECTION CHART >> 690

DC≦12	DC>12
0 - 0.020	0 - 0.030



Type1

(End Mill with End Face Center Coolant Hole) Unit: mm

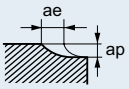
Order Number	DC	RE1	APMX	A3	LH	DCON	No. of Flutes	RMPX	Multi-task radius part				EP7020	type
									S10	DCIN	RE2	RE3		
IMX10C4FD10010C	10	1.99	0.7	10.5	16	9.7	4	2.1°	0.27	3.4	1.5	5	●	1
IMX12C4FD12012C	12	2.1	0.8	12.5	19	11.7	4	2.8°	0.33	4.5	1.5	6	●	1
IMX16C4FD16016C	16	2.75	1	16.5	24	15.5	4	3°	0.42	6.2	2	8	●	1
IMX20C4FD20021C	20	3.07	1.3	21	30	19.5	4	3.3°	0.59	8	2	10	●	1
IMX25C4FD25026C	25	4.21	1.6	26	37.5	24.5	4	4.5°	0.67	10	3	12	●	1

iMX-C4FD-C

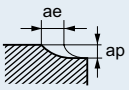
RECOMMENDED CUTTING CONDITIONS

·Side milling

Work material	Carbon steel, Alloy steel, Mild Steel, Copper, Copper alloys AISI 1045, AISI 4140, ASTM A36, AISI 1010						Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT						Hardened steel, Precipitation hardening stainless steel, Ferritic and Martensitic stainless steel AISI H13, AISI L6, AISI 431, AISI 420, AISI 630, AISI631					
Dia. DC(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)	Width of cut ae(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)	Width of cut ae(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)	Width of cut ae(mm)
10	150	4800	0.4	7700	0.5	6	135	4300	0.4	6900	0.5	6	120	3800	0.3	4600	0.5	6
12	150	4000	0.45	7200	0.6	7.2	135	3600	0.45	6500	0.6	7.2	120	3200	0.3	3800	0.6	7.2
16	150	3000	0.5	6000	0.8	9.6	135	2700	0.5	5400	0.8	9.6	120	2400	0.4	3800	0.8	9.6
20	150	2400	0.5	4800	1	12	135	2100	0.5	4200	1	12	120	1900	0.4	3000	1	12
25	150	1900	0.5	3800	1.25	15	135	1700	0.5	3400	1.25	15	120	1500	0.4	2400	1.25	15



Work material	Austenitic stainless steel, Titanium alloy, Cobalt chromium alloy AISI 304, AISI 316, AISI 304LN, AISI 316LN, Ti-6Al-4V						Heat resistant alloys Inconel718					
Dia. DC(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)	Width of cut ae(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)	Width of cut ae(mm)
10	40	1300	0.2	1000	0.5	6	25	800	0.1	320	0.5	6
12	40	1100	0.2	880	0.6	7.2	25	660	0.1	260	0.6	7.2
16	40	800	0.3	960	0.8	9.6	25	500	0.15	300	0.8	9.6
20	40	640	0.3	770	1	12	25	400	0.15	240	1	12
25	40	510	0.3	610	1.25	15	25	320	0.15	190	1.25	15



- For stainless steel, titanium alloy and heat resistant alloy, the use of water-soluble coolant is effective.
- If the depth of cut is shallow, the revolution and feed rate can be increased.
- Vibration may occur if the rigidity of machine or work piece is low. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.
- Reduce the feed by 1/2 for ramping process.

iMX-C4FV

iMX END MILL SERIES

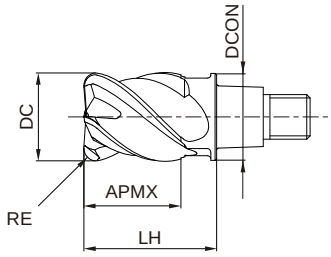
Corner radius head for high efficiency machining, 4 flute, Irregular helix

Product Information

Work Material

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 690

	DC≦20	DC>20
R	±0.010	±0.020
	DC≦12	DC>12
	0 - 0.020	0 - 0.030



Type1

Unit : mm

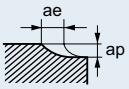
Order Number	DC	RE	APMX	LH	DCON	No. of Flutes	EP6120	type
IMX10C4FV100R20010	10	2	10.5	16	9.7	4	●	1
IMX12C4FV120R20012	12	2	12.5	19	11.7	4	●	1
IMX16C4FV160R30016	16	3	16.5	24	15.5	4	●	1
IMX20C4FV200R30021	20	3	21	30	19.5	4	●	1
IMX25C4FV250R40026	25	4	26	37.5	24.5	4	●	1

iMX-C4FV

RECOMMENDED CUTTING CONDITIONS

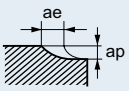
·High depth of cut conditions

Work material		Carbon steel, Alloy steel, Gray Cast Iron AISI 1045, AISI 4140, AISI No 45 B						Pre-hardened steel, Alloy tool steel AISI P21, AISI P20, SKD, SKT						Hardened steel (45— 55HRC) AISI H13, AISI L6					
Dia. DC(mm)	Corner R RE (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut ap(mm)	Width of cut ae(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut ap(mm)	Width of cut ae(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut ap(mm)	Width of cut ae(mm)
10	2	90	2900	0.25	2900	1.2	4.5	75	2400	0.21	2000	1	4.5	60	1900	0.22	1700	0.7	4.5
12	2	90	2400	0.25	2400	1.8	6	75	2000	0.21	1700	1.4	6	60	1600	0.22	1400	0.9	6
16	3	90	1800	0.25	1800	1.8	7.5	75	1500	0.2	1200	1.4	7.5	60	1200	0.22	1100	0.9	7.5
20	3	90	1400	0.25	1400	1.8	9	75	1200	0.2	1000	1.4	9	60	950	0.22	850	0.9	9
25	4	90	1100	0.25	1100	2.4	11.5	75	950	0.2	750	1.8	11.5	60	750	0.22	650	1.2	11.5



·High speed milling

Work material		Carbon steel, Alloy steel, Gray Cast Iron AISI 1045, AISI 4140, AISI No 45 B						Pre-hardened steel, Alloy tool steel AISI P21, AISI P20, SKD, SKT						Hardened steel (45— 55HRC) AISI H13, AISI L6					
Dia. DC(mm)	Corner R RE (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut ap(mm)	Width of cut ae(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut ap(mm)	Width of cut ae(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut ap(mm)	Width of cut ae(mm)
10	2	150	4800	0.51	9800	0.6	4.5	125	4000	0.43	6900	0.46	4.5	100	3200	0.43	5500	0.36	4.5
12	2	150	4000	0.56	9000	0.9	6	125	3300	0.48	6400	0.7	6	100	2700	0.47	5100	0.45	6
16	3	150	3000	0.6	7200	0.9	7.5	125	2500	0.53	5300	0.7	7.5	100	2000	0.54	4300	0.45	7.5
20	3	150	2400	0.6	5800	0.9	9	125	2000	0.37	3000	0.7	9	100	1600	0.39	2500	0.45	9
25	4	150	1900	0.6	4500	1.2	11.5	125	1600	0.39	2500	0.9	11.5	100	1300	0.39	2000	0.6	11.5



- If the depth of cut is shallow, the revolution and feed rate can be increased.
- Air blow or oil mist is recommended for good chip evacuation.
- For profile machining such as moulds, machining conditions may differ considerably depending on the workpiece geometry, machining methods and depth of cut. Reduce the feed rate especially when machining the corner sections of a workpiece.
- The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abnormal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.

iMX-C3A

iMX END MILL SERIES

Corner radius head, 3 flute, For aluminium alloy

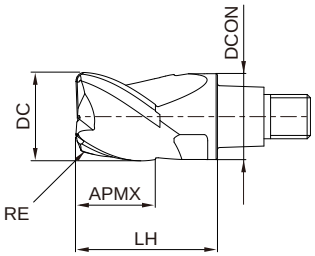
Product Information

UWC 37.5°

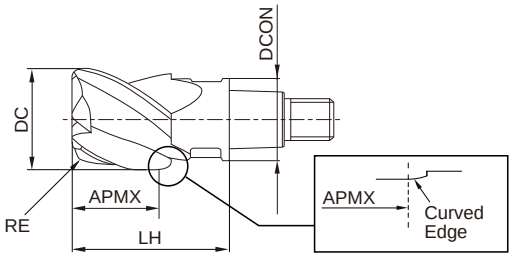
Work Material

N F M

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 690



Type1



Type2

R	
±0.020	
DC≦12	DC>12
0 - 0.020	0 - 0.030

(Type 2 is offset type.) Unit: mm

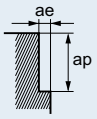
Order Number	DC	RE	APMX	LH	DCON	No. of Flutes	ET2020	type
IMX10C3A100R10008	10	1	8	16	9.7	3	●	1
IMX10C3A100R25008	10	2.5	8	16	9.7	3	●	1
IMX10C3A120R10010	12	1	10.1	19	9.7	3	●	3
IMX12C3A120R10010	12	1	10.1	19	11.7	3	●	1
IMX12C3A120R32010	12	3.2	10.1	19	11.7	3	●	1
IMX12C3A140R10011	14	1	11.7	22.5	11.7	3	●	3
IMX16C3A160R10013	16	1	13.3	24	15.5	3	●	1
IMX16C3A160R32013	16	3.2	13.3	24	15.5	3	●	1
IMX16C3A180R32014	18	3.2	14.9	27	15.5	3	●	3
IMX20C3A200R10017	20	1	17	30	19.5	3	●	1
IMX20C3A200R32017	20	3.2	17	30	19.5	3	●	1
IMX20C3A220R32018	22	3.2	18.6	33	19.5	3	●	3
IMX25C3A250R10020	25	1	20	37.5	24.5	3	●	1
IMX25C3A250R32021	25	3.2	21	37.5	24.5	3	●	1
IMX25C3A250R50021	25	5	21	37.5	24.5	3	●	1
IMX25C3A280R32023	28	3.2	23.4	41.5	24.5	3	●	3

iMX-C3A

RECOMMENDED CUTTING CONDITIONS

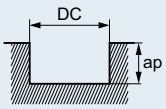
·Side milling

Work material	Aluminium alloy A6061, A7075					
Dia. DC(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut ap(mm)	Width of cut ae(mm)
10	500	16000	0.117	5600	8	3
12	500	13000	0.118	4600	9.6	3.6
16	500	10000	0.153	4600	12.8	4.8
20	500	8000	0.175	4200	16	6
25	500	6000	0.211	3800	20	7.5



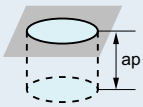
·Slotting

Work material	Aluminium alloy A6061, A7075				
Dia. DC(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut ap(mm)
10	500	16000	0.068	3300	5
12	500	13000	0.072	2800	6
16	500	10000	0.093	2800	8
20	500	8000	0.108	2600	10
25	500	6000	0.127	2300	12.5



·Plunging

Work material	Aluminium alloy A6061, A7075					
Dia. DC(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Revolution (mm/rev)	Table Feed (mm/min)	Depth of cut Depth ap(mm)	Step ap2(mm)
10	300	9600	0.100	960	5	3
12	300	8000	0.100	800	6.0	2.5
16	300	6000	0.100	600	8.0	2.5
20	300	4800	0.100	480	10	3
25	300	3800	0.100	380	13	2.5

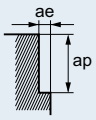


- The use of water-soluble coolant is recommended.
- Vibration may occur if the rigidity of machine or work piece is low. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.

iMX-C3A

·Side milling (Offset type)

Work material		Aluminium alloy A6061, A7075					
L/D	Dia. DC(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/tooth)	Table Feed (mm/min)	Depth of cut (mm)	Width of cut ae(mm)
≦3	12	500	13000	0.117	4600	9.6	2.4
	14	500	11000	0.118	3900	11.2	2.8
	18	500	8800	0.153	4000	14.4	3.6
	22	500	7200	0.175	3800	17.6	4.4
	28	500	5700	0.211	3600	22.4	5.6
5	12	300	8000	0.09	2200	9.6	1.0
	14	300	6800	0.09	1800	11.2	1.1
	18	300	5300	0.12	1900	14.4	1.4
	22	300	4300	0.14	1800	17.6	1.8
	28	300	3400	0.17	1700	22.4	2.2
7	12	200	5300	0.08	1300	9.6	0.5
	14	200	4500	0.08	1100	11.2	0.6
	18	200	3500	0.11	1200	14.4	0.7
	22	200	2900	0.12	1000	17.6	0.9
	28	200	2300	0.15	1000	22.4	1.1



- The use of water-soluble coolant is recommended.
- Vibration may occur if the rigidity of machine or work piece is low. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.

iMX-C8T-C

iMX END MILL SERIES

Corner radius, Taper head, 8 flute, With coolant hole

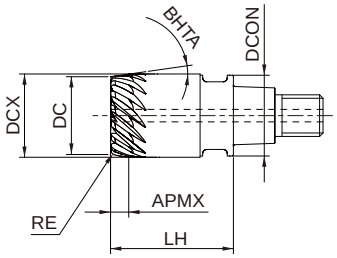
Product Information

Work Material

M S

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 690

R	±0.015
	0 - 0.020



Type1

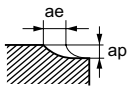
(End Mill with End Face Center Coolant Hole) Unit: mm

Order Number	DC	RE	APMX	DCX	LH	DCON	BHTA	No. of Flutes	EP7020	type
IMX10C8T080R05T080C	8	0.5	7.12	10	16	9.7	8°	8	●	1
IMX10C8T080R10T080C	8	1	7.12	10	16	9.7	8°	8	●	1

RECOMMENDED CUTTING CONDITIONS

·Side milling

Work material		Austenitic stainless steel, Ferritic and Martensitic stainless steel AISI 304, AISI 316, AISI 304LN, AISI 316LN, AISI 410, AISI 430, AISI 431, AISI 420						Precipitation hardening stainless steel, Titanium alloys AISI 630, AISI 631, Ti-6Al-4V						Heat resistant alloys Inconel718					
Dia. DC(mm)	No. of Flutes	Cutting speed (m/min)	Revolution (min-1)	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Cutting speed (m/min)	Revolution (min-1)	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Cutting speed (m/min)	Revolution (min-1)	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)
8	8	300	12000	0.10	9600	0.3	1.2	200	8000	0.10	6400	0.3	1.2	60	2400	0.08	1500	0.3	0.8
10	10	300	9500	0.10	9500	0.3	1.5	200	6400	0.10	6400	0.3	1.5	60	1900	0.08	1500	0.3	1.0
15	12	300	6400	0.12	9200	0.3	2.2	200	4200	0.12	6000	0.3	2.2	60	1300	0.10	1600	0.3	1.5
15	15	300	6400	0.10	9600	0.3	2.2	200	4200	0.10	6300	0.3	2.2	60	1300	0.08	1600	0.3	1.5
19	12	300	5000	0.12	7200	0.3	2.8	200	3400	0.12	4900	0.3	2.8	60	1000	0.10	1200	0.3	1.9
19	15	300	5000	0.10	7500	0.3	2.8	200	3400	0.10	5100	0.3	2.8	60	1000	0.08	1200	0.3	1.9



- The use of water-soluble coolant is recommended.
- Vibration may occur if the rigidity of machine or work piece is low. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.

iMX-C10T-C

iMX END MILL SERIES

Corner radius, Taper head, 10 flute, With coolant hole

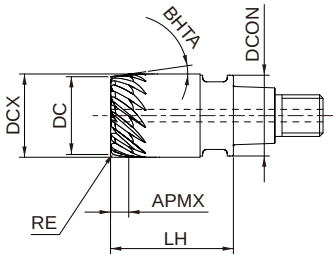
Product Information

Work Material

M S

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 690

R	±0.015
	0 - 0.020



Type1

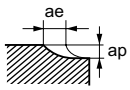
(End Mill with End Face Center Coolant Hole) Unit: mm

Order Number	DC	RE	APMX	DCX	LH	DCON	BHTA	No. of Flutes	EP7020	type
IMX12C10T100R05T080C	10	0.5	7.12	12	19	11.7	8°	10	●	1
IMX12C10T100R10T080C	10	1	7.12	12	19	11.7	8°	10	●	1

RECOMMENDED CUTTING CONDITIONS

·Side milling

Work material		Austenitic stainless steel, Ferritic and Martensitic stainless steel AISI 304, AISI 316, AISI 304LN, AISI 316LN, AISI 410, AISI 430, AISI 431, AISI 420						Precipitation hardening stainless steel, Titanium alloys AISI 630, AISI 631, Ti-6Al-4V						Heat resistant alloys Inconel718					
Dia. DC(mm)	No. of Flutes	Cutting speed (m/min)	Revolution (min⁻¹)	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Cutting speed (m/min)	Revolution (min⁻¹)	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Cutting speed (m/min)	Revolution (min⁻¹)	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)
8	8	300	12000	0.10	9600	0.3	1.2	200	8000	0.10	6400	0.3	1.2	60	2400	0.08	1500	0.3	0.8
10	10	300	9500	0.10	9500	0.3	1.5	200	6400	0.10	6400	0.3	1.5	60	1900	0.08	1500	0.3	1.0
15	12	300	6400	0.12	9200	0.3	2.2	200	4200	0.12	6000	0.3	2.2	60	1300	0.10	1600	0.3	1.5
15	15	300	6400	0.10	9600	0.3	2.2	200	4200	0.10	6300	0.3	2.2	60	1300	0.08	1600	0.3	1.5
19	12	300	5000	0.12	7200	0.3	2.8	200	3400	0.12	4900	0.3	2.8	60	1000	0.10	1200	0.3	1.9
19	15	300	5000	0.10	7500	0.3	2.8	200	3400	0.10	5100	0.3	2.8	60	1000	0.08	1200	0.3	1.9



- The use of water-soluble coolant is recommended.
- Vibration may occur if the rigidity of machine or work piece is low. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.

iMX-C12T-C

iMX END MILL SERIES

Corner radius, Taper head, 12 flute, With coolant hole

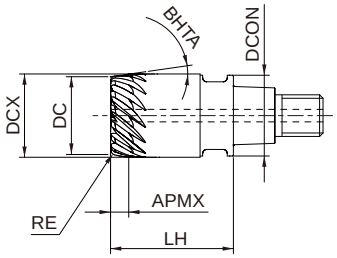
Product Information

Work Material

M S

Technical Info >> 1993
ISO13399 Property >> 1966
SYMBOL DESCRIPTIONS >> 664
END MILLS SELECTION CHART >> 690

R	
	±0.015
	DC>12
	0 - 0.030



Type1

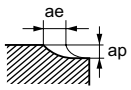
(End Mill with End Face Center Coolant Hole) Unit: mm

Order Number	DC	RE	APMX	DCX	LH	DCON	BHTA	No. of Flutes	EP7020	type
IMX16C12T150R20T080C	15	2	3.56	16	24	15.5	8°	12	●	1
IMX20C12T190R20T080C	19	2	3.56	20	30	19.5	8°	12	●	1

RECOMMENDED CUTTING CONDITIONS

·Side milling

Work material		Austenitic stainless steel, Ferritic and Martensitic stainless steel AISI 304, AISI 316, AISI 304LN, AISI 316LN, AISI 410, AISI 430, AISI 431, AISI 420						Precipitation hardening stainless steel, Titanium alloys AISI 630, AISI 631, Ti-6Al-4V						Heat resistant alloys Inconel718					
Dia. DC(mm)	No. of Flutes	Cutting speed (m/min)	Revolution (min-1)	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Cutting speed (m/min)	Revolution (min-1)	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Cutting speed (m/min)	Revolution (min-1)	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)
8	8	300	12000	0.10	9600	0.3	1.2	200	8000	0.10	6400	0.3	1.2	60	2400	0.08	1500	0.3	0.8
10	10	300	9500	0.10	9500	0.3	1.5	200	6400	0.10	6400	0.3	1.5	60	1900	0.08	1500	0.3	1.0
15	12	300	6400	0.12	9200	0.3	2.2	200	4200	0.12	6000	0.3	2.2	60	1300	0.10	1600	0.3	1.5
15	15	300	6400	0.10	9600	0.3	2.2	200	4200	0.10	6300	0.3	2.2	60	1300	0.08	1600	0.3	1.5
19	12	300	5000	0.12	7200	0.3	2.8	200	3400	0.12	4900	0.3	2.8	60	1000	0.10	1200	0.3	1.9
19	15	300	5000	0.10	7500	0.3	2.8	200	3400	0.10	5100	0.3	2.8	60	1000	0.08	1200	0.3	1.9



- The use of water-soluble coolant is recommended.
- Vibration may occur if the rigidity of machine or work piece is low. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.

iMX-C15T-C

iMX END MILL SERIES

Corner radius, Taper head, 15 flute, With coolant hole

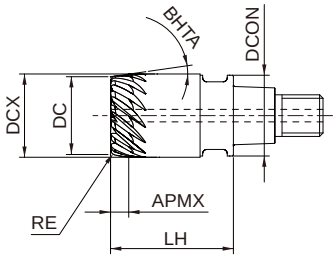
Product Information

Work Material

M S

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 690

R	±0.015
DC>12	0 / - 0.030



Type1

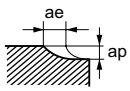
(End Mill with End Face Center Coolant Hole) Unit: mm

Order Number	DC	RE	APMX	DCX	LH	DCON	BHTA	No. of Flutes	EP7020	type
IMX16C15T150R05T080C	15	0.5	3.56	16	24	15.5	8°	15	●	1
IMX16C15T150R10T080C	15	1	3.56	16	24	15.5	8°	15	●	1
IMX20C15T190R05T080C	19	0.5	3.56	20	30	19.5	8°	15	●	1
IMX20C15T190R10T080C	19	1	3.56	20	30	19.5	8°	15	●	1

RECOMMENDED CUTTING CONDITIONS

·Side milling

Work material		Austenitic stainless steel, Ferritic and Martensitic stainless steel AISI 304, AISI 316, AISI 304LN, AISI 316LN, AISI 410, AISI 430, AISI 431, AISI 420						Precipitation hardening stainless steel, Titanium alloys AISI 630, AISI 631, Ti-6Al-4V						Heat resistant alloys Inconel718					
Dia. DC(mm)	No. of Flutes	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)
8	8	300	12000	0.10	9600	0.3	1.2	200	8000	0.10	6400	0.3	1.2	60	2400	0.08	1500	0.3	0.8
10	10	300	9500	0.10	9500	0.3	1.5	200	6400	0.10	6400	0.3	1.5	60	1900	0.08	1500	0.3	1.0
15	12	300	6400	0.12	9200	0.3	2.2	200	4200	0.12	6000	0.3	2.2	60	1300	0.10	1600	0.3	1.5
15	15	300	6400	0.10	9600	0.3	2.2	200	4200	0.10	6300	0.3	2.2	60	1300	0.08	1600	0.3	1.5
19	12	300	5000	0.12	7200	0.3	2.8	200	3400	0.12	4900	0.3	2.8	60	1000	0.10	1200	0.3	1.9
19	15	300	5000	0.10	7500	0.3	2.8	200	3400	0.10	5100	0.3	2.8	60	1000	0.08	1200	0.3	1.9



- The use of water-soluble coolant is recommended.
- Vibration may occur if the rigidity of machine or work piece is low. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.

iMX-CH3L

iMX END MILL SERIES

Chamfer head, 3 flute

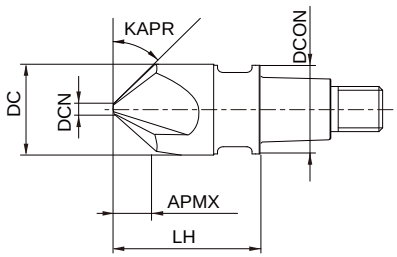
Product Information

Work Material

P M S H

Technical Info >> 1993
ISO13399 Property >> 1966
SYMBOL DESCRIPTIONS >> 664
END MILLS SELECTION CHART >> 690

DCN=1.5
±0.020



Type1

Unit : mm

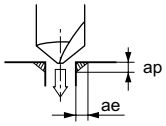
Order Number	DC	APMX	KAPR	DCN	LH	DCON	No. of Flutes	EP7020	type
IMX10CH3L100A45	10	4.2	45°	1.5	16	9.7	3	●	1
IMX12CH3L120A45	12	5.2	45°	1.5	19	11.7	3	●	1
IMX16CH3L160A45	16	7.2	45°	1.5	24	15.5	3	●	1
IMX20CH3L200A45	20	9.2	45°	1.5	30	19.5	3	●	1

iMX-CH3L

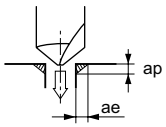
RECOMMENDED CUTTING CONDITIONS

·Chamfering (Hole circumference)

Work material		Carbon steel, Alloy steel, Gray Cast Iron AISI 1045, AISI 4140, ASTM A36, AISI 1010						Alloy tool steel, Carbon steel, Alloy steel, Pre-hardened steel SKD, SKT, AISI 4340, AISI P21, PX5						Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V					
Dia. DC(mm)	No. of Flutes	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)
10	3	40	1300	0.04	160	1.8	1.8	40	1300	0.03	120	1.8	1.8	30	950	0.03	86	1.8	1.8
12	3	40	1100	0.04	130	2.2	2.2	40	1100	0.03	99	2.2	2.2	30	800	0.03	72	2.2	2.2
16	3	40	800	0.04	96	2.4	2.4	40	800	0.03	72	2.4	2.4	30	600	0.03	54	2.4	2.4
20	3	40	640	0.04	77	2.6	2.6	40	640	0.03	58	2.6	2.6	30	480	0.03	43	2.6	2.6



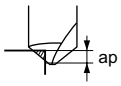
Work material		Hardened steel (45— 55HRC) AISI H13, AISI L6						Heat resistant alloys Inconel718					
Dia. DC(mm)	No. of Flutes	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap(mm)	Depth of cut ae(mm)
10	3	30	950	0.02	57	1.8	1.8	30	950	0.04	110	1.8	1.8
12	3	30	800	0.02	48	2.2	2.2	30	800	0.04	96	2.2	2.2
16	3	30	600	0.02	36	2.4	2.4	30	600	0.04	72	2.4	2.4
20	3	30	480	0.02	29	2.6	2.6	30	480	0.04	58	2.6	2.6



- For stainless steel, titanium alloy and heat resistant alloy, the use of water-soluble coolant is effective.
- Vibration may occur if the rigidity of machine or work piece is low. In this case, please reduce the revolution and feed rate proportionately.

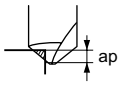
·Chamfering (Shape circumference)

Work material		Carbon steel, Alloy steel, Gray Cast Iron AISI 1045, AISI 4140, ASTM A36, AISI 1010					Alloy tool steel, Carbon steel, Alloy steel, Pre-hardened steel SKD, SKT, AISI 4340, AISI P21, PX5					Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V				
Dia. DC(mm)	No. of Flutes	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap(mm)
10	3	100	3200	0.04	480	2.0	70	2200	0.03	300	2.0	60	1900	0.03	230	2.0
12	3	100	2700	0.04	410	2.4	70	1900	0.03	260	2.4	60	1600	0.03	190	2.4
16	3	100	2000	0.04	300	2.7	70	1400	0.03	190	2.7	60	1200	0.03	140	2.7
20	3	100	1600	0.04	240	3.2	70	1100	0.03	150	3.2	60	950	0.03	110	3.2



iMX-CH3L

Work material		Hardened steel (45— 55HRC) AISI H13, AISI L6					Heat resistant alloys Inconel718				
Dia. DC(mm)	No. of Flutes	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap(mm)
10	3	50	1600	0.02	140	2.0	30	950	0.04	110	2.0
12	3	50	1300	0.02	120	2.4	30	800	0.04	96	2.4
16	3	50	990	0.02	89	2.7	30	600	0.04	72	2.7
20	3	50	800	0.02	72	3.2	30	480	0.04	58	3.2



- For stainless steel, titanium alloy and heat resistant alloy, the use of water-soluble coolant is effective.
- Vibration may occur if the rigidity of machine or work piece is low. In this case, please reduce the revolution and feed rate proportionately.

iMX-CH6V

iMX END MILL SERIES

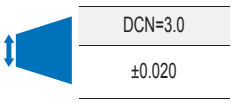
Chamfer head, 6 flute

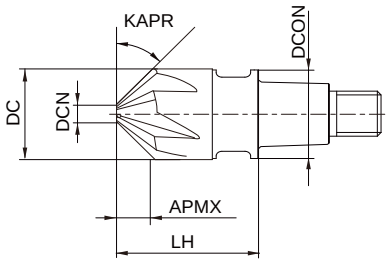
Product Information

Work Material

P M S H

Technical Info >> 1993 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 664 END MILLS SELECTION CHART >> 690





Type1

Unit : mm

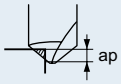
Order Number	DC	APMX	KAPR	DCN	LH	DCON	No. of Flutes	EP7020	type
IMX12CH6V120A45	12	4.5	45°	3	19	11.7	6	●	1
IMX16CH6V160A45	16	6.5	45°	3	24	15.5	6	●	1
IMX20CH6V200A45	20	8.5	45°	3	30	19.5	6	●	1

iMX-CH6V

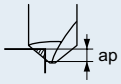
RECOMMENDED CUTTING CONDITIONS

·Chamfering (Shape circumference)

Work material		Carbon steel, Alloy steel, Gray Cast Iron AISI 1045, AISI 4140, ASTM A36, AISI 1010					Alloy tool steel, Carbon steel, Alloy steel, Pre-hardened steel SKD, SKT, AISI 4340, AISI P21, PX5					Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V				
Dia. DC(mm)	No. of Flutes	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap(mm)
12	6	100	2700	0.05	810	2.4	70	1900	0.05	510	2.4	60	1600	0.04	380	2.4
16	6	100	2000	0.05	600	2.7	70	1400	0.05	380	2.7	60	1200	0.04	290	2.7
20	6	100	1600	0.05	480	3.2	70	1100	0.05	300	3.2	60	950	0.04	230	3.2



Work material		Hardened steel (45— 55HRC) AISI H13, AISI L6					Heat resistant alloys Inconel718				
Dia. DC(mm)	No. of Flutes	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap(mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap(mm)
12	6	50	1300	0.03	230	2.4	30	800	0.04	190	2.4
16	6	50	990	0.03	180	2.7	30	600	0.04	140	2.7
20	6	50	800	0.03	140	3.2	30	480	0.04	120	3.2



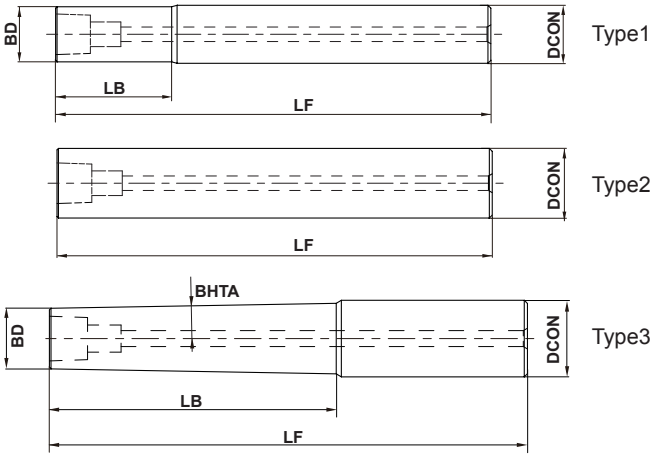
- For stainless steel, titanium alloy and heat resistant alloy, the use of water-soluble coolant is effective.
- Vibration may occur if the rigidity of machine or work piece is low. In this case, please reduce the revolution and feed rate proportionately.

iMX CARBIDE HOLDER

Undercut

Straight

Taper neck type



h6	DCON=10	12≤DCON≤16	20≤DCON≤25		
	0 - 0.009	0 - 0.011	0 - 0.013		

Carbide Holder

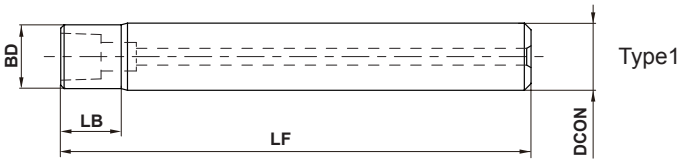
Unit : mm

Order Number	BHTA	LB	BD	LF	DCON	Stock	Type	Suitable Head	Wrench	Anti-seize Lubricant
IMX10-U10N014L070C	—	14	9.7	70	10	●	1	IMX10□□□	IMX10-WR	MK1KS
IMX10-S10L090C	—	—	—	90	10	●	2	IMX10□□□	IMX10-WR	MK1KS
IMX10-U10N034L090C	—	34	9.7	90	10	●	1	IMX10□□□	IMX10-WR	MK1KS
IMX10-S10L110C	—	—	—	110	10	●	2	IMX10□□□	IMX10-WR	MK1KS
IMX10-U10N054L110C	—	54	9.7	110	10	●	1	IMX10□□□	IMX10-WR	MK1KS
IMX10-A12N054L110C	1°	54	9.7	110	12	●	3	IMX10□□□	IMX10-WR	MK1KS
IMX12-U12N017L080C	—	17	11.7	80	12	●	1	IMX12□□□	IMX12-WR	MK1KS
IMX12-S12L100C	—	—	—	100	12	●	2	IMX12□□□	IMX12-WR	MK1KS
IMX12-U12N041L100C	—	41	11.7	100	12	●	1	IMX12□□□	IMX12-WR	MK1KS
IMX12-S12L130C	—	—	—	130	12	●	2	IMX12□□□	IMX12-WR	MK1KS
IMX12-U12N065L130C	—	65	11.7	130	12	●	1	IMX12□□□	IMX12-WR	MK1KS
IMX12-A16N065L130C	1°	65	11.7	130	16	●	3	IMX12□□□	IMX12-WR	MK1KS
IMX16-U16N024L080C	—	24	15.5	80	16	●	1	IMX16□□□	IMX16-WR	MK1KS
IMX16-S16L110C	—	—	—	110	16	●	2	IMX16□□□	IMX16-WR	MK1KS
IMX16-U16N056L110C	—	56	15.5	110	16	●	1	IMX16□□□	IMX16-WR	MK1KS
IMX16-S16L150C	—	—	—	150	16	●	2	IMX16□□□	IMX16-WR	MK1KS
IMX16-U16N088L150C	—	88	15.5	150	16	●	1	IMX16□□□	IMX16-WR	MK1KS
IMX16-A20N088L150C	1°	88	15.5	150	20	●	3	IMX16□□□	IMX16-WR	MK1KS
IMX20-U20N030L090C	—	30	19.5	90	20	●	1	IMX20□□□	IMX20-WR	MK1KS
IMX20-S20L130C	—	—	—	130	20	●	2	IMX20□□□	IMX20-WR	MK1KS
IMX20-U20N070L130C	—	70	19.5	130	20	●	1	IMX20□□□	IMX20-WR	MK1KS
IMX20-S20L180C	—	—	—	180	20	●	2	IMX20□□□	IMX20-WR	MK1KS
IMX20-U20N110L180C	—	110	19.5	180	20	●	1	IMX20□□□	IMX20-WR	MK1KS
IMX20-A25N110L180C	1°	110	19.5	180	25	●	3	IMX20□□□	IMX20-WR	MK1KS
IMX25-U25N037L110C	—	37.5	24.5	110	25	●	1	IMX25□□□	IMX25-WR	MK1KS
IMX25-S25L160C	—	—	—	160	25	●	2	IMX25□□□	IMX25-WR	MK1KS
IMX25-U25N087L160C	—	87.5	24.5	160	25	●	1	IMX25□□□	IMX25-WR	MK1KS
IMX25-S25L210C	—	—	—	210	25	●	2	IMX25□□□	IMX25-WR	MK1KS

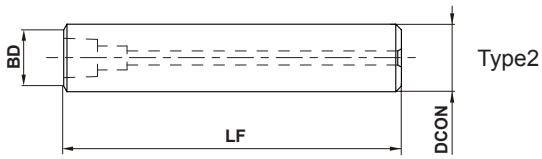
*The fastening size of the holder and head should be the same.

● : Inventory maintained in Japan.

Undercut



Highly Rigid Straight



h6	DCON=10	12 ≤DCON ≤16	20 ≤DCON ≤25	DCON=32
	0 - 0.009	0 - 0.011	0 - 0.013	0 - 0.016

Steel Holder

Unit : mm

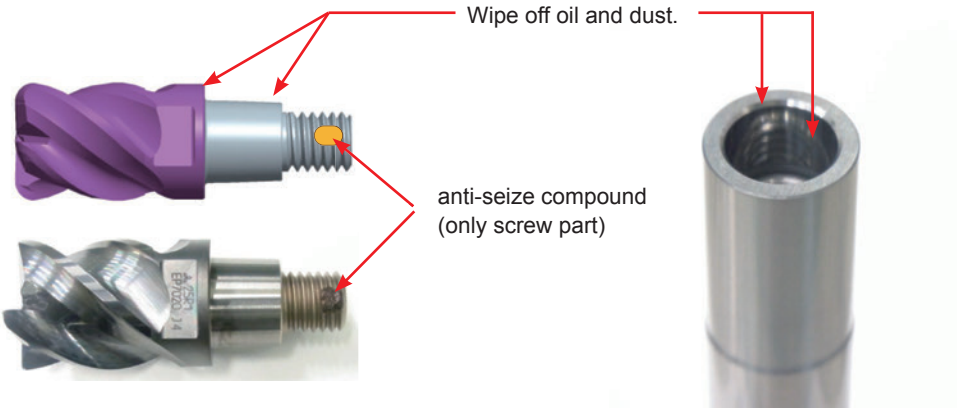
Order Number	LB	BD	LF	DCON	Stock	Type	Suitable Head	Wrench	Anti-seize Lubricant
IMX10-U10N009L070S	9	9.7	70	10	●	1	IMX10□	IMX10-WR	MK1KS
IMX10-G12L060S	—	—	60	12	●	2	IMX10□	IMX10-WR	MK1KS
IMX12-U12N011L080S	11	11.7	80	12	●	1	IMX12□	IMX12-WR	MK1KS
IMX12-G16L070S	—	—	70	16	●	2	IMX12□	IMX12-WR	MK1KS
IMX16-U16N016L080S	16	15.5	80	16	●	1	IMX16□	IMX16-WR	MK1KS
IMX16-G20L070S	—	—	70	20	●	2	IMX16□	IMX16-WR	MK1KS
IMX20-U20N020L090S	20	19.5	90	20	●	1	IMX20□	IMX20-WR	MK1KS
IMX20-G25L080S	—	—	80	25	●	2	IMX20□	IMX20-WR	MK1KS
IMX25-U25N025L110S	25	24.5	110	25	●	1	IMX25□	IMX25-WR	MK1KS
IMX25-G32L100S	—	—	100	32	●	2	IMX25□	IMX25-WR	MK1KS

*The fastening size of the holder and head should be the same.

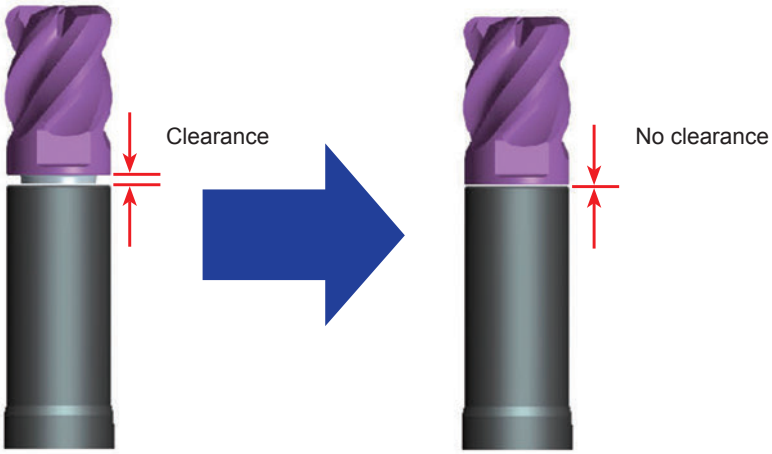
● : **Inventory maintained in Japan.**

HOW TO INSTALL THE HEAD

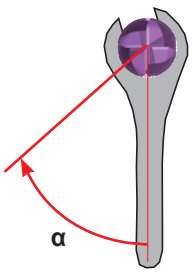
- Before installing remove all the dust and oil etc. Remove also the anti-rust oil from a new head.
  Coat only the screw part of the head with a small amount of anti-seize compound. If too much compound is used, during tightening, the anti-seize compound may enter the taper part and have a large effect on the coupling mechanism. Wipe off the anti-seize compound and make adjustments.
  Be careful that there is no anti-seize compound sticking inside the taper when inserting the head into the holder.



- Be careful because you may cut your hand if you touch the edge of the blade directly when tightening.
  There is still a clearance in this state, use the accessory wrench to tighten until the face of the head and holder fit snugly together.
- Refer to the table below for the necessary recommended torque angle.
  If regulating more strictly, use the torque wrench to tighten by the recommended torque below.



Fastening size	Reference tightening angle α	Recommended clamping torque (Nm)
iMX10	50°	10
iMX12	50°	15
iMX16	50°	30
iMX20	40°	50
iMX25	35°	75

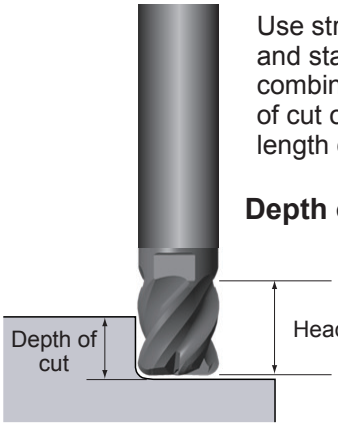


Note 1) Do not handle cutting edges with bare hands.
Note 2) Please use the wrench provided. It is thinner than a standard wrench to prevent damage to the flutes when tightening.

iMX holder application

- Combination of the straight type and standard head causes interference when the depth of cut is head length or more. (Because holder diameter = head diameter)
- Combination of the straight type and offset head may make the depth of cutting length or more. (Because holder diameter < head diameter)

Straight + Standard head

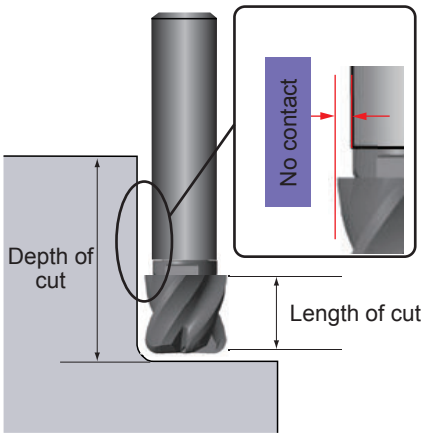


Use straight type and standard head combination at a depth of cut of the head length or less.

Depth of cut < Head length

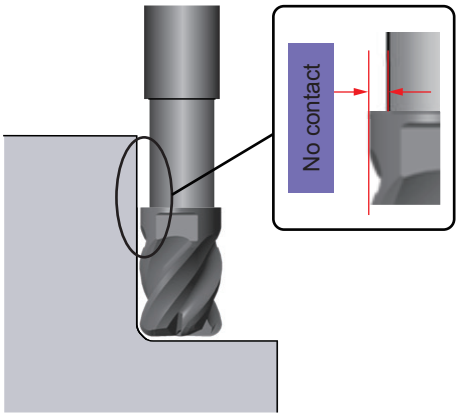
Installation at an overhang of 3D or less is also possible, if the depth of cut < head length is assumed.

Straight + Offset head

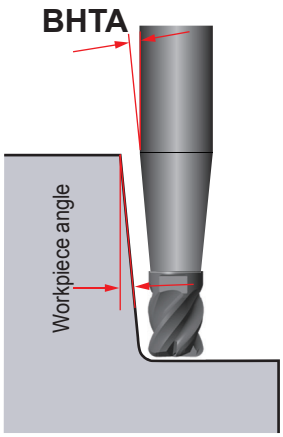


- It is suitable for vertical wall machining, because the undercut type has a relief neck.
- A taper neck with thick relief has high rigidity. Especially a stable cutting is demonstrated at deeper machining.
- Perform straight shank additional grinding together with customer application for undercut taper neck type. (Refer to the cutting edge diameter (BD) of each type for the minimum machining diameter.)

Undercut + Standard head



Taper neck + Standard head



Memo

JM
JM
JM

MILLING TOOLS

INSERT STANDARDS
CBN&PCD INSERT STANDARDS
INSERT GRADES

IDENTIFICATION 1286
GRADES FOR MILLING..... 1288
MILLING APPLICATION RANGE 1289
COATED CARBIDE(CVD&PVD) 1292
CERMET..... 1294
CEMENTED CARBIDE 1295
CBN(SINTERED CBN)..... 1296
PCD(SINTERED DIAMOND) 1297
CLASSIFICATION..... 1298
ROTATING INSERTS..... 1308
WIPER INSERT..... 1332
CBN & PCD TURNING INSERTS 1334
CBN AND PCD WITH WIPER..... 1337
DRILLING INSERTS 1338

IDENTIFICATION

Symbol	Insert Shape
N	Heptagonal
O	Octagonal
S	Square
T	Triangular
C	Rhombic80°
M	Rhombic86°
A	Parallelogram85°
R	Round
X	Special Design
W	Wiper

① Insert Shape

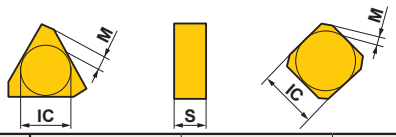
Symbol	Normal Clearance AN
C	7°
D	15°
E	20°
F	25°
G	30°
N	0°
P	11°
O	Other Normal Clearance
X	Other Normal Clearance

② Normal Clearance

① ② ③ ④

S E E R

③ Tolerance Class



Symbol	Tolerance of Nose Height **M** (mm)	Tolerance of Inscribed Circle **IC** (mm)	Tolerance of Thickness **S** (mm)
A	±0.005	±0.025	±0.025
C	±0.013	±0.025	±0.025
E	±0.025	±0.025	±0.025
G	±0.025	±0.025	±0.13
K*	±0.013	±0.05−±0.15	±0.025
M*	±0.08−±0.18	±0.05−±0.15	±0.13
N*	±0.08−±0.18	±0.05−±0.15	±0.025

The surface of insert with * mark is sintered.

④ Fixing and/or for Chip Breaker

Symbol	Hole	Hole Configuration	Chip Breaker	Figure
W	With Hole	Cylindrical Hole + One Countersink (40°−60°)	No	
T	With Hole		Single Sided	
B	With Hole	Cylindrical Hole + One Countersink (70°−90°)	No	
N	Without Hole	–	No	
R	Without Hole	–	Single Sided	
X	–	–	–	Special Design

Symbol R	Symbol C	Symbol S	Symbol T	Diameter of Inscribed Circle
	06	06	11	6.35
	08	07	13	7.94
	09	09	16	9.525
10				10.00
12				12.00
	12	12	22	12.70
	16	15	27	15.875
20				20.00

⑤ Insert Size

Symbol	Insert Thickness (mm)
03	3.18
T3	3.97
04	4.76

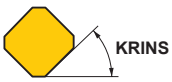
⑥ Insert Thickness

Symbol	Honing
F	Sharp
E	Round
T	Chamfer
S	Chamfer+Hone
Z	Chamfer (Strong Cutting Edge Type)

⑨ Cutting Edge Condition

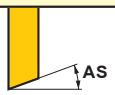
⑤	⑥			⑨				
12	03	A	F	E	R	1	-	JS
		⑦	⑧		⑩	⑪		⑫

⑦ Wiper insert cutting angle



Symbol	Wiper insert cutting angle
A	45°
E	75°
P	90°
Z	Other Angle

⑧ Clearance of Wiper Insert

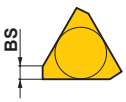


Symbol	Clearance Angle
D	15°
E	20°
F	25°
G	30°

⑩ Hand Tool Holder

Symbol	Hand Tool Holder
L	Left Hand Tool Holder
N	For Both Right and Left Hand Tool Holder
R	Right Hand Tool Holder

⑪ Width of Wiper Insert



Symbol	Width of Wiper Insert
1	1.4 (1.94 only for TEKN)

⑫ Chip Breaker

Symbol	Name
FT	FT Breaker
HS	HS Breaker
JH	JH Breaker
JM	JM Breaker
JP	JP Breaker
JS	JS Breaker
LS	LS Breaker
MM	MM Breaker
MS	MS Breaker

GRADES FOR MILLING

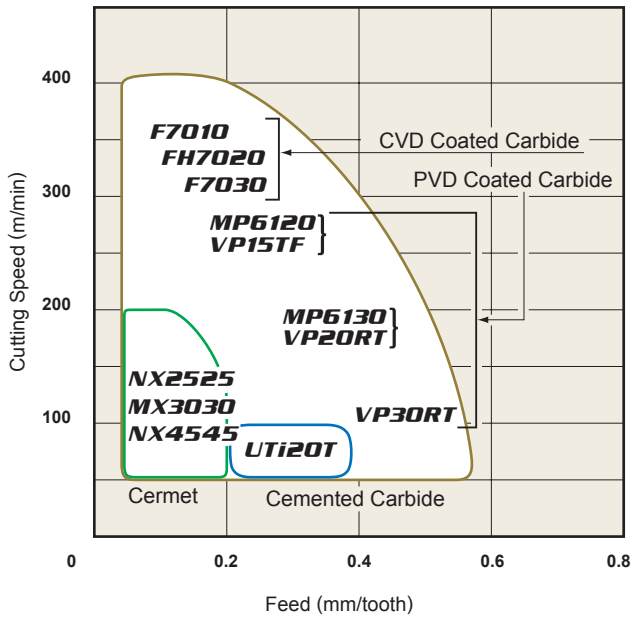
INDEXABLE INSERT GRADES FOR MILLING

ISO		Coated Carbide										Cermet			Cemented Carbide			CBN (Sintered CBN)		PCD (Sintered Diamond)		
		CVD			PVD																	
P Steel	P01	F7010																				
	P10		FH7020									NX2525										
	P20			F7030	MP6120		VP15TF		MP6130		UP20M		VP20RT	NEW MX3030	NX4545	UTi20T						
	P30																					
	P40													VP30RT								
M Stainless Steel	M01	F7010																				
	M10											NX2525										
	M20			F7030			VP15TF		MP7130	MP7030	UP20M		VP20RT	NEW MX3030	NX4545	UTi20T						
	M30																					
	M40													MP7140 VP30RT								
K Cast Iron	K01															HTi05T		MB710	MB730			
	K10	MC5020			MP8010		VP15TF					NX2525					HTi10					
	K20												VP20RT									
	K30																	UTi20T				
N Non-Ferrous Metal	N01																			MD205	MD220	MD230
	N10															HTi10						
	N20						LC15TF										TF15					
	N30																					
S Heat Resistant Alloy • Ti Alloy	S01																	MB730				
	S10				MP9120		VP15TF		MP9130	MP9030												
	S20																					
	S30																					
H Hardened Materials	H01				MP8010																	
	H10						VP15TF															
	H20																					
	H30																					

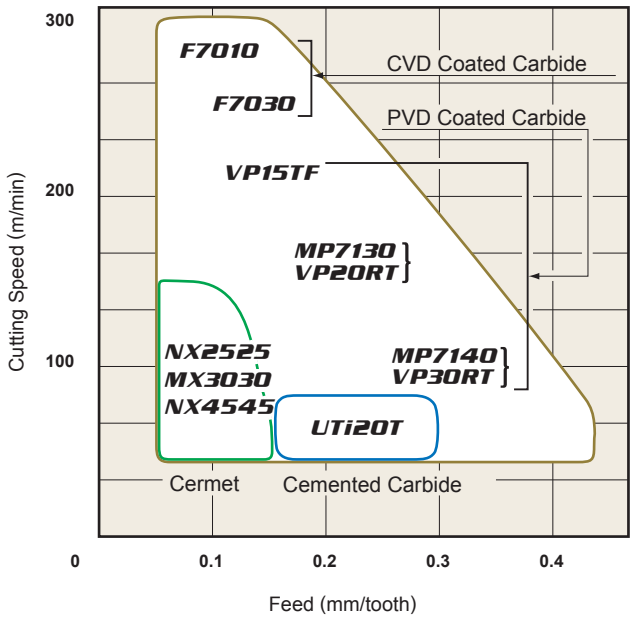
■ = MIRACLE SIGMA

MILLING APPLICATION RANGE

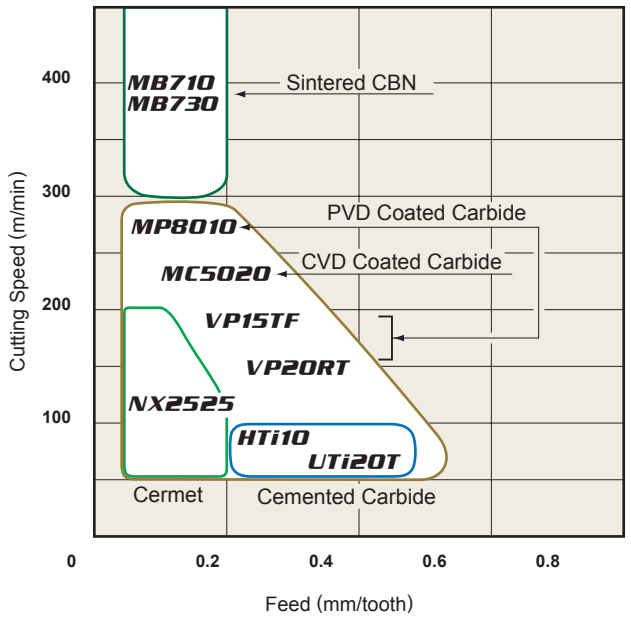
P STEEL



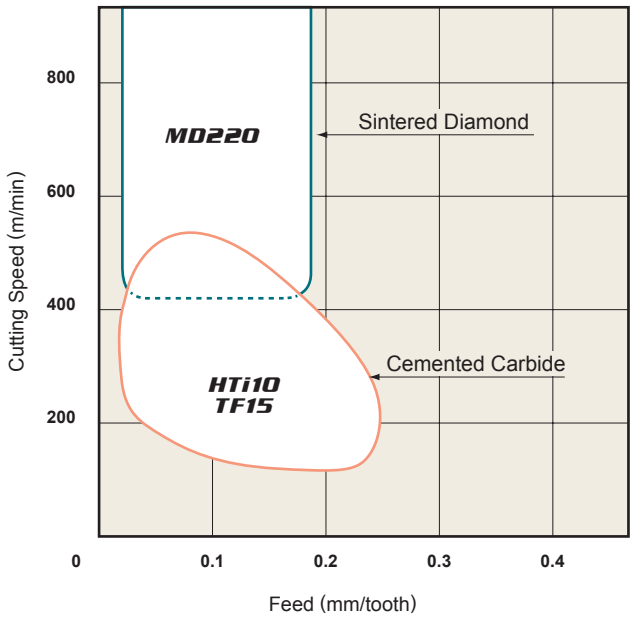
M STAINLESS STEEL



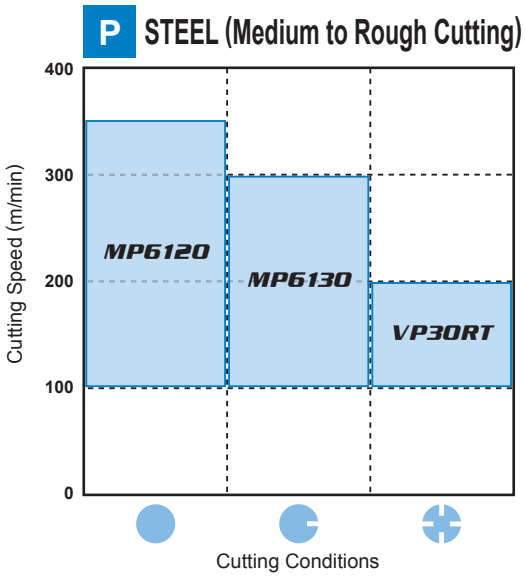
K CAST IRON

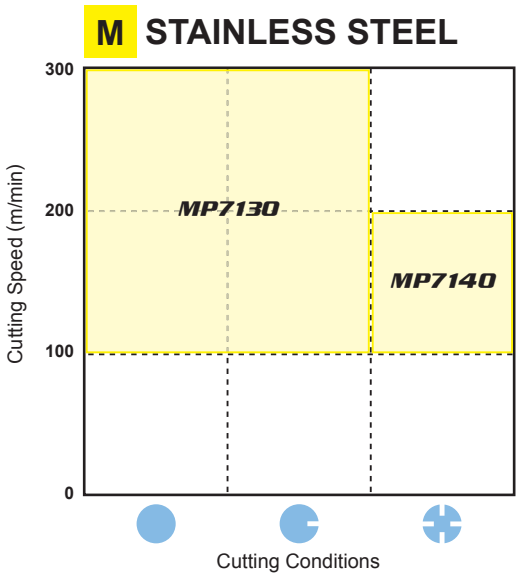


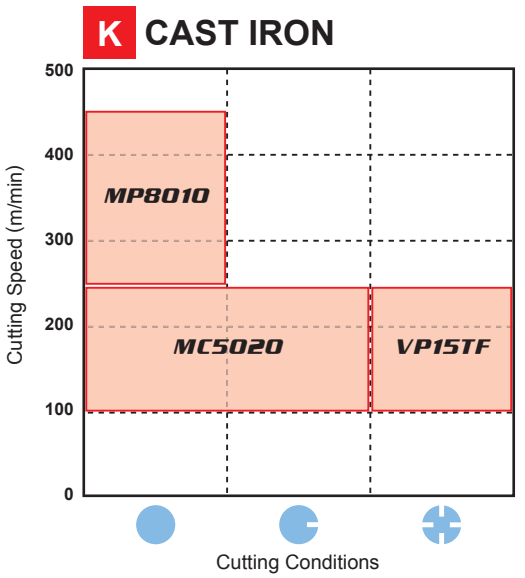
N NON-FERROUS METAL

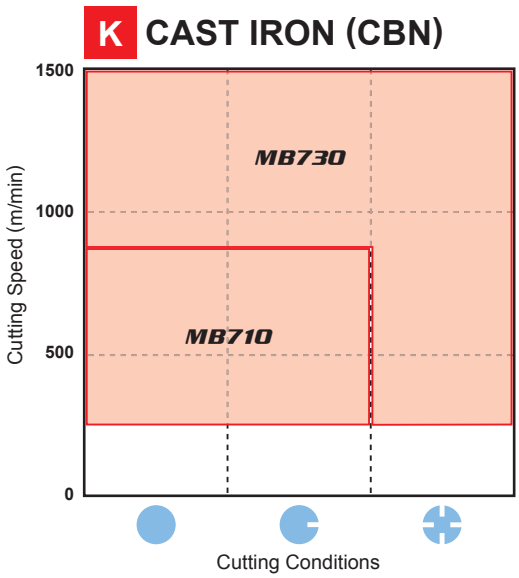


●Recommendation of the insert grade based on cutting speed and conditions for each workpiece.





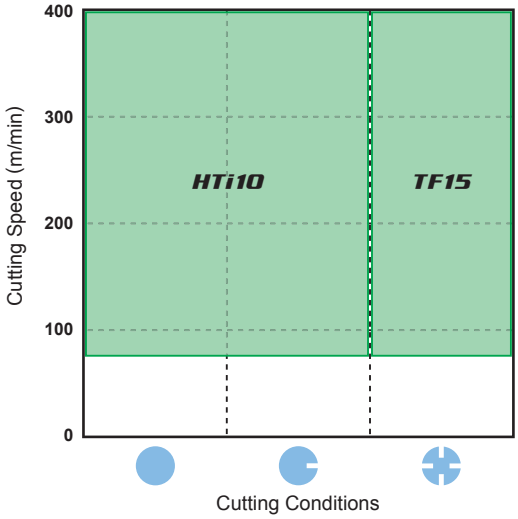




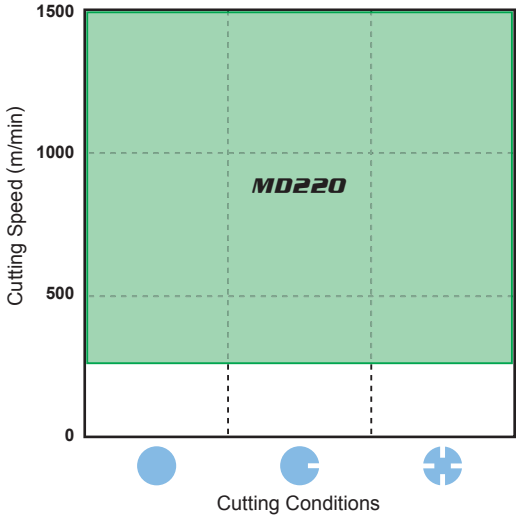
CUTTING CONDITIONS

Stable Cutting	Plane Cutting Constant Depth of Cut Pre-Machined Securely Clamped Component Cutting
General Cutting	
Unstable Cutting	Heavy Interrupted Cutting Irregular Depth of Cut Low Clamping Rigidity Cutting

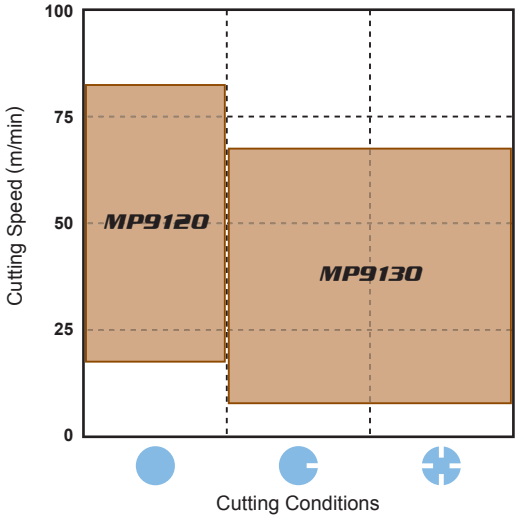
N NON-FERROUS METAL



N NON-FERROUS METAL (PCD)



S HEAT RESISTANT ALLOY, TITANIUM ALLOY



COATED CARBIDE(CVD&PVD)

<CVD>

- Special tough fibrous structure improves wear and fracture resistance.
- It covers a wide application range and reduces the number of tools required.

<PVD>

- PVD coating prolongs tool life when compared to cemented carbide under the same cutting conditions.
- Coating of tools with sharp edges is possible without softening or changing the quality of the subsrate.

SELECTION STANDARD

MILLING

	Work Material	Recommended Grade	Recommended Cutting Speed (m/min)	ISO	Application Range
P	Steel	**F7030**	200 (150 — 250)	P10	FH7020, F7030, MP9120, VP15TF, MP6130, UP20M, VP20RT, VP30RT
		MP6120	150 (100 — 200)	P20	
		MP6130	150 (100 — 200)	P30	
		VP15TF	150 (100 — 200)	P40	
M	Stainless Steel	**F7030**	200 (150 — 250)	M10	F7030, VP15TF, MP7130, MP7030, UP20M, VP20RT, MP7140, VP30RT
		MP7030	150 (100 — 200)	M20	
		MP7130	150 (100 — 200)	M30	
		MP7140	150 (100 — 200)	M40	
		VP15TF	150 (100 — 200)		
K	Cast Iron	**MC5020**	180 (100 — 250)	K01	MC5020, MP8010, VP15TF, VP20RT
				K10	
		VP15TF	150 (100 — 200)	K20	
				K30	
N	Aluminium Alloy	**LC15TF**	1000 (200 — 3000)	N10	LC15TF
				N20	
				N30	
S	Heat Resistant Alloy Ti Alloy	**MP9120**	30 (20 — 40)	S01	MP9120, VP15TF, MP9130, MP9030
		VP15TF	30 (20 — 40)	S10	
		MP9130	40 (25 — 60)	S20	
		MP9030	40 (25 — 60)	S30	
H	Hardened Materials	**MP8010**	80 (50 — 120)	H01	MP8010, VP15TF
				H10	
		VP15TF	80 (50 — 120)	H20	
				H30	

■ = MIRACLE SIGMA

GRADE CHARACTERISTICS

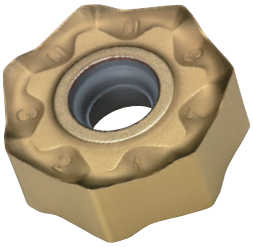
Grade	Substrate		Coating Layer	
	Hardness (HRA)	T.R.S (GPa)	Composition	Thickness
MC5020	91.0	2.2	TiCN-Al_2O_3-Ti Compound	Thick
FH7020	88.8	2.8	TiCN-Al_2O_3-Ti Compound	Thick
F7030	88.8	2.8	TiCN-Al^2O^3-TiN	Thin
MP6120	91.5	2.5	(Al,Ti,Cr)N	Thin
MP6130	90.5	2.5	(Al,Ti,Cr)N	Thin
MP7030	90.5	2.5	(Al,Ti)N-Ti Compound	Thin
MP7130	90.5	2.5	(Al,Ti,Cr)N	Thin
MP7140	88.8	2.8	(Al,Ti,Cr)N	Thin

Grade	Substrate		Coating Layer	
	Hardness (HRA)	T.R.S (GPa)	Composition	Thickness
MP8010	93.5	2.3	(Al,Ti,Si)N	Thin
MP9120	91.5	2.5	(Al,Ti,Cr)N	Thin
MP9030	90.5	2.5	(Al,Ti)N-Ti Compound	Thin
MP9130	90.5	2.7	(Al,Ti,Cr)N	Thin
VP15TF	91.5	2.5	(Al,Ti)N	Thin
VP20RT	90.5	2.5	(Al,Ti)N	Thin
VP30RT	88.8	2.8	(Al,Ti)N	Thin
UP20M	90.5	2.0	Ti Compound	Thin

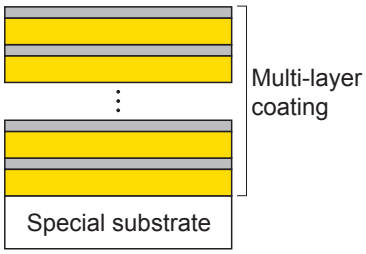
*1GPa=102kg/mm^2

For machining of stainless steel

MP7030



MP7030 has a multi-layer coating based on newly developed Ti-compound. It provides superior wear and fracture resistance in stainless steel machining. A special tough cemented carbide substrate gives excellent performance in machining of difficult-to-cut materials such as stainless steel.



Heat-resistant Alloy, Cutting For Titanium Alloy

MP9130

An enhanced super fine cemented carbide substrate has increased toughness while maintaining hardness.
The Al-Ti-Cr-N accumulating coating ensures optimum heat and wear resistance. The combination of these properties gives excellent fracture resistance and welding resistance because of low coefficient of friction when machining titanium alloy.

CERMET

- NX2525 for high speed milling.
- NX4545, MX3030 for general milling.

SELECTION STANDARD

MILLING

	Work Material	Recommended Grade	Recommended Cutting Speed (m/min)	ISO	Application Range
P M	Steel	**NX2525**	250 (150 — 350)	P10 M10	NX2525
				P20 M20	NEW MX3030 / NX4545
		MX3030 **NX4545**	150 (120 — 180)	P30 M30	
K	Cast Iron	**NX2525**	200 (150 — 300)	K01	
				K10	NX2525
				K20	

(Note) In case of wet cutting, please use coated carbide VP15TF for steel cutting and coated carbide MC5020 for cast iron cutting.

GRADE CHARACTERISTICS

Grade	Hardness (HRA)	T.R.S. (GPa)	Thermal Conductivity (W/m•K) *	Thermal Expansion ($\times 10^{-6}$/K)
NX2525	92.2	2.0	33	7.8
NEW **MX3030**	90.0	2.2	33	7.8
NX4545	90.0	2.2	33	7.8

*1GPa=102kg/mm^2, 1W/m • K=2.39×10^{-3}cal/cm • sec • ℃

CEMENTED CARBIDE

● **Available grade series are UTi20T for steel and cast iron, and HTi10 for cast iron, non-ferrous metal and non-metal.**

SELECTION STANDARD

● MILLING

	Work Material	Recommended Grade	Recommended Cutting Speed (m/min)	ISO	Application Range
P	Steel	**UTi20T**	120 (50 — 180)	P10	
				P20	UTi20T
				P30	UTi20T
M	Stainless Steel	**UTi20T**	120 (50 — 180)	M10	
				M20	UTi20T
				M30	UTi20T
K	Cast Iron	**HTi10**	100 (50 — 150)	K10	HTi10
				K20	HTi10
		UTi20T	120 (50 — 180)	K30	UTi20T
N	Non-Ferrous Metal	**HTi10** **TF15**	400 (300 — 500)	N01	HTi10
				N10	HTi10
				N20	TF15
				N30	TF15

MAIN COMPONENT AND APPLICATION

ISO	Main Component	Characteristics	Work Material
P M	WC-TiC-TaC-Co	Heat / Deformation resistance.	Carbon steel, Alloy steel, Stainless steel and Cast iron
K N	WC-Co	High rigidity and wear resistance.	Cast iron, Non-Ferrous metals and Non-metal

GRADE CHARACTERISTICS

ISO	Grade	Hardness (HRA)	Thermal Conductivity (W/m•K)*	Thermal Expansion ($\times 10^{-6}$/K)	Young's Modulus (GPa) *	T.R.S (GPa) *
P M	**UTi20T**	90.5	38	5.5	520	2.0
K N	**HTi05T**	92.5	79	4.5	600	1.5
K N	**HTi10**	92.0	79	4.6	630	2.0
N	**TF15**	91.5	71	5.3	580	2.5

*1GPa=102kg/mm^2, 1W/m • K=2.39×10^{-3}cal/cm • sec • ℃

CBN(SINTERED CBN)

- MB710 and MB730 for cast iron cutting.
- BC5030 for high speed machining of cast irons now available.
- Due to the combination of the BC5030 insert geometry and the AOX allows the use of up to 16 corners per insert, enabling cost effective high efficiency machining.

SELECTION STANDARD / RECOMMENDED CUTTING CONDITIONS

FINISHING

Work Material		Structure	Cutting Speed (m/min) 250 500 750 1000 1250	Feed (mm/tooth)	Depth of Cut (mm)	Coolant
Grey Cast Iron	JIS FC250	Ferritic + Pearilitic	MB710 / MB730	−0.3	−0.5	Dry
	JIS FC300	Pearilitic				

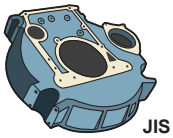
ROUGHING

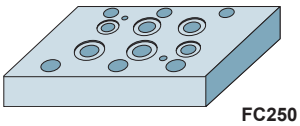
Work Material		Structure	Cutting Speed (m/min) 250 500 1000 1500 2000	Feed (mm/tooth)	Depth of Cut (mm)	Coolant
Grey Cast Iron	JIS FC250	Pearilitic	BC5030	−0.15	−3.0	Dry

FEATURES AND BASE

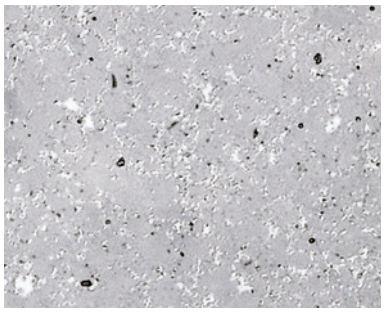
Grade	Application	Features	Main Component	Coating Layer
MB710	For General Cutting	General purpose grade with well balanced wear and fracture resistance.	CBN TiC Al_2O_3	–
MB730	For High Speed Cutting For interrupted Cutting	Has the largest CBN content and therefore displays good thermal conductivity. It is suitable for the high temperatures that are generated in high speed cutting.	CBN (High Content) Co Base Alloy	–
BC5030	For high-speed machining at large depths of cut High-speed interrupted machining at large depths of cut	High CBN content and high thermal conductivity. The whole insert is composed of sintered CBN. This enables high speed, high efficiency machining at larger depths of cut. The coated grade for easy recognition of used corners.	CBN AlN	TiN

APPLICATION EXAMPLES

Tool		AOX445R10008D
Insert		SL-ONEN120404ASN (BC5030)
Machine		Machining Center
Workpiece		 JIS FC250
Cutting Condition	Cutting Speed (m/min)	1200
	Depth of Cut (mm)	2.8
	Width of Cut (mm)	70
	Table Feed (mm/min)	3057
	Feed per Tooth (mm/tooth)	0.1
Result		10 times longer tool life and 4 times higher efficiency than ceramics. Excellent machining with a surface finish of Ra < 1.6μm

Tool		NF10000R0408D (MB730)
Workpiece		 FC250
Component		Hydraulic component
Cutting Condition	Cutting Speed (m/min)	1800
	Feed per Tooth (mm/tooth)	0.1
	Table Feed (mm/min)	4584
	Depth of Cut (mm)	0.05
	Width of Cut (mm)	90
Coolant		Dry (Wet cutting at previous process)
Axial Runout (mm)		≤0.005mm
Result		Compared with competitor CBN grade cutting, the normal wear surface is excellent and a extendable life finishing is maintained.

PCD(SINTERED DIAMOND)



Micro-Structure of **MD220**

- **Suitable for non-ferrous metals cutting such as aluminium alloy.**
- **Suitable for extremely high speed finishing.**

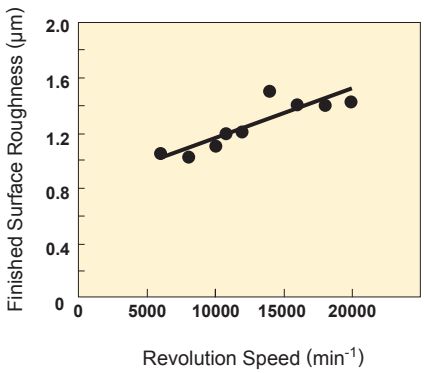
GRADE FEATURES

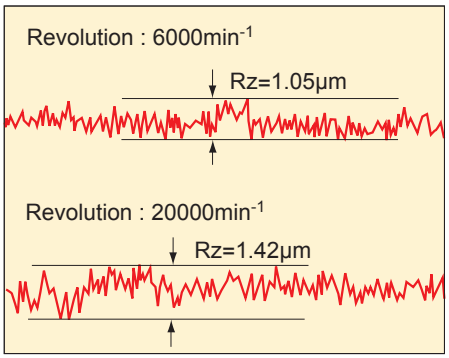
Grade	Features
MD220	Excellent in the balance between wear resistance and fracture resistance. For a wide range of tooling applications.

RECOMMENDED CUTTING CONDITIONS

Work Material	Cutting Speed (m/min)	Grade	Feed per Tooth (mm/tooth)	Depth of Cut (mm)
Aluminium Alloy (Si ≤12%)	1000—6000	**MD220**	—0.3	—0.5
Aluminium Alloy (Si ≥13%)	200—800			

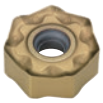
CUTTING PERFORMANCE





<Cutting Conditions>
Workpiece : JIS A7075-T6
Insert : NP-GDCW1240PDFR2
Grade : MD220
Tool : V10000R0406D
Feed : 0.2mm/tooth
Depth of Cut : 0.5mm
Width of Cut : 80mm
Dry Cutting

CLASSIFICATION

Cutter Type	Order Number	Page
AF5000	LDCN190412R LDCN190412L	1334
AF10000	GDCN2004PDR	1334
AHX440S AHX475S	NNMU130508ZER-L NNMU130508ZEN-M NNMU130532ZEN-M NNMU130532ZEN-R	1314
	WNEU1305ZEN4C-M	1332
AHX640S	NNMU200708ZEN-M	1314
	NNMU200708ZEN-MP	1314
	NNMU200712ZER-L	1315
	NNMU200712ZER-MM	1314
AHX640S	WNEU2007ZEN7C-M	1333
	WNEU2007ZEN7C-WP	1333
	NNMU200608ZEN-MK	1315
	NNMU200608ZEN-HK	1315
	WNEU2006ZEN7C-WK	1333
AHX640W	NNMU200608ZEN-MK	1315
	NNMU200608ZEN-HK	1315
	WNEU2006ZEN7C-WK	1333
AJX PMC	JOMW06T215ZZSR-FT JOMW080320ZZSR-FT JDMW09T320ZDSR-FT JDMW120420ZDSR-FT JDMW140520ZDSR-FT	1310
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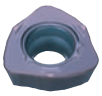	JDMT120420ZDSR-ST JDMT140520ZDSR-ST	1310
	JOMT06T216ZZER-JL JOMT080322ZZER-JL JDMT09T323ZDER-JL JDMT120423ZDER-JL JDMT140523ZDER-JL	1310
AOX445	SL-ONEN120404ASN	1335
APX3000	AOGT123602PEFR-GM AOGT123604PEFR-GM AOGT123608PEFR-GM	1308
	AOMT123602PEER-M AOMT123604PEER-M AOMT123608PEER-M AOMT123610PEER-M AOMT123612PEER-M AOMT123616PEER-M AOMT123620PEER-M AOMT123624PEER-M AOMT123630PEER-M AOMT123632PEER-M	1308

Cutter Type	Order Number	Page
APX3000	AOMT123604PEER-H	1308
	AOMT123608PEER-H	
	AOMT123616PEER-H	
APX4000	AOMT184804PEER-H	1308
	AOMT184808PEER-H	
	AOMT184816PEER-H	
	AOMT184832PEER-H	
	AOMT184840PEER-H	
	AOMT184850PEER-H	
	AOMT184864PEER-H	
	AOMT184804PEER-M	1308
	AOMT184808PEER-M	
	AOMT184810PEER-M	
	AOMT184812PEER-M	
	AOMT184816PEER-M	
	AOMT184820PEER-M	
AQX	QOMT0830R-M2	1316
	QOMT1035R-M2	
	QOMT1342R-M2	
	QOMT1651R-M2	
	QOMT1856R-M2	
	QOMT2062R-M2	
	QOMT2576R-M2	
	QOGT0830R-G1	1316
	QOGT1035R-G1	
	QOGT1342R-G1	
	QOGT1651R-G1	
	QOGT1856R-G1	
	QOGT2062R-G1	
	QOGT2576R-G1	

Cutter Type	Order Number	Page
ARP	RPHT1040M0E4-L	1316
	RPHT1040M0E4-M	
	RPHT1040M0E4-R	
	RPHT1248M0E4-L	
	RPHT1248M0E4-M	
	RPHT1248M0E4-R	
	RPMT1040M0E4-L	
	RPMT1040M0E4-M	
	RPMT1040M0E4-R	
	RPMT1248M0E4-L	
	RPMT1248M0E4-M	
	RPMT1248M0E4-R	
ARX	RDMW0517M0E	1316
	RDMW0620M0E	
	RDMW0724M0E	
ASX400 ASX400 Side Cutter	SOET12T308PEER-JL	1320
	SOMT12T308PEER-JM	1321
	SOMT12T308PEEL-JM	
	SOMT12T308PEER-JH	1320
	SOMT12T320PEER-FT	1321
	SOGT12T308PEFR-JP	1320
	WOEW12T308PEER8C	1333
	WOEW12T308PETR8C	

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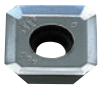
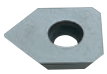
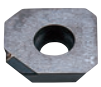
ASX445	SEET13T3AGEN-JL	1319
	SEMT13T3AGSN-JM	1319
	SEMT13T3AGSN-JH	1319
	SEMT13T3AGSN-FT	1319
	SEGT13T3AGFN-JP	1319
	WEEW13T3AGER8C	1332
	WEEW13T3AGTR8C	
	WEEW13T3AGFR3C	1337
	WEEW13T3AGTR3C	

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AXD4000	XDGX175004PDFR-GL	1328
	XDGX175008PDFR-GL	
	XDGX175012PDFR-GL	
	XDGX175016PDFR-GL	
	XDGX175020PDFR-GL	
	XDGX175024PDFR-GL	
	XDGX175030PDFR-GL	
	XDGX175032PDFR-GL	
	XDGX175040PDFR-GL	
	XDGX175050PDFR-GL	
	XDGX175004PDER-GM	1329
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	XDGX175012PDER-GM	
	XDGX175016PDER-GM	
	XDGX175020PDER-GM	
	XDGX175024PDER-GM	
	XDGX175030PDER-GM	
	XDGX175032PDER-GM	
	XDGX175040PDER-GM	
	XDGX175050PDER-GM	
	XDGX175004PDFR-GM	1329
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	XDGX175012PDFR-GM	
	XDGX175016PDFR-GM	
	XDGX175020PDFR-GM	
	XDGX175024PDFR-GM	
	XDGX175030PDFR-GM	
	XDGX175032PDFR-GM	
	XDGX175040PDFR-GM	
	XDGX175050PDFR-GM	

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AXD7000	XDGX227008PDFR-GL	1328
	XDGX227016PDFR-GL	
	XDGX227020PDFR-GL	
	XDGX227024PDER-GL	
	XDGX227030PDFR-GL	
	XDGX227032PDFR-GL	
	XDGX227040PDFR-GL	
	XDGX227050PDFR-GL	
	XDGX227008PDER-GLA	1328
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	XDGX227020PDER-GLA	
	XDGX227024PDER-GLA	
	XDGX227030PDER-GLA	
	XDGX227032PDER-GLA	
	XDGX227040PDER-GLA	
	XDGX227050PDER-GLA	
BAE	AEMW150304ER	1309
	AEMW150308ER	
	AEMW19T304ER	
	AEMW19T308ER	
BAP300 SRM2	APMT1135PDER-H1	1309
	APMT1135PDER-H2	
	APMT1135PDER-H3	
	APMT1135PDER-H4	
	APMT1135PDER-H6	
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	APMT1135PDER-M1	
	APMT1135PDER-M2	
	APGT1135PDFR-G2	1308

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BAP300 Under-cut Type	ZRM0603R-M3	1331
	ZRM0603R-M4	
	ZRM0603R-M5	
BAP3500	XPMT13T3PDER-M1	1331
	XPMT13T3PDER-M2	
	XPMT13T3PDER-M6	
	XPMT13T3PDER-M75	
	XPMT13T3PDER-M8	
	XPGT13T3PDFR-G1	1331
	XPGT13T3PDFR-G2	
	XPGT13T3PDFR-G6	
	XPGT13T3PDFR-G75	
	XPGT13T3PDFR-G8	
	XPGT13T3PDER-G1	1331
	XPGT13T3PDER-G2	
	XPGT13T3PDER-G6	
	XPGT13T3PDER-G75	
	XPGT13T3PDER-G8	
BAP400 SRM2	APMT1604PDER-H1	1309
	APMT1604PDER-H2	
	APMT1604PDER-H4	
	APMT1604PDER-H6	
	APMT1604PDER-H8	
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	SFCN1203ZFFR2	
	SFCN1203ZFFL2	
	SFCN1203ZFFR2	1335
	WFC42ZFER2	1337
	NP-WFC42ZFER2	1337
BMR	HNMX1206EN06-R	1310
	HNMX1206EN12-R	1310
BN425 DN	SNC43B2G	1320
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	SNK43B2G	
	SNK43B2S	
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BRP	RPMW08T2M0T	1317
	RPMW10T3M0E	
	RPMW10T3M0T	
	RPMW1204M0E	
	RPMW1204M0T	
	RPMW1606M0E	
	RPMW1606M0T	
	RPMT08T2M0E-JS	1317
	RPMT10T3M0E-JS	
	RPMT1204M0E-JS	
	RPMT1606M0E-JS	
BSP	SPMB1204APT	1322
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	XDGT1550PDER-G12	
	XDGT1550PDER-G16	
	XDGT1550PDER-G20	
	XDGT1550PDER-G30	
	XDGT1550PDER-G32	
	XDGT1550PDER-G40	
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	XDGT1550PDFR-G20	
	XDGT1550PDFR-G30	
	XDGT1550PDFR-G32	
	XDGT1550PDFR-G40	
	XDGT1550PDFR-G50	
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CESP CFSP CGSP	SPMW090304	1323
	SPMW090308	
	SPMW120304	
	SPMW120308	
DCCC BZC	CCMX083508EN-A	1309
	CCMX09T308EN-A	
	CCMX09T308EN-B	1310
	ZCMX083508ER-A	1331
	ZCMX09T308ER-A	
	ZCMX09T308ER-B	1331
E404 FE404	SEA42C10GR	1317
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ECMP TAB	MPMT070308	1313
	MPMT090308	
	MPMT120408	

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FBP415 QBP415	SPEN1203EEER1	1322
	SPEN1203EEEL1	
	SPNN1203EEER1	
	SPNN1203EEEL1	
	SPER1203EEER-JS	1322
	SPEN1203EETR1	1335
	WPC42EEER10C	1333
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FF3000	SPCA53Z	1321
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FMSD	SDEN1203AEN	1317
	SDKN1203AEN	
	SDKN1203AETN	
	SDKN1504AETN	
FP490	SPEN424A	1321

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NF10000 QF10000	GDCN2004PDFR3	1334
NF10000	NP-GDCN2004PDSR3	1334
NR10000	GDCN2004ZDTR1	1334
MG200	MGEEW1035PFTR	1313
MG300	MGEEW1242PFTR	1313
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MG245	MGEEW1035AFTR	1313
MG345	MGEEW1242AFTR	1313

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MVX	SOMX063005-UM	1338
	SOMX073505-UM	
	SOMX084005-UM	
	SOMX094506-UM	
	SOMX115506-UM	
	SOMX136008-UM	
	SOMX166508-UM	
	SOMX187008-UM	
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	SOMX084005-US	
	SOMX094506-US	
	SOMX115506-US	
	SOMX136008-US	
	SOMX166508-US	
	SOMX187008-US	
	SOMX062905-UH	1339
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	SOMX083905-UH	
	SOMX094406-UH	
	SOMX115406-UH	
	SOMX135908-UH	
	SOMX166408-UH	
	SOMX186908-UH	
	SOGX063005-UN	1339
	SOGX073505-UN	
	SOGX084005-UN	
	SOGX094506-UN	
	SOGX115506-UN	
	SOGX136008-UN	
	SOGX166508-UN	
	SOGX187008-UN	

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NSE300 SE300	TEEN1603PEFR1	1325
	TEEN1603PEER1	
	TEEN1603PETR1	
	TEEN1603PESR1	
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	TECN1603PEER1W	
	TECN1603PETR1W	
	TEER1603PEER-JS	1326
	TECN1603PEFR1	1335
NSE400 SE400	TECN2204PEFR1	1326
	TECN2204PEER1	
	TECN2204PETR1	
	TEEN2204PEFR1	
	TEEN2204PEER1	
	TEEN2204PETR1	
	TEEN2204PESR1	
	TEKN2204PEER1	
	TEKN2204PESR1	
	TEKN2204PETR1	
	TEKN2204PETR	
	TEER2204PEER-JS	1326
	TECN2204PEFR1	1335

Cutter Type	Order Number	Page
OCTACUT BOE	OEMX12T3ETR1	1315
	OEMX12T3ESR1	
	OEMX1705ESR1	
	OEMX1705ETR1	
	OEMX12T3ETR1	1334
	OEMX12T3EER1-JS	1315
	OEMX1705EER1-JS	
	OEMX1705ETR1-JS	
	REMX1705SN	1316
	REMX12T3EN-JS	1316
	REMX1705EN-JS	
P425	WPC42W3GR	1333
PMF	TPEW1303ZPER2	1326
	TPEW1303ZPTR2	1336
PMR	CPMT1205ZPEN-M2	1310
	CPMT1205ZPEN-M3	
	CPMT1906ZPEN-M2	
	CPMT1906ZPEN-M3	

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S300	SPMW090304	1323
	SPMW090308	
S400	SPMW120304	1323
	SPMW120308	
	SPMN120304	1322
	SPMN120304T	
	SPMN120308	
	SPMN120312	
	SPMN120408	
	SPMN120412	
	SPGN120304	
	SPGN120308	
	SPGN120312	
S500	SPMN150408	1322
	SPMN150412	
	SPGN150404	
	SPGN150408	
SE415 QSE415	SEEN1203EFFR1	1318
	SEEN1203EFER1	
	SEEN1203EFTR1	
	SEEN1203EFSR1	
	SEKN1203EFSR1	1318
	SEKN1203EFTR1	
	SEKN1203EFTR	
	SEER1203EFER-JS	1318
	SECN1203EFFR1	1335
	WEC42EFER5C	1332
	WEC42EFTR5C	

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	SEEN1203AFEN1	
	SEEN1203AFTN1	
	SEEN1203AFSN1	
	SEKN1203AFSN1	
	SEKN1203AFTN1	
	SEKN1203AFTN	
	SEER1203AFEN-JS	1318
	SECN1203AFFR1	1335
	WEC42AFTR5C	1332
SE515	SECN1504EFTR1	1318
	SEEN1504EFER1	
	SEEN1504EFSR1	
	SEEN1504EFTR1	
	SEKN1504EFSR1	
	SEKN1504EFTR1	
	WEC53EFTR5C	1332
SE545	SEEN1504AFEN1	1318
	SEEN1504AFSN1	
	SEEN1504AFTN1	
	SEKN1504AFSN1	
	SEKN1504AFTN1	
	SEER1504AFEN-JS	1318

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SE545	WEC53AFER5C	1332
	WEC53AFTR5C	
SG20	RGEN2004M0EN	1317
	RGEN2004M0SN	
SPX	JPMX140412-JM	1311
	JPMX190412-JM	
	JPMX140412-WH	1311
	JPMX190412-WH	
	MPMX120412-JM	1314
	MPMX120412-WH	1314
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	SPMX120408-WH	1323
SRB	SRBT10	1323
	SRBT12	
	SRBT16	
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	SRBT30	
	SRBT32	
SRF	SRFT10	1323
	SRFT12	
	SRFT16	
	SRFT20	
	SRFT25	
	SRFT30	
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SRM2	SRM16C-M	1324
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	SRM25C-M	
	SRM30C-M	
	SRM32C-M	
	SRM16E-M	1324
	SRM20E-M	
	SRM25E-M	
	SRM30E-M	
	SRM32E-M	
	SRG16C	1324
	SRG20C	
	SRG25C	
	SRG30C	
	SRG32C	
	SRG16E	1324
	SRG20E	
	SRG25E	
	SRG30E	
	SRG32E	
SRM2φ40 φ50	SRG40C	1324
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	SRG40E	1324
	SRG50E	
	APMT1135PDER-H2	1309
	APMT1604PDER-H2	
	APMT1135PDER-M2	1309
	APMT1604PDER-M2	

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STAW	STAWK○○○○○TG	1346
	STAWN○○○○○T	1344
	STAWN○○○○○TH	
SUF	SUFT10R05	1325
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	SUFT16R10	
	SUFT16R15	
	SUFT16R20	
	SUFT16R30	
	SUFT20R05	
	SUFT20R10	
	SUFT20R15	
	SUFT20R20	
	SUFT20R30	
	SUFT25R05	
	SUFT25R10	
	SUFT25R20	
	SUFT25R30	
	SUFT30R05	
	SUFT30R10	
	SUFT30R20	
	SUFT30R30	
	SUFT32R05	
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	SUFT32R20	

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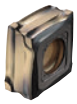
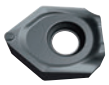
TAF	GCMT040204-U1	1338
	GCMT040204-U2	1338
	GPMT060204-U1	1338
	GPMT070204-U1	
	GPMT090304-U1	
	GPMT11T308-U1	
	GPMT140408-U1	
	GPMT060204-U2	1338
	GPMT070204-U2	
	GPMT090304-U2	
	GPMT11T308-U2	
	GPMT140408-U2	
	GPMT060204-U3	1338
	GPMT070204-U3	
	GPMT090304-U3	
	GPMT11T308-U3	
	GPMT140408-U3	
TAW	TAWNH○○○○○T	1340
	TAWKH○○○○○TG	1342
	TAWBH○○○○○T	1341

Cutter Type	Order Number	Page
TBE1	SPMT120408-A	1323
TSMP	MPMW070308	1313
	MPMW090308	
	MPMW120408	
V10000	NP-GDCW1240PDFR2	1334
VAS400 Side Cutter	LNGU130804PNER-M	1312
	LNGU130804PNEL-M	
	LNGU130808PNER-M	
	LNGU130808PNEL-M	
	LNGU130812PNER-M	
	LNGU130812PNEL-M	
	LNGU130816PNER-M	
	LNGU130816PNEL-M	
	LNGU130820PNER-M	
	LNGU130820PNEL-M	
	LNGU130824PNER-M	
	LNGU130824PNEL-M	
	LNGU130830PNER-M	
	LNGU130830PNEL-M	
	LNGU130840PNER-M	
	LNGU130840PNEL-M	
	LNGU130850PNER-M	
	LNGU130850PNEL-M	

Cutter Type	Order Number	Page
VAS500 Side Cutter	LNGU171004PNER-R	1312
	LNGU171004PNEL-R	
	LNGU171008PNER-R	
	LNGU171008PNEL-R	
	LNGU171012PNER-R	
	LNGU171012PNEL-R	
	LNGU171016PNER-R	
	LNGU171016PNEL-R	
	LNGU171020PNER-R	
	LNGU171020PNEL-R	
	LNGU171024PNER-R	
	LNGU171024PNEL-R	
	LNGU171030PNER-R	
	LNGU171030PNEL-R	
	LNGU171040PNER-R	
	LNGU171040PNEL-R	
	LNGU171050PNER-R	
	LNGU171050PNEL-R	
	LNGU171060PNER-R	
	LNGU171060PNEL-R	
	LNGU171070PNER-R	
	LNGU171070PNEL-R	
VFX5	XNMU160708R-MS	1330
	XNMU160712R-MS	
	XNMU160716R-MS	
	XNMU160724R-MS	
	XNMU160732R-MS	
	XNMU160740R-MS	
	XNMU160708R-HS	1330
	XNMU160708R-LS	1330

Cutter Type	Order Number	Page
VFX6	XNMU190912R-MS	1330
	XNMU190916R-MS	
	XNMU190924R-MS	
	XNMU190932R-MS	
	XNMU190940R-MS	
	XNMU190950R-MS	
	XNMU190912R-HS	1330
	XNMU190912R-LS	1330
VOX400 VOS400 Side Cutter 	SONX1206PER	1321
	SONX1206PEL	
	WOEX1206PER5C	1333
VIPER	TPNX1605N	1327
WSX445	SNGU140812ANFR-L	1320
	SNGU140812ANER-L	
	SNGU140812ANER-M	
	SNMU140812ANER-M	
	SNMU140812ANER-R	
	SNMU140812ANER-H	
	SNGU140812ANEL-M	
	SNMU140812ANEL-M	
	SNMU140812ANEL-R	

Cutter Type	Order Number	Page
WSX445 	WNGU1406ANEN8C-M	1333
Corner Angle 0° 11° Positive	TPEN1603PPR	1326
	TPEN2204PDR	
	TPKN1603PPR	
	TPKN2204PDR	
Corner Angle 15° 11° Positive	SPKN1203EDR	1322
	SPKN1504EDR	
	SPEN1203EDR	
Corner Angle 45° 20° Positive	SEKN1203AGTN	1319
Negative	SNMN120408	1320
	SNMN120412	
11° Positive	TPMN160304	1327
	TPMN160308	
	TPMN160312	
	TPMN220404	
	TPMN220408	
	TPMN220412	

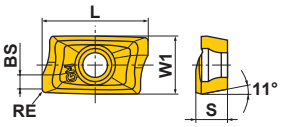
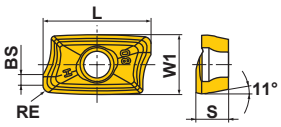
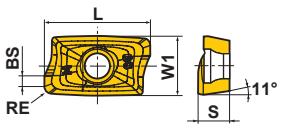
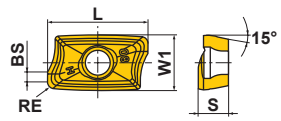
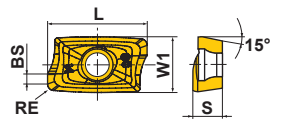
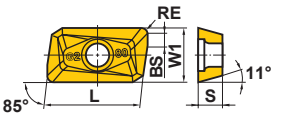
Memo

ROTATING INSERTS

Work Material		MC5020	MP6120	MP6130	MP7130	MP9120	MP9130	VP15TF	VP20RT	HTi10	TF15
P	Steel		◐	✣				◐	◐		
M	Stainless Steel				◔			◔	◔		
K	Cast Iron	◐						✣	✣	◐	
N	Non-ferrous Metal									◐	◐
S	Heat-resistant Alloy, Titanium Alloy					◐	✣	◐			
H	Hardened Steel							◔			

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✣ : Unstable Cutting

Honing :
E : Round **F** : Sharp

Shape	Order Number	Class	Honing	MC5020	MP6120	MP6130	MP7130	MP9120	MP9130	VP15TF	VP20RT	HTi10	TF15	L	W1	S	BS	RE	Geometry
				Coated								Carbide		Dimensions (mm)					
APX3000	AOGT123602PEFR-GM	G	F										●	12	6.6	3.6	1.8	0.2	
	AOGT123604PEFR-GM	G	F										●	12	6.6	3.6	1.6	0.4	
	AOGT123608PEFR-GM	G	F										●	12	6.6	3.6	1.2	0.8	
APX3000	AOMT123604PEER-H	M	E	●	●	●	●	●	●	●	●			12	6.6	3.6	1.6	0.4	
	AOMT123608PEER-H	M	E	●	●	●	●	●	●	●	●			12	6.6	3.6	1.2	0.8	
	AOMT123616PEER-H	M	E	●	●	●	●	●	●	●	●			12	6.6	3.6	0.4	1.6	
APX3000	AOMT123602PEER-M	M	E		●	●	●	●	●	●	●			12	6.6	3.6	1.8	0.2	
	AOMT123604PEER-M	M	E		●	●	●	●	●	●	●			12	6.6	3.6	1.6	0.4	
	AOMT123608PEER-M	M	E		●	●	●	●	●	●	●			12	6.6	3.6	1.2	0.8	
	AOMT123610PEER-M	M	E		●	●	●	●	●	●	●			12	6.6	3.6	1.0	1.0	
	AOMT123612PEER-M	M	E		●	●	●	●	●	●	●			12	6.6	3.6	0.8	1.2	
	AOMT123616PEER-M	M	E		●	●	●	●	●	●	●			12	6.6	3.6	0.4	1.6	
	AOMT123620PEER-M	M	E		●	●	●	●	●	●	●			12	6.6	3.6	0.4	2.0	
	AOMT123624PEER-M	M	E		●	●	●	●	●	●	●			12	6.6	3.6	0.4	2.4	
	AOMT123630PEER-M	M	E		●	●	●	●	●	●	●			12	6.6	3.6	0.4	3.0	
	AOMT123632PEER-M	M	E		●	●	●	●	●	●	●			12	6.6	3.6	0.4	3.2	
APX4000	AOMT184804PEER-H	M	E	●	●	●	●	●	●	●	●			18	9	4.8	1.8	0.4	
	AOMT184808PEER-H	M	E	●	●	●	●	●	●	●	●			18	9	4.8	1.4	0.8	
	AOMT184816PEER-H	M	E	●	●	●	●	●	●	●	●			18	9	4.8	0.4	1.6	
	AOMT184832PEER-H	M	E			●	●				●			18	9	4.8	0.4	3.2	
	AOMT184840PEER-H	M	E			●	●				●			18	9	4.8	0.4	4.0	
	AOMT184850PEER-H	M	E			●	●				●			18	9	4.8	—	5.0	
	AOMT184864PEER-H	M	E			●	●				●			18	9	4.8	—	6.35	
APX4000	AOMT184804PEER-M	M	E		●	●	●	●	●	●	●			18	9	4.8	1.8	0.4	
	AOMT184808PEER-M	M	E		●	●	●	●	●	●	●			18	9	4.8	1.4	0.8	
	AOMT184810PEER-M	M	E		●			●	●	●				18	9	4.8	1.0	1.0	
	AOMT184812PEER-M	M	E		●			●	●	●				18	9	4.8	0.8	1.2	
	AOMT184816PEER-M	M	E		●	●	●	●	●	●	●			18	9	4.8	0.4	1.6	
	AOMT184820PEER-M	M	E		●			●	●	●				18	9	4.8	0.4	2.0	
BAP300	APGT1135PDFR-G2	G	F									●		11	6.35	3.5	1.2	0.8	

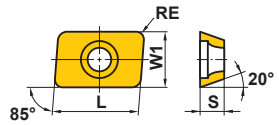
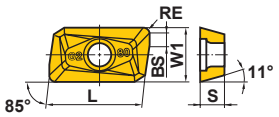
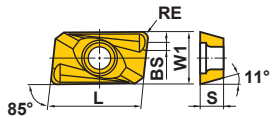
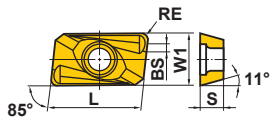
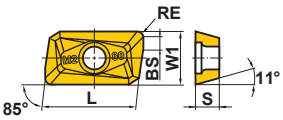
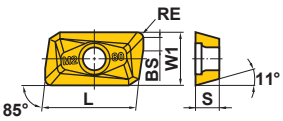
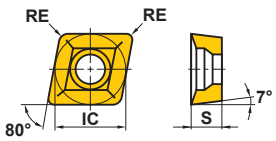
■ = MIRACLE SIGMA

● : Inventory maintained in Japan.
(10 inserts in one case)

Work Material		F7030	VP15TF	UP20M	NX2525	NX4545	UTi20T	HTi10
P	Steel	◐	◐	◐	●	◐	◐	
M	Stainless Steel	◔	◔	◔	○	◔	◔	
K	Cast Iron		✠		●		✠	◐
N	Non-ferrous Metal							◐
S	Heat-resistant Alloy, Titanium Alloy		◐					
H	Hardened Steel		◔					

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✠ : Unstable Cutting

Honing :
E : Round **F** : Sharp

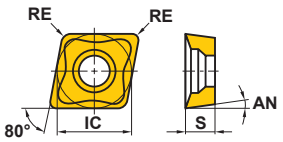
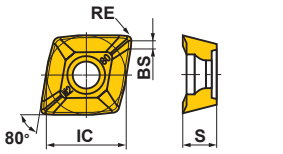
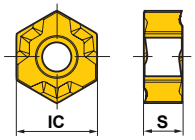
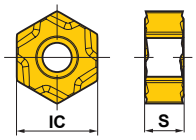
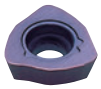
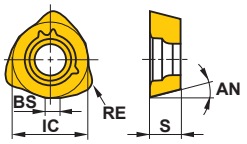
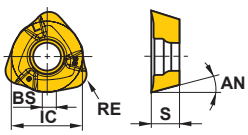
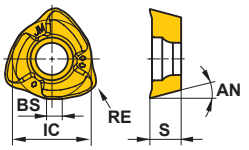
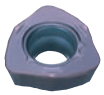
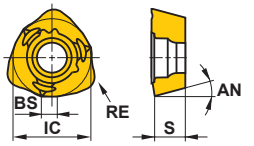
Shape	Order Number	Class	Honing	Coated F7030	Coated VP15TF	Coated UP20M	Cermet NX2525	Cermet NX4545	Carbide UTi20T	Carbide HTi10	Dimensions (mm) IC	L	W1	S	BS	RE	Geometry
BAE	AEMW150304ER	M	E			●	●		●		—	15.875	9.525	3.18	—	0.4	
	AEMW150308ER	M	E			●	●		●		—	15.875	9.525	3.18	—	0.8	
	AEMW19T304ER	M	E			●	●		●		—	19.05	12.7	3.97	—	0.4	
	AEMW19T308ER	M	E			●	●		●		—	19.05	12.7	3.97	—	0.8	
BAP400	APGT1604PDFR-G2	G	F							●	—	16.5	9.525	4.76	1.4	0.8	
BAP300 SRM2 SRM2ϕ40 ϕ50	APMT1135PDER-H1	M	E	●	●		●	●		●	—	11	6.35	3.5	1.5	0.4	
	APMT1135PDER-H2	M	E	●	●		●	●		●	—	11	6.35	3.5	1.2	0.8	
	APMT1135PDER-H3	M	E	●							—	11	6.35	3.5	0.8	1.2	
	APMT1135PDER-H4	M	E	●							—	11	6.35	3.5	0.4	1.6	
	APMT1135PDER-H6	M	E	●							—	11	6.35	3.5	0.4	2.4	
BAP400 SRM2 SRM2ϕ40 ϕ50	APMT1604PDER-H1	M	E	●							—	16.5	9.525	4.76	1.7	0.4	
	APMT1604PDER-H2	M	E	●	●		●	●		●	—	16.5	9.525	4.76	1.4	0.8	
	APMT1604PDER-H4	M	E	●							—	16.5	9.525	4.76	0.4	1.6	
	APMT1604PDER-H6	M	E	●							—	16.5	9.525	4.76	0.4	2.4	
	APMT1604PDER-H8	M	E	●							—	16.5	9.525	4.76	0.4	3.2	
BAP300 SRM2 SRM2ϕ40 ϕ50	APMT1135PDER-M0	M	E	●							—	11	6.35	3.5	1.8	0.2	
	APMT1135PDER-M1	M	E	●							—	11	6.35	3.5	1.5	0.4	
	APMT1135PDER-M2	M	E	●	●			●			—	11	6.35	3.5	1.2	0.8	
BAP400 SRM2 SRM2ϕ40 ϕ50	APMT1604PDER-M2	M	E	●	●			●			—	16.5	9.525	4.76	1.4	0.8	
DCCC	CCMX083508EN-A	M	E	●		●			●		7.94	—	—	3.5	—	0.8	
	CCMX09T308EN-A	M	E	●	●	●			●		9.525	—	—	3.97	—	0.8	

ROTATING TOOL INSERTS

Work Material		F7030	FH7020	MP6120	MP6130	MP7130	MP7140	MP9120	MP9130	MC5015	VP15TF	VP30RT	UTi20T
P	Steel	◐	◐	◐	✲						◐	✲	◐
M	Stainless Steel	◔				◔	✲				◔	✲	◔
K	Cast Iron		●							◐	✲		✲
N	Non-ferrous Metal												
S	Heat-resistant Alloy, Titanium Alloy							◐	✲		◐		
H	Hardened Steel										◔		

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting
✲ : Unstable Cutting

Honing :
E : Round **S** : Chamfer + Hone

Shape	Order Number	Class	Honing	F7030	FH7020	MP6120	MP6130	MP7130	MP7140	MP9120	MP9130	MC5015	VP15TF	VP30RT	UTi20T	IC	S	BS	RE	AN	Geometry
				Coated											Carbide	Dimensions (mm)					
DCCC	CCMX09T308EN-B	M	E	●											●	9.525	3.97	–	0.8	7°	
PMR	CPMT1205ZPEN-M2	M	E										●			12.7	5.56	1.4	0.8	–	
	CPMT1205ZPEN-M3	M	E										●			12.7	5.56	1.4	1.2	–	
	CPMT1906ZPEN-M2	M	E										●			19.05	6.35	1.4	0.8	–	
	CPMT1906ZPEN-M3	M	E										●			19.05	6.35	1.4	1.2	–	
BMR	HNMX1206EN06-R	M	E									●				12.7	6	–	–	–	
BMR	HNMX1206EN12-R	M	E									●				12.7	6	–	–	–	
AJX PMC 	JOMW06T215ZZSR-FT	M	S		●	●	●	●	●	●	●		●	●		6.35	2.78	1.2	1.5	13°	
	JOMW080320ZZSR-FT	M	S		●	●	●	●	●	●	●		●	●		8	3.18	1.4	2	13°	
	JDMW09T320ZDSR-FT	M	S		●	●	●	●	●	●	●		●	●		9.525	3.97	1.8	2	15°	
	JDMW120420ZDSR-FT	M	S		●	●	●	●	●	●	●		●	●		12	4.76	2.5	2	15°	
	JDMW140520ZDSR-FT	M	S		●	●	●	●	●	●	●		●	●		14	5.56	2.8	2	15°	
AJX	JOMT06T216ZZER-JL	M	E					●	●	●	●					6.35	2.78	1.2	1.6	13°	
	JOMT080322ZZER-JL	M	E					●	●	●	●					8	3.18	1.4	2.2	13°	
	JDMT09T323ZDER-JL	M	E					●	●	●	●					9.525	3.97	1.8	2.3	15°	
	JDMT120423ZDER-JL	M	E					●	●	●	●					12	4.76	2.5	2.3	15°	
	JDMT140523ZDER-JL	M	E					●	●	●	●					14	5.56	2.8	2.3	15°	
AJX PMC	JOMT06T215ZZSR-JM	M	S		●	●	●	●	●	●	●		●	●		6.35	2.78	1.2	1.5	13°	
	JOMT080320ZZSR-JM	M	S		●	●	●	●	●	●	●		●	●		8	3.18	1.4	2	13°	
	JDMT09T320ZDSR-JM	M	S		●	●	●	●	●	●	●		●	●		9.525	3.97	1.8	2	15°	
	JDMT120420ZDSR-JM	M	S		●	●	●	●	●	●	●		●	●		12	4.76	2.5	2	15°	
	JDMT140520ZDSR-JM	M	S		●	●	●	●	●	●	●		●	●		14	5.56	2.8	2	15°	
AJX PMC 	JDMT120420ZDSR-ST	M	S		●	●	●	●	●				●	●		12	4.76	2.5	2	15°	
	JDMT140520ZDSR-ST	M	S		●	●	●	●	●				●	●		14	5.56	2.8	2	15°	

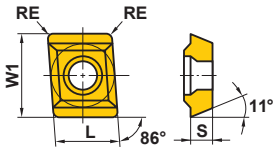
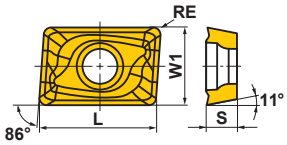
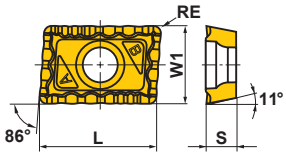
● : Inventory maintained in Japan.
(10 inserts in one case)

■ = MIRACLE SIGMA

Work Material			VP15TF	VP20RT	UP20M	UTi20T
	P	Steel	◐	◐	◐	◐
	M	Stainless Steel	◔	◔	◔	◔
	K	Cast Iron	✠	✠		✠
	N	Non-ferrous Metal				
	S	Heat-resistant Alloy, Titanium Alloy	◐			
	H	Hardened Steel	◔			

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✠ : Unstable Cutting

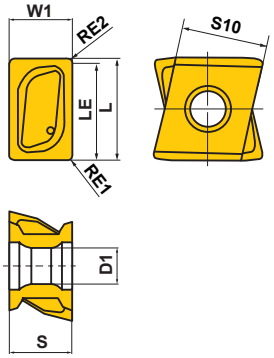
Honing :
E : Round

Shape	Order Number	Class	Honing	Coated VP15TF	Coated VP20RT	Coated UP20M	Carbide UTi20T	Dimensions (mm) L	W1	S	RE	Geometry
CBJP TAB	**JPMT060204-E**	M	E	●		●	●	6.5	7.94	2.38	0.4	 This figure is for outer insert (E).
SPX	**JPMX140412-JM**	M	E	●	●			14.3	12.7	4.79	1.2	
	JPMX190412-JM	M	E	●	●			19.05	12.7	4.83	1.2	
SPX	**JPMX140412-WH**	M	E	●	●			14.3	12.7	4.76	1.2	
	JPMX190412-WH	M	E	●	●			19.05	12.7	4.76	1.2	

Work Material			MP6120	VP15TF
	P	Steel	◐	◐
	M	Stainless Steel		◔
	K	Cast Iron		✠
	N	Non-ferrous Metal		
	S	Heat-resistant Alloy, Titanium Alloy		◐
	H	Hardened Steel		◔

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✠ : Unstable Cutting

Honing :
E : Round

Shape	Order Number	Class	Honing	Coated MP6120	Coated VP15TF	L	LE	S	S10	RE1	RE2	W1	D1	Geometry
						Dimensions (mm)								
VAS400 Side Cutter	**LNGU130804PNER-M**	G	E		●	13.0	12.2	8.0	11.0	0.4	0.8	8.0	4.5	
	LNGU130804PNEL-M	G	E		●	13.0	12.2	8.0	11.0	0.4	0.8	8.0	4.5	
	LNGU130808PNER-M	G	E		●	13.0	12.2	8.0	11.0	0.8	0.8	8.0	4.5	
	LNGU130808PNEL-M	G	E		●	13.0	12.2	8.0	11.0	0.8	0.8	8.0	4.5	
	LNGU130812PNER-M	G	E		●	13.0	12.2	8.0	11.0	1.2	0.8	8.0	4.5	
	LNGU130812PNEL-M	G	E		●	13.0	12.2	8.0	11.0	1.2	0.8	8.0	4.5	
	LNGU130816PNER-M	G	E		●	13.0	12.2	8.0	11.0	1.6	0.8	8.0	4.5	
	LNGU130816PNEL-M	G	E		●	13.0	12.2	8.0	11.0	1.6	0.8	8.0	4.5	
	LNGU130820PNER-M	G	E		●	13.0	12.2	8.0	11.0	2.0	0.8	8.0	4.5	
	LNGU130820PNEL-M	G	E		●	13.0	12.2	8.0	11.0	2.0	0.8	8.0	4.5	
	LNGU130824PNER-M	G	E		●	13.0	12.2	8.0	11.0	2.4	0.8	8.0	4.5	
	LNGU130824PNEL-M	G	E		●	13.0	12.2	8.0	11.0	2.4	0.8	8.0	4.5	
	LNGU130830PNER-M	G	E		●	13.0	11.4	8.0	11.0	3.0	1.6	8.0	4.5	
	LNGU130830PNEL-M	G	E		●	13.0	11.4	8.0	11.0	3.0	1.6	8.0	4.5	
	LNGU130840PNER-M	G	E		●	13.0	11.4	8.0	11.0	4.0	1.6	8.0	4.5	
	LNGU130840PNEL-M	G	E		●	13.0	11.4	8.0	11.0	4.0	1.6	8.0	4.5	
	LNGU130850PNER-M	G	E		●	13.0	11.4	8.0	11.0	5.0	1.6	8.0	4.5	
	LNGU130850PNEL-M	G	E		●	13.0	11.4	8.0	11.0	5.0	1.6	8.0	4.5	
VAS500 Side Cutter	**LNGU171004PNER-R**	G	E	●	●	17.0	16.2	10.0	13.0	0.4	0.8	10.0	5.5	
	LNGU171004PNEL-R	G	E	●	●	17.0	16.2	10.0	13.0	0.4	0.8	10.0	5.5	
	LNGU171008PNER-R	G	E	●	●	17.0	16.2	10.0	13.0	0.8	0.8	10.0	5.5	
	LNGU171008PNEL-R	G	E	●	●	17.0	16.2	10.0	13.0	0.8	0.8	10.0	5.5	
	LNGU171012PNER-R	G	E	●	●	17.0	16.2	10.0	13.0	1.2	0.8	10.0	5.5	
	LNGU171012PNEL-R	G	E	●	●	17.0	16.2	10.0	13.0	1.2	0.8	10.0	5.5	
	LNGU171016PNER-R	G	E	●	●	17.0	16.2	10.0	13.0	1.6	0.8	10.0	5.5	
	LNGU171016PNEL-R	G	E	●	●	17.0	16.2	10.0	13.0	1.6	0.8	10.0	5.5	
	LNGU171020PNER-R	G	E	●	●	17.0	16.2	10.0	13.0	2.0	0.8	10.0	5.5	
	LNGU171020PNEL-R	G	E	●	●	17.0	16.2	10.0	13.0	2.0	0.8	10.0	5.5	
	LNGU171024PNER-R	G	E	●	●	17.0	16.2	10.0	13.0	2.4	0.8	10.0	5.5	
	LNGU171024PNEL-R	G	E	●	●	17.0	16.2	10.0	13.0	2.4	0.8	10.0	5.5	
	LNGU171030PNER-R	G	E	●	●	17.0	15.4	10.0	13.0	3.0	1.6	10.0	5.5	
	LNGU171030PNEL-R	G	E	●	●	17.0	15.4	10.0	13.0	3.0	1.6	10.0	5.5	
	LNGU171040PNER-R	G	E	●	●	17.0	15.4	10.0	13.0	4.0	1.6	10.0	5.5	
	LNGU171040PNEL-R	G	E	●	●	17.0	15.4	10.0	13.0	4.0	1.6	10.0	5.5	
	LNGU171050PNER-R	G	E	●	●	17.0	15.4	10.0	13.0	5.0	1.6	10.0	5.5	
	LNGU171050PNEL-R	G	E	●	●	17.0	15.4	10.0	13.0	5.0	1.6	10.0	5.5	
	LNGU171060PNER-R	G	E	●	●	17.0	15.4	10.0	13.0	6.0	1.6	10.0	5.5	
	LNGU171060PNEL-R	G	E	●	●	17.0	15.4	10.0	13.0	6.0	1.6	10.0	5.5	
	LNGU171070PNER-R	G	E	●	●	17.0	15.4	10.0	13.0	7.0	1.6	10.0	5.5	
	LNGU171070PNEL-R	G	E	●	●	17.0	15.4	10.0	13.0	7.0	1.6	10.0	5.5	Right hand insert shown.

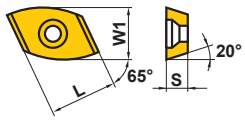
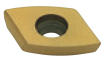
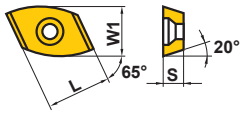
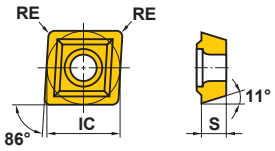
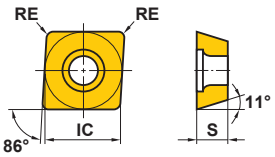
● : Inventory maintained in Japan.
(10 inserts in one case)

■ = MIRACLE SIGMA

Work Material			VP15TF	UP20M	NX2525	UTi20T	HTi10
	P	Steel	◐	◐	●	◐	
	M	Stainless Steel	◔	◔	○	◔	
	K	Cast Iron	✠		●	✠	◐
	N	Non-ferrous Metal					◐
	S	Heat-resistant Alloy, Titanium Alloy	◐				
	H	Hardened Steel	◔				

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✠ : Unstable Cutting

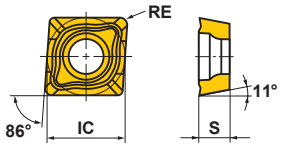
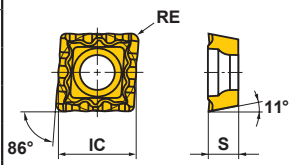
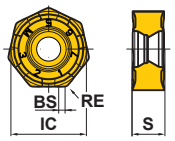
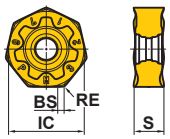
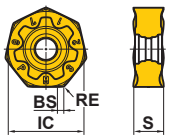
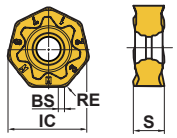
Honing :
E : Round **T** : Chamfer

Shape	Order Number	Class	Honing	Coated		Cermet	Carbide		Dimensions (mm)					Geometry
				VP15TF	UP20M	NX2525	UTi20T	HTi10	L	W1	IC	S	RE	
MG245 MG345 MG445	MGEEW1035AFTR	E	T		●	●	●	●	10	9	—	3.5	—	 This figure is for outer insert (E).
	MGEEW1242AFTR	E	T		●	●	●	●	12	10.5	—	4.2	—	
	MGEEW1650AFTR	E	T		●	●	●	●	16	13	—	5	—	
MG200 MG300 MG400 	MGEEW1035PFTR	E	T		●	●	●	●	10	9	—	3.5	—	
	MGEEW1242PFTR	E	T		●	●	●	●	12	10.5	—	4.2	—	
	MGEEW1650PFTR	E	T		●		●	●	16	13	—	5	—	
CBMP ECMP TAB	MPMT070308	M	E		●		●		—	—	7.94	3.18	0.8	
	MPMT090308	M	E	●	●		●		—	—	9.525	3.18	0.8	
	MPMT120408	M	E		●		●		—	—	12.7	4.76	0.8	
TSMP	MPMW070308	M	E				●		—	—	7.94	3.18	0.8	
	MPMW090308	M	E				●		—	—	9.525	3.18	0.8	
	MPMW120408	M	E				●		—	—	12.7	4.76	0.8	

Work Material			MP6120	MP6130	MP7130	MP7140	MC5020	VP15TF	VP20RT	MP7030
	P	Steel	◐	✠				◐	◐	
	M	Stainless Steel			◔	✠		◔	◔	◔
	K	Cast Iron					◐	✠	✠	
	N	Non-ferrous Metal								
	S	Heat-resistant Alloy, Titanium Alloy						◐		
	H	Hardened Steel						◔		

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting
✠ : Unstable Cutting

Honing :
E : Round

Shape	Order Number	Class	Honing	MP6120	MP6130	MP7130	MP7140	MC5020	VP15TF	VP20RT	MP7030	IC	S	BS	RE	Geometry
				Coated								Dimensions (mm)				
SPX	**MPMX120412-JM**	M	E						●	●		12.7	4.79	—	1.2	
SPX	**MPMX120412-WH**	M	E						●	●		12.7	4.76	—	1.2	
AHX440S AHX475S	**NNMU130508ZER-L**	M	E	●	●	●	●	●	●			13.4	5.77	1	0.8	
	NNMU130508ZEN-M	M	E	●	●	●	●	●	●			13.4	5.57	1	0.8	
	NNMU130532ZEN-M	M	E	●	●	●	●	●	●			13.4	5.57	—	3.2	
	NNMU130532ZEN-R	M	E	●	●	●	●	●	●			13.4	5.47	—	3.2	
AHX640S	**NNMU200708ZEN-M**	M	E	●	●							20	8	1	0.8	
AHX640S	**NNMU200708ZEN-MP**	M	E						●			20	8	1	0.8	
AHX640S	**NNMU200712ZER-MM**	M	E								●	20	8	1	1.2	

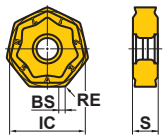
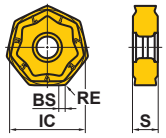
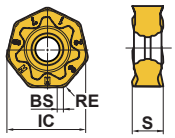
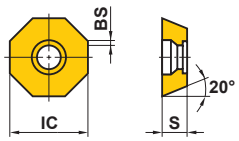
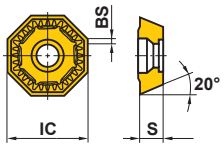
■ = MIRACLE SIGMA

● : Inventory maintained in Japan.
(10 inserts in one case)

Work Material		F7030	MP9120	MP9130	MC5020	VP15TF	VP20RT	NX4545
P	Steel	◐				◐	◐	◐
M	Stainless Steel	◔				◔	◔	◔
K	Cast Iron				◐	✣	✣	
N	Non-ferrous Metal							
S	Heat-resistant Alloy, Titanium Alloy		◐	✣		◐		
H	Hardened Steel					◔		

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting
✣ : Unstable Cutting

Honing :
E : Round **S** : Chamfer + Hone **T** : Chamfer

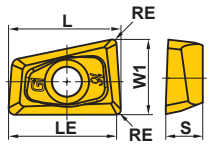
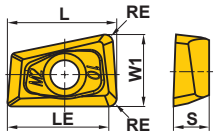
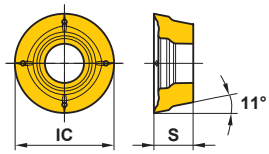
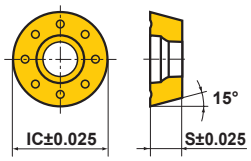
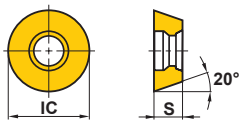
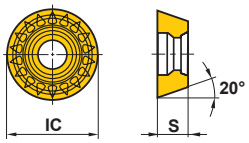
Shape	Order Number	Class	Honing	F7030	MP9120	MP9130	MC5020	VP15TF	VP20RT	NX4545	IC	S	BS	RE	Geometry
				Coated						Cermet	Dimensions (mm)				
AHX640S AHX640W	NNMU200608ZEN-MK	M	E				●	●	●		20	6.55	1	0.8	
AHX640S AHX640W	NNMU200608ZEN-HK	M	E				●	●	●		20	6.55	1	0.8	
AHX640S	NNMU200712ZER-L	M	E		●	●					20	8	1	1.2	
OCTACUT	OEMX12T3ETR1	M	T							●	12.7	3.97	1	—	
	OEMX12T3ESR1	M	S	●							12.7	3.97	1	—	
	OEMX1705ETR1	M	T					●		●	17	5	1.4	—	
	OEMX1705ESR1	M	S	●							17	5	1.4	—	
OCTACUT	OEMX12T3EER1-JS	M	E	●							12.7	3.97	1	—	
	OEMX1705EER1-JS	M	E	●							17	5	1.4	—	
	OEMX1705ETR1-JS	M	T					●			17	5	1.4	—	

■ = MIRACLE SIGMA

ROTATING TOOL INSERTS

Work Material		F7030	MC7020	MP6120	MP6130	MP7130	MP7140	MP9120	MP9130	VP15TF	VP30RT	MP8010	HTi10
P	Steel	◐		●	◐					◐	✱		
M	Stainless Steel	◔	◔			◔	◔			◔	✱		
K	Cast Iron									✱		●	◐
N	Non-ferrous Metal												◐
S	Heat-resistant Alloy, Titanium Alloy							◐	✱	◐			
H	Hardened Steel									◔		●	

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting
✱ : Unstable Cutting
Honing :
E : Round **F** : Sharp **S** : Chamfer + Hone

Shape	Order Number	Class	Honing	Coated											Carbide	Dimensions (mm)						Geometry
				F7030	MC7020	MP6120	MP6130	MP7130	MP7140	MP9120	MP9130	VP15TF	VP30RT	MP8010	HTi10	L	LE	W1	IC	S	RE	
AQX	QOGT0830R-G1	G	E ✱1			●				●		●			●	8.4	7.4	5.5	—	3	0.4	
	QOGT1035R-G1	G	E ✱1			●				●		●			●	10.6	9.2	7	—	3.5	0.4	
	QOGT1342R-G1	G	E ✱1			●				●		●			●	13.1	11.5	8.7	—	4.2	0.4	
	QOGT1651R-G1	G	E ✱1			●				●		●			●	16.5	14.5	11	—	5.1	0.4	
	QOGT1856R-G1	G	E ✱1			●				●		●			●	18	16	12	—	5.6	0.4	
	QOGT2062R-G1	G	E ✱1			●				●		●			●	20.4	18	13.6	—	6.2	0.4	
	QOGT2576R-G1	G	E ✱1			●				●		●			●	25.8	23	17.2	—	7.6	0.4	
AQX	QOMT0830R-M2	M	E			●	●	●	●	●		●	●			8.4	7.4	5.5	—	3	0.8	
	QOMT1035R-M2	M	E			●	●	●	●	●		●	●			10.6	9.2	7	—	3.5	0.8	
	QOMT1342R-M2	M	E			●	●	●	●	●		●	●			13.1	11.5	8.7	—	4.2	0.8	
	QOMT1651R-M2	M	E			●	●	●	●	●		●	●			16.5	14.5	11	—	5.1	0.8	
	QOMT1856R-M2	M	E			●	●	●	●	●		●	●			18	16	12	—	5.6	0.8	
	QOMT2062R-M2	M	E			●	●	●	●	●		●	●			20.4	18	13.6	—	6.2	0.8	
	QOMT2576R-M2	M	E			●	●	●	●	●		●	●			25.8	23	17.2	—	7.6	0.8	
ARP	RPHT1040M0E4-L	H	E		●			●			●					—	—	—	10	3.97	—	
	RPHT1040M0E4-M	H	E		●			●			●					—	—	—	10	3.97	—	
	RPHT1040M0E4-R	H	E		●			●			●					—	—	—	10	3.97	—	
	RPHT1248M0E4-L	H	E		●			●			●					—	—	—	12	4.76	—	
	RPHT1248M0E4-M	H	E		●			●			●					—	—	—	12	4.76	—	
	RPHT1248M0E4-R	H	E		●			●			●					—	—	—	12	4.76	—	
	RPMT1040M0E4-L	M	E		●			●			●					—	—	—	10	3.97	—	
	RPMT1040M0E4-M	M	E		●			●			●					—	—	—	10	3.97	—	
	RPMT1040M0E4-R	M	E		●			●			●					—	—	—	10	3.97	—	
	RPMT1248M0E4-L	M	E		●			●			●					—	—	—	12	4.76	—	
	RPMT1248M0E4-M	M	E		●			●			●					—	—	—	12	4.76	—	
	RPMT1248M0E4-R	M	E		●			●			●					—	—	—	12	4.76	—	
ARX	RDMW0517M0E	M	E									●		●		—	—	—	5	1.70	—	
	RDMW0620M0E	M	E									●		●		—	—	—	6	1.99	—	
	RDMW0724M0E	M	E									●		●		—	—	—	7	2.38	—	
OCTACUT	REMX1705SN	M	S	●												—	—	—	17.25	5.2	—	
OCTACUT	REMX12T3EN-JS	M	E	●												—	—	—	12.95	4.17	—	
	REMX1705EN-JS	M	E	●												—	—	—	17.25	5.2	—	

✱1 Grade HTi10 is "F".

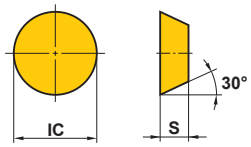
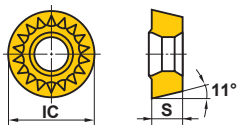
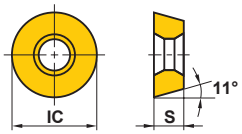
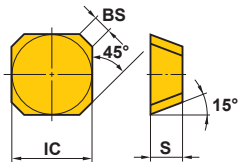
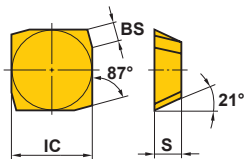
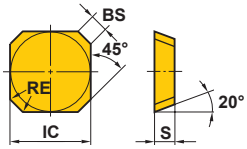
■ = MIRACLE SIGMA

● : Inventory maintained in Japan. ▲ : Inventory maintained in Japan. To be replaced by new products.
(10 inserts in one case)

Work Material		F7030	MC5020	VP15TF	UP20M	NX2525	NX4545	UTi20T	HTi10
P	Steel	◐		◐	◐	●	◐	◐	
M	Stainless Steel	◔		◔	◔	◔	◔	◔	
K	Cast Iron		◐	✣		●		✣	◐
N	Non-ferrous Metal								◐
S	Heat-resistant Alloy, Titanium Alloy			◐					
H	Hardened Steel			◐					

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✣ : Unstable Cutting

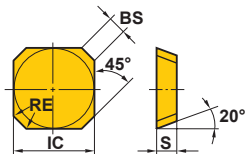
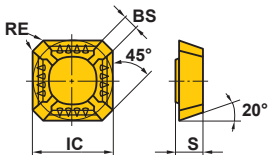
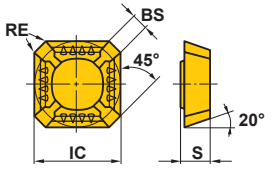
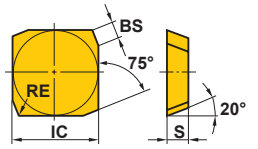
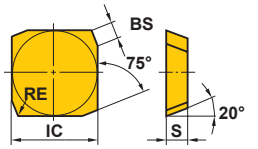
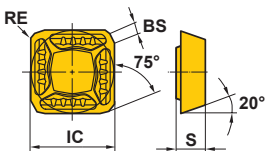
Honing :
E : Round **F** : Sharp **S** : Chamfer + Hone **T** : Chamfer

Shape	Order Number	Class	Honing	Coated				Cermet		Carbide		Dimensions (mm)				Geometry
				F7030	MC5020	VP15TF	UP20M	NX2525	NX4545	UTi20T	HTi10	IC	S	BS	RE	
SG20	RGEN2004M0EN	E	E			●						20	4.76	—	—	
	RGEN2004M0SN	E	S	●			●			●	●	20	4.76	—	—	
BRP	RPMT08T2M0E-JS	M	E	●		●						8	2.78	—	—	
	RPMT10T3M0E-JS	M	E	●		●						10	3.97	—	—	
	RPMT1204M0E-JS	M	E	●		●				●		12	4.76	—	—	
	RPMT1606M0E-JS	M	E	●		●						16	6.35	—	—	
BRP	RPMW08T2M0T	M	T			●						8	2.78	—	—	
	RPMW10T3M0E	M	E	●					●			10	3.97	—	—	
	RPMW10T3M0T	M	T			●						10	3.97	—	—	
	RPMW1204M0E	M	E	●					●	●		12	4.76	—	—	
	RPMW1204M0T	M	T			●						12	4.76	—	—	
	RPMW1606M0E	M	E	●						●		16	6.35	—	—	
	RPMW1606M0T	M	T			●						16	6.35	—	—	
FMSD	SDEN1203AEN	E	T						▲			12.7	3.18	1.2	—	
	SDKN1203AEN	K	T	▲		●		▲		▲		12.7	3.18	1.2	—	
	SDKN1203AETN	K	T						▲			12.7	3.18	1.7	—	
	SDKN1504AETN	K	T						▲			15.875	4.76	1.7	—	
FE404 E404	SEA42C10GR	A	F								▲	12.7	3.18	2.4	—	
	SEA42C10GL	A	F								▲	12.7	3.18	2.4	—	
SE445	SECN1203AFTN1	C	T						●			12.7	3.18	1.4	1.0	
	SEEN1203AFFN1	E	F								●	12.7	3.18	1.4	1.0	
	SEEN1203AFEN1	E	E			●						12.7	3.18	1.4	1.0	
	SEEN1203AFTN1	E	T					●	●			12.7	3.18	1.4	1.0	
	SEEN1203AFSN1	E	S	●	●							12.7	3.18	1.4	1.0	
	SEKN1203AFSN1	K	S	●								12.7	3.18	1.4	—	
	SEKN1203AFTN1	K	T							●		12.7	3.18	1.4	—	
	SEKN1203AFTN	K	T						●			12.7	3.18	1.7	1.0	

Work Material		F7030	MC5020	VP15TF	NX2525	NX4545	UTi20T	HTi10
P	Steel	◐		◐	●	◐	◐	
M	Stainless Steel	◔		◔	◯	◔	◔	
K	Cast Iron		◐	✠	●		✠	◐
N	Non-ferrous Metal							◐
S	Heat-resistant Alloy, Titanium Alloy			◐				
H	Hardened Steel			◔				

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✠ : Unstable Cutting

Honing :
E : Round **F** : Sharp **S** : Chamfer + Hone **T** : Chamfer

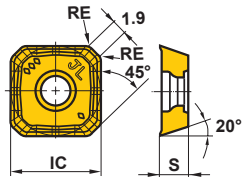
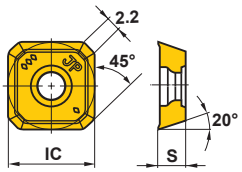
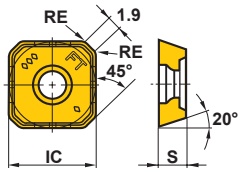
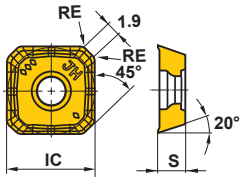
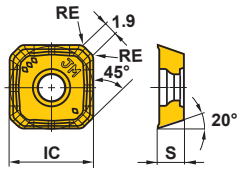
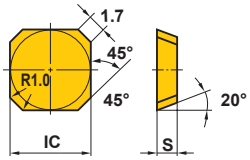
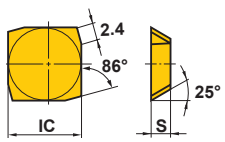
Shape	Order Number	Class	Honing	Coated F7030	Coated MC5020	Coated VP15TF	Cermet NX2525	Cermet NX4545	Carbide UTi20T	Carbide HTi10	IC	S	BS	RE	Geometry
SE545	SEEN1504AFEN1	E	E			●					15.875	4.76	1.4	1.0	
	SEEN1504AFTN1	E	T				●	●			15.875	4.76	1.4	1.0	
	SEEN1504AFSN1	E	S	●	●						15.875	4.76	1.4	1.0	
	SEKN1504AFSN1	K	S	●							15.875	4.76	1.4	—	
	SEKN1504AFTN1	K	T						●		15.875	4.76	1.4	—	
SE445	SEER1203AFEN-JS	E	E	●	●	●					12.7	3.18	1.4	1.0	
SE545	SEER1504AFEN-JS	E	E	●	●						15.875	4.76	1.4	1.0	
SE415 QSE415	SEEN1203EFFR1	E	F							●	12.7	3.18	1.4	1.0	
	SEEN1203EFER1	E	E			●					12.7	3.18	1.4	1.0	
	SEEN1203EFTR1	E	T				●	●			12.7	3.18	1.4	1.0	
	SEEN1203EFSR1	E	S	●	●						12.7	3.18	1.4	1.0	
	SEKN1203EFSR1	K	S	●							12.7	3.18	1.4	—	
	SEKN1203EFTR1	K	T						●		12.7	3.18	1.4	—	
	SEKN1203EFTR	K	T					●			12.7	3.18	1.8	1.0	Right hand insert shown.
SE515	SECN1504EFTR1	C	T					●			15.875	4.76	1.4	1.0	
	SEEN1504EFER1	E	E			●					15.875	4.76	1.4	1.0	
	SEEN1504EFTR1	E	T					●			15.875	4.76	1.4	1.0	
	SEEN1504EFSR1	E	S	●							15.875	4.76	1.4	1.0	
	SEKN1504EFSR1	K	S	●							15.875	4.76	1.4	—	
	SEKN1504EFTR1	K	T						●		15.875	4.76	1.4	—	Right hand insert shown.
SE415 QSE415	SEER1203EFER-JS	E	E	●	●						12.7	3.18	1.4	1.0	

● : Inventory maintained in Japan. □ : Non stock, produced to order only. ▲ : Inventory maintained in Japan. To be replaced by new products.
(10 inserts in one case)

Work Material		F7030	MC5020	MP6120	MP6130	MP7130	MP7140	MP9120	MP9130	VP15TF	VP30RT	NX4545	HTi10
P	Steel	◐		◐	✠					◐	✠	◐	
M	Stainless Steel	◔				◔	✠			◔	✠	◔	
K	Cast Iron		◐							✠			◐
N	Non-ferrous Metal												◐
S	Heat-resistant Alloy, Titanium Alloy							◐	✠	◐			
H	Hardened Steel									◔			

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✠ : Unstable Cutting

Honing :
E : Round F : Sharp
S : Chamfer + Hone T : Chamfer

Shape	Order Number	Class	Honing	F7030	MC5020	MP6120	MP6130	MP7130	MP7140	MP9120	MP9130	VP15TF	VP30RT	NX4545	HTi10	IC	S	RE	Geometry
				Coated										Cermet	Carbide	Dimensions (mm)			
ASX445	SEET13T3AGEN-JL	E	E	●		●	●	●	●	●	●	●	●	●		13.4	3.97	1.5	
ASX445	SEGT13T3AGFN-JP	G	F												●	13.4	3.97	—	
ASX445	SEMT13T3AGSN-FT	M	S		●											13.4	3.97	1.5	
ASX445	SEMT13T3AGSN-JH	M	S	●	●	●	●	●	●	●	●	●	●			13.4	3.97	1.5	
ASX445	SEMT13T3AGSN-JM	M	S	●	●	●	●	●	●	●	●	●	●	●		13.4	3.97	1.5	
Corner Angle 45°	SEKN1203AGTN	K	T											▲		12.7	3.18	—	
BF407 QBF407	SFAN1203ZFFR2	A	F												●	12.7	3.175	—	
	SFAN1203ZFFL2	A	F												●	12.7	3.175	—	
	SFCN1203ZFFR2	C	F												●	12.7	3.175	—	
	SFCN1203ZFFL2	C	F												□	12.7	3.175	—	

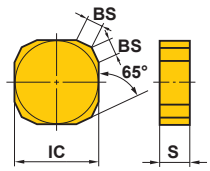
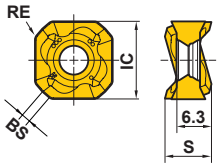
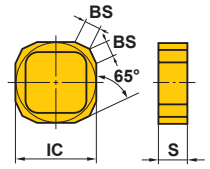
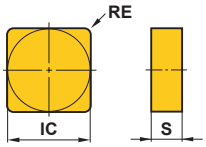
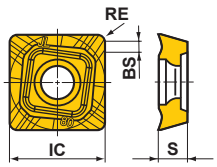
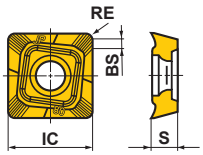
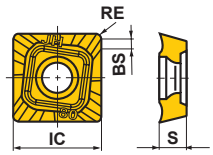
■ = MIRACLE SIGMA

ROTATING TOOL INSERTS

Work Material		F7030	MC5020	MP6120	MP6130	MP7130	MP7140	MP9120	MP9130	VP15TF	VP20RT	VP30RT	MX3030	NX2525	NX4545	UTi20T	HTi10	TF15
		Coated											Cermet			Carbide		
P	Steel	◐		◐	✠					◐	◐	✠	◐	●	◐	◐		
M	Stainless Steel	◔				◔	✠			◔	◔	✠	◔	○	◔	◔		
K	Cast Iron		◐							✠	✠		◐	●		✠	◐	
N	Non-ferrous Metal																◐	◐
S	Heat-resistant Alloy, Titanium Alloy							◐	✠	◐	◐							
H	Hardened Steel									◔								

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✠ : Unstable Cutting

Honing :
E : Round **F** : Sharp **T** : Chamfer

Shape	Order Number	Class	Honing	F7030	MC5020	MP6120	MP6130	MP7130	MP7140	MP9120	MP9130	VP15TF	VP20RT	VP30RT	MX3030	NX2525	NX4545	UTi20T	HTi10	TF15	IC	S	BS	RE	Geometry
BN425 DN	SNC43B2G	C	F																●		12.7	4.8	2	—	
	SNC43B2S	C	T *1														●	●			12.7	4.8	2	—	
	SNK43B2G	K	F															●	●		12.7	4.8	2	—	
	SNK43B2S	K	T *1													●	●	●			12.7	4.8	2	—	
WSX445	SNGU140812ANFR-L	G	F																	●	14	8.4	1.5	1.2	
	SNGU140812ANER-L	G	E		●	●	●	●	●	●	●	●	●		●						14	8.4	1.5	1.2	
	SNGU140812ANER-M	G	E		●	●	●	●	●	●	●	●	●		●						14	8.4	1.5	1.2	
	SNMU140812ANER-M	M	E		●	●	●	●	●	●	●	●	●		●						14	8.4	1.5	1.2	
	SNMU140812ANER-R	M	E		●	●	●					●	●								14	8.4	1.5	1.2	
	SNMU140812ANER-H	M	E		●	●	●					●	●								14	8.4	1.5	1.2	
	SNGU140812ANEL-M	G	E		●	●	●					●			●						14	8.4	1.5	1.2	
	SNMU140812ANEL-M	M	E		●	●	●					●			●						14	8.4	1.5	1.2	
	SNMU140812ANEL-R	M	E		●	●	●					●									14	8.4	1.5	1.2	Right hand insert shown.
BN425 DN	SNKF43B2S	K	T													●					12.7	4.8	2	—	
	SNMF43B2G	M	E		●																12.7	4.8	2	—	
	SNMN120408	M	E		●																12.7	4.78	—	0.8	
	SNMN120412	M	E		●																12.7	4.78	—	1.2	
ASX400	SOET12T308PEER-JL	E	E	●		●	●	●	●	●	●	●		●			●				12.7	3.97	1.4	0.8	
ASX400	SOGT12T308PEFR-JP	G	F																●		12.7	3.97	1.4	0.8	
ASX400	SOMT12T308PEER-JH	M	E	●	●	●	●	●	●	●	●	●									12.7	3.97	1.4	0.8	

*1 Grade UTi20T is "E".

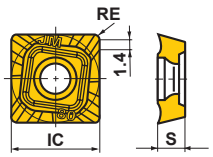
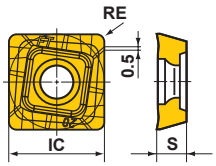
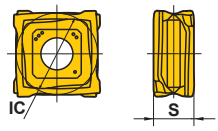
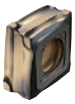
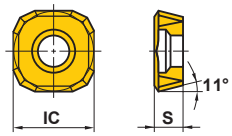
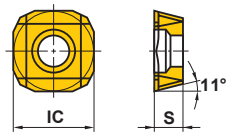
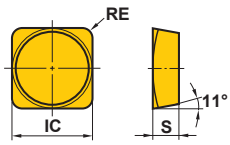
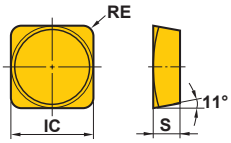
■ = MIRACLE SIGMA

● : Inventory maintained in Japan.
(10 inserts in one case)

Work Material			F7030	MC5020	MP6130	MP6130	MP7130	MP7140	MP9120	MP9130	VP15TF	VP30RT	NX2525	NX4545	HTi10	HTi05T
	P	Steel	◐		◐	✣					◐	✣	●	◐		
	M	Stainless Steel	◔				◔	✣			◔	✣	◔	◔		
	K	Cast Iron		◐							✣		●		◐	●
	N	Non-ferrous Metal													◐	●
	S	Heat-resistant Alloy, Titanium Alloy							◐	✣	◐					
	H	Hardened Steel									◐					

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✣ : Unstable Cutting

Honing :
E : Round **F** : Sharp

Shape	Order Number	Class	Honing	Coated										Cermet		Carbide		Dimensions (mm)			Geometry
				F7030	MC5020	MP6130	MP6130	MP7130	MP7140	MP9120	MP9130	VP15TF	VP30RT	NX2525	NX4545	HTi10	HTi05T	IC	S	RE	
ASX400 **ASX400** Side Cutter	**SOMT12T308PEER-JM**	M	E	●	●	●	●	●	●	●	●	●	●		●			12.7	3.97	0.8	 Right hand insert shown.
	SOMT12T308PEEL-JM	M	E									●						12.7	3.97	0.8	
ASX400	**SOMT12T320PEER-FT**	M	E		●	●				●	●	●						12.7	3.97	2.0	
VOX400 **VOS400** Side Cutter	**SONX1206PER**	N	E		●							●						12.7	6.3	—	 Right hand insert shown.
	SONX1206PEL	N	E									●						12.7	6.3	—	
																					
FF3000	**SPCA53Z**	C	E											●				15.88	4.8	—	
FF3000	**SPCG53Z**	C	F											●			●	15.88	4.8	—	
FP490	**SPEN424A**	E	F													●	●	12.7	3.18	1.6	
FP590	**SPEN535A**	E	F														●	15.875	4.76	2.0	

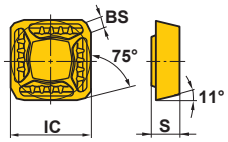
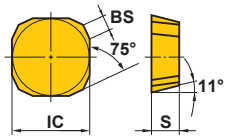
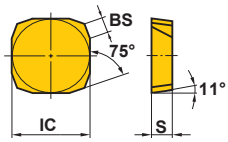
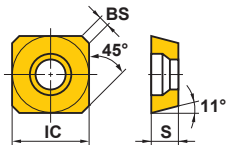
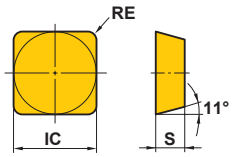
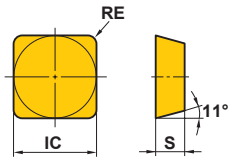
■ = MIRACLE SIGMA

ROTATING TOOL INSERTS

Work Material		F7030	MC5020	VP15TF	UP20M	NX2525	NX4545	UTi20T	HTi10
P	Steel	◐		◐	◐	●	◐	◐	
M	Stainless Steel	◔		◔	◔	◔	◔	◔	
K	Cast Iron		◐	✱		●		✱	◐
N	Non-ferrous Metal								◐
S	Heat-resistant Alloy, Titanium Alloy			◐					
H	Hardened Steel			◔					

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✱ : Unstable Cutting

Honing :
E : Round **F** : Sharp **T** : Chamfer

Shape	Order Number	Class	Honing	Coated				Cermet		Carbide		Dimensions (mm)				Geometry
				F7030	MC5020	VP15TF	UP20M	NX2525	NX4545	UTi20T	HTi10	IC	S	BS	RE	
FBP415	**SPER1203EEER-JS**	E	E		●							12.7	3.18	1.4	—	
Corner Angle 15°	**SPEN1203EDR**	E	T	▲				▲	▲			12.7	3.18	1.4	—	 Right hand insert shown.
	SPKN1203EDR	K	T✱1	▲	●	●		▲		▲	▲	12.7	3.18	1.4	—	
	SPKN1504EDR	K	T✱1			●	▲	▲		▲	▲	15.875	4.76	1.4	—	
FBP415	**SPEN1203EEER1**	E	E		●						●	12.7	3.175	1.4	—	 Right hand insert shown.
	SPEN1203EEEL1	E	E		●						●	12.7	3.175	1.4	—	
	SPNN1203EEER1	N	E		●						●	12.7	3.18	1.3	—	
	SPNN1203EEEL1	N	E								●	12.7	3.18	1.3	—	
BSP	**SPMB1204APT**	M	T				●			●		12.7	4.76	1.4	—	
S400	**SPMN120304**	M	E✱1			●				●	●	12.7	3.18	—	0.4	
	SPMN120304T	M	T					●				12.7	3.18	—	0.4	
	SPMN120308	M	E	●		●	●			●	●	12.7	3.18	—	0.8	
	SPMN120312	M	E✱1	●		●				●	●	12.7	3.18	—	1.2	
	SPMN120408	M	E		●					●	●	12.7	4.76	—	0.8	
	SPMN120412	M	E		●					●		12.7	4.76	—	1.2	
	SPGN120304	G	E✱1					●		●	●	12.7	3.18	—	0.4	
	SPGN120308	G	E✱1				●	●		●	●	12.7	3.18	—	0.8	
	SPGN120312	G	F								●	12.7	3.18	—	1.2	
S500	**SPMN150408**	M	E							●		15.875	4.76	—	0.8	
	SPMN150412	M	E							●		15.875	4.76	—	1.2	
	SPGN150404	G	E							●		15.875	4.76	—	0.4	
	SPGN150408	G	E✱1								●	15.875	4.76	—	0.8	

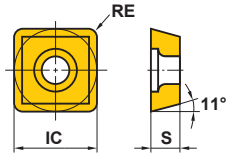
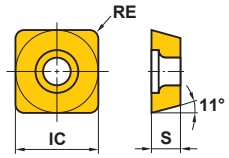
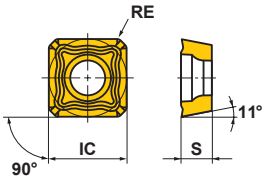
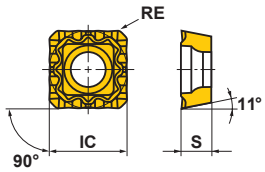
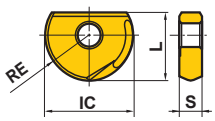
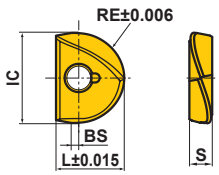
✱1 Grade HTi10 is "F".

● : Inventory maintained in Japan. ▲ : Inventory maintained in Japan. To be replaced by new products.
(10 inserts in one case)

Work Material			EP6120	VP15TF	VP20RT	UP20M	MP8010	NX2525	NX4545	UTi20T	HTi10
	P	Steel	◐	◐	◐	◐		●	◐	◐	
	M	Stainless Steel		◔	◔	◔		◯	◔	◔	
	K	Cast Iron		✠	✠		●	●		✠	◐
	N	Non-ferrous Metal	◐								◐
	S	Heat-resistant Alloy, Titanium Alloy		◐							
	H	Hardened Steel		◔			●				

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✠ : Unstable Cutting

Honing :
E : Round **F** : Sharp

Shape	Order Number	Class	Honing	Coated					Cermet		Carbide		Dimensions (mm)					Geometry
				EP6120	VP15TF	VP20RT	UP20M	MP8010	NX2525	NX4545	UTi20T	HTi10	L	IC	S	BS	RE	
TBE1	SPMT120408-A	M	E				▲				▲		—	12.7	4.76	—	0.8	
CESP CFSP CGSP S300 S400	SPMW090304	M	E *1		●		●		●	●	●	●	—	9.525	3.18	—	0.4	
	SPMW090308	M	E *1		●		●		●	●	●	●	—	9.525	3.18	—	0.8	
	SPMW120304	M	E *1		●		●		●	●	●	●	—	12.7	3.18	—	0.4	
	SPMW120308	M	E *1		●		●		●	●	●	●	—	12.7	3.18	—	0.8	
SPX	SPMX120408-JM	M	E		●	●							—	12.7	4.80	—	0.8	
SPX	SPMX120408-WH	M	E		●	●							—	12.7	4.76	—	0.8	
SRB	SRBT10	—	F		●								8.5	10	2.6	—	5	
	SRBT12	—	F		●								10	12	3	—	6	
	SRBT16	—	F		●								12	16	4	—	8	
	SRBT20	—	F		●								15	20	5	—	10	
	SRBT25	—	F		●								18.5	25	6	—	12.5	
	SRBT30	—	F		●								22.5	30	7	—	15	
	SRBT32	—	F		●								23.5	32	7	—	16	
SRF	* SRFT10	—	F	●	●			●					8.5	10	2.6	0.5	5	
	* SRFT12	—	F	●	●			●					10	12	3	0.5	6	
	* SRFT16	—	F	●	●			●					12	16	4	1	8	
	* SRFT20	—	F	●	●			●					15	20	5	1	10	
	* SRFT25	—	F	●	●			●					18.5	25	6	1	12.5	
	* SRFT30	—	F	●	●			●					22.5	30	7	1	15	
	* SRFT32	—	F	●	●			●					23.5	32	7	1	16	

* 2 inserts in one case.
*1 Grade NX2525 and NX4545 are "T".

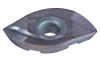
■ = MIRACLE SIGMA

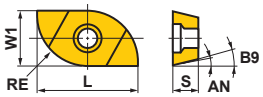
Work Material			MP6120	MP9120	VP15TF	VP20RT	VP30RT
	P	Steel	◐		◐	◐	✠
	M	Stainless Steel			◔	◔	✠
	K	Cast Iron			✠	✠	
	N	Non-ferrous Metal					
	S	Heat-resistant Alloy, Titanium Alloy		◐	◐		
	H	Hardened Steel			◐		

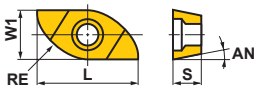
Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✠ : Unstable Cutting

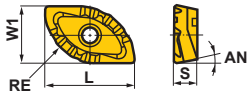
Honing :
E : Round

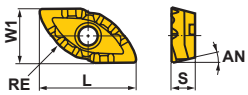
Shape	Order Number	Class	Honing	MP6120	MP9120	VP15TF	VP20RT	VP30RT	RE	L	W1	S	AN	B9	Geometry
				Coated					Dimensions (mm)						
SRM2	SRG16C	G	E	●	●	●			8	16	8.2	3.5	11°	—	
	SRG20C	G	E	●	●	●			10	19	10.2	4.6	10°	18°	
	SRG25C	G	E	●	●	●			12.5	24	12.8	5.5	10°	18°	
	SRG30C	G	E	●	●	●			15	28	15.3	7	10°	18°	
	SRG32C	G	E	●	●	●			16	28	16.3	7	10°	18°	
SRM2	SRG16E	G	E	●	●	●			8	13.5	6.7	3.5	11°	—	
	SRG20E	G	E	●	●	●			10	15.5	8.5	4.6	9°	—	
	SRG25E	G	E	●	●	●			12.5	20.5	10.2	5.5	9°	—	
	SRG30E	G	E	●	●	●			15	25.2	12.2	7	9°	—	
	SRG32E	G	E	●	●	●			16	26.1	13.1	7	9°	—	
SRM2ϕ40 ϕ50	* SRG40C	G	E			●	●	●	20	36	20.5	8.0	11°	—	
	* SRG50C	G	E			●	●	●	25	40	26	8.5	11°	—	
SRM2ϕ40 ϕ50	* SRG40E	G	E			●	●	●	20	32	16.6	8.0	11°	—	
	* SRG50E	G	E			●	●	●	25	35.8	20	8.5	11°	—	
SRM2	SRM16C-M	M	E	●	●	●			8	16	8.2	3.5	11°	—	
	SRM20C-M	M	E	●	●	●			10	19	10.2	4.6	10°	18°	
	SRM25C-M	M	E	●	●	●			12.5	24	12.8	5.5	10°	18°	
	SRM30C-M	M	E	●	●	●			15	28	15.3	7	10°	18°	
	SRM32C-M	M	E	●	●	●			16	28	16.3	7	10°	18°	
SRM2	SRM16E-M	M	E	●	●	●			8	13.5	6.7	3.5	11°	—	
	SRM20E-M	M	E	●	●	●			10	15.5	8.5	4.6	9°	—	
	SRM25E-M	M	E	●	●	●			12.5	20.5	10.2	5.5	9°	—	
	SRM30E-M	M	E	●	●	●			15	25.2	12.2	7	9°	—	
	SRM32E-M	M	E	●	●	●			16	26.1	13.1	7	9°	—	

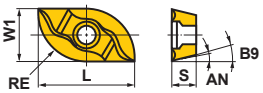












* 2 inserts in one case.

■ = MIRACLE SIGMA

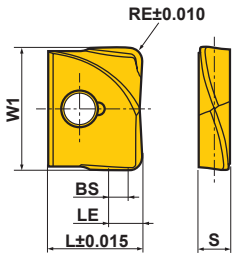
● : Inventory maintained in Japan.
(10 inserts in one case)

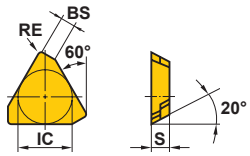
Work Material		F7030	MC5020	VP15TF	UP20M	MP8010	NX2525	NX4545	UTi20T	HTi10
P	Steel	◐		◐	◐		●	◐	◐	
M	Stainless Steel	◔		◔	◔		○	◔	◔	
K	Cast Iron		◐	✱		●	●		✱	◐
N	Non-ferrous Metal									◐
S	Heat-resistant Alloy, Titanium Alloy			◐						
H	Hardened Steel			◔		●				

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✱ : Unstable Cutting

Honing :
E : Round **F** : Sharp **S** : Chamfer + Hone **T** : Chamfer

Shape	Order Number	Class	Honing	Coated					Cermet		Carbide		Dimensions (mm)							Geometry
				F7030	MC5020	VP15TF	UP20M	MP8010	NX2525	NX4545	UTi20T	HTi10	W1	LE	IC	L	S	BS	RE	
SUF	* SUFT10R05	—	F			●		●					10	1.5	—	8.5	2.6	1	0.5	
	* SUFT10R10	—	F			●		●					10	2	—	8.5	2.6	1	1	
	* SUFT10R20	—	F			●		●					10	3	—	8.5	2.6	1	2	
	* SUFT12R05	—	F			●		●					12	1.7	—	10	3	1.2	0.5	
	* SUFT12R10	—	F			●		●					12	2.2	—	10	3	1.2	1	
	* SUFT12R20	—	F			●		●					12	3.2	—	10	3	1.2	2	
	* SUFT12R30	—	F			●		●					12	4.2	—	10	3	1.2	3	
	* SUFT16R05	—	F			●		●					16	2.1	—	12	4	1.6	0.5	
	* SUFT16R10	—	F			●		●					16	2.6	—	12	4	1.6	1	
	* SUFT16R15	—	F			●		●					16	3.1	—	12	4	1.6	1.5	
	* SUFT16R20	—	F			●		●					16	3.6	—	12	4	1.6	2	
	* SUFT16R30	—	F			●		●					16	4.6	—	12	4	1.6	3	
	* SUFT20R05	—	F			●		●					20	2.5	—	15	5	2	0.5	
	* SUFT20R10	—	F			●		●					20	3	—	15	5	2	1	
	* SUFT20R15	—	F			●		●					20	3.5	—	15	5	2	1.5	
	* SUFT20R20	—	F			●		●					20	4	—	15	5	2	2	
	* SUFT20R30	—	F			●		●					20	5	—	15	5	2	3	
	* SUFT25R05	—	F			●		●					25	3	—	18.5	6	2.5	0.5	
	* SUFT25R10	—	F			●		●					25	3.5	—	18.5	6	2.5	1	
	* SUFT25R20	—	F			●		●					25	4.5	—	18.5	6	2.5	2	
	* SUFT25R30	—	F			●		●					25	5.5	—	18.5	6	2.5	3	
	* SUFT30R05	—	F			●		●					30	3.5	—	22.5	7	3	0.5	
	* SUFT30R10	—	F			●		●					30	4	—	22.5	7	3	1	
	* SUFT30R20	—	F			●		●					30	5	—	22.5	7	3	2	
	* SUFT30R30	—	F			●		●					30	6	—	22.5	7	3	3	
	* SUFT32R05	—	F			●		●					32	3.7	—	23.5	7	3.2	0.5	
	* SUFT32R10	—	F			●		●					32	4.2	—	23.5	7	3.2	1	
	* SUFT32R20	—	F			●		●					32	5.2	—	23.5	7	3.2	2	
NSE300 SE300	TEEN1603PEFR1	E	F									●	—	—	9.525	—	3.175	1.4	0.4	
	TEEN1603PEER1	E	E			●						●	—	—	9.525	—	3.175	1.4	0.4	
	TEEN1603PETR1	E	T				●		●	●	●		—	—	9.525	—	3.175	1.4	0.4	
	TEEN1603PESR1	E	S	●	●								—	—	9.525	—	3.175	1.4	0.4	



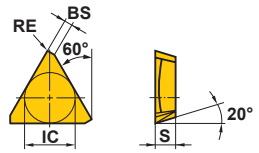
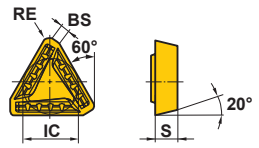
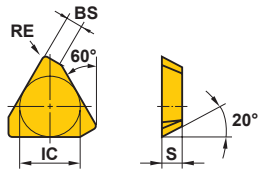
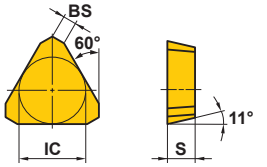
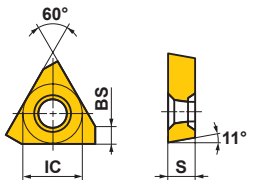


* 2 inserts in one case.

Work Material		F7030	MC5020	VP15TF	UP20M	AP10H	NX2525	NX4545	UTi20T	HTi10
P	Steel	◐		◐	◐		●	◐	◐	
M	Stainless Steel	◔		◔	◔		○	◔	◔	
K	Cast Iron		◐	✱		◐	●		✱	◐
N	Non-ferrous Metal									◐
S	Heat-resistant Alloy, Titanium Alloy			◐						
H	Hardened Steel			◔						

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✱ : Unstable Cutting

Honing :
E : Round **F** : Sharp **S** : Chamfer + Hone **T** : Chamfer

Shape	Order Number	Class	Honing	Coated					Cermet		Carbide		Dimensions (mm)				Geometry
				F7030	MC5020	VP15TF	UP20M	AP10H	NX2525	NX4545	UTi20T	HTi10	IC	S	BS	RE	
NSE300 SE300	TECN1603PEFR1W	C	F									●	9.525	3.175	1.4	0.4	
	TECN1603PEER1W	C	E									●	9.525	3.175	1.4	0.4	
	TECN1603PETR1W	C	T						●	●	●		9.525	3.175	1.4	0.4	
NSE300 NSE400	TEER1603PEER-JS	E	E	●							●		9.525	3.175	1.4	0.4	Wall face finishing. 
	TEER2204PEER-JS	E	E	●							●		12.7	4.76	1.4	1.0	
NSE400 SE400	TECN2204PEFR1	C	F									●	12.7	4.76	1.4	1.0	
	TECN2204PEER1	C	E									●	12.7	4.76	1.4	1.0	
	TECN2204PETR1	C	T						●	●	●		12.7	4.76	1.4	1.0	
	TEEN2204PEFR1	E	F									●	12.7	4.76	1.4	1.0	
	TEEN2204PEER1	E	E			●						●	12.7	4.76	1.4	1.0	
	TEEN2204PETR1	E	T				●		●	●	●		12.7	4.76	1.4	1.0	
	TEEN2204PESR1	E	S	●	●								12.7	4.76	1.4	1.0	
	TEKN2204PEER1	K	E									●	12.7	4.76	1.94	—	
	TEKN2204PESR1	K	S	●									12.7	4.76	1.94	—	
	TEKN2204PETR1	K	T				●		●		●		12.7	4.76	1.94	—	
	TEKN2204PETR	K	T							●			12.7	4.76	1.94	—	Right hand insert shown.
	TPEN1603PPR	E	T	▲					▲				9.525	3.18	1.2	—	
	TPKN1603PPR	K	T *1	▲		●	▲		▲	▲	▲	▲	9.525	3.18	1.2	—	
	TPEN2204PDR	E	T *1	▲									12.7	4.76	1.4	—	
	TPKN2204PDR	K	T *1	▲		●	▲		▲	▲	▲	▲	12.7	4.76	1.4	—	
PMF	TPEW1303ZPER2	E	E			●		●					7.94	3.18	2	—	

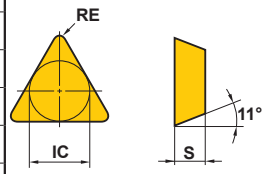
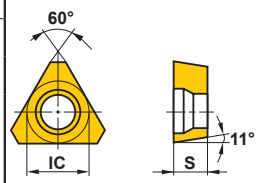
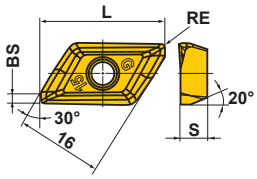
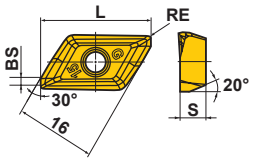
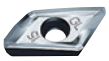
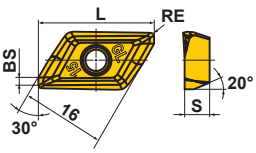
*1 Grade F7030 is "E".

● : Inventory maintained in Japan. ▲ : Inventory maintained in Japan. To be replaced by new products.
(10 inserts in one case)

Work Material			F7030	VP15TF	LC15TF	UP20M	NX2525	UTi20T	HTi10	TF15
	P	Steel	◐	◐		◐	●	◐		
	M	Stainless Steel	◐	◐		◐	○	◐		
	K	Cast Iron		✱			●	✱	◐	
	N	Non-ferrous Metal			◐				◐	◐
	S	Heat-resistant Alloy, Titanium Alloy		◐						
	H	Hardened Steel		◐						

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✱ : Unstable Cutting

Honing :
E : Round **F** : Sharp

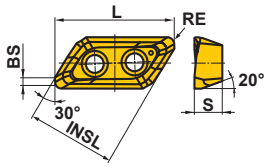
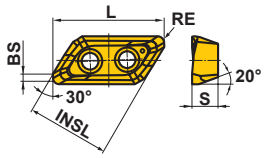
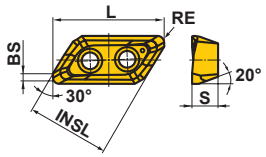
Shape	Order Number	Class	Honing	Coated F7030	Coated VP15TF	Coated LC15TF	Coated UP20M	Cermet NX2525	Carbide UTi20T	Carbide HTi10	Carbide TF15	Dimensions (mm) L	IC	S	BS	RE	Geometry
11°Positive	TPMN160304	M	E*1	●	●		●	●	●	●		—	9.525	3.18	—	0.4	
	TPMN160308	M	E*2	●	●		●	●	●	●		—	9.525	3.18	—	0.8	
	TPMN160312	M	E*1				●			●		—	9.525	3.18	—	1.2	
	TPMN220404	M	E						●			—	12.7	4.76	—	0.4	
	TPMN220408	M	E*1	●	●		●		●	●		—	12.7	4.76	—	0.8	
	TPMN220412	M	E*1	●	●				●	●		—	12.7	4.76	—	1.2	
VIPER	TPNX1605N	N	E						●			—	9.525	5	—	—	
BXD4000	XDGT1550PDER-G04	G	E		●							22	—	5	1.5	0.4	
	XDGT1550PDER-G08	G	E		●							22	—	5	1.1	0.8	
	XDGT1550PDER-G12	G	E		●							22	—	5	0.7	1.2	
	XDGT1550PDER-G16	G	E		●							22	—	5	0.4	1.6	
	XDGT1550PDER-G20	G	E		●							21.7	—	5	0.2	2.0	
	XDGT1550PDER-G30	G	E		●							20	—	5	0.6	3.0	
	XDGT1550PDER-G32	G	E		●							20	—	5	0.4	3.2	
	XDGT1550PDER-G40	G	E		●							19	—	5	0.5	4.0	
	XDGT1550PDER-G50	G	E		●							18	—	5	0.4	5.0	
BXD4000	XDGT1550PDFR-G04	G	F			●					●	22	—	5	1.5	0.4	
	XDGT1550PDFR-G08	G	F			●					●	22	—	5	1.1	0.8	
	XDGT1550PDFR-G12	G	F			●					●	22	—	5	0.7	1.2	
	XDGT1550PDFR-G16	G	F			●					●	22	—	5	0.4	1.6	
	XDGT1550PDFR-G20	G	F			●					●	21.7	—	5	0.2	2.0	
	XDGT1550PDFR-G30	G	F			●					●	20	—	5	0.6	3.0	
	XDGT1550PDFR-G32	G	F			●					●	20	—	5	0.4	3.2	
	XDGT1550PDFR-G40	G	F			●					●	19	—	5	0.5	4.0	
	XDGT1550PDFR-G50	G	F			●					●	18	—	5	0.4	5.0	
BXD4000 	XDGT1550PDFR-GL04	G	F								●	22	—	5	1.5	0.4	
	XDGT1550PDFR-GL08	G	F								●	22	—	5	1.1	0.8	

*1 Grade HTi10 is "F".
*2 Grade HTi10 is "F", Grade NX2525 is "T".

Work Material			LC15TF	MP6120	MP9120	TF15
	P	Steel		●		
	M	Stainless Steel				
	K	Cast Iron				
	N	Non-ferrous Metal	◐		✣	◐
	S	Heat-resistant Alloy, Titanium Alloy			◐	
	H	Hardened Steel				

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✣ : Unstable Cutting

Honing :
E : Round **F** : Sharp

Shape	Order Number	Class	Honing	Coated LC15TF	Coated MP6120	Coated MP9120	Carbide TF15	Dimensions (mm) L	INSL	S	BS	RE	Geometry
AXD4000	**XDGX175004PDFR-GL**	G	F	●			●	23.0	17.5	5	1.7	0.4	
	XDGX175008PDFR-GL	G	F	●			●	23.0	17.5	5	1.3	0.8	
	XDGX175012PDFR-GL	G	F	●			●	23.0	17.5	5	0.9	1.2	
	XDGX175016PDFR-GL	G	F	●			●	22.0	17.5	5	1.4	1.6	
	XDGX175020PDFR-GL	G	F	●			●	22.0	17.5	5	1.0	2.0	
	XDGX175024PDFR-GL	G	F	●			●	22.0	17.5	5	0.6	2.4	
	XDGX175030PDFR-GL	G	F	●			●	21.1	17.5	5	0.8	3.0	
	XDGX175032PDFR-GL	G	F	●			●	21.1	17.5	5	0.6	3.2	
	XDGX175040PDFR-GL	G	F	●			●	20.0	17.5	5	0.8	4.0	
	XDGX175050PDFR-GL	G	F	●			●	19.4	17.5	5	0.4	5.0	
AXD7000	**XDGX227008PDFR-GL**	G	F	●			●	30.0	22.5	7	2.0	0.8	
	XDGX227016PDFR-GL	G	F	●			●	30.0	22.5	7	1.2	1.6	
	XDGX227020PDFR-GL	G	F	●			●	30.0	22.5	7	0.8	2.0	
	XDGX227024PDER-GL	G	F	●			●	30.0	22.5	7	0.8	2.4	
	XDGX227030PDFR-GL	G	F	●			●	28.8	22.5	7	0.8	3.0	
	XDGX227032PDFR-GL	G	F	●			●	28.8	22.5	7	0.6	3.2	
	XDGX227040PDFR-GL	G	F	●			●	27.5	22.5	7	0.9	4.0	
	XDGX227050PDFR-GL	G	F	●			●	27.0	22.5	7	0.4	5.0	
AXD7000	**XDGX227008PDER-GLA**	G	E		●	●		30.0	22.5	7	2.0	0.8	
	XDGX227016PDER-GLA	G	E		●	●		30.0	22.5	7	1.2	1.6	
	XDGX227020PDER-GLA	G	E		●	●		30.0	22.5	7	0.8	2.0	
	XDGX227024PDER-GLA	G	E		●	●		30.0	22.5	7	0.8	2.4	
	XDGX227030PDER-GLA	G	E		●	●		28.8	22.5	7	0.8	3.0	
	XDGX227032PDER-GLA	G	E		●	●		28.8	22.5	7	0.6	3.2	
	XDGX227040PDER-GLA	G	E		●	●		27.5	22.5	7	0.9	4.0	
	XDGX227050PDER-GLA	G	E		●	●		27.0	22.5	7	0.4	5.0	

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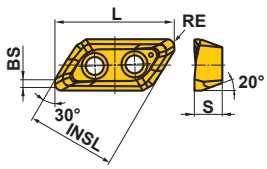
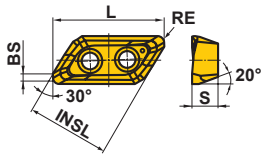
● : Inventory maintained in Japan.
(10 inserts in one case)

Work Material			MP6120	MP9120	TF15
	P	Steel	●		
	M	Stainless Steel			
	K	Cast Iron			
	N	Non-ferrous Metal		✠	◐
	S	Heat-resistant Alloy, Titanium Alloy		◐	
	H	Hardened Steel			

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✠ : Unstable Cutting

Honing :
E : Round **F** : Sharp

Shape	Order Number	Class	Honing	Coated MP6120	Coated MP9120	Carbide TF15	L	INSL	S	BS	RE	Geometry
AXD4000	**XDGX175004PDER-GM**	G	E	●	●		23.0	17.5	5	1.7	0.4	
	XDGX175008PDER-GM	G	E	●	●		23.0	17.5	5	1.3	0.8	
	XDGX175012PDER-GM	G	E	●	●		23.0	17.5	5	0.9	1.2	
	XDGX175016PDER-GM	G	E	●	●		22.0	17.5	5	1.4	1.6	
	XDGX175020PDER-GM	G	E	●	●		22.0	17.5	5	1.0	2.0	
	XDGX175024PDER-GM	G	E	●	●		22.0	17.5	5	0.6	2.4	
	XDGX175030PDER-GM	G	E	●	●		21.1	17.5	5	0.8	3.0	
	XDGX175032PDER-GM	G	E	●	●		21.1	17.5	5	0.6	3.2	
	XDGX175040PDER-GM	G	E	●	●		20.0	17.5	5	0.5	4.0	
	XDGX175050PDER-GM	G	E	●	●		19.4	17.5	5	0.4	5.0	
AXD4000	**XDGX175004PDFR-GM**	G	F			●	23.0	17.5	5	1.7	0.4	
	XDGX175008PDFR-GM	G	F			●	23.0	17.5	5	1.3	0.8	
	XDGX175012PDFR-GM	G	F			●	23.0	17.5	5	0.9	1.2	
	XDGX175016PDFR-GM	G	F			●	22.0	17.5	5	1.4	1.6	
	XDGX175020PDFR-GM	G	F			●	22.0	17.5	5	1.0	2.0	
	XDGX175024PDFR-GM	G	F			●	22.0	17.5	5	0.6	2.4	
	XDGX175030PDFR-GM	G	F			●	21.1	17.5	5	0.8	3.0	
	XDGX175032PDFR-GM	G	F			●	21.1	17.5	5	0.6	3.2	
	XDGX175040PDFR-GM	G	F			●	20.0	17.5	5	0.5	4.0	
	XDGX175050PDFR-GM	G	F			●	19.4	17.5	5	0.4	5.0	

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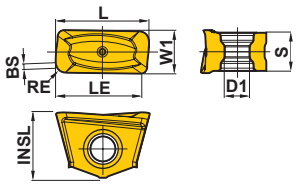
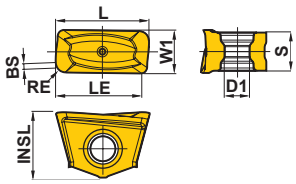
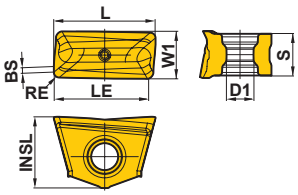
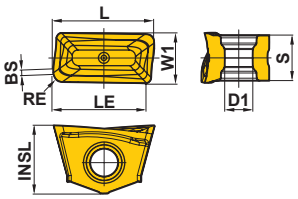
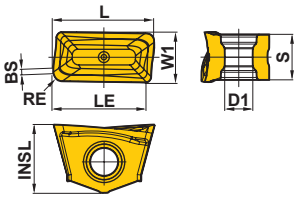
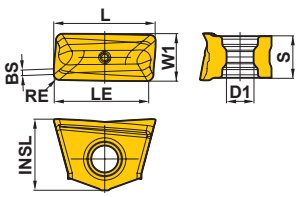
Work Material				
	P	Steel		
	M	Stainless Steel		
	K	Cast Iron		
	N	Non-ferrous Metal		
	S	Heat-resistant Alloy, Titanium Alloy	◐	◐
	H	Hardened Steel		

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✱ : Unstable Cutting

Honing :
E : Round

Shape	Order Number	Class	Honing	Coated MP9030	Coated MP9130	L	LE	W1	INSL	S	BS	RE	D1	Geometry
VFX5	XNMU160708R-MS	M	E	●	●	16.0	13.4	7.0	11.1	6.5	1.0	0.8	4.2	
	XNMU160712R-MS	M	E	●	●	16.0	13.8	7.0	11.1	6.5	1.0	1.2	4.2	
	XNMU160716R-MS	M	E	●	●	16.0	13.8	7.0	11.1	6.5	1.0	1.6	4.2	
	XNMU160724R-MS	M	E	●	●	16.0	13.8	7.0	11.1	6.5	1.0	2.4	4.2	
	XNMU160732R-MS	M	E	●	●	17.3	14.4	7.0	11.1	6.5	—	3.2	4.2	
	XNMU160740R-MS	M	E	●	●	18.9	15.2	7.0	11.1	6.5	—	4.0	4.2	
VFX5	XNMU160708R-HS	M	E	●	●	16.0	13.4	7.0	11.1	6.5	1.0	0.8	4.2	
VFX5	XNMU160708R-LS	M	E		●	16.0	13.4	7.0	11.1	6.5	1.0	0.8	4.2	
VFX6	XNMU190912R-MS	M	E	●	●	19.1	16.5	9.5	12.7	8.5	1.0	1.2	5.2	
	XNMU190916R-MS	M	E	●	●	19.1	16.5	9.5	12.7	8.5	1.0	1.6	5.2	
	XNMU190924R-MS	M	E	●	●	19.1	16.6	9.5	12.7	8.5	1.0	2.4	5.2	
	XNMU190932R-MS	M	E	●	●	20.2	17.1	9.5	12.7	8.5	—	3.2	5.2	
	XNMU190940R-MS	M	E	●	●	21.8	17.8	9.5	12.7	8.5	—	4.0	5.2	
	XNMU190950R-MS	M	E	●	●	21.8	17.8	9.5	12.7	8.5	—	5.0	5.2	
VFX6	XNMU190912R-HS	M	E	●	●	19.1	16.5	9.5	12.7	8.5	1.0	1.2	5.2	
VFX6	XNMU190912R-LS	M	E		●	19.1	16.5	9.5	12.7	8.5	1.0	1.2	5.2	

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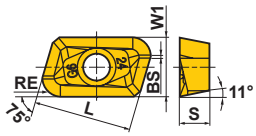
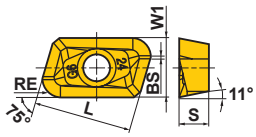
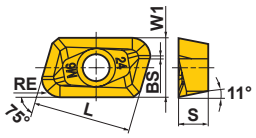
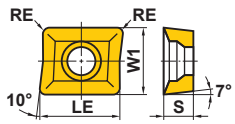
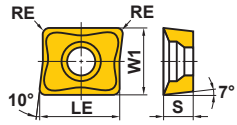
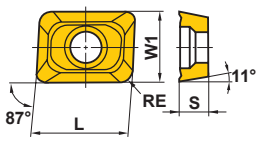
● : Inventory maintained in Japan.
(10 inserts in one case)

Work Material		F7030	VP15TF	UP20M	HTi10	UTi20T
P	Steel	◐	◐	◐		◐
M	Stainless Steel	◔	◔	◔		◔
K	Cast Iron		✣		◐	✣
N	Non-ferrous Metal				◐	
S	Heat-resistant Alloy, Titanium Alloy		◐			
H	Hardened Steel		◔			

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✣ : Unstable Cutting

Honing :
E : Round **F** : Sharp

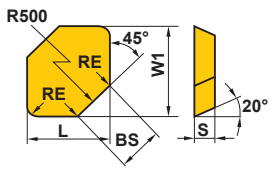
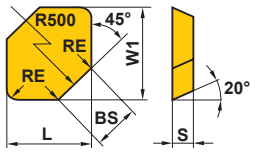
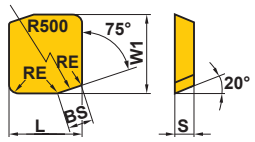
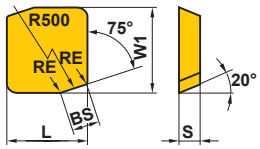
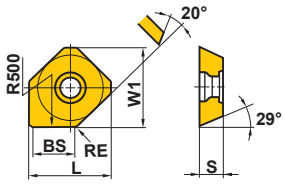
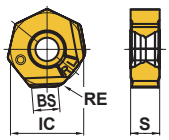
Shape	Order Number	Class	Honing	Coated F7030	Coated VP15TF	Coated UP20M	Carbide HTi10	Carbide UTi20T	L	W1	S	BS	RE	Geometry
BAP3500	XPGT13T3PDER-G1	G	E		●				13	7.9	3.97	1.6	0.4	
	XPGT13T3PDER-G2	G	E		●				13	7.9	3.97	1.2	0.8	
	XPGT13T3PDER-G6	G	E		●				13	7.9	3.97	0.4	2.4	
	XPGT13T3PDER-G75	G	E		●				13	7.9	3.97	0.4	3.0	
	XPGT13T3PDER-G8	G	E		●				13	7.9	3.97	0.4	3.2	
BAP3500	XPGT13T3PDFR-G1	G	F				●		13	7.9	3.97	1.6	0.4	
	XPGT13T3PDFR-G2	G	F				●		13	7.9	3.97	1.2	0.8	
	XPGT13T3PDFR-G6	G	F				●		13	7.9	3.97	0.4	2.4	
	XPGT13T3PDFR-G75	G	F				●		13	7.9	3.97	0.4	3.0	
	XPGT13T3PDFR-G8	G	F				●		13	7.9	3.97	0.4	3.2	
BAP3500	XPMT13T3PDER-M1	M	E	●	●				13	7.9	3.97	1.6	0.4	
	XPMT13T3PDER-M2	M	E	●	●				13	7.9	3.97	1.2	0.8	
	XPMT13T3PDER-M6	M	E	●	●				13	7.9	3.97	0.4	2.4	
	XPMT13T3PDER-M75	M	E	●	●				13	7.9	3.97	0.4	3.0	
	XPMT13T3PDER-M8	M	E	●	●				13	7.9	3.97	0.4	3.2	
DCCC	ZCMX083508ER-A	M	E	●				●	10.4	7.94	3.5	—	0.8	
	ZCMX09T308ER-A	M	E	●	●	●		●	12	9.525	3.97	—	0.8	
DCCC	ZCMX09T308ER-B	M	E	●		●		●	12	9.525	3.97	—	0.8	
BAP300 Under-cut type	ZRM0603R-M3	M	E		●				8.5	6.35	3.18	—	1.2	
	ZRM0603R-M4	M	E		●				8.5	6.35	3.18	—	1.6	
	ZRM0603R-M5	M	E		●				8.5	6.35	3.18	—	2.0	

WIPER INSERT

Work Material		MP6120	MC5020	VP15TF	NX2525	VP25N	HTi05T
P	Steel	◐		◐	●	●	
M	Stainless Steel			◐	◐		
K	Cast Iron		◐	✠	●	●	●
N	Non-ferrous Metal						●
S	Heat-resistant Alloy, Titanium Alloy			◐			
H	Hardened Steel			◐			

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✠ : Unstable Cutting

Honing :
E : Round **T** : Chamfer

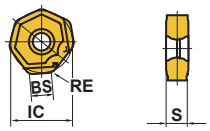
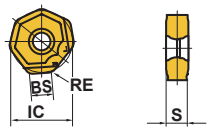
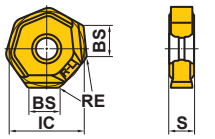
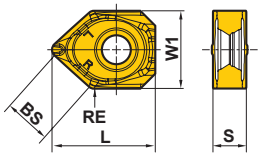
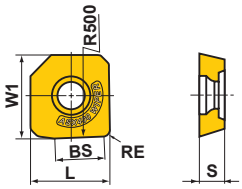
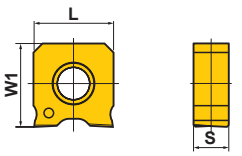
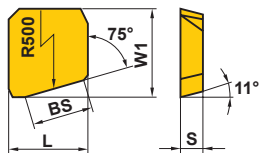
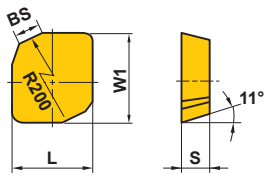
Shape	Order Number	Class	Honing	Coated MP6120	Coated MC5020	Coated VP15TF	Cermet NX2525	Coated Cermet VP25N	Carbide HTi05T	Dimensions (mm) L	W1	IC	S	BS	RE	Geometry
SE445	WEC42AFTR5C	C	T				●			12.7	15.33	—	3.18	5	1.0	 Right hand insert shown.
SE545	WEC53AFER5C	C	E						●	15.875	18.505	—	4.76	5	1.0	 Right hand insert shown.
	WEC53AFTR5C	C	T				●			15.875	18.505	—	4.76	5	1.0	
SE415	WEC42EFER5C	C	E						●	12.7	13.728	—	3.18	5	1.0	 Right hand insert shown.
	WEC42EFTR5C	C	T				●			12.7	13.728	—	3.18	5	1.0	
SE515	WEC53EFTR5C	C	T				●			15.875	16.903	—	4.76	5	1.0	 Right hand insert shown.
ASX445	WEEW13T3AGER8C	E	E		●	●			●	16.48	16.6	—	3.97	7.5	1.5	
	WEEW13T3AGTR8C	E	T				●	●		16.48	16.6	—	3.97	7.5	1.5	
AHX440S	WNEU1305ZEN4C-M	E	E	●	●	●				—	—	13.4	5.1	4	2.7	

● : Inventory maintained in Japan. ▲ : Inventory maintained in Japan. To be replaced by new products.
(10 inserts in one case)

Work Material		MC5020	MP6120	VP15TF	NX2525	HTi10	HTi05T
P	Steel		◐	◐	●		
M	Stainless Steel			◐	◐		
K	Cast Iron	◐		✣	●	◐	●
N	Non-ferrous Metal					◐	●
S	Heat-resistant Alloy, Titanium Alloy			◐			
H	Hardened Steel			◐			

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✣ : Unstable Cutting

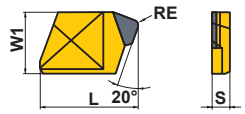
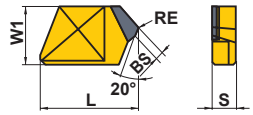
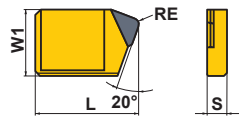
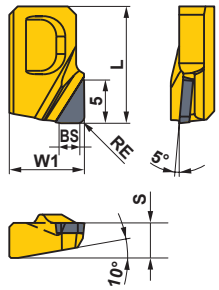
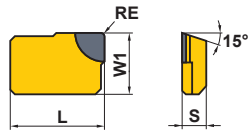
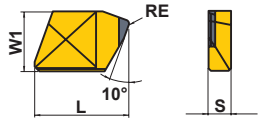
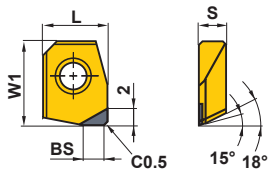
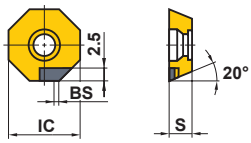
Honing :
E : Round **F** : Sharp **T** : Chamfer

Shape	Order Number	Class	Honing	Coated			Cermet	Carbide		Dimensions (mm)						Geometry
				MC5020	MP6120	VP15TF	NX2525	HTi10	HTi05T	L	W1	IC	S	BS	RE	
AHX640S	WNEU2007ZEN7C-M	E	E		●					—	—	20	6.9	7.2	0.8	
AHX640S	WNEU2007ZEN7C-WP	E	E			●				—	—	20	6.9	7.1	0.8	
AHX640S AHX640W	WNEU2006ZEN7C-WK	E	E	●						—	—	20	6.55	7.4	0.8	
WSX445	WNGU1406ANEN8C-M	G	E	●	●	●				18.1	14	—	6	8	1.0	
ASX400	WOEW12T308PEER8C	E	E						●	12.5	13.2	—	3.97	8	0.8	
	WOEW12T308PETR8C	E	T				●			12.5	13.2	—	3.97	8	0.8	
VOX400	WOEX1206PER5C	E	E			●				12.5	13.025	—	5.5	—	—	
FBP415 QBP415	WPC42EEER10C	C	E						●	12.7	15.163	—	3.175	10	—	 Right hand insert shown.
	WPC42EEEL10C	C	E						●	12.7	15.163	—	3.175	10	—	
P425	WPC42W3GR	C	F					▲		12.7	14.5	—	3.2	6	—	

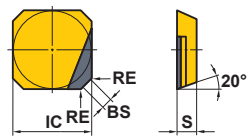
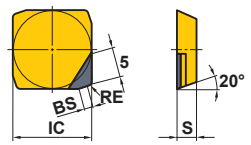
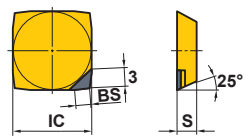
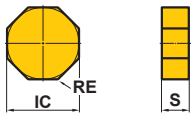
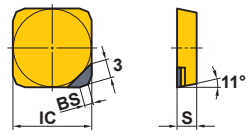
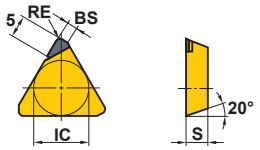
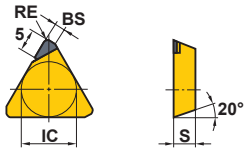
= MIRACLE SIGMA

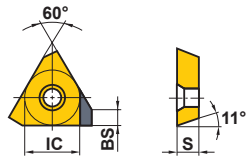
ROTATING TOOL INSERTS

CBN & PCD TURNING INSERTS

Shape	Order Number	Class	CBN		PCD		Dimensions (mm)						Geometry
			MB730		MD220	MD2030	L	W1	IC	S	BS	RE	
NF10000 QF10000	GDCN2004PDFR3	C			●		20	12.7	—	4.76	—	1.2	
NR10000	GDCN2004ZDTR1	C			●		20	12.7	—	4.76	1.4	0.8	
AF10000	GDCN2004PDR	C			●		20	12.7	—	4.76	—	1.2	
FMAX	GOER1404PXFR2	E				●	14	9	—	4.2	2	0.4	
	GOER1408PXFR2	E				●	14	9	—	4.2	2	0.8	
AF5000	LDCN190412R	C	●		●		19.05	12.7	—	4.76	—	1.2	 Right hand insert shown.
	LDCN190412L	C			●		19.05	12.7	—	4.76	—	1.2	
NF10000	NP-GDCN2004PDSR3	C	●				20	12.7	—	4.76	—	0.8	
V10000	NP-GDCW1240PDFR2	C			●		9.5	12	—	4	2	—	
OCTACUT	OEMX12T3ETR1	M	●				—	—	12.7	3.97	1	—	

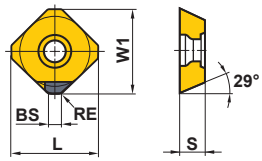
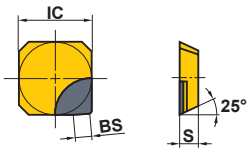
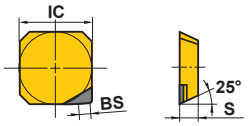
● : Inventory maintained in Japan.
(1 inserts in one case)

Shape	Order Number	Class	CBN		PCD		Dimensions (mm)				Geometry
			MB710	BC5030	MD220		IC	S	BS	RE	
SE445	SECN1203AFFR1	C			●		12.7	3.18	1.4	1.0	
SE415	SECN1203EFFR1	C			●		12.7	3.18	1.4	1.0	
BF407	SFCN1203ZFFR2	C			●		12.7	3.175	2.4	—	
AOX445	SL-ONEN120404ASN	E		●			12.7	4.76	—	0.4	
FBP415	SPEN1203EETR1	E	●				12.7	3.175	1.4	—	
SE300 NSE300	TECN1603PEFR1	C			●		9.525	3.175	1.4	0.4	
SE400 NSE400	TECN2204PEFR1	C			●		12.7	4.76	1.4	1.0	

Shape	Order Number	Class	CBN		PCD		Dimensions (mm)				Geometry
			MB710	MB730	MD220		IC	S	BS	RE	
PMF	TPEW1303ZPTR2	E	●				7.94	3.18	2	–	

● : Inventory maintained in Japan.
(1 insert in one case)

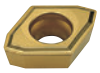
CBN AND PCD WITH WIPER

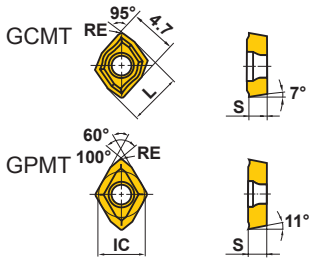
Shape	Order Number	Class	CBN	PCD	Dimensions (mm)						Geometry
			MB710	MD220	L	W1	IC	S	BS	RE	
ASX445	WEEW13T3AGFR3C	E		●	16.48	16.6	—	3.97	3.0	1.5	
	WEEW13T3AGTR3C	E	●		16.48	16.6	—	3.97	3.0	1.5	
BF407	WFC42ZFER2	C		●	—	—	12.4	3.175	2.4	—	
BF407	NP-WFC42ZFER2	C		●	—	—	12.4	3.175	2.4	—	 Right hand insert shown.

DRILLING INSERTS

Shape	Order Number	Class	Coated							Dimensions (mm)				Geometry
			VP15TF	UP20M	GP20M	UE6020	US735	MC1020	MC5020	IC	L	S	RE	
TAF	GCMT040204-U1	M		●						–	5.0	2.38	0.4	U1 Breaker
	GPMT060204-U1	M		●		●				5.56	–	2.38	0.4	
	GPMT070204-U1	M		●		●				6.35	–	2.38	0.4	
	GPMT090304-U1	M		●		●				7.94	–	3.18	0.4	
	GPMT11T308-U1	M		●		●				9.525	–	3.97	0.8	
	GPMT140408-U1	M		●		●				12.7	–	4.76	0.8	
TAF	GCMT040204-U2	M	●		●					–	5.0	2.38	0.4	U2 Breaker
	GPMT060204-U2	M	●	●		●	●			5.56	–	2.38	0.4	
	GPMT070204-U2	M	●	●		●	●			6.35	–	2.38	0.4	
	GPMT090304-U2	M	●	●		●	●			7.94	–	3.18	0.4	
	GPMT11T308-U2	M	●	●		●	●			9.525	–	3.97	0.8	
	GPMT140408-U2	M	●	●		●	●			12.7	–	4.76	0.8	
TAF	GPMT060204-U3	M		●		●	●			5.56	–	2.38	0.4	U3 Breaker
	GPMT070204-U3	M		●		●	●			6.35	–	2.38	0.4	
	GPMT090304-U3	M		●		●	●			7.94	–	3.18	0.4	
	GPMT11T308-U3	M		●		●	●			9.525	–	3.97	0.8	
	GPMT140408-U3	M		●		●	●			12.7	–	4.76	0.8	
MVX	SOMX063005-UM	M	●					●	●	6	–	3	0.5	
	SOMX073505-UM	M	●					●	●	7	–	3.5	0.5	
	SOMX084005-UM	M	●					●	●	8.3	–	4	0.5	
	SOMX094506-UM	M	●					●	●	9.7	–	4.5	0.6	
	SOMX115506-UM	M	●					●	●	11.6	–	5.5	0.6	
	SOMX136008-UM	M	●					●	●	13.8	–	6	0.8	
	SOMX166508-UM	M	●					●	●	16.5	–	6.5	0.8	
	SOMX187008-UM	M	●					●	●	18.2	–	7	0.8	
MVX	SOMX063005-US	M	●							6	–	3	0.5	
	SOMX073505-US	M	●							7	–	3.5	0.5	
	SOMX084005-US	M	●							8.3	–	4	0.5	
	SOMX094506-US	M	●							9.7	–	4.5	0.6	
	SOMX115506-US	M	●							11.6	–	5.5	0.6	
	SOMX136008-US	M	●							13.8	–	6	0.8	
	SOMX166508-US	M	●							16.5	–	6.5	0.8	
	SOMX187008-US	M	●							18.2	–	7	0.8	

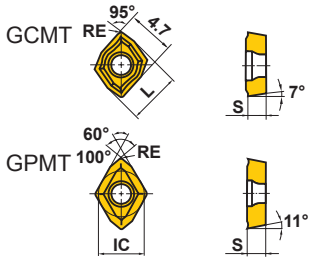
GCMT

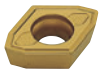

GPMT

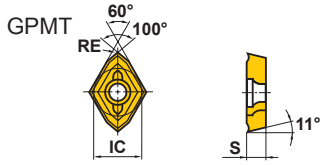


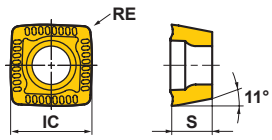
GCMT

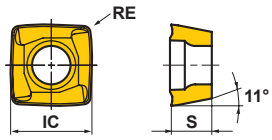
GPMT



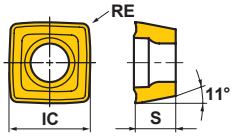
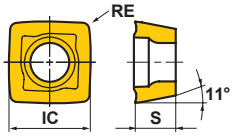






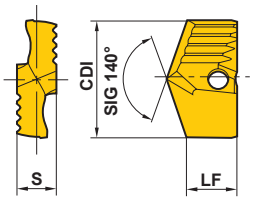


● : Inventory maintained in Japan.
(1 insert in one case)

Shape	Order Number	Class	Coated							Dimensions (mm)				Geometry
			DP8020	TF15						IC	L	S	RE	
MVX	SOMX062905-UH	M	●							6	–	2.9	0.5	
	SOMX073405-UH	M	●							7	–	3.4	0.5	
	SOMX083905-UH	M	●							8.3	–	3.9	0.5	
	SOMX094406-UH	M	●							9.7	–	4.4	0.6	
	SOMX115406-UH	M	●							11.6	–	5.4	0.6	
	SOMX135908-UH	M	●							13.8	–	5.9	0.8	
	SOMX166408-UH	M	●							16.5	–	6.4	0.8	
	SOMX186908-UH	M	●							18.2	–	6.9	0.8	
MVX	SOGX063005-UN	G		●						6	–	3	0.5	
	SOGX073505-UN	G		●						7	–	3.5	0.5	
	SOGX084005-UN	G		●						8.3	–	4	0.5	
	SOGX094506-UN	G		●						9.7	–	4.5	0.6	
	SOGX115506-UN	G		●						11.6	–	5.5	0.6	
	SOGX136008-UN	G		●						13.8	–	6	0.8	
	SOGX166508-UN	G		●						16.5	–	6.5	0.8	
	SOGX187008-UN	G		●						18.2	–	7	0.8	

Applicable Drill Shape Geometry

TAW H Type



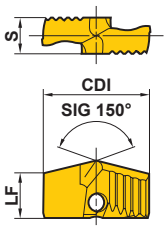
Order Number	Coated VP15TF	Coated VP10H	Dimensions (mm) CDI	LF	S	Applicable Holder
TAWNH1400T	▲		14.0	7.6	5.0	TAWSNH 1400S16
TAWNH1410T	▲		14.1	7.6	5.0	TAWMNH 1400S16
TAWNH1420T	▲		14.2	7.6	5.0	TAWLNH 1400S16
TAWNH1430T	▲		14.3	7.6	5.0	
TAWNH1440T	▲		14.4	7.6	5.0	
TAWNH1450T	▲		14.5	7.5	5.0	TAWSNH 1500S20
TAWNH1460T	▲		14.6	7.5	5.0	TAWMNH 1500S20
TAWNH1470T	▲		14.7	7.5	5.0	TAWLNH 1500S20
TAWNH1480T	▲		14.8	7.5	5.0	
TAWNH1490T	▲		14.9	7.5	5.0	
TAWNH1500T	▲		15.0	7.4	5.0	
TAWNH1510T	▲		15.1	7.4	5.0	
TAWNH1520T	▲		15.2	7.4	5.0	
TAWNH1530T	▲		15.3	7.4	5.0	
TAWNH1540T	▲		15.4	7.4	5.0	
TAWNH1550T	▲		15.5	7.9	6.0	TAWSN 1600S20
TAWNH1560T	▲		15.6	7.9	6.0	TAWMN 1600S20
TAWNH1570T	▲		15.7	7.9	6.0	TAWLN 1600S20
TAWNH1580T	▲		15.8	7.9	6.0	
TAWNH1590T	▲		15.9	7.9	6.0	
TAWNH1600T	▲		16.0	7.8	6.0	
TAWNH1610T	▲		16.1	7.8	6.0	
TAWNH1620T	▲		16.2	7.8	6.0	
TAWNH1630T	▲		16.3	7.8	6.0	
TAWNH1640T	▲		16.4	7.8	6.0	
TAWNH1650T	▲		16.5	7.7	6.0	TAWSN 1700S20
TAWNH1660T	▲		16.6	7.7	6.0	TAWMN 1700S20
TAWNH1670T	▲		16.7	7.7	6.0	TAWLN 1700S20
TAWNH1680T	▲		16.8	7.7	6.0	
TAWNH1690T	▲		16.9	7.7	6.0	
TAWNH1700T	▲		17.0	7.6	6.0	
TAWNH1710T	▲		17.1	7.6	6.0	
TAWNH1720T	▲		17.2	7.6	6.0	
TAWNH1730T	▲		17.3	7.6	6.0	
TAWNH1740T	▲		17.4	7.6	6.0	
TAWNH1750T	▲		17.5	7.5	6.0	TAWSN 1800S20
TAWNH1760T	▲		17.6	7.5	6.0	TAWMN 1800S20
TAWNH1770T	▲		17.7	7.5	6.0	TAWLN 1800S20
TAWNH1780T	▲		17.8	7.5	6.0	
TAWNH1790T	▲		17.9	7.5	6.0	
TAWNH1800T	▲		18.0	7.4	6.0	
TAWNH1810T	▲		18.1	7.4	6.0	
TAWNH1820T	▲		18.2	7.4	6.0	
TAWNH1830T	▲		18.3	7.4	6.0	
TAWNH1840T	▲		18.4	7.4	6.0	

Order Number	Coated VP15TF	Coated VP10H	Dimensions (mm) CDI	LF	S	Applicable Holder
TAWNH1850T	●	□	18.5	9.3	7.0	TAWSN 1900S25
TAWNH1860T	●	□	18.6	9.3	7.0	TAWMN 1900S25
TAWNH1870T	●	□	18.7	9.3	7.0	TAWLN 1900S25
TAWNH1880T	●	□	18.8	9.3	7.0	
TAWNH1890T	●	□	18.9	9.3	7.0	
TAWNH1900T	●	□	19.0	9.2	7.0	
TAWNH1910T	●	□	19.1	9.2	7.0	
TAWNH1920T	●	□	19.2	9.2	7.0	
TAWNH1930T	●	□	19.3	9.2	7.0	
TAWNH1940T	●	□	19.4	9.2	7.0	
TAWNH1950T	●	□	19.5	9.1	7.0	TAWSN 2000S25
TAWNH1960T	●	□	19.6	9.1	7.0	TAWMN 2000S25
TAWNH1970T	●	□	19.7	9.1	7.0	TAWLN 2000S25
TAWNH1980T	●	□	19.8	9.1	7.0	
TAWNH1990T	●	□	19.9	9.1	7.0	
TAWNH2000T	●	□	20.0	9.0	7.0	
TAWNH2010T	□	□	20.1	9.0	7.0	
TAWNH2020T	□	□	20.2	9.0	7.0	
TAWNH2030T	□	□	20.3	9.0	7.0	
TAWNH2040T	□	□	20.4	9.0	7.0	
TAWNH2050T	●	□	20.5	8.9	7.0	TAWSN 2100S25
TAWNH2060T	□	□	20.6	8.9	7.0	TAWMN 2100S25
TAWNH2070T	□	□	20.7	8.9	7.0	TAWLN 2100S25
TAWNH2080T	□	□	20.8	8.9	7.0	
TAWNH2090T	□	□	20.9	8.9	7.0	
TAWNH2100T	●	□	21.0	8.8	7.0	
TAWNH2110T	□	□	21.1	8.8	7.0	
TAWNH2120T	□	□	21.2	8.8	7.0	
TAWNH2130T	□	□	21.3	8.8	7.0	
TAWNH2140T	□	□	21.4	8.8	7.0	
TAWNH2150T	●	□	21.5	10.6	8.0	TAWSN 2200S25
TAWNH2160T	□	□	21.6	10.6	8.0	TAWMN 2200S25
TAWNH2170T	□	□	21.7	10.6	8.0	TAWLN 2200S25
TAWNH2180T	□	□	21.8	10.6	8.0	
TAWNH2190T	□	□	21.9	10.6	8.0	
TAWNH2200T	●	□	22.0	10.5	8.0	
TAWNH2210T	□	□	22.1	10.5	8.0	
TAWNH2220T	□	□	22.2	10.5	8.0	
TAWNH2230T	□	□	22.3	10.5	8.0	
TAWNH2240T	□	□	22.4	10.5	8.0	
TAWNH2250T	●	□	22.5	10.4	8.0	TAWSN 2300S25
TAWNH2260T	□	□	22.6	10.4	8.0	TAWMN 2300S25
TAWNH2270T	□	□	22.7	10.4	8.0	TAWLN 2300S25
TAWNH2280T	□	□	22.8	10.4	8.0	
TAWNH2290T	□	□	22.9	10.4	8.0	

● : Inventory maintained in Japan. □ : Non stock, produced to order only. ▲ : Inventory maintained in Japan. To be replaced by new products.
(1 insert in one case)

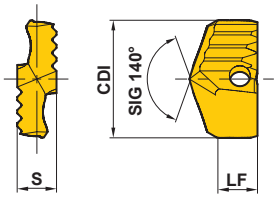
Order Number	Coated VP15TF	Coated VP10H	Dimensions (mm) CDI	LF	S	Applicable Holder
TAWNH2300T	●	□	23.0	10.3	8.0	TAWSN 2300S25 TAWMN 2300S25 TAWLN 2300S25
TAWNH2310T	□	□	23.1	10.3	8.0	
TAWNH2320T	□	□	23.2	10.3	8.0	
TAWNH2330T	□	□	23.3	10.3	8.0	
TAWNH2340T	□	□	23.4	10.3	8.0	
TAWNH2350T	●	□	23.5	10.2	8.0	TAWSN 2400S32 TAWMN 2400S32 TAWLN 2400S32
TAWNH2360T	□	□	23.6	10.2	8.0	
TAWNH2370T	□	□	23.7	10.2	8.0	
TAWNH2380T	□	□	23.8	10.2	8.0	
TAWNH2390T	□	□	23.9	10.2	8.0	
TAWNH2400T	●	□	24.0	10.1	8.0	
TAWNH2410T	□	□	24.1	10.1	8.0	
TAWNH2420T	□	□	24.2	10.1	8.0	
TAWNH2430T	□	□	24.3	10.1	8.0	
TAWNH2440T	□	□	24.4	10.1	8.0	
TAWNH2450T	●	□	24.5	11.7	9.0	TAWSN 2500S32 TAWMN 2500S32 TAWLN 2500S32
TAWNH2460T	□	□	24.6	11.7	9.0	
TAWNH2470T	□	□	24.7	11.7	9.0	
TAWNH2480T	□	□	24.8	11.7	9.0	
TAWNH2490T	□	□	24.9	11.7	9.0	
TAWNH2500T	●	□	25.0	11.6	9.0	
TAWNH2510T	□	□	25.1	11.6	9.0	
TAWNH2520T	□	□	25.2	11.6	9.0	
TAWNH2530T	□	□	25.3	11.6	9.0	
TAWNH2540T	□	□	25.4	11.6	9.0	
TAWNH2550T	●	□	25.5	11.5	9.0	TAWSN 2600S32 TAWMN 2600S32 TAWLN 2600S32
TAWNH2560T	□	□	25.6	11.5	9.0	
TAWNH2570T	□	□	25.7	11.5	9.0	
TAWNH2580T	□	□	25.8	11.5	9.0	
TAWNH2590T	□	□	25.9	11.5	9.0	
TAWNH2600T	●	□	26.0	11.4	9.0	
TAWNH2610T	□	□	26.1	11.4	9.0	
TAWNH2620T	□	□	26.2	11.4	9.0	
TAWNH2630T	□	□	26.3	11.4	9.0	
TAWNH2640T	□	□	26.4	11.4	9.0	

Order Number	Coated VP15TF	Coated VP10H	Dimensions (mm) CDI	LF	S	Applicable Holder
TAWNH2650T	●	□	26.5	11.3	9.0	TAWSN 2700S32 TAWMN 2700S32 TAWLN 2700S32
TAWNH2660T	□	□	26.6	11.3	9.0	
TAWNH2670T	□	□	26.7	11.3	9.0	
TAWNH2680T	□	□	26.8	11.3	9.0	
TAWNH2690T	□	□	26.9	11.3	9.0	
TAWNH2700T	●	□	27.0	11.2	9.0	
TAWNH2710T	□	□	27.1	11.2	9.0	
TAWNH2720T	□	□	27.2	11.2	9.0	
TAWNH2730T	□	□	27.3	11.2	9.0	
TAWNH2740T	□	□	27.4	11.2	9.0	
TAWNH2750T	●	□	27.5	12.3	10.0	TAWSN 2800S32 TAWMN 2800S32 TAWLN 2800S32
TAWNH2760T	□	□	27.6	12.3	10.0	
TAWNH2770T	□	□	27.7	12.3	10.0	
TAWNH2780T	□	□	27.8	12.3	10.0	
TAWNH2790T	□	□	27.9	12.3	10.0	
TAWNH2800T	●	□	28.0	12.2	10.0	
TAWNH2810T	□	□	28.1	12.2	10.0	
TAWNH2820T	□	□	28.2	12.2	10.0	
TAWNH2830T	□	□	28.3	12.2	10.0	
TAWNH2840T	□	□	28.4	12.2	10.0	
TAWNH2850T	●	□	28.5	12.1	10.0	TAWSN 2900S32 TAWMN 2900S32 TAWLN 2900S32
TAWNH2860T	□	□	28.6	12.1	10.0	
TAWNH2870T	□	□	28.7	12.1	10.0	
TAWNH2880T	□	□	28.8	12.1	10.0	
TAWNH2890T	□	□	28.9	12.1	10.0	
TAWNH2900T	●	□	29.0	12.0	10.0	
TAWNH2910T	□	□	29.1	12.0	10.0	
TAWNH2920T	□	□	29.2	12.0	10.0	
TAWNH2930T	□	□	29.3	12.0	10.0	
TAWNH2940T	□	□	29.4	12.0	10.0	
TAWNH2950T	●	□	29.5	11.9	10.0	TAWSN 3000S32 TAWMN 3000S32 TAWLN 3000S32
TAWNH2960T	□	□	29.6	11.9	10.0	
TAWNH2970T	□	□	29.7	11.9	10.0	
TAWNH2980T	□	□	29.8	11.9	10.0	
TAWNH2990T	□	□	29.9	11.9	10.0	
TAWNH3000T	●	□	30.0	11.8	10.0	
TAWNH3010T	□	□	30.1	11.8	10.0	
TAWNH3020T	□	□	30.2	11.8	10.0	
TAWNH3030T	□	□	30.3	11.8	10.0	
TAWNH3040T	□	□	30.4	11.8	10.0	

Applicable Drill Shape Geometry	Order Number	Coated VP15TF		Dimensions (mm) CDI	LF	S
TAW H Type 	TAWBH2450T	●		24.5	11.7	9.0
	TAWBH2460T	□		24.6	11.7	9.0
	TAWBH2470T	●		24.7	11.7	9.0
	TAWBH2650T	□		26.5	11.3	9.0
	TAWBH2670T	●		26.7	11.3	9.0

Applicable Drill Shape Geometry

TAW H Type
(Cast Iron)



Order Number	Coated DP5010	Dimensions (mm) CDI	LF	S	Applicable Holder
TAWKH1400TG	▲	14.0	7.1	5.0	TAWSNH 1400S16
TAWKH1410TG	▲	14.1	7.1	5.0	TAWMNH 1400S16
TAWKH1420TG	▲	14.2	7.1	5.0	TAWLNH 1400S16
TAWKH1430TG	▲	14.3	7.1	5.0	
TAWKH1440TG	▲	14.4	7.1	5.0	
TAWKH1450TG	▲	14.5	7.0	5.0	TAWSNH 1500S20
TAWKH1460TG	▲	14.6	7.0	5.0	TAWMNH 1500S20
TAWKH1470TG	▲	14.7	7.0	5.0	TAWLNH 1500S20
TAWKH1480TG	▲	14.8	7.0	5.0	
TAWKH1490TG	▲	14.9	7.0	5.0	
TAWKH1500TG	▲	15.0	6.9	5.0	
TAWKH1510TG	▲	15.1	6.9	5.0	
TAWKH1520TG	▲	15.2	6.9	5.0	
TAWKH1530TG	▲	15.3	6.9	5.0	
TAWKH1540TG	▲	15.4	6.9	5.0	
TAWKH1550TG	▲	15.5	7.3	6.0	TAWSN 1600S20
TAWKH1560TG	▲	15.6	7.3	6.0	TAWMN 1600S20
TAWKH1570TG	▲	15.7	7.3	6.0	TAWLN 1600S20
TAWKH1580TG	▲	15.8	7.3	6.0	
TAWKH1590TG	▲	15.9	7.3	6.0	
TAWKH1600TG	▲	16.0	7.2	6.0	
TAWKH1610TG	▲	16.1	7.2	6.0	
TAWKH1620TG	▲	16.2	7.2	6.0	
TAWKH1630TG	▲	16.3	7.2	6.0	
TAWKH1640TG	▲	16.4	7.2	6.0	
TAWKH1650TG	▲	16.5	7.1	6.0	TAWSN 1700S20
TAWKH1660TG	▲	16.6	7.1	6.0	TAWMN 1700S20
TAWKH1670TG	▲	16.7	7.1	6.0	TAWLN 1700S20
TAWKH1680TG	▲	16.8	7.1	6.0	
TAWKH1690TG	▲	16.9	7.1	6.0	
TAWKH1700TG	▲	17.0	7.0	6.0	
TAWKH1710TG	▲	17.1	7.0	6.0	
TAWKH1720TG	▲	17.2	7.0	6.0	
TAWKH1730TG	▲	17.3	7.0	6.0	
TAWKH1740TG	▲	17.4	7.0	6.0	
TAWKH1750TG	▲	17.5	6.8	6.0	TAWSN 1800S20
TAWKH1760TG	▲	17.6	6.8	6.0	TAWMN 1800S20
TAWKH1770TG	▲	17.7	6.8	6.0	TAWLN 1800S20
TAWKH1780TG	▲	17.8	6.8	6.0	
TAWKH1790TG	▲	17.9	6.8	6.0	
TAWKH1800TG	▲	18.0	6.8	6.0	
TAWKH1810TG	▲	18.1	6.8	6.0	
TAWKH1820TG	▲	18.2	6.8	6.0	
TAWKH1830TG	▲	18.3	6.8	6.0	
TAWKH1840TG	▲	18.4	6.8	6.0	

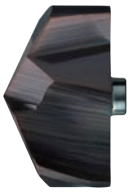
Order Number	Coated DP5010	Dimensions (mm) CDI	LF	S	Applicable Holder
TAWKH1850TG	●	18.5	8.6	7.0	TAWSN 1900S25
TAWKH1860TG	●	18.6	8.6	7.0	TAWMN 1900S25
TAWKH1870TG	●	18.7	8.6	7.0	TAWLN 1900S25
TAWKH1880TG	●	18.8	8.6	7.0	
TAWKH1890TG	●	18.9	8.6	7.0	
TAWKH1900TG	●	19.0	8.5	7.0	
TAWKH1910TG	●	19.1	8.5	7.0	
TAWKH1920TG	●	19.2	8.5	7.0	
TAWKH1930TG	●	19.3	8.5	7.0	
TAWKH1940TG	●	19.4	8.5	7.0	
TAWKH1950TG	●	19.5	8.4	7.0	TAWSN 2000S25
TAWKH1960TG	●	19.6	8.4	7.0	TAWMN 2000S25
TAWKH1970TG	●	19.7	8.4	7.0	TAWLN 2000S25
TAWKH1980TG	●	19.8	8.4	7.0	
TAWKH1990TG	●	19.9	8.4	7.0	
TAWKH2000TG	●	20.0	8.3	7.0	
TAWKH2010TG	□	20.1	8.3	7.0	
TAWKH2020TG	□	20.2	8.3	7.0	
TAWKH2030TG	□	20.3	8.3	7.0	
TAWKH2040TG	□	20.4	8.3	7.0	
TAWKH2050TG	●	20.5	8.2	7.0	TAWSN 2100S25
TAWKH2060TG	□	20.6	8.2	7.0	TAWMN 2100S25
TAWKH2070TG	□	20.7	8.2	7.0	TAWLN 2100S25
TAWKH2080TG	□	20.8	8.2	7.0	
TAWKH2090TG	□	20.9	8.2	7.0	
TAWKH2100TG	●	21.0	8.1	7.0	
TAWKH2110TG	□	21.1	8.1	7.0	
TAWKH2120TG	□	21.2	8.1	7.0	
TAWKH2130TG	□	21.3	8.1	7.0	
TAWKH2140TG	□	21.4	8.1	7.0	
TAWKH2150TG	●	21.5	9.8	8.0	TAWSN 2200S25
TAWKH2160TG	□	21.6	9.8	8.0	TAWMN 2200S25
TAWKH2170TG	□	21.7	9.8	8.0	TAWLN 2200S25
TAWKH2180TG	□	21.8	9.8	8.0	
TAWKH2190TG	□	21.9	9.8	8.0	
TAWKH2200TG	●	22.0	9.7	8.0	
TAWKH2210TG	□	22.1	9.7	8.0	
TAWKH2220TG	□	22.2	9.7	8.0	
TAWKH2230TG	□	22.3	9.7	8.0	
TAWKH2240TG	□	22.4	9.7	8.0	
TAWKH2250TG	●	22.5	9.6	8.0	TAWSN 2300S25
TAWKH2260TG	□	22.6	9.6	8.0	TAWMN 2300S25
TAWKH2270TG	□	22.7	9.6	8.0	TAWLN 2300S25
TAWKH2280TG	□	22.8	9.6	8.0	
TAWKH2290TG	□	22.9	9.6	8.0	

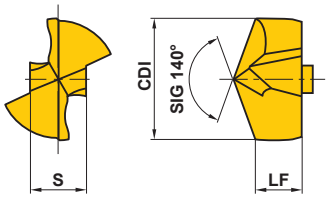
● : Inventory maintained in Japan. □ : Non stock, produced to order only. ▲ : Inventory maintained in Japan. To be replaced by new products.
(1 insert in one case)

Order Number	Coated DP5010		Dimensions (mm) CDI	LF	S	Applicable Holder
TAWKH2300TG	●		23.0	9.5	8.0	TAWSN 2300S25 TAWMN 2300S25 TAWLN 2300S25
TAWKH2310TG	□		23.1	9.5	8.0	
TAWKH2320TG	□		23.2	9.5	8.0	
TAWKH2330TG	□		23.3	9.5	8.0	
TAWKH2340TG	□		23.4	9.5	8.0	
TAWKH2350TG	●		23.5	9.4	8.0	TAWSN 2400S32 TAWMN 2400S32 TAWLN 2400S32
TAWKH2360TG	□		23.6	9.4	8.0	
TAWKH2370TG	□		23.7	9.4	8.0	
TAWKH2380TG	□		23.8	9.4	8.0	
TAWKH2390TG	□		23.9	9.4	8.0	
TAWKH2400TG	●		24.0	9.3	8.0	
TAWKH2410TG	□		24.1	9.3	8.0	
TAWKH2420TG	□		24.2	9.3	8.0	
TAWKH2430TG	□		24.3	9.3	8.0	
TAWKH2440TG	□		24.4	9.3	8.0	
TAWKH2450TG	●		24.5	10.8	9.0	TAWSN 2500S32 TAWMN 2500S32 TAWLN 2500S32
TAWKH2460TG	□		24.6	10.8	9.0	
TAWKH2470TG	□		24.7	10.8	9.0	
TAWKH2480TG	□		24.8	10.8	9.0	
TAWKH2490TG	□		24.9	10.8	9.0	
TAWKH2500TG	●		25.0	10.7	9.0	
TAWKH2510TG	□		25.1	10.7	9.0	
TAWKH2520TG	□		25.2	10.7	9.0	
TAWKH2530TG	□		25.3	10.7	9.0	
TAWKH2540TG	□		25.4	10.7	9.0	
TAWKH2550TG	●		25.5	10.6	9.0	TAWSN 2600S32 TAWMN 2600S32 TAWLN 2600S32
TAWKH2560TG	□		25.6	10.6	9.0	
TAWKH2570TG	□		25.7	10.6	9.0	
TAWKH2580TG	□		25.8	10.6	9.0	
TAWKH2590TG	□		25.9	10.6	9.0	
TAWKH2600TG	●		26.0	10.5	9.0	
TAWKH2610TG	□		26.1	10.5	9.0	
TAWKH2620TG	□		26.2	10.5	9.0	
TAWKH2630TG	□		26.3	10.5	9.0	
TAWKH2640TG	□		26.4	10.5	9.0	
TAWKH2650TG	●		26.5	10.4	9.0	TAWSN 2700S32 TAWMN 2700S32 TAWLN 2700S32
TAWKH2660TG	□		26.6	10.4	9.0	
TAWKH2670TG	□		26.7	10.4	9.0	
TAWKH2680TG	□		26.8	10.4	9.0	
TAWKH2690TG	□		26.9	10.4	9.0	
TAWKH2700TG	●		27.0	10.3	9.0	
TAWKH2710TG	□		27.1	10.3	9.0	
TAWKH2720TG	□		27.2	10.3	9.0	
TAWKH2730TG	□		27.3	10.3	9.0	
TAWKH2740TG	□		27.4	10.3	9.0	

Order Number	Coated DP5010		Dimensions (mm) CDI	LF	S	Applicable Holder
TAWKH2750TG	●		27.5	11.3	10.0	TAWSN 2800S32 TAWMN 2800S32 TAWLN 2800S32
TAWKH2760TG	□		27.6	11.3	10.0	
TAWKH2770TG	□		27.7	11.3	10.0	
TAWKH2780TG	□		27.8	11.3	10.0	
TAWKH2790TG	□		27.9	11.3	10.0	
TAWKH2800TG	●		28.0	11.2	10.0	
TAWKH2810TG	□		28.1	11.2	10.0	
TAWKH2820TG	□		28.2	11.2	10.0	
TAWKH2830TG	□		28.3	11.2	10.0	
TAWKH2840TG	□		28.4	11.2	10.0	
TAWKH2850TG	●		28.5	11.1	10.0	TAWSN 2900S32 TAWMN 2900S32 TAWLN 2900S32
TAWKH2860TG	□		28.6	11.1	10.0	
TAWKH2870TG	□		28.7	11.1	10.0	
TAWKH2880TG	□		28.8	11.1	10.0	
TAWKH2890TG	□		28.9	11.1	10.0	
TAWKH2900TG	●		29.0	11.0	10.0	
TAWKH2910TG	□		29.1	11.0	10.0	
TAWKH2920TG	□		29.2	11.0	10.0	
TAWKH2930TG	□		29.3	11.0	10.0	
TAWKH2940TG	□		29.4	11.0	10.0	
TAWKH2950TG	●		29.5	10.9	10.0	TAWSN 3000S32 TAWMN 3000S32 TAWLN 3000S32
TAWKH2960TG	□		29.6	10.9	10.0	
TAWKH2970TG	□		29.7	10.9	10.0	
TAWKH2980TG	□		29.8	10.9	10.0	
TAWKH2990TG	□		29.9	10.9	10.0	
TAWKH3000TG	●		30.0	10.8	10.0	
TAWKH3010TG	□		30.1	10.8	10.0	
TAWKH3020TG	□		30.2	10.8	10.0	
TAWKH3030TG	□		30.3	10.8	10.0	
TAWKH3040TG	□		30.4	10.8	10.0	

Applicable Drill Shape Geometry: **STAW**



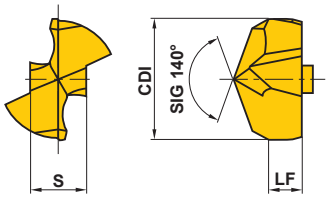


Order Number	Stock VP15TF	Stock VP10H	Dimensions (mm) CDI	LF	S	Applicable Holder
STAWN1000TH	●	□	10.0	3.8	4.6	STAWSS1000S16 STAWSN1000S16 STAWMN1000S16 STAWLN1000S16
STAWN1010TH	●	□	10.1	3.8	4.6	
STAWN1020TH	●	□	10.2	3.8	4.6	
STAWN1030TH	●	□	10.3	3.8	4.6	
STAWN1040TH	●	□	10.4	3.8	4.6	
STAWN1050TH	●	□	10.5	4.0	4.8	STAWSS1050S16 STAWSN1050S16 STAWMN1050S16 STAWLN1050S16
STAWN1060TH	●	□	10.6	4.0	4.8	
STAWN1070TH	●	□	10.7	4.0	4.8	
STAWN1080TH	●	□	10.8	4.0	4.8	
STAWN1090TH	●	□	10.9	4.0	4.8	
STAWN1100TH	●	□	11.0	4.2	5.1	STAWSS1100S16 STAWSN1100S16 STAWMN1100S16 STAWLN1100S16
STAWN1110TH	●	□	11.1	4.2	5.1	
STAWN1120TH	●	□	11.2	4.2	5.1	
STAWN1130TH	●	□	11.3	4.2	5.1	
STAWN1140TH	●	□	11.4	4.2	5.1	
STAWN1150TH	●	□	11.5	4.4	5.3	STAWSS1150S16 STAWSN1150S16 STAWMN1150S16 STAWLN1150S16
STAWN1160TH	●	□	11.6	4.4	5.3	
STAWN1170TH	●	□	11.7	4.4	5.3	
STAWN1180TH	●	□	11.8	4.4	5.3	
STAWN1190TH	●	□	11.9	4.4	5.3	
STAWN1200TH	●	□	12.0	4.6	5.5	STAWSS1200S16 STAWSN1200S16 STAWMN1200S16 STAWLN1200S16
STAWN1210TH	●	□	12.1	4.6	5.5	
STAWN1220TH	●	□	12.2	4.6	5.5	
STAWN1230TH	●	□	12.3	4.6	5.5	
STAWN1240TH	●	□	12.4	4.6	5.5	
STAWN1250TH	●	□	12.5	4.8	5.8	STAWSS1250S16 STAWSN1250S16 STAWMN1250S16 STAWLN1250S16
STAWN1260TH	●	□	12.6	4.8	5.8	
STAWN1270TH	●	□	12.7	4.8	5.8	
STAWN1280TH	●	□	12.8	4.8	5.8	
STAWN1290TH	●	□	12.9	4.8	5.8	
STAWN1300TH	●	□	13.0	4.9	6.0	STAWSS1300S16 STAWSN1300S16 STAWMN1300S16 STAWLN1300S16
STAWN1310TH	●	□	13.1	4.9	6.0	
STAWN1320TH	●	□	13.2	4.9	6.0	
STAWN1330TH	●	□	13.3	4.9	6.0	
STAWN1340TH	●	□	13.4	4.9	6.0	
STAWN1350TH	●	□	13.5	5.1	6.2	STAWSS1350S16 STAWSN1350S16 STAWMN1350S16 STAWLN1350S16
STAWN1360TH	●	□	13.6	5.1	6.2	
STAWN1370TH	●	□	13.7	5.1	6.2	
STAWN1380TH	●	□	13.8	5.1	6.2	
STAWN1390TH	●	□	13.9	5.1	6.2	
STAWN1400TH	●		14.0	5.3	6.4	STAWSS1400S16 STAWSN1400S16 STAWMN1400S16 STAWLN1400S16
STAWN1410TH	●		14.1	5.3	6.4	
STAWN1420TH	●		14.2	5.3	6.4	
STAWN1430TH	●		14.3	5.3	6.4	
STAWN1440TH	●		14.4	5.3	6.4	

● : Inventory maintained in Japan. □ : Non stock, produced to order only.
(1 insert in one case)

Order Number	Stock		Dimensions (mm)			Applicable Holder
	VP15TF	VP10H	CDI	LF	S	
STAWN1450TH	●		14.5	5.5	6.7	STAWSS1450S16 STAWSN1450S16 STAWMN1450S16 STAWLN1450S16
STAWN1460TH	●		14.6	5.5	6.7	
STAWN1470TH	●		14.7	5.5	6.7	
STAWN1480TH	●		14.8	5.5	6.7	
STAWN1490TH	●		14.9	5.5	6.7	
STAWN1500TH	●		15.0	5.7	6.9	STAWSS1500S20 STAWSN1500S20 STAWMN1500S20 STAWLN1500S20
STAWN1510TH	●		15.1	5.7	6.9	
STAWN1520TH	●		15.2	5.7	6.9	
STAWN1530TH	●		15.3	5.7	6.9	
STAWN1540TH	●		15.4	5.7	6.9	
STAWN1550T	●		15.5	5.9	7.1	STAWSS1600S20 STAWSN1600S20 STAWMN1600S20 STAWLN1600S20
STAWN1560T	●		15.6	5.9	7.1	
STAWN1570T	●		15.7	5.9	7.1	
STAWN1580T	●		15.8	5.9	7.1	
STAWN1590T	●		15.9	5.9	7.1	
STAWN1600T	●		16.0	5.9	7.1	
STAWN1610T	●		16.1	5.9	7.1	
STAWN1620T	●		16.2	5.9	7.1	
STAWN1630T	●		16.3	5.9	7.1	
STAWN1640T	●		16.4	5.9	7.1	
STAWN1650T	●		16.5	6.3	7.6	STAWSS1700S20 STAWSN1700S20 STAWMN1700S20 STAWLN1700S20
STAWN1660T	●		16.6	6.3	7.6	
STAWN1670T	●		16.7	6.3	7.6	
STAWN1680T	●		16.8	6.3	7.6	
STAWN1690T	●		16.9	6.3	7.6	
STAWN1700T	●		17.0	6.3	7.6	
STAWN1710T	●		17.1	6.3	7.6	
STAWN1720T	●		17.2	6.3	7.6	
STAWN1730T	●		17.3	6.3	7.6	
STAWN1740T	●		17.4	6.3	7.6	
STAWN1750T	●		17.5	6.7	8.1	STAWSS1800S20 STAWSN1800S20 STAWMN1800S20 STAWLN1800S20
STAWN1760T	●		17.6	6.7	8.1	
STAWN1770T	●		17.7	6.7	8.1	
STAWN1780T	●		17.8	6.7	8.1	
STAWN1790T	●		17.9	6.7	8.1	
STAWN1800T	●		18.0	6.7	8.1	
STAWN1810T	●		18.1	6.7	8.1	
STAWN1820T	●		18.2	6.7	8.1	
STAWN1830T	●		18.3	6.7	8.1	
STAWN1840T	●		18.4	6.7	8.1	

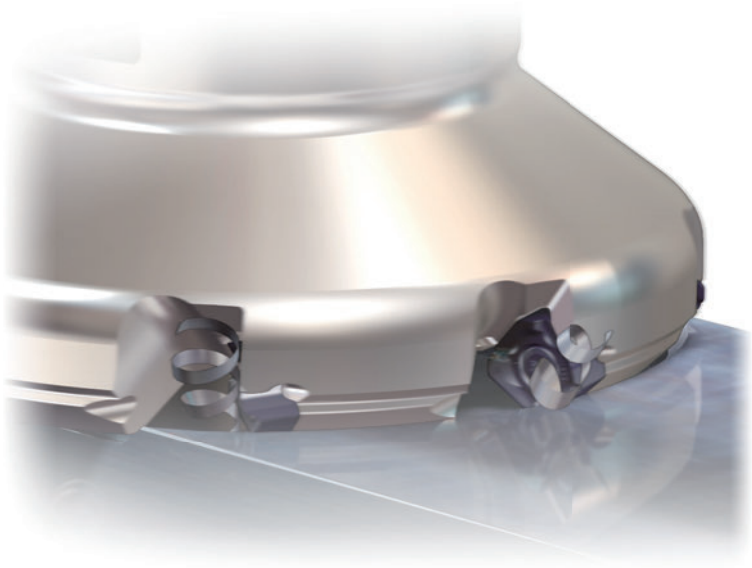
Applicable Drill Shape Geometry	STAW



Order Number	Stock DP5010		Dimensions (mm) CDI	LF	S	Applicable Holder
STAWK1000TG	●		10.0	3.3	4.6	STAWSS1000S16 STAWSN1000S16 STAWMN1000S16 STAWLN1000S16
STAWK1010TG	●		10.1	3.3	4.6	
STAWK1020TG	●		10.2	3.3	4.6	
STAWK1030TG	●		10.3	3.3	4.6	
STAWK1040TG	●		10.4	3.3	4.6	
STAWK1050TG	●		10.5	3.5	4.8	STAWSS1050S16 STAWSN1050S16 STAWMN1050S16 STAWLN1050S16
STAWK1060TG	●		10.6	3.5	4.8	
STAWK1070TG	●		10.7	3.5	4.8	
STAWK1080TG	●		10.8	3.5	4.8	
STAWK1090TG	●		10.9	3.5	4.8	
STAWK1100TG	●		11.0	3.7	5.1	STAWSS1100S16 STAWSN1100S16 STAWMN1100S16 STAWLN1100S16
STAWK1110TG	●		11.1	3.7	5.1	
STAWK1120TG	●		11.2	3.7	5.1	
STAWK1130TG	●		11.3	3.7	5.1	
STAWK1140TG	●		11.4	3.7	5.1	
STAWK1150TG	●		11.5	3.9	5.3	STAWSS1150S16 STAWSN1150S16 STAWMN1150S16 STAWLN1150S16
STAWK1160TG	●		11.6	3.9	5.3	
STAWK1170TG	●		11.7	3.9	5.3	
STAWK1180TG	●		11.8	3.9	5.3	
STAWK1190TG	●		11.9	3.9	5.3	
STAWK1200TG	●		12.0	4.1	5.5	STAWSS1200S16 STAWSN1200S16 STAWMN1200S16 STAWLN1200S16
STAWK1210TG	●		12.1	4.1	5.5	
STAWK1220TG	●		12.2	4.1	5.5	
STAWK1230TG	●		12.3	4.1	5.5	
STAWK1240TG	●		12.4	4.1	5.5	
STAWK1250TG	●		12.5	4.2	5.8	STAWSS1250S16 STAWSN1250S16 STAWMN1250S16 STAWLN1250S16
STAWK1260TG	●		12.6	4.2	5.8	
STAWK1270TG	●		12.7	4.2	5.8	
STAWK1280TG	●		12.8	4.2	5.8	
STAWK1290TG	●		12.9	4.2	5.8	
STAWK1300TG	●		13.0	4.4	6.0	STAWSS1300S16 STAWSN1300S16 STAWMN1300S16 STAWLN1300S16
STAWK1310TG	●		13.1	4.4	6.0	
STAWK1320TG	●		13.2	4.4	6.0	
STAWK1330TG	●		13.3	4.4	6.0	
STAWK1340TG	●		13.4	4.4	6.0	
STAWK1350TG	●		13.5	4.6	6.2	STAWSS1350S16 STAWSN1350S16 STAWMN1350S16 STAWLN1350S16
STAWK1360TG	●		13.6	4.6	6.2	
STAWK1370TG	●		13.7	4.6	6.2	
STAWK1380TG	●		13.8	4.6	6.2	
STAWK1390TG	●		13.9	4.6	6.2	

● : Inventory maintained in Japan.
(1 insert in one case)

Order Number	Stock		Dimensions (mm)			Applicable Holder
	DP5010		CDI	LF	S	
STAWK1400TG	●		14.0	4.8	6.4	STAWSS1400S16 STAWSN1400S16 STAWMN1400S16 STAWLN1400S16
STAWK1410TG	●		14.1	4.8	6.4	
STAWK1420TG	●		14.2	4.8	6.4	
STAWK1430TG	●		14.3	4.8	6.4	
STAWK1440TG	●		14.4	4.8	6.4	
STAWK1450TG	●		14.5	5.0	6.7	STAWSS1450S16 STAWSN1450S16 STAWMN1450S16 STAWLN1450S16
STAWK1460TG	●		14.6	5.0	6.7	
STAWK1470TG	●		14.7	5.0	6.7	
STAWK1480TG	●		14.8	5.0	6.7	
STAWK1490TG	●		14.9	5.0	6.7	
STAWK1500TG	●		15.0	5.2	6.9	STAWSS1500S20 STAWSN1500S20 STAWMN1500S20 STAWLN1500S20
STAWK1510TG	●		15.1	5.2	6.9	
STAWK1520TG	●		15.2	5.2	6.9	
STAWK1530TG	●		15.3	5.2	6.9	
STAWK1540TG	●		15.4	5.2	6.9	
STAWK1550TG	●		15.5	5.3	7.1	STAWSS1600S20 STAWSN1600S20 STAWMN1600S20 STAWLN1600S20
STAWK1560TG	●		15.6	5.3	7.1	
STAWK1570TG	●		15.7	5.3	7.1	
STAWK1580TG	●		15.8	5.3	7.1	
STAWK1590TG	●		15.9	5.3	7.1	
STAWK1600TG	●		16.0	5.3	7.1	
STAWK1610TG	●		16.1	5.3	7.1	
STAWK1620TG	●		16.2	5.3	7.1	
STAWK1630TG	●		16.3	5.3	7.1	
STAWK1640TG	●		16.4	5.3	7.1	
STAWK1650TG	●		16.5	5.7	7.6	STAWSS1700S20 STAWSN1700S20 STAWMN1700S20 STAWLN1700S20
STAWK1660TG	●		16.6	5.7	7.6	
STAWK1670TG	●		16.7	5.7	7.6	
STAWK1680TG	●		16.8	5.7	7.6	
STAWK1690TG	●		16.9	5.7	7.6	
STAWK1700TG	●		17.0	5.7	7.6	
STAWK1710TG	●		17.1	5.7	7.6	
STAWK1720TG	●		17.2	5.7	7.6	
STAWK1730TG	●		17.3	5.7	7.6	
STAWK1740TG	●		17.4	5.7	7.6	
STAWK1750TG	●		17.5	6.0	8.1	STAWSS1800S20 STAWSN1800S20 STAWMN1800S20 STAWLN1800S20
STAWK1760TG	●		17.6	6.0	8.1	
STAWK1770TG	●		17.7	6.0	8.1	
STAWK1780TG	●		17.8	6.0	8.1	
STAWK1790TG	●		17.9	6.0	8.1	
STAWK1800TG	●		18.0	6.0	8.1	
STAWK1810TG	●		18.1	6.0	8.1	
STAWK1820TG	●		18.2	6.0	8.1	
STAWK1830TG	●		18.3	6.0	8.1	
STAWK1840TG	●		18.4	6.0	8.1	



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BAP300	1432, 1528	PMR	1576	VOX400	1422
BMR	1578	Qing	1589	WSX445	1364

SYMBOL DESCRIPTIONS

KAPR (Cutting Edge Angle) List

15° KAPR	15°
35° KAPR	35°
45° KAPR	45°
50° KAPR	50°
75° KAPR	75°
86° KAPR	86°
90° KAPR	90°
R KAPR	R

Application

	Plane Cutting
	Chamfer Milling
	Shoulder milling with R
	Face milling near the wall
	Shoulder milling
	Wall milling
	Slot milling
	Step milling
	Ramp milling
	Slot milling with R
	Copy milling
	T-Slot milling

● : Inventory maintained.
▲ : Inventory maintained.
To be replaced by new products.
□ : Non stock, produced to order only.

Machining Precision

F **Finish Cutting**

M **Medium Cutting**

R **Rough Cutting**

Work Material Range

1st Recommenedation

P M K N S H

2nd Recommenedation

P M K N S H

MAXIMUM ALLOWABLE CUTTERS REVOLUTION

Diameter (mm)	WSX445		ASX445		AOX445		ASX400		SE515	
	Max. Allowable Revolution (min^{-1})	Clamp Torque (N • m)	Max. Allowable Revolution (min^{-1})	Clamp Torque (N • m)	Max. Allowable Revolution (min^{-1})	Clamp Torque (N • m)	Max. Allowable Revolution (min^{-1})	Clamp Torque (N • m)	Max. Allowable Revolution (min^{-1})	Clamp Torque (N • m)
40	19000	3.5	—	—	—	—	—	—	—	—
50	17000	3.5	18000	3.5	13000	8	18000	3.5	—	—
63	15000	3.5	16000	3.5	12000	8	16000	3.5	—	—
80	14000	3.5	14000	3.5	11000	8	14000	3.5	—	—
100	12000	3.5	13000	3.5	9300	8	13000	3.5	9300	8
125	11000	3.5	12000	3.5	8300	8	12000	3.5	8100	8
160	9500	3.5	10000	3.5	7200	8	10000	3.5	7000	8
200	8500	3.5	9000	3.5	6400	8	9000	3.5	—	—
250	—	—	8000	3.5	—	—	8000	3.5	—	—
315	—	—	6500	3.5	—	—	—	—	—	—

Diameter (mm)	FMAX		AHX440		AHX475		AHX640S		AHX640W	
	Max. Allowable Revolution (min^{-1})	Clamp Torque (N • m)	Max. Allowable Revolution (min^{-1})	Clamp Torque (N • m)	Max. Allowable Revolution (min^{-1})	Clamp Torque (N • m)	Max. Allowable Revolution (min^{-1})	Clamp Torque (N • m)	Max. Allowable Revolution (min^{-1})	Clamp Torque (N • m)
40	—	—	21000	3.5	—	—	—	—	—	—
50	30000	3.5	19800	3.5	18300	3.5	—	—	—	—
63	27000	3.5	18300	3.5	17200	3.5	12000	5	—	—
80	24500	3.5	16500	3.5	15700	3.5	10000	5	8900	6
100	22000	3.5	14600	3.5	14000	3.5	8700	5	7800	6
125	19600	3.5	12600	3.5	12200	3.5	7500	5	6600	6
160	—	—	10200	3.5	9900	3.5	6100	5	5300	6
200	—	—	—	—	—	—	5100	5	4100	6
250	—	—	—	—	—	—	—	—	2900	6
315	—	—	—	—	—	—	—	—	1700	6

Diameter (mm)	AXD4000		AXD7000		BXD4000		V10000		SG20	
	Max. Allowable Revolution (min^{-1})	Clamp Torque (N • m)	Max. Allowable Revolution (min^{-1})	Clamp Torque (N • m)	Max. Allowable Revolution (min^{-1})	Clamp Torque (N • m)	Max. Allowable Revolution (min^{-1})	Clamp Torque (N • m)	Max. Allowable Revolution (min^{-1})	Clamp Torque (N • m)
20	15000	1.5	—	—	15000	4	—	—	—	—
25	49000	1.5	—	—	38000	4	—	—	—	—
28	48500	1.5	—	—	—	—	—	—	—	—
32	48000	1.5	41000	3.5	33000	4	—	—	—	—
35	45000	1.5	—	—	31000	4	—	—	—	—
40	41000	1.5	36000	3.5	29000	4	—	—	—	—
50	35000	1.5	30000	3.5	24000	4	—	—	—	—
63	30000	1.5	25000	3.5	21000	4	25000	3.5	—	—
80	27000	1.5	23000	3.5	19000	4	22300	3.5	8200	8
100	23000	1.5	19000	3.5	16000	4	20000	3.5	7000	8
125	20000	1.5	16000	3.5	14000	4	17800	3.5	6100	8
160	—	—	—	—	—	—	—	—	5300	8

(Note) All values shown on this chart are based on the insert being properly seated in pocket and torqued to the recommended values.

LIST OF CUTTING EDGE DIAMETER TOLERANCES

Milling	Cutting edge diameter tolerance (mm)	Milling	Cutting edge diameter tolerance (mm)
APX3000 Arbor Type	−0.1 −0.4	ASX400	0 −0.3
APX3000 Shank Type	−0.1 −0.2	AJX	−0.1 −0.4
APX4000 Arbor Type	−0.1 −0.4	AQX	−0.1 −0.3
APX4000 Shank Type	−0.1 −0.2	SPX	−0.1 −0.3
AXD4000 Arbor Type	−0.1 −0.4	OCTACUT	0 −0.3
AXD4000 Shank Type	−0.1 −0.2	BRP	−0.1 −0.3
AXD7000 Arbor Type	−0.1 −0.4	ARP Arbor Type	−0.1 −0.3
AXD7000 Shank Type	−0.1 −0.2	ARP Shank Type	−0.1 −0.2
BXD4000 Arbor Type	−0.1 −0.4	ARX	−0.05 −0.15
BXD4000 Shank Type	−0.1 −0.2	SRM	−0.05 −0.15
VFX5 Shell Type	−0.1 −0.3	SRF	0 −0.027
VFX6 Shell Type	−0.1 −0.3	PMR	0 −0.3
VOX400 Arbor Type	−0.1 −0.4	PMF	0 −0.3

(Note 1) Cutting edge diameter tolerance when the gauge insert is set.
(Note 2) When setting the insert available, the insert tolerance is added to the above tolerance. (Tolerance when setting the insert for SRF.)

CLASSIFICATION

Product Name · Shape	KAPR	APMX (mm)	Features	Cutter Dia. (mm)	Work Material	Page
WSX445	45° KAPR	5	●For General Cutting ●Unique design both sides insert ●Sudden fracture & welding prevention function ●Highly efficient chip discharge	Ø40 — Ø200	P M K N S H	1364
ASX445	45° KAPR	6	●For General Cutting ●Precision inexpensive moulded type 20° positive insert. ●Screw-on type. ●A wide range of chip breakers. ●High rigidity due to carbide shim.	Ø50 — Ø315	P M K N S H	1376
AHX440S	50° KAPR	3	●For General Cutting ●Heptagonal double sided insert. ●Economical 14 cutting edge inserts. ●Multi insert design for high feed machining.	Ø40 — Ø160	P M K H	1382
AHX475S	15° KAPR	1.6	●For General Cutting ●Heptagonal double sided insert. ●Economical 14 cutting edge inserts. ●Multi insert design for high feed machining.	Ø50 — Ø160	P K H	1387
AHX640S	50° KAPR	6	●For General Cutting ●Heptagonal double sided insert. ●Economical 14 cutting edge inserts. ●Multi insert design for high feed machining.	Ø63 — Ø200	P M K S H	1390
AHX640W	50° KAPR	6	●For High Feed Cutting for Cast Iron ●Heptagonal double sided insert. ●Economical 14 cutting edge inserts. ●Multi insert design for high feed machining.	Ø80 — Ø315	K	1398
AOX445	45° KAPR	8	●For High Efficiency Cutting for Cast Iron ●Solid CBN octagonal double sided insert. ●Economical 16 cutting edge inserts. (When the depth of cut is 3mm) ●For high efficiency roughing through to finishing. ●Easy operation and cleansing.	Ø63 — Ø160	K	1406
SE515	75° KAPR	11.5	●For Heavy Cutting ●20°positive insert. ●High rake angle. ●High rigidity due to carbide shim	Ø100 — Ø160	P M K N	1408
SG20	R KAPR	8	●30°positive insert. ●High rake angle. ●Round shape insert with a strong cutting edge. ●Suitable for difficult-to-cut materials.	Ø80 — Ø160	P M K H	1410
FMAX	90° KAPR	2	●For high-efficiency finishing of aluminum alloys ●Feed Maximum (FMAX) milling cutter for ultra efficient and accurate finishing.	Ø50 — Ø125	N	1412

CLASSIFICATION

Product Name · Shape	KAPR	APMX (mm)	Features	Cutter Dia. (mm)	Work Material	Page
V10000	90° KAPR	1.5	●High Feed Finishing for Aluminium Alloy ●Insert with PCD. ●Light weight, strong aluminium alloy cutter body. ●Anti-Fly insert mechanism enables high speed milling. ●Adjustable cutting edge run-out function.	Ø63 — Ø125	N	1416
NF10000	90° KAPR	PCD 4.0 CBN 1.0	●High Feed Finishing for Aluminium Alloy ●Insert with PCD. ●Suitable for high speed finishing of light alloys. ●Adjustable cutting edge run-out function.	Ø80 — Ø125	K N	1418
FF3000	90° KAPR	0.3	●High Feed Finishing ●11°positive insert. ●1000—3000mm/min high feed machining. ●For finishing of steel machining. ●Adjustable cutting edge run-out function.	Ø125 — Ø250	P M K N	1420
FP490	90° KAPR	0.5	●High Feed Cutting for Cast Iron ●11°positive insert. ●Suitable for cast iron finishing. ●Multi-insert design. ●For high feed cutting. ●Easy tool exchange.	Ø80 — Ø500	K	1580
FP590	90° KAPR	0.5	●High Feed Cutting for Cast Iron ●11°positive insert. ●Suitable for cast iron finishing. ●Multi-insert design. ●For high feed cutting. ●Easy tool exchange.	Ø125 — Ø500	K	1582
FE404	86° KAPR	9	●High Feed Cutting for Cast Iron ●21°positive insert. ●High rake and relief angle. ●Multi-insert design. ●Suitable for light alloy machining. ●Easy tool exchange.	Ø100 — Ø500	N	1584
AJX MIRACLE SIGMA	—	2	●Multi Functional Milling ●15°positive insert. ●High rigidity double clamp structure. ●Suitable for high feed machining. ●With through coolant holes. ●Special insert design with 3 cutting edges.	Ø50 — Ø160	P M K S H	1492
ARP MIRACLE SIGMA	R KAPR	5 | 6	●Run out does not occur easily when changing sections. ●Solid clamping system. ●Standardized stock of extra fine pitch.	Ø40 — Ø100	M S	1508
BRP	R KAPR	6 | 8	●Multi Functional Milling ●11°positive insert. ●Round shape insert with a strong cutting edge. ●Wide range of tools available. ●Suitable for mould machining.	Ø40 — Ø100	P M K S H	1520
OCTACUT	42° KAPR	7 | 9	●Multi Functional Milling ●20°positive insert. ●For octagonal and round type inserts. ●Multi functional machining.	Ø40 — Ø160	P M K H	1503

CLASSIFICATION

Product Name · Shape	KAPR	APMX (mm)	Features	Cutter Dia. (mm)	Work Material	Page
VOX400	90° KAPR	10	●For Cast Iron ●Vertical inserts with high strength cutting edge. ●Economical 8 cutting edge inserts. ●Screw-on type.	Ø50 — Ø250	K	1422
ASX400 MIRACLE SIGMA	90° KAPR	10	●For General Cutting ●High accuracy, high quality vertical wall. ●Low cutting force insert. ●With through air & coolant holes.	Ø50 — Ø250	P M K N S H	1426
APX3000 MIRACLE SIGMA	90° KAPR	10	●For Multi Functional Cutting ●High accuracy, high quality vertical wall. ●Low cutting force insert. ●With through air & coolant holes.	Ø32 — Ø100	P M K N S H	1444
APX4000 MIRACLE SIGMA	90° KAPR	15	●For General Cutting ●Low resistance chipbreaker. ●Low resistance insert and high rigidity design for excellent performance. ●For high-speed machining. ●Multi-functional machining.	Ø40 — Ø160	P M K S H	1452
AXD4000 MIRACLE SIGMA	90° KAPR	14.8 | 15.5	●Aluminium Alloy to Difficult-to-cut Material Cutting ●Low resistance chipbreaker. ●Low resistance insert and high rigidity design for excellent performance. ●For high-speed machining. ●Multi-functional machining.	Ø40 — Ø125	P N S	1460
AXD7000 MIRACLE SIGMA	90° KAPR	20.4 | 21	●Low resistance chipbreaker. ●Low resistance insert and high rigidity design for excellent performance. ●For high-speed machining. ●Multi-functional machining.	Ø50 — Ø125	P N S	1468
BXD4000	90° KAPR	15	●Aluminium Alloy to Difficult-to-cut Material Cutting ●Curved cutting edge and high rigidity holder produce high wall accuracy. ●Low resistance insert and high rigidity design for excellent performance. ●With through coolant holes to ensure smooth chip discharge. ●For high-speed machining.	Ø40 — Ø125	P M K N S H	1478

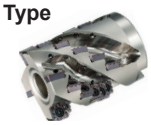
CLASSIFICATION

Product Name · Shape	KAPR	APMX (mm)	Features	Cutter Dia. (mm)	Work Material	Page
WSX445 MIRACLE SIGMA	45° KAPR	5	●Unique design both sides insert ●Sudden fracture & welding prevention function ●Highly efficient chip discharge	Ø40 — Ø80	P M K N S H	1368
ASX445 MIRACLE SIGMA	45° KAPR	6	●Precision inexpensive moulded type 20°positive insert. ●Screw-on type. ●A wide range of chip breakers. ●High rigidity due to carbide shim.	Ø50 — Ø80	P M K N S H	1378
AOX445	45° KAPR	8	●Solid CBN octagonal double sided insert. ●Economical 16 cutting edge inserts. (when the depth of cut is 3mm) ●For high efficiency roughing through to finishing. ●Easy operation and cleansing.	Ø50 — Ø63	K	1407
AJX MIRACLE SIGMA	—	2	●13° and 15° positive inserts. ●High rigidity double clamp structure. ●Suitable for high feed machining. ●With through coolant holes. ●Special insert design with 3 cutting edges.	Ø16 — Ø63	P M K S H	1494
ASX400 MIRACLE SIGMA	90° KAPR	10	●High tolerance M-class inserts. ●Economical 4 cutting edge inserts. ●Curved cutting edge and high rigidity holder. ●Screw-on type.	Ø40 — Ø80	P M K N S H	1428
BAP300	90° KAPR	9	●11° positive insert. ●Inserts with wiper edges produce optimal finished surface. ●Multi insert design for high feed machining.	Ø10 — Ø63	P M K N S H	1432
BAP300 Long Cutting Edge	90° KAPR	25 – 51	●11° positive insert. ●Inserts with wiper edges produce optimal finished surface. ●Multi insert design for high feed machining.	Ø20 — Ø40	P M K N S H	1528
APX3000 MIRACLE SIGMA	90° KAPR	10	●High accuracy, high quality vertical wall. ●Low cutting force insert. ●With through air & coolant holes.	Ø12 — Ø63	P M K N S H	1442
APX4000 MIRACLE SIGMA	90° KAPR	15	●High accuracy, high quality vertical wall. ●Low cutting force insert. ●With through air & coolant holes.	Ø25 — Ø63	P M K S H	1450

CLASSIFICATION

Product Name · Shape	KAPR	APMX (mm)	Features	Cutter Dia. (mm)	Work Material	Page
APX4000 MIRACLE SIGMA Long Cutting Edge 	90° KAPR	56 – 84	●High accuracy, high quality vertical wall. ●Low cutting force insert. ●With through air & coolant holes.	Ø40 — Ø50	P M K S	1524
APX4000 MIRACLE SIGMA Shell Type 	90° KAPR	42 – 56	●High accuracy, high quality vertical wall. ●Low cutting force insert. ●With through air & coolant holes.	Ø50 — Ø63	P M K S	1525
AXD4000 MIRACLE SIGMA 	90° KAPR	14.8 – 15.5	●Low resistance chipbreaker. ●Low resistance insert and high rigidity design for excellent performance. ●For high-speed machining. ●Multi-functional machining.	Ø20 — Ø40	P N S	1458
AXD7000 MIRACLE SIGMA 	90° KAPR	20.4 – 21	●Low resistance chipbreaker. ●Low resistance insert and high rigidity design for excellent performance. ●For high-speed machining. ●Multi-functional machining.	Ø32 — Ø40	P N S	1470
BXD4000 	90° KAPR	15	●Curved cutting edge and high rigidity holder produce high wall accuracy. ●Low resistance insert and high rigidity design for excellent performance. ●With through coolant holes to ensure smooth chip discharge. ●For high-speed machining.	Ø20 — Ø40	P M K N S H	1480
AQX MIRACLE SIGMA 	90° KAPR	7.4 – 55	●The center bottom cutting edge enables drilling without previously formed hole. ●With through coolant holes.	Ø16 — Ø50	P M K N S H	1482
AJX MIRACLE SIGMA 	—	2	●13° and 15° positive inserts. ●High rigidity double clamp structure. ●Suitable for high feed machining. ●With through coolant holes. ●Special insert design with 3 cutting edges.	Ø16 — Ø63	P M K S H	1494
ARP MIRACLE SIGMA 	R KAPR	5 – 6	●Run out does not occur easily when changing sections. ●Solid clamping system. ●Standardized stock of extra fine pitch.	Ø25 — Ø50	M S	1510
ARX 	R KAPR	2.5 – 3.5	●15°positive, high tolerance M-class insert. ●Effective for various machining applications. ●With through air & coolant holes.	Ø10 — Ø25	P M K H	1514

CLASSIFICATION

Product Name · Shape	KAPR	APMX (mm)	Features	Cutter Dia. (mm)	Work Material	Page
OCTACUT	42° KAPR	7 – 9	●20°positive insert. ●For octagonal and round type inserts. ●Multi-functional machining.	Ø32 — Ø63	P M K H	1502
BRP	R KAPR	4 – 5	●11°positive insert. ●Round shape insert with a strong cutting edge. ●Wide range of tools available. ●Suitable for mould machining.	Ø12 — Ø63	P M K S H	1518
DCCC	90° KAPR	27 – 93	●Different helical flute angles prevents chattering.	Ø25 — Ø50	P M K	1530
SPX	90° KAPR	72 – 261	●Low cutting resistance due to the use of wavy inserts. ●Suitable for heavy cutting due to holder rigidity.	Ø50 — Ø63	P M K S	1533
SPX Shell Type 	90° KAPR	58	●Low cutting resistance due to the use of wavy inserts. ●Suitable for heavy cutting due to holder rigidity.	Ø63 — Ø80	P M K S	1534
VFX5 MIRACLE SIGMA	90° KAPR	26 – 75	●High performance titanium alloy milling. ●High rigidity design. ●Highly reliable clamping mechanism.	Ø40 — Ø80	S	1538
VFX6 MIRACLE SIGMA	90° KAPR	31 – 90	●High performance titanium alloy milling. ●High rigidity design. ●Highly reliable clamping mechanism.	Ø63 — Ø100	S	1542
SRF MIRACLE SIGMA	R KAPR	5 – 16	●S-shaped cutting edge provides sharpness similar to that of solid ball nose end mills. ●Highly accurate corner radius tolerance allows for high precision finishing. ●Carbide shank type available.	Ø10 — Ø32	P K N H	1546
SUF	R KAPR	1.5 – 5.2	●Highly accurate corner radius tolerance allows for high precision finishing. ●Seamless gash.	Ø10 — Ø32	P M K H	1550

CLASSIFICATION

Product Name · Shape	KAPR	APMX (mm)	Features	Cutter Dia. (mm)	Work Material	Page
SRM2 MIRACLE SIGMA	R KAPR	12 – 44	●Suitable for roughing to semi-finishing of small and medium moulds. ●High rigidity body design. ●Low resistance chipbreaker. ●Through coolant hole type.	Ø16 — Ø30	P M K H	1554
SRM2 ϕ40/ϕ50	R KAPR	54 – 63	●Best for roughing of moulds. ●Low resistance chipbreaker. ●Highly rigid body.	Ø40 — Ø50	P K	1562
CESP•CFSP•CGSP	30° 45° 60° KAPR	5.9 – 10.2	●Covers 5 cutting modes. ●Excellent sharpness with 11°positive inserts. ●30°, 45° and 60° chamfer series.	Ø4 — Ø32	P K	1564
TSMP	90° KAPR	11 – 18	●T-groove order number 14, 18 and 22 are available. ●86° rhombic shape 11° positive insert. ●Shoulder milling and inversed spot facing are also possible.	Ø25 — Ø40	P K	1566
CBJP•CBMP	94° KAPR	—	●Capable of spot facing machining, boring and interpolation. ●For seat machining of hexagon socket head bolt (M8-M30). ●86°rhombic shape 11°positive insert.	Ø14 — Ø48	P M K	1568
KSMG	—	1.2 – 4.5	●Side face grooving tool for machining centers. ●The minimum cutting diameter is ϕ25mm for internal grooving. ●For groove widths of 1.25mm — 6.0mm.	Ø25 — Ø40	P K	1570
PMF	91° KAPR	0.1	●2 directional cutting with large overhang. ●Excellent straightness. ●Excellent wall accuracy.	Ø50 — Ø80	P K	1574
PMR	90° KAPR	11 – 17	●2 directional cutting with large overhang. ●Horizontal feed cutting and oblique cutting are also possible. ●Unique shape of curved edge gives high rigidity and low resistance.	Ø50 — Ø80	P K	1576

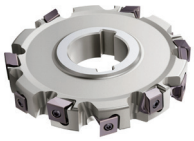
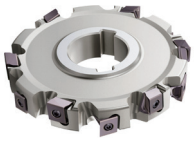
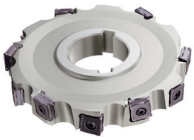
CLASSIFICATION

Product Name · Shape	KAPR	APMX (mm)	Features	Cutter Dia. (mm)	Work Material	Page
ASX400	90° KAPR	10	●High tolerance M-class inserts. ●Economical 4 cutting edge inserts. ●Curved cutting edge and high rigidity holder. ●Screw-on type.	Ø32 — Ø40	P M K N S H	1429
APX3000	90° KAPR	10	●High accuracy, high quality vertical wall. ●Low cutting force insert. ●With through air & coolant holes.	Ø16 — Ø40	P M K N S H	1446
APX4000	90° KAPR	15	●High accuracy, high quality vertical wall. ●Low cutting force insert. ●With through air & coolant holes.	Ø25 — Ø40	P M K S H	1454
AQX	90° KAPR	7.4 | 18	●The center bottom cutting edge enables drilling without previously formed hole. ●With through coolant holes.	Ø16 — Ø40	P M K N S H	1486
AJX	—	2	●13° and 15° positive inserts. ●High rigidity double clamp structure. ●Suitable for high feed machining. ●With through coolant holes. ●Special insert design with 3 cutting edges.	Ø16 — Ø40	P M K S H	1496
ARP	R KAPR	5 | 6	●Run out does not occur easily when changing sections. ●Solid clamping system. ●With through coolant holes.	Ø25 — Ø40	M S	1511
ARX	R KAPR	3	●15°positive, high tolerance M-class insert. ●Effective for various machining applications. ●With through air & coolant holes.	Ø16 — Ø25	P M K H	1515
SRF	R KAPR	5 | 16	●S-shaped cutting edge provides sharpness similar to that of solid ball nose end mills. ●Highly accurate corner radius tolerance allows for high precision finishing. ●Carbide shank type available.	Ø16 — Ø32	P K N H	1547
SUF	R KAPR	1.5 | 5.2	●Highly accurate corner radius tolerance allows for high precision finishing. ●Seamless gash.	Ø16 — Ø32	P M K H	1551

CLASSIFICATION

Product Name · Shape	KAPR	APMX (mm)	Features	Cutter Dia. (mm)	Work Material	Page
SRM2 MIRACLE SIGMA	R KAPR	12 | 44	●Suitable for roughing to semi-finishing of small and medium moulds. ●High rigidity body design. ●Low resistance chipbreaker. ●Through coolant hole type.	Ø16 — Ø32	P M K H	1556
PMC	49.5° KAPR1 55° KAPR2	—	●For under-cutting trimmed part of press mould. ●2 directional cutting with large overhang.	Ø25 — Ø40	P K	1572

CLASSIFICATION

Product Name · Shape	KAPR	APMX (mm)	Features	Cutter Dia. (mm)	Work Material	Page
VAS400 Side Cutter 	90° KAPR	11.4 | 12.2	●Insert with 4 Cutting Edges Secure Clamping ●Low Cutting Resistance Insert → Preferred Sharpness ●Holders Can Load All Corner R ★Cutter bodies are only available through special orders.	Ø80 — Ø160	K	1436
VAS500 Side Cutter 	90° KAPR	15.4 | 16.2	●Insert with 4 Cutting Edges Secure Clamping ●Low Cutting Resistance Insert → Preferred Sharpness ●Holders Can Load All Corner R ★Cutter bodies are only available through special orders.	Ø100 — Ø200	P M K	1438
VOS400 Side Cutter 	90° KAPR	10	●For Cast Iron ●Cutter body with high-rigidity design ●Innovative vertical insert ●Economical 8 cutting edge inserts. ★Cutter bodies are only available through special orders.	Ø80 — Ø160	K	1440
ASX400 Side Cutter	90° KAPR	10	●High-precision non-grinding insert ●Economical 4 cutting edge inserts. ●Excellent wall surface precision with curved cutting edges and high-precision body ★Cutter bodies are only available through special orders.	Ø80 — Ø160	P M K	1441

Product Name · Shape	KAPR	APMX (mm)	Features	Cutter Dia. (mm)	Work Material	Page
BMR	35° KAPR	—	●Double Positive Breaker ●12-Corner Type with Right Hand ●Body with Peripheral Cutting Edge Run-out Regulator ★Cutter bodies are only available through special orders.	—	K	1578

WSX445

General Cutting

Product Information

45° KAPR

Work Material

P M K N S H F R

SYMBOL DESCRIPTIONS >> 1350
TECHNICAL DATA >> 1987
ISO13399 Property >> 1966

Fig.1

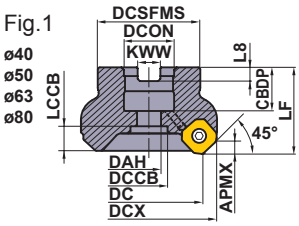


Fig.2

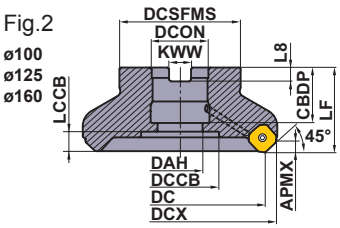
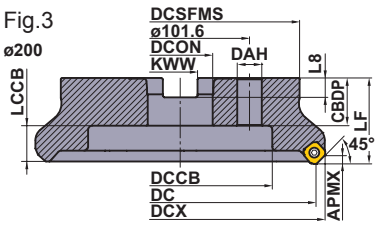


Fig.3



Right hand tool holder shown.

- Unique design both sides insert
- Sudden fracture & welding prevention function
- Highly efficient chip discharge

Arbor Type Right Hand Tool Holder

KAPR :45°
GAMP:+17° T :-7°—-2°
GAMF:-6°—+1° I :+16°—+19°

DC=mm size, DCON=Inch size (mm)

DC	Order Number	Stock	Coolant Hole	* No.T	Type	DCX	LF	DCON	WT(kg)	APMX	Type (Fig.)
40	**WSX445-040A03AR**	●	○	3	Coarse Pitch	52.8	40	16	0.3	5	1
40	**WSX445-040A04AR**	●	○	4	Fine Pitch	52.8	40	16	0.3	5	1
50	**WSX445-050A03AR**	●	○	3	Coarse Pitch	62.9	40	22	0.5	5	1
50	**WSX445-050A04AR**	●	○	4	Fine Pitch	62.9	40	22	0.4	5	1
50	**WSX445-050A05AR**	●	○	5	Extra Fine Pitch	62.9	40	22	0.4	5	1
63	**WSX445-063A04AR**	●	○	4	Coarse Pitch	75.9	40	22	0.6	5	1
63	**WSX445-063A05AR**	●	○	5	Fine Pitch	75.9	40	22	0.6	5	1
63	**WSX445-063A06AR**	●	○	6	Extra Fine Pitch	75.9	40	22	0.6	5	1
80	**WSX445R08004CA**	●	○	4	Coarse Pitch	92.9	50	25.4	1.3	5	1
80	**WSX445R08006CA**	●	○	6	Fine Pitch	92.9	50	25.4	1.2	5	1
80	**WSX445R08008CA**	●	○	8	Extra Fine Pitch	92.9	50	25.4	1.1	5	1
100	**WSX445R10005DA**	●	○	5	Coarse Pitch	112.9	50	31.75	1.8	5	2
100	**WSX445R10007DA**	●	○	7	Fine Pitch	112.9	50	31.75	1.7	5	2
100	**WSX445R10010DA**	●	○	10	Extra Fine Pitch	112.9	50	31.75	1.6	5	2
125	**WSX445R12506EA**	●	○	6	Coarse Pitch	137.9	63	38.1	3.2	5	2
125	**WSX445R12508EA**	●	○	8	Fine Pitch	137.9	63	38.1	3.1	5	2
125	**WSX445R12512EA**	●	○	12	Extra Fine Pitch	137.9	63	38.1	3.0	5	2
160	**WSX445R16007FA**	●	○	7	Coarse Pitch	172.9	63	50.8	4.9	5	2
160	**WSX445R16010FA**	●	○	10	Fine Pitch	172.9	63	50.8	4.8	5	2
160	**WSX445R16016FA**	●	○	16	Extra Fine Pitch	172.8	63	50.8	4.6	5	2
200	**WSX445R20008KN**	●	–	8	Coarse Pitch	212.9	63	47.625	8.7	5	3
200	**WSX445R20012KN**	●	–	12	Fine Pitch	212.9	63	47.625	8.6	5	3
200	**WSX445R20020KN**	●	–	20	Extra Fine Pitch	212.8	63	47.625	8.4	5	3

(Note1) A set bolt to the arbor is not supplied with the body.
(Note2) Please use a set bolt of the FMC(metric) type on the cutter body from 40 to 63 in diameter(DC).
(Note3) Please use a set bolt of the FMA type on the cutter body from 80 to 200 in diameter(DC).
* Number of Teeth

● : **Inventory maintained in Japan.**

WSX445

Arbor Type Left Hand Tool Holder

DC=mm size, DCON=Inch size (mm)

DC	Order Number	Stock	Coolant Hole	* No.T	Type	DCX	LF	DCON	WT(kg)	APMX	Type (Fig.)
80	**WSX445L08004CA**	●	○	4	Coarse Pitch	92.9	50	25.4	1.3	5	1
100	**WSX445L10005DA**	●	○	5	Coarse Pitch	112.9	50	31.75	1.8	5	2
125	**WSX445L12506EA**	●	○	6	Coarse Pitch	137.9	63	38.1	3.2	5	2
160	**WSX445L16007FA**	●	○	7	Coarse Pitch	172.9	63	50.8	4.9	5	2
200	**WSX445L20008KN**	●	–	8	Coarse Pitch	212.9	63	47.625	8.7	5	3

(Note1) A set bolt to the arbor is not supplied with the body.
(Note2) Please use a set bolt of the FMC(metric) type on the cutter body from 40 to 63 in diameter(DC).
(Note3) Please use a set bolt of the FMA type on the cutter body from 80 to 200 in diameter(DC).
* Number of Teeth

SPARE PARTS

Arbor Type	* Clamp Screw	Wrench (Insert)
WSX445	TPS4R	TIP15W

* Clamp Torque (N • m) : TPS4R=4.0

SET BOLT (SOLD SEPARATELY)

(mm)

Arbor Type	Set Bolt: With Coolant Hole Order Number	Set Bolt: Without Coolant Hole Order Number	Fig.	Reference Dimensions a	b	c	d	e	f	g
WSX445-040A○○AR	HSC08025H	HSC08040	1	13	M8×1.25	33	8	5	–	–
WSX445-050A○○AR	HSC10030H	HSC10035	1	16	M10×1.5	40	10	6	–	–
WSX445-063A○○AR	HSC10030H	HSC10035	1	16	M10×1.5	40	10	6	–	–
WSX445-080A○○A○	HSC12035H	HSC12035 HSC12045	1	18	M12×1.75	47 57	12	10	–	–
WSX445-100B○○A○	MBA16033H	—	2	40	M16×2	43	10	14	6	23
WSX445-125B○○A○	MBA20040H	—	2	50	M20×2.5	54	14	17	6	27
WSX445-160C○○N○	No coolant hole	—	2	50	M20×2.5	54	14	17	6	27
WSX445-200C○○NR	No coolant hole	—	1	24	M16×2	43	16	14	–	–
WSX445○080○○CA	HSC12035H	HSC12035 HSC12045	1	18	M12×1.75	47 57	12	10	–	–
WSX445○100○○DA	MBA16033H	—	2	40	M16×2	43	10	14	6	23
WSX445○125○○EA	MBA20040H	—	2	50	M20×2.5	54	14	17	6	27
WSX445○160○○FA	MBA24045H	—	2	65	M24×3	59	14	17	10	37
WSX445○200○○KN	No coolant hole	—	1	24	M16×2	43	16	14	–	–

Geometry

Fig.1

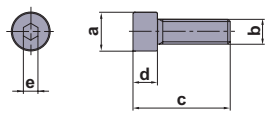
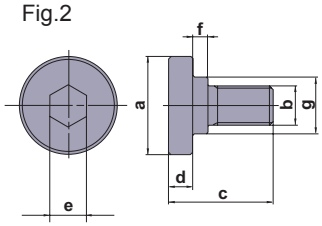


Fig.2

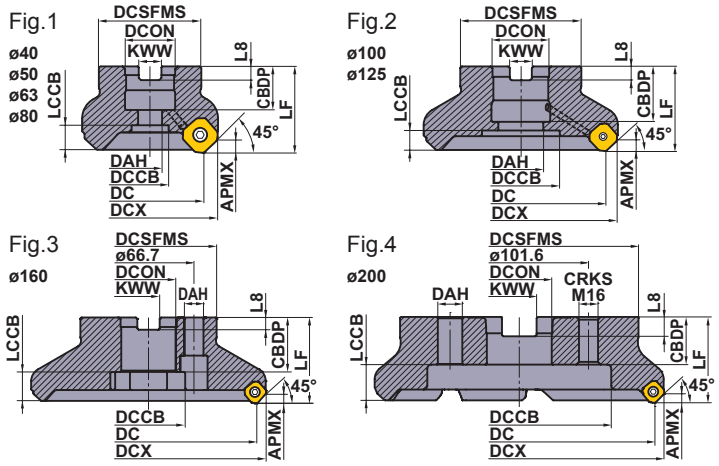


(Note 1) Internal coolant is necessary with the set bolt.

WSX445

Metric Standard

The cutter bore diameter DCON is indicated in millimetres.



Right hand insert shown.

Arbor Type Right Hand Tool Holder

KAPR : 45°
GAMP : +17° T : -7°—-2°
GAMF : -6°—+1° I : +16°—+19°

DC = mm size, DCON = mm size (mm)

DC	Order Number	Stock	Coolant Hole	* No.T	形式	DCX	LF	DCON	WT(kg)	APMX	Fig.
40	**WSX445-040A03AR**	●	○	3	Coarse Pitch	52.8	40	16	0.3	5	1
40	**WSX445-040A04AR**	●	○	4	Fine Pitch	52.8	40	16	0.3	5	1
50	**WSX445-050A03AR**	●	○	3	Coarse Pitch	62.9	40	22	0.5	5	1
50	**WSX445-050A04AR**	●	○	4	Fine Pitch	62.9	40	22	0.4	5	1
50	**WSX445-050A05AR**	●	○	5	Extra Fine Pitch	62.9	40	22	0.4	5	1
63	**WSX445-063A04AR**	●	○	4	Coarse Pitch	75.9	40	22	0.6	5	1
63	**WSX445-063A05AR**	●	○	5	Fine Pitch	75.9	40	22	0.6	5	1
63	**WSX445-063A06AR**	●	○	6	Extra Fine Pitch	75.9	40	22	0.6	5	1
80	**WSX445-080A04AR**	●	○	4	Coarse Pitch	92.9	50	27	1.3	5	1
80	**WSX445-080A06AR**	●	○	6	Fine Pitch	92.9	50	27	1.2	5	1
80	**WSX445-080A08AR**	●	○	8	Extra Fine Pitch	92.9	50	27	1.1	5	1
100	**WSX445-100B05AR**	●	○	5	Coarse Pitch	112.9	50	32	1.9	5	2
100	**WSX445-100B07AR**	●	○	7	Fine Pitch	112.9	50	32	1.9	5	2
100	**WSX445-100B10AR**	●	○	10	Extra Fine Pitch	112.9	50	32	1.8	5	2
125	**WSX445-125B06AR**	●	○	6	Coarse Pitch	137.9	63	40	3.4	5	2
125	**WSX445-125B08AR**	●	○	8	Fine Pitch	137.9	63	40	3.4	5	2
125	**WSX445-125B12AR**	●	○	12	Extra Fine Pitch	137.9	63	40	3.2	5	2
160	**WSX445-160C07NR**	●	–	7	Coarse Pitch	172.9	63	40	4.9	5	3
160	**WSX445-160C10NR**	●	–	10	Fine Pitch	172.9	63	40	4.8	5	3
160	**WSX445-160C16NR**	●	–	16	Extra Fine Pitch	172.8	63	40	4.6	5	3
200	**WSX445-200C08NR**	●	–	8	Coarse Pitch	212.9	63	60	7.5	5	4
200	**WSX445-200C12NR**	●	–	12	Fine Pitch	212.9	63	60	7.4	5	4
200	**WSX445-200C20NR**	●	–	20	Extra Fine Pitch	212.8	63	60	7.2	5	4

(Note1) A set bolt to the arbor is not supplied with the body.
(Note2) Please use a set bolt of the FMC(metric) type on the cutter body from 40 to 63 in diameter(DC).
(Note3) Please use a set bolt of the FMA type on the cutter body from 80 to 200 in diameter(DC).
* Number of Teeth

● : **Inventory maintained in Japan.**

WSX445

Arbor Type Left Hand Tool Holder

DC=mm size, DCON=mm size (mm)

DC	Order Number	Stock	Coolant Hole	* No.T	Type	DCX	LF	DCON	WT(kg)	APMX	Fig.
80	**WSX445-080A04AL**	●	○	4	Coarse Pitch	92.9	50	27	1.3	5	1
100	**WSX445-100B05AL**	●	○	5	Coarse Pitch	112.9	50	32	1.9	5	2
125	**WSX445-125B06AL**	●	○	6	Coarse Pitch	137.9	63	40	3.4	5	2
160	**WSX445-160C07NL**	●	–	7	Coarse Pitch	172.9	63	40	4.9	5	3

(Note1) A set bolt to the arbor is not supplied with the body.
(Note2) Please use a set bolt of the FMC(metric) type on the cutter body from 40 to 63 in diameter(DC).
(Note3) Please use a set bolt of the FMA type on the cutter body from 80 to 200 in diameter(DC).
* Number of Teeth

SPARE PARTS

Arbor Type	* Clamp Screw	Wrench (Insert)
WSX445	TPS4R	TIP15W

* Clamp Torque (N • m) : TPS4R=4.0

SET BOLT (SOLD SEPARATELY)

(mm)

Arbor Type	Set Bolt: With Coolant Hole Order Number	Set Bolt: Without Coolant Hole Order Number	Fig.	Reference Dimensions a	b	c	d	e	f	g
WSX445-040A○○AR	HSC08025H	HSC08040	1	13	M8×1.25	33	8	5	–	–
WSX445-050A○○AR	HSC10030H	HSC10035	1	16	M10×1.5	40	10	6	–	–
WSX445-063A○○AR	HSC10030H	HSC10035	1	16	M10×1.5	40	10	6	–	–
WSX445-080A○○A○	HSC12035H	HSC12035 HSC12045	1	18	M12×1.75	47 57	12	10	–	–
WSX445-100B○○A○	MBA16033H	—	2	40	M16×2	43	10	14	6	23
WSX445-125B○○A○	MBA20040H	—	2	50	M20×2.5	54	14	17	6	27
WSX445-160C○○N○	No coolant hole	—	2	50	M20×2.5	54	14	17	6	27
WSX445-200C○○NR	No coolant hole	—	1	24	M16×2	43	16	14	–	–
WSX445○080○○CA	HSC12035H	HSC12035 HSC12045	1	18	M12×1.75	47 57	12	10	–	–
WSX445○100○○DA	MBA16033H	—	2	40	M16×2	43	10	14	6	23
WSX445○125○○EA	MBA20040H	—	2	50	M20×2.5	54	14	17	6	27
WSX445○160○○FA	MBA24045H	—	2	65	M24×3	59	14	17	10	37
WSX445○200○○KN	No coolant hole	—	1	24	M16×2	43	16	14	–	–

Geometry

Fig.1

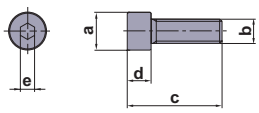
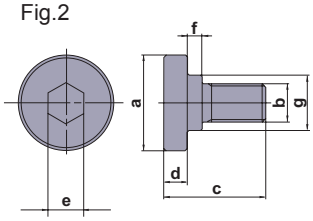
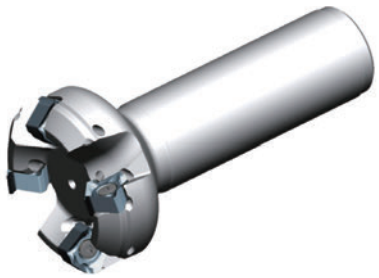


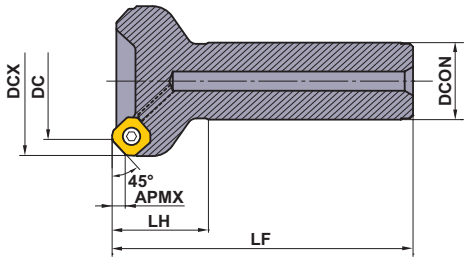
Fig.2



(Note 1) Internal coolant is necessary with the set bolt.

WSX445





Right hand tool holder only.

SHANK TYPE

(mm)

DC	Order Number	Stock	Coolant Hole	* No.T	Type	DCX	LF	DCON	LH	WT(kg)	APMX
40	**WSX445R4003SA32M**	●	○	3	Coarse Pitch	52.8	125	32	40	0.8	5
40	**WSX445R4004SA32M**	●	○	4	Fine Pitch	52.8	125	32	40	0.8	5
50	**WSX445R5003SA32M**	●	○	3	Coarse Pitch	62.9	125	32	40	1.0	5
50	**WSX445R5004SA32M**	●	○	4	Fine Pitch	62.9	125	32	40	1.0	5
63	**WSX445R6304SA32M**	●	○	4	Coarse Pitch	75.9	125	32	40	1.2	5
63	**WSX445R6305SA32M**	●	○	5	Fine Pitch	75.9	125	32	40	1.2	5
80	**WSX445R8004SA32M**	●	○	4	Coarse Pitch	92.9	125	32	40	1.6	5
80	**WSX445R8006SA32M**	●	○	6	Fine Pitch	92.9	125	32	40	1.5	5

● : Inventory maintained in Japan.

SPARE PARTS

Arbor Type	* Clamp Screw	Wrench (Insert)
WSX445	TPS4R	TIP15W

* Clamp Torque (N • m) : TPS4R=4.0

WSX445

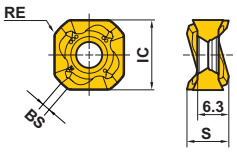
INSERTS WITH BREAKER

(mm)

Work Material			MC5020	MP6120	MP6130	MP7130	MP7140	MP9120	MP9130	VP15TF	VP20RT	MX3030		TF15	
	P	Steel		◐	✲					◐	◐	◐			
	M	Stainless Steel				◐	✲			◐	◐	◐			
	K	Cast Iron	◐							✲	✲	◐			
	N	Non-ferrous Metal												◐	
	S	Heat-resistant Alloy, Titanium Alloy						◐	✲	◐	◐				
	H	Hardened Steel								◐					

Cutting Conditions :
● : Stable Cutting ◐ : General Cutting
✲ : Unstable Cutting

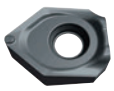
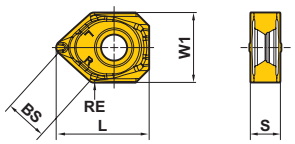
Honing : **E** : Round **F** : Sharp

Shape	Order Number	Class	Hand	Honing	MC5020	MP6120	MP6130	MP7130	MP7140	MP9120	MP9130	VP15TF	VP20RT	MX3030		TF15		IC	S	BS	RE	Geometry
					Coated									Cermet		Carbide						
	SNGU140812ANFR-L	G	R	F												●		14	8.4	1.5	1.2	
	SNGU140812ANER-L	G	R	E	●	●	●	●	●	●	●	●	●	●				14	8.4	1.5	1.2	
	SNGU140812ANER-M	G	R	E	●	●	●	●	●	●	●	●	●	●				14	8.4	1.5	1.2	
	SNMU140812ANER-M	M	R	E	●	●	●	●	●	●	●	●	●	●				14	8.4	1.5	1.2	
	SNMU140812ANER-R	M	R	E	●	●	●					●	●					14	8.4	1.5	1.2	
	SNMU140812ANER-H	M	R	E	●	●	●					●	●					14	8.4	1.5	1.2	
	SNGU140812ANEL-M	G	L	E	●	●	●					●		●				14	8.4	1.5	1.2	
	SNMU140812ANEL-M	M	L	E	●	●	●					●		●				14	8.4	1.5	1.2	
	SNMU140812ANEL-R	M	L	E	●	●	●					●						14	8.4	1.5	1.2	Right hand insert shown.

■ = MIRACLE SIGMA

WIPER INSERTS

(mm)

Shape	Order Number	Class	Honing	MC5020	MP6120	VP15TF		L	W1	S	BS	RE	Geometry
				Coated									
	**WNGU1406ANEN8C-M**	G	E	●	●	●		18.1	14	6	8	1.0	

● : Inventory maintained in Japan. (10 inserts in one case)

■ = MIRACLE SIGMA

Instructions for use of wiper inserts

Fig.1

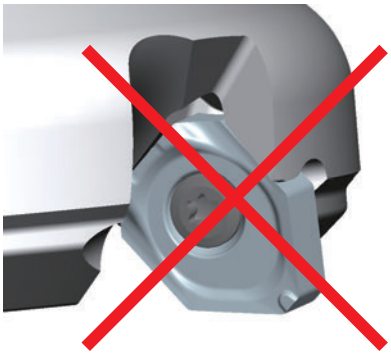


Fig.2

Wiper inserts for WSX445 are two-cornered. Please set as shown in Fig.1.
Excellent finished surfaces can be achieved with one wiper.
Set more than 2 wiper inserts, equally spaced, when the feed per revolution is larger than 8 mm/rev.

WSX445

RECOMMENDED CUTTING CONDITIONS

Dry cutting

Work Material		Hardness	1st Recommendation	2nd Recommendation	vc (m/min)	Finish Cutting fz	Finish Cutting ap
P						L Breaker	
	Mild Steel	≤ 180HB	MP6120	VP15TF	250 (200—300)	0.15 (0.1—0.2)	≤ 1.0
			MP6130	VP20RT	240 (190—290)	0.15 (0.1—0.2)	≤ 1.0
			MX3030	—	180 (130—230)	0.15 (0.1—0.2)	≤ 1.0
	Carbon Steel Alloy Steel	180—350HB	MP6120	VP15TF	220 (170—270)	0.15 (0.1—0.2)	≤ 1.0
			MP6130	VP20RT	200 (150—250)	0.15 (0.1—0.2)	≤ 1.0
			MX3030	—	150 (120—180)	0.15 (0.1—0.2)	≤ 1.0
	Alloy Tool Steel	≤ 350HB (annealing)	MP6120	VP15TF	220 (170—270)	0.15 (0.1—0.2)	≤ 1.0
			MP6130	VP20RT	200 (150—250)	0.15 (0.1—0.2)	≤ 1.0
			MX3030	—	150 (120—180)	0.15 (0.1—0.2)	≤ 1.0
	Pre-Hardened Steel	35—45HRC	MP6120	VP15TF	140 (100—180)	0.15 (0.1—0.2)	≤ 1.0
			MP6130	VP20RT	120 (90—150)	0.15 (0.1—0.2)	≤ 1.0
M						L Breaker	
	Austenitic Stainless Steel	≤ 200HB	MP7130	VP15TF	200 (150—250)	0.15 (0.1—0.2)	≤ 1.0
			MP7140	VP20RT	200 (150—250)	0.15 (0.1—0.2)	≤ 1.0
			MX3030	—	130 (100—180)	0.15 (0.1—0.2)	≤ 1.0
	Austenitic Stainless Steel	>200HB	MP7130	VP15TF	170 (120—220)	0.15 (0.1—0.2)	≤ 1.0
			MP7140	VP20RT	170 (120—220)	0.15 (0.1—0.2)	≤ 1.0
	Two-phase Stainless Steel	≤ 280HB	MP7130	VP15TF	160 (110—210)	0.15 (0.1—0.2)	≤ 1.0
			MP7140	VP20RT	160 (110—210)	0.15 (0.1—0.2)	≤ 1.0
	Precipitation Hardening Stainless Steel	≤ 450HB	MP7130	VP15TF	150 (100—200)	0.15 (0.1—0.2)	≤ 1.0
			MP7140	VP20RT	150 (100—200)	0.15 (0.1—0.2)	≤ 1.0
K						L Breaker	
	Gray Cast Iron	≤ 350MPa	MC5020	—	220 (200—270)	0.15 (0.1—0.2)	≤ 1.0
			VP15TF	—	180 (130—250)	0.15 (0.1—0.2)	≤ 1.0
			VP20RT	—	170 (120—240)	0.15 (0.1—0.2)	≤ 1.0
			MX3030	—	150 (120—180)	0.15 (0.1—0.2)	≤ 1.0
	Ductile Cast Iron	≤ 450MPa	MC5020	—	200 (180—250)	0.15 (0.1—0.2)	≤ 1.0
			VP15TF	VP20RT	160 (110—240)	0.15 (0.1—0.2)	≤ 1.0
	Ductile Cast Iron	≤ 800MPa	MC5020	—	200 (180—250)	0.15 (0.1—0.2)	≤ 1.0
			VP15TF	—	160 (110—240)	0.15 (0.1—0.2)	≤ 1.0
			VP20RT	—	150 (100—200)	0.15 (0.1—0.2)	≤ 1.0
H						M Breaker	
	Hardened Steel	40—55HRC	VP15TF	—	50 (30—70)	0.05 (0.05—0.1)	≤ 1.0
	Hardened Steel	55—62HRC	VP15TF	—	40 (20—50)	0.05 (0.05—0.1)	≤ 1.0

* Refer to the table above and set the cutting conditions to match the application.
* Wet cutting is recommended, when focusing on the surface finish. (Life is lower than dry cutting.)

WSX445

(mm)

A feed per revolution by processing area **fz**(mm/t.) and the depth of cut							
Light Cutting		Medium Cutting		Rough Cutting		Heavy Cutting	
fz	**ap**	**fz**	**ap**	**fz**	**ap**	**fz**	**ap**
L,M Breaker		M Breaker		M,R Breaker		R,H Breaker	
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	—	—	—	—
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	—	—	—	—
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	—	—	—	—
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
L,M Breaker		M Breaker					
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	—	—	—	—
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	—	—	—	—
0.15 (0.1—0.2)	≤ 2.0	—	—	—	—	—	—
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	—	—	—	—
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	—	—	—	—
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	—	—	—	—
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	—	—	—	—
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	—	—	—	—
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	—	—	—	—
L,M Breaker		M Breaker		M,R Breaker		R,H Breaker	
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	—	—	—	—
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
M,R Breaker		R,H Breaker					
0.05 (0.05—0.1)	≤ 1.5	0.1 (0.05—0.15)	≤ 2.0	—	—	—	—
0.05 (0.05—0.1)	≤ 1.5	0.1 (0.05—0.15)	≤ 2.0	—	—	—	—

WSX445

RECOMMENDED CUTTING CONDITIONS

Wet Cutting

Work Material		Hardness	1st Recommendation	2nd Recommendation	vc (m/min)	Finish Cutting fz	Finish Cutting ap
P						L Breaker	
	Mild Steel	≤ 180HB	MP6120	VP15TF	150 (100—200)	0.15 (0.1—0.2)	≤ 1.0
			MP6130	VP20RT	150 (100—200)	0.15 (0.1—0.2)	≤ 1.0
	Carbon Steel Alloy Steel	180—350HB	MP6120	VP15TF	120 (80—160)	0.15 (0.1—0.2)	≤ 1.0
			MP6130	VP20RT	120 (80—160)	0.15 (0.1—0.2)	≤ 1.0
	Alloy Tool Steel	≤ 350HB (annealing)	MP6120	VP15TF	120 (80—160)	0.15 (0.1—0.2)	≤ 1.0
			MP6130	VP20RT	120 (80—160)	0.15 (0.1—0.2)	≤ 1.0
	Pre-Hardened Steel	35—45HRC	MP6120	VP15TF	100 (80—120)	0.15 (0.1—0.2)	≤ 1.0
			MP6130	VP20RT	100 (80—120)	0.15 (0.1—0.2)	≤ 1.0
M						L Breaker	
	Austenitic Stainless Steel	≤ 200HB	MP7130	VP15TF	130 (80—180)	0.15 (0.1—0.2)	≤ 1.0
			MP7140	VP20RT	130 (80—180)	0.15 (0.1—0.2)	≤ 1.0
	Austenitic Stainless Steel	> 200HB	MP7130	VP15TF	100 (80—150)	0.15 (0.1—0.2)	≤ 1.0
			MP7140	VP20RT	100 (80—150)	0.15 (0.1—0.2)	≤ 1.0
	Two-phase Stainless Steel	≤ 280HB	MP7130	VP15TF	100 (80—150)	0.15 (0.1—0.2)	≤ 1.0
			MP7140	VP20RT	100 (80—150)	0.15 (0.1—0.2)	≤ 1.0
	Precipitation Hardening Stainless Steel	≤ 450HB	MP7130	VP15TF	90 (50—140)	0.15 (0.1—0.2)	≤ 1.0
			MP7140	VP20RT	90 (50—140)	0.15 (0.1—0.2)	≤ 1.0
K						L Breaker	
	Gray Cast Iron	≤ 350MPa	MC5020	—	180 (160—200)	0.15 (0.1—0.2)	≤ 1.0
			VP15TF	VP20RT	130 (100—160)	0.15 (0.1—0.2)	≤ 1.0
	Ductile Cast Iron	≤ 450MPa	MC5020	—	180 (160—200)	0.15 (0.1—0.2)	≤ 1.0
			VP15TF	VP20RT	130 (100—160)	0.15 (0.1—0.2)	≤ 1.0
	Ductile Cast Iron	≤ 800MPa	MC5020	—	180 (160—200)	0.15 (0.1—0.2)	≤ 1.0
			VP15TF	VP20RT	110 (80—140)	0.15 (0.1—0.2)	≤ 1.0
N						L Breaker	
	Aluminum Alloy	—	TF15	—	≥ 300	0.15 (0.1—0.2)	≤ 1.0
S						L Breaker	
	Titanium Alloy	—	MP9120	VP15TF	50 (40—60)	0.05 (0.05—0.1)	≤ 1.0
			MP9130	VP20RT	50 (40—60)	0.05 (0.05—0.1)	≤ 1.0
	Heat Resistant Alloy	—	MP9120	VP15TF	40 (20—50)	0.05 (0.05—0.1)	≤ 1.0
			MP9130	VP20RT	40 (20—50)	0.05 (0.05—0.1)	≤ 1.0

* Refer to the table above and set the cutting conditions to match the application.
* Wet cutting is recommended, when focusing on the surface finish. (Life is lower than dry cutting.)

WSX445

(mm)

A feed per revolution by processing area **fz**(mm/t.) and the depth of cut							
Light Cutting		Medium Cutting		Rough Cutting		Heavy Cutting	
fz	**ap**	**fz**	**ap**	**fz**	**ap**	**fz**	**ap**
L,M Breaker		M Breaker		M,R Breaker		R,H Breaker	
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
L,M Breaker		M Breaker					
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	—	—	—	—
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	—	—	—	—
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	—	—	—	—
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	—	—	—	—
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	—	—	—	—
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	—	—	—	—
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	—	—	—	—
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	—	—	—	—
L,M Breaker		M Breaker		M,R Breaker		R,H Breaker	
0.15 (0.1—0.2)	≤ 2.0	0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
0.15 (0.1—0.2)	≤ 2.0	0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
0.15 (0.1—0.2)	≤ 2.0	0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
0.15 (0.1—0.2)	≤ 2.0	0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
0.15 (0.1—0.2)	≤ 2.0	0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
0.15 (0.1—0.2)	≤ 2.0	0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
L Breaker		L Breaker		L Breaker		L Breaker	
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
L,M Breaker		M Breaker					
0.05 (0.05—0.1)	≤ 1.5	0.1 (0.05—0.15)	≤ 2.0	—	—	—	—
0.05 (0.05—0.1)	≤ 1.5	0.1 (0.05—0.15)	≤ 2.0	—	—	—	—
0.05 (0.05—0.1)	≤ 1.5	0.1 (0.05—0.15)	≤ 2.0	—	—	—	—
0.05 (0.05—0.1)	≤ 1.5	0.1 (0.05—0.15)	≤ 2.0	—	—	—	—

WSX445

Arbor Type Mounting Dimensions

Fig.1

ø40
ø50
ø63
ø80

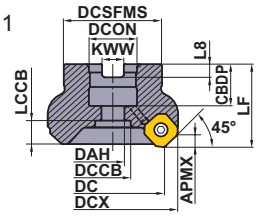


Fig.2

ø100
ø125
ø160

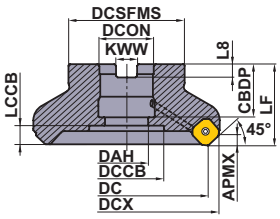
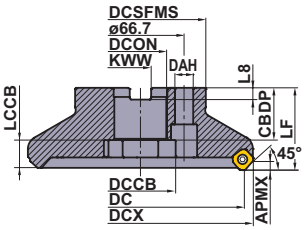


Fig.3

ø160



Right hand insert shown.

(mm)

DC	Order Number	DCON	CBDP	DAH	DCCB	LCCB	DCSFMS	KWW	L8	Fig.
40	**WSX445-040A03AR**	16	18	9	14	13.3	37	8.4	5.6	1
40	**WSX445-040A04AR**	16	18	9	14	13.3	37	8.4	5.6	1
50	**WSX445-050A03AR**	22	20	11	17	11.3	47	10.4	6.3	1
50	**WSX445-050A04AR**	22	20	11	17	11.3	47	10.4	6.3	1
50	**WSX445-050A05AR**	22	20	11	17	11.3	47	10.4	6.3	1
63	**WSX445-063A04AR**	22	20	11	17	11.3	50	10.4	6.3	1
63	**WSX445-063A05AR**	22	20	11	17	11.3	50	10.4	6.3	1
63	**WSX445-063A06AR**	22	20	11	17	11.3	50	10.4	6.3	1
80	**WSX445R08004CA**	25.4	26	13	20	14.3	56	9.5	6	1
80	**WSX445R08006CA**	25.4	26	13	20	14.3	56	9.5	6	1
80	**WSX445R08008CA**	25.4	26	13	20	14.3	56	9.5	6	1
80	**WSX445L08004CA**	25.4	26	13	20	14.3	56	9.5	6	1
80	**WSX445-080A04AR**	27	23	13	20	14.3	56	12.4	7	1
80	**WSX445-080A06AR**	27	23	13	20	14.3	56	12.4	7	1
80	**WSX445-080A08AR**	27	23	13	20	14.3	56	12.4	7	1
80	**WSX445-080A04AL**	27	23	13	20	14.3	56	12.4	7	1
100	**WSX445R10005DA**	31.75	32	26	45	11.3	70	12.7	8	2
100	**WSX445R10007DA**	31.75	32	26	45	11.3	70	12.7	8	2
100	**WSX445R10010DA**	31.75	32	26	45	11.3	70	12.7	8	2
100	**WSX445L10005DA**	31.75	32	26	45	11.3	70	12.7	8	2
100	**WSX445-100B05AR**	32	26	26	45	16.3	78	14.4	8	2
100	**WSX445-100B07AR**	32	26	26	45	16.3	78	14.4	8	2
100	**WSX445-100B10AR**	32	26	26	45	16.3	78	14.4	8	2
100	**WSX445-100B05AL**	32	26	26	45	16.3	78	14.4	8	2

WSX445

Fig.4
ø200

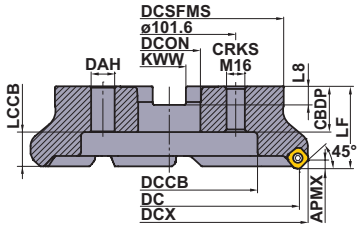
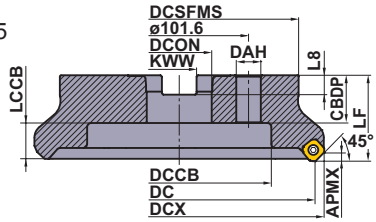


Fig.5
ø200



Right hand insert shown.

(mm)

DC	Order Number	DCON	CBDP	DAH	DCCB	LCCB	DCSFMS	KWW	L8	Fig.
125	**WSX445R12506EA**	38.1	36	30	56	19.3	80	15.9	10	2
125	**WSX445R12508EA**	38.1	36	30	56	19.3	80	15.9	10	2
125	**WSX445R12512EA**	38.1	36	30	56	19.3	80	15.9	10	2
125	**WSX445L12506EA**	38.1	36	30	56	19.3	80	15.9	10	2
125	**WSX445-125B06AR**	40	28	30	56	21.3	89	16.4	9	2
125	**WSX445-125B08AR**	40	28	30	56	21.3	89	16.4	9	2
125	**WSX445-125B12AR**	40	28	30	56	21.3	89	16.4	9	2
125	**WSX445-125B06AL**	40	28	30	56	21.3	89	16.4	9	2
160	**WSX445-160C07NR**	40	40	14	56	21.3	100	16.4	9	3
160	**WSX445-160C10NR**	40	40	14	56	21.3	100	16.4	9	3
160	**WSX445-160C16NR**	40	40	14	56	21.3	100	16.4	9	3
160	**WSX445-160C07NL**	40	40	14	56	21.3	100	16.4	9	3
160	**WSX445R16007FA**	50.8	38	40	72	16.3	100	19.1	11	2
160	**WSX445R16010FA**	50.8	38	40	72	16.3	100	19.1	11	2
160	**WSX445R16016FA**	50.8	38	40	72	16.3	100	19.1	11	2
160	**WSX445L16007FA**	50.8	38	40	72	16.3	100	19.1	11	2
200	**WSX445R20008KN**	47.625	35	18	135	26.3	175	25.4	14.22	5
200	**WSX445R20012KN**	47.625	35	18	135	26.3	175	25.4	14.22	5
200	**WSX445R20020KN**	47.625	35	18	135	26.3	175	25.4	14.22	5
200	**WSX445L20008KN**	47.625	35	18	135	26.3	175	25.4	14.22	5
200	**WSX445-200C08NR**	60	32	18	135	29.3	160	25.7	14.22	4
200	**WSX445-200C12NR**	60	32	18	135	29.3	160	25.7	14.22	4
200	**WSX445-200C20NR**	60	32	18	135	29.3	160	25.7	14.22	4

ASX445

General Cutting

Product Information

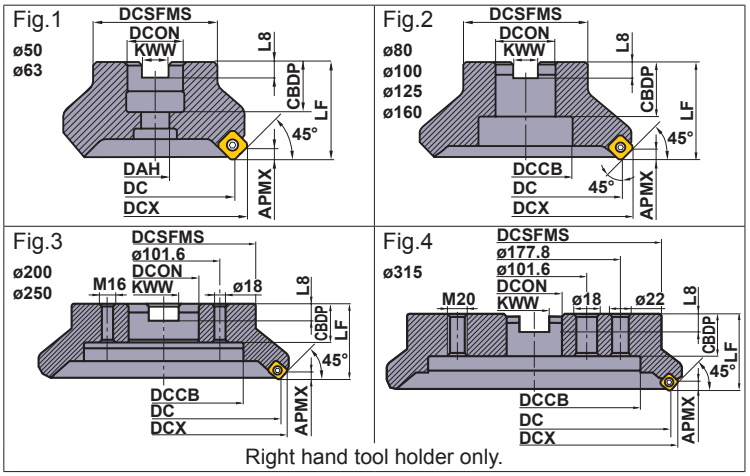
45° KAPR

Work Material

P M K N S H F R

SYMBOL DESCRIPTIONS >> 1350
TECHNICAL DATA >> 1987
ISO13399 Property >> 1966

- Precision inexpensive moulded type 20°positive insert.
- Screw-on type.
- A wide range of chip breakers.
- High rigidity due to carbide shim.



Right hand tool holder only.

ARBOR TYPE

KAPR :45°
GAMP:+20°—+23° T :+4°49′—+9°53′
GAMF:-13°—-10° I :+22°55′—+23°02′

Type	Order Number	Stock R	Number of Teeth	Dimensions(mm) DC	DCX	LF	DCON	CBDP	DAH	DCCB	DCSFMS	KWW	L8	WT* (kg)	APMX (mm)	Type (Fig.)
Coarse Pitch	ASX445-050A03R	●	3	50	63.0	40	22	20	11	—	45	10.4	6.3	0.5	6	1
	ASX445-063A04R	●	4	63	75.9	40	22	20	11	—	50	10.4	6.3	0.7	6	1
	ASX445R08004C	●	4	80	93.2	50	25.4	26	—	38	56	9.5	6	1.1	6	2
	ASX445R10005D	●	5	100	113.2	50	31.75	32	—	45	70	12.7	8	1.8	6	2
	ASX445R12506E	●	6	125	138.0	63	38.1	35	—	60	80	15.9	10	2.9	6	2
	ASX445R16007F	●	7	160	173.0	63	50.8	38	—	80	100	19.1	11	4.7	6	2
	ASX445R20008K	●	8	200	212.9	63	47.625	35	—	140	175	25.4	14.22	7.9	6	3
	ASX445R25010K	●	10	250	262.9	63	47.625	35	—	180	220	25.4	14.22	12.9	6	3
	ASX445R31514P	●	14	315	327.9	63	47.625	40	—	245	285	25.4	14.22	22.4	6	4
Fine Pitch	ASX445-050A04R	●	4	50	63.0	40	22	20	11	—	45	10.4	6.3	0.4	6	1
	ASX445-063A05R	●	5	63	75.9	40	22	20	11	—	50	10.4	6.3	0.6	6	1
	ASX445R08006C	●	6	80	93.2	50	25.4	26	—	38	56	9.5	6	1.0	6	2
	ASX445R10007D	●	7	100	113.2	50	31.75	32	—	45	70	12.7	8	1.7	6	2
	ASX445R12508E	●	8	125	138.0	63	38.1	35	—	60	80	15.9	10	2.8	6	2
	ASX445R16010F	●	10	160	173.0	63	50.8	38	—	80	100	19.1	11	4.6	6	2
	ASX445R20012K	●	12	200	212.9	63	47.625	35	—	140	175	25.4	14.22	7.8	6	3
	ASX445R25014K	●	14	250	262.9	63	47.625	35	—	180	220	25.4	14.22	12.8	6	3
	ASX445R31518P	●	18	315	327.9	63	47.625	40	—	245	285	25.4	14.22	22.2	6	4
Extra Fine Pitch	ASX445-050A05R	●	5	50	63.0	40	22	20	11	—	45	10.4	6.3	0.4	6	1
	ASX445-063A06R	●	6	63	75.9	40	22	20	11	—	50	10.4	6.3	0.6	6	1
	ASX445R08008C	●	8	80	93.2	50	25.4	26	—	38	56	9.5	6	1.1	6	2
	ASX445R10010D	●	10	100	113.2	50	31.75	32	—	45	70	12.7	8	1.8	6	2
	ASX445R12512E	●	12	125	138.0	63	38.1	35	—	60	80	15.9	10	2.9	6	2
	ASX445R16016F	●	16	160	173.0	63	50.8	38	—	80	100	19.1	11	4.7	6	2
	ASX445R20020K	●	20	200	212.9	63	47.625	35	—	140	175	25.4	14.22	7.8	6	3
	ASX445R25024K	●	24	250	262.9	63	47.625	35	—	180	220	25.4	14.22	12.8	6	3
	ASX445R31528P	●	28	315	327.9	63	47.625	40	—	245	285	25.4	14.22	21.8	6	4

* WT : Tool Weight

● : Inventory maintained in Japan.

ASX445

Fig.1
ø50
ø63

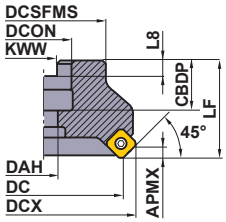


Fig.2
ø80
ø100

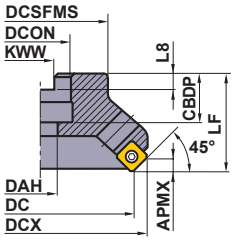
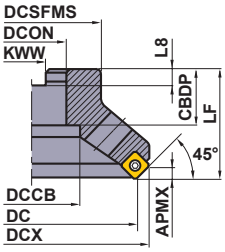


Fig.3
ø125



For metric arbor

The cutter bore diameter DCON is indicated in millimetre.

ø50, ø63

Over ø80

Fig.4
ø160

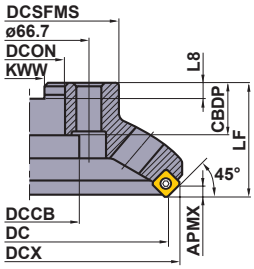
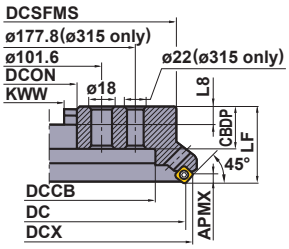


Fig.5
ø200
ø250
ø315



KAPR :45°
GAMP:+20°—+23° T :+4°49′—+9°53′
GAMF:-13°—-10° I :+22°55′—+23°02′

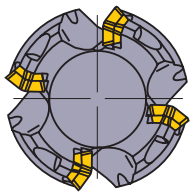
Right hand tool holder only.

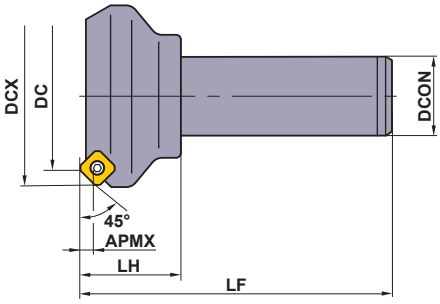
ARBOR TYPE

Type	Order Number	Stock R	Number of Teeth	Dimensions(mm) DC	DCX	LF	DCON	CBDP	DAH	DCCB	DCSFMS	KWW	L8	WT* (kg)	APMX (mm)	Type (Fig.)
Coarse Pitch	ASX445-050A03R	●	3	50	63.0	40	22	20	11	—	45	10.4	6.3	0.5	6	1
	ASX445-063A04R	●	4	63	75.9	40	22	20	11	—	50	10.4	6.3	0.7	6	1
	ASX445-080A04R	●	4	80	93.2	50	27	23	13	—	56	12.4	7	1.0	6	2
	ASX445-100A05R	●	5	100	113.2	50	32	26	17	—	70	14.4	8	1.6	6	2
	ASX445-125B06R	●	6	125	138.0	63	40	32	—	56	80	16.4	9	2.4	6	3
	ASX445-160C07R	●	7	160	173.0	63	40	29	—	56	100	16.4	9	3.9	6	4
	ASX445-200C08R	●	8	200	212.9	63	60	32	—	135	155	25.7	14.22	6.7	6	5
	ASX445-250C10R	●	10	250	262.9	63	60	32	—	174	200	25.7	14.22	10.5	6	5
	ASX445-315C14R	●	14	315	327.9	80	60	57	—	256.8	285	25.7	14.22	22.4	6	5
Fine Pitch	ASX445-050A04R	●	4	50	63.0	40	22	20	11	—	45	10.4	6.3	0.4	6	1
	ASX445-063A05R	●	5	63	75.9	40	22	20	11	—	50	10.4	6.3	0.6	6	1
	ASX445-080A06R	●	6	80	93.2	50	27	23	13	—	56	12.4	7	0.9	6	2
	ASX445-100A07R	●	7	100	113.2	50	32	26	17	—	70	14.4	8	1.5	6	2
	ASX445-125B08R	●	8	125	138.0	63	40	32	—	56	80	16.4	9	2.3	6	3
	ASX445-160C10R	●	10	160	173.0	63	40	29	—	56	100	16.4	9	3.6	6	4
	ASX445-200C12R	●	12	200	212.9	63	60	32	—	135	155	25.7	14.22	5.8	6	5
	ASX445-250C14R	●	14	250	262.9	63	60	32	—	174	200	25.7	14.22	10.6	6	5
	ASX445-315C18R	●	18	315	327.9	80	60	57	—	256.8	285	25.7	14.22	22.2	6	5
Extra Fine Pitch	ASX445-050A05R	●	5	50	63.0	40	22	20	11	—	45	10.4	6.3	0.4	6	1
	ASX445-063A06R	●	6	63	75.9	40	22	20	11	—	50	10.4	6.3	0.6	6	1
	ASX445-080A08R	●	8	80	93.2	50	27	23	13	—	56	12.4	7	0.9	6	2
	ASX445-100A10R	●	10	100	113.2	50	32	26	17	—	70	14.4	8	1.5	6	2
	ASX445-125B12R	●	12	125	138.0	63	40	32	—	56	80	16.4	9	2.3	6	3
	ASX445-160C16R	●	16	160	173.0	63	40	29	—	56	100	16.4	9	3.6	6	4
	ASX445-200C20R	●	20	200	212.9	63	60	32	—	135	155	25.7	14.22	6.5	6	5
	ASX445-250C24R	●	24	250	262.9	63	60	32	—	174	200	25.7	14.22	10.3	6	5
	ASX445-315C28R	●	28	315	327.9	80	60	57	—	256.8	285	25.7	14.22	21.8	6	5

* WT : Tool Weight

ASX445



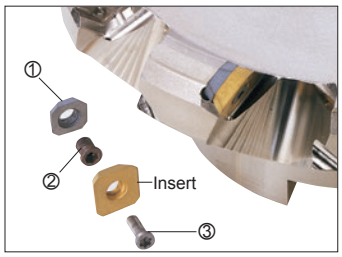


Right hand tool holder only.

SHANK TYPE

Order Number	Stock R	Number of Teeth	Dimensions(mm) DC	DCX	LF	DCON	LH	APMX (mm)
ASX445R503S32	●	3	50	63.0	125	32	40	6
ASX445R634S32	●	4	63	75.9	125	32	40	6
ASX445R804S32	●	4	80	93.2	125	32	40	6

● : Inventory maintained in Japan.



SPARE PARTS

Tool Holder Number	① Shim	② Shim Screw *	③ Clamp Screw *	Wrench (Insert)	Wrench (Shim)
ASX445	STASX445N	WCS503507H	TPS35	TIP15T	HKY35R

* Clamp Torque (N • m) : WCS503507H=5.0, TPS35=3.5

Wrench	1. Wrench: The ASX400 uses a TORXPLUS® clamp screw. The attached wrench is for the exclusive use of this screw. To ensure the effectiveness of TORXPLUS® only use the attached wrench. 2. Hexagonal wrench: The attached hexagonal wrench is for use with the seat and the shim. The wrench size is 3.5mm.
Spare Parts	Only use the original parts that were supplied when purchased. If other parts are used the performance and safety can not be assured.

ASX445

RECOMMENDED CUTTING CONDITIONS

	Work Material	Hardness	Grade	Cutting Speed (m/min)	Finish—Light Cutting		Light—Rough Cutting		Medium—Heavy Cutting	
					Feed per Tooth (mm/t.)	Breaker	Feed per Tooth (mm/t.)	Breaker	Feed per Tooth (mm/t.)	Breaker
P	Mild Steel	≤180HB	F7030	280 (210—350)	0.15 (0.1—0.2)	JL	0.2 (0.1—0.3)	JM	0.3 (0.2—0.4)	JH
			MP6120 VP15TF	250 (200—300)	0.15 (0.1—0.2)	JL	0.2 (0.1—0.3)	JM	0.3 (0.2—0.4)	JH
			MP6130	240 (190—290)	0.15 (0.1—0.2)	JL	0.2 (0.1—0.3)	JM	0.3 (0.2—0.4)	JH
			VP30RT	230 (180—280)	0.15 (0.1—0.2)	JL	0.2 (0.1—0.3)	JM	0.3 (0.2—0.4)	JH
			NX4545	180 (130—230)	0.15 (0.1—0.2)	JL	0.2 (0.1—0.3)	JM	—	—
	Carbon Steel Alloy Steel	180—280HB	F7030	250 (200—300)	0.15 (0.1—0.2)	JL	0.2 (0.1—0.3)	JM	0.3 (0.2—0.4)	JH
			MP6120 VP15TF	220 (170—270)	0.15 (0.1—0.2)	JL	0.2 (0.1—0.3)	JM	0.3 (0.2—0.4)	JH
			MP6130	200 (150—230)	0.15 (0.1—0.2)	JL	0.2 (0.1—0.3)	JM	0.3 (0.2—0.4)	JH
			VP30RT	150 (120—180)	0.15 (0.1—0.2)	JL	0.2 (0.1—0.3)	JM	0.3 (0.2—0.4)	JH
			NX4545	150 (120—180)	0.15 (0.1—0.2)	JL	0.2 (0.1—0.3)	JM	—	—
		280—350HB	F7030	180 (130—230)	0.15 (0.1—0.2)	JL	0.2 (0.1—0.3)	JM	0.3 (0.2—0.4)	JH
			MP6120 VP15TF	140 (100—180)	0.15 (0.1—0.2)	JL	0.2 (0.1—0.3)	JM	0.3 (0.2—0.4)	JH
			MP6130	120 (90—150)	0.15 (0.1—0.2)	JL	0.2 (0.1—0.3)	JM	0.3 (0.2—0.4)	JH
			VP30RT	100 (80—160)	0.15 (0.1—0.2)	JL	0.2 (0.1—0.3)	JM	0.3 (0.2—0.4)	JH
			NX4545	100 (80—160)	0.15 (0.1—0.2)	JL	0.2 (0.1—0.3)	JM	—	—
M	Stainless Steel	≤270HB	MP7130 VP15TF	220 (170—270)	0.15 (0.1—0.2)	JL	0.2 (0.1—0.3)	JM	0.3 (0.2—0.4)	JH
			MP7140 VP30RT	200 (150—250)	0.15 (0.1—0.2)	JL	0.2 (0.1—0.3)	JM	0.3 (0.2—0.4)	JH
			NX4545	150 (120—180)	0.15 (0.1—0.2)	JL	0.2 (0.1—0.3)	JM	—	—
K	Cast Iron Ductile Cast Iron	Tensile Strength ≤450MPa	MC5020	200 (150—250)	—	—	0.2 (0.1—0.3)	JM	0.3 (0.2—0.4)	JH FT
			VP15TF	180 (130—250)	0.15 (0.1—0.2)	JL	0.2 (0.1—0.3)	JM	0.3 (0.2—0.4)	JH
		Tensile Strength ≥450MPa	MC5020	110 (80—150)	—	—	0.2 (0.1—0.3)	JM	0.3 (0.2—0.4)	JH FT
N	Aluminium Alloy	—	HTi10	650 (300—1000)	0.15 (0.1—0.2)	JP	0.2 (0.1—0.3)	JP	0.3 (0.2—0.4)	JP
S	Titanium Alloy	—	MP9120 VP15TF	50 (40—60)	0.15 (0.1—0.2)	JL	0.2 (0.1—0.3)	JM	0.3 (0.2—0.4)	JH
			MP9130	45 (30—55)	0.15 (0.1—0.2)	JL	0.2 (0.1—0.3)	JM	0.3 (0.2—0.4)	JH
	Heat Resistant Alloy (Inconel718 etc.)	—	MP9120 VP15TF	40 (20—50)	0.15 (0.1—0.2)	JL	0.2 (0.1—0.3)	JM	0.3 (0.2—0.4)	JH
			MP9130	35 (15—45)	0.15 (0.1—0.2)	JL	0.2 (0.1—0.3)	JM	0.3 (0.2—0.4)	JH
H	Hardened Steel	40—55HRC	VP15TF	80 (60—100)	0.1 (0.05—0.15)	JL	0.15 (0.1—0.2)	JM	0.2 (0.1—0.3)	JH

●Revolution (min^{-1})=(1000 x Cutting Speed)÷(3.14 x DC) ●Table Feed (mm/min)=Feed per Tooth x Number of Teeth x Cutter Revolution

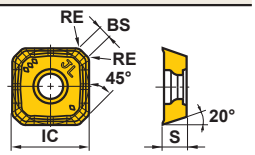
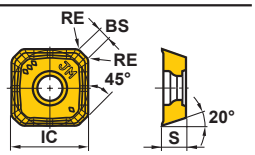
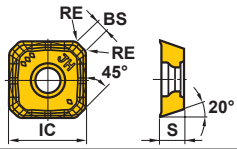
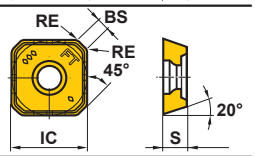
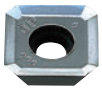
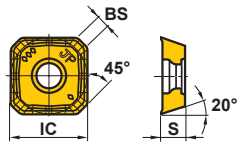
ASX445

INSERTS

Work Material		F7030	MC5020	MP6120	MP6130	MP7130	MP7140	MP9120	MP9130	VP15TF	VP30RT	NX4545		HTi10	
P	Steel	General		General	Unstable					General	Unstable	General			
M	Stainless Steel	General				General	Stable			General	Stable	General			
K	Cast Iron		General							Unstable				General	
N	Non-ferrous Metal													General	
S	Heat-resistant Alloy, Titanium Alloy							General	Unstable	General					
H	Hardened Steel									General					

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✠ : Unstable Cutting

Honing :
E : Round **F** : Sharp
S : Chamfer + Hone **T** : Chamfer

Application	Shape	Order Number	Class	Honing	F7030	MC5020	MP6120	MP6130	MP7130	MP7140	MP9120	MP9130	VP15TF	VP30RT	NX4545		HTi10		IC	S	BS	RE	Geometry
					Coated										Cermet		Carbide		Dimensions(mm)				
Finish–Light Cutting	JL Breaker	**SEET13T3AGEN-JL**	E	E	●		●	●	●	●	●	●	●	●	●				13.4	3.97	1.9	1.5	
Light–Rough Cutting	JM Breaker	**SEMT13T3AGSN-JM**	M	S	●	●	●	●	●	●	●	●	●	●	●				13.4	3.97	1.9	1.5	
Medium–Heavy Cutting	JH Breaker	**SEMT13T3AGSN-JH**	M	S	●	●	●	●	●	●	●	●	●	●					13.4	3.97	1.9	1.5	
Roughing For Cast Iron	FT Breaker	**SEMT13T3AGSN-FT**	M	S		●													13.4	3.97	1.9	1.5	
For Aluminium Alloy	JP Breaker 	**SEGT13T3AGFN-JP**	G	F													●		13.4	3.97	2.2	—	

● : **Inventory maintained in Japan.**
(10 inserts in one case) (CBN and PCD inserts are available in 1 piece in one case)

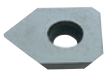
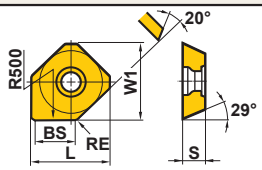
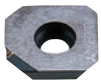
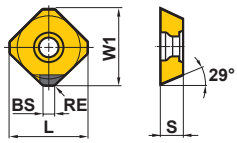
■ = MIRACLE SIGMA

Instructions for use of the JP breaker

* The JP breaker has sharp cutting edges.
  Wear gloves when handling.
* When machining aluminium alloy, welding to the cutting edge tends to occur, often leading to insert failure. To prevent this, wet cutting is recommended.

ASX445

WIPER INSERTS

Shape	Order Number	Honing	Coated		Cermet		Coated Cermet		Carbide		CBN		PCD		Dimensions (mm)					Geometry
			MC5020	VP15TF	NX2525		VP25N		HTi05T		MB710		MD220		L	W1	S	BS	RE	
	WEEW13T3AGER8C	E	●	●					●						16.48	16.60	3.97	7.5	1.5	
	WEEW13T3AGTR8C	T			●		●								16.48	16.60	3.97	7.5	1.5	
	WEEW13T3AGFR3C	F											●		16.48	16.60	3.97	3.0	1.5	
	WEEW13T3AGTR3C	T									●				16.48	16.60	3.97	3.0	1.5	

*Wiper inserts are single-cornered.
*CBN grade MB710 is for cast iron.
*PCD grade MD220 is for aluminum alloy.

Instructions for use of wiper inserts

Fig.1

Fig.2

- These wiper inserts are single-cornered.
- Install the insert so that the cutting edge is located as shown in Fig., 1.
  Do not install the wiper insert as shown in Fig. 2. (The insert may be damaged by a too heavy cutting load.)
- Recommended depth of cutting is ap=0.2-0.5(mm).
  (Be aware of the cutting load if the depth of cut is over the recommendation.)
- The major cutting edge of a wiper insert is set more inside than a general tooth.
  This is to prevent heavy loads on the wiper insert. (To prevent fracture set the feed under 0.2 mm/tooth)
- Excellent finished surface can be obtained with one wiper insert.
- When the feed per revolution is larger than the width of the wiper edge, install 2 or more wiper inserts equally inside the cutting body.

RECOMMENDED CUTTING CONDITIONS WHEN USING A WIPER INSERT

Work Material	Grade	Recommended Cutting Speed (m/min)
P	VP25N	200 (80—250)
	VP15TF	180 (80—250)
M	VP15TF	120—270
K	MC5020	130—250
	VP15TF	
S	VP15TF	20—50
H	VP15TF	40—80

●Recommended depth of cut (ap) is 0.2mm-0.5mm and feed per tooth (fz) is up to 0.2mm/t.

AHX440S

General Cutting

Product Information

50° KAPR

Work Material

P M K H F R

SYMBOL DESCRIPTIONS >> 1350
TECHNICAL DATA >> 1987
ISO13399 Property >> 1966

Fig. 1
ø40
ø50
ø63
ø80

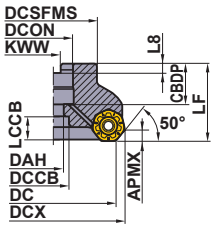


Fig. 2
ø100
ø125
ø160

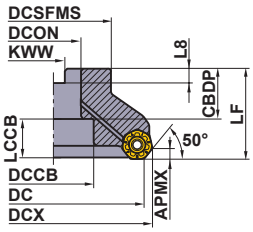
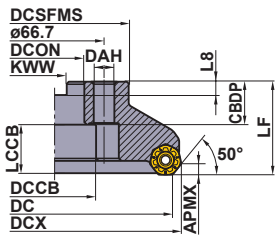


Fig. 3
ø160



KAPR :50° T :15° (When using the M breaker insert)
GAMP:-6° I :5°
GAMF :-7°
DC = mm size, DCON = Inch size

Right hand tool holder only.

(mm)

DC	Order Number	Stock	Coolant Hole	* No.T	LF	DCX	DCON	Type (Fig.)	WT(kg)	APMX
40	AHX440S-040A03AR	●	○	3	40	48.4	16	1	0.3	3
	AHX440S-040A04AR	●	○	4	40	48.4	16	1	0.2	3
50	AHX440S-050A04AR	●	○	4	40	58.4	22	1	0.4	3
	AHX440S-050A05AR	●	○	5	40	58.4	22	1	0.4	3
	AHX440S-050A06AR	●	○	6	40	58.4	22	1	0.4	3
63	AHX440S-063A05AR	●	○	5	40	71.4	22	1	0.6	3
	AHX440S-063A06AR	●	○	6	40	71.4	22	1	0.6	3
	AHX440S-063A08AR	●	○	8	40	71.4	22	1	0.5	3
80	AHX440SR08006CA	●	○	6	50	88.4	25.4	1	1.1	3
	AHX440SR08008CA	●	○	8	50	88.4	25.4	1	1.1	3
	AHX440SR08010CA	●	○	10	50	88.4	25.4	1	1.1	3
100	AHX440SR10007DA	●	○	7	50	108.4	31.75	2	1.6	3
	AHX440SR10010DA	●	○	10	50	108.4	31.75	2	1.6	3
	AHX440SR10012DA	●	○	12	50	108.3	31.75	2	1.6	3
125	AHX440SR12508EA	●	○	8	63	133.4	38.1	2	3.0	3
	AHX440SR12512EA	●	○	12	63	133.4	38.1	2	3.0	3
	AHX440SR12514EA	●	○	14	63	133.3	38.1	2	2.9	3
160	AHX440SR16010FA	●	○	10	63	168.4	50.8	2	4.8	3
	AHX440SR16014FA	●	○	14	63	168.4	50.8	2	4.6	3
	AHX440SR16016FA	●	○	16	63	168.4	50.8	2	4.7	3

(Note 1) The cutter body does not have a set bolt for an arbor.
(Note 2) The above "APMX" will vary depending on the breaker insert.
* Number of Teeth

● : **Inventory maintained in Japan.**

SPARE PARTS

Tool Holder Number	* Clamp Screw	Wrench (Insert)
AHX440S	TS35R	TKY15T

* Clamp Torque (N • m) : TS35R=3.5

AHX440S

Metric Standard

KAPR :50° T :15° (When using the M breaker insert)
GAMP :-6° I :5°
GAMF :-7°
DC = mm size, DCON = mm size

(mm)

DC	Order Number	Stock	Coolant Hole	* No.T	LF	DCX	DCON	Type (Fig.)	WT(kg)	APMX
40	**AHX440S-040A03AR**	●	○	3	40	48.4	16	1	0.3	3
	AHX440S-040A04AR	●	○	4	40	48.4	16	1	0.2	3
50	**AHX440S-050A04AR**	●	○	4	40	58.4	22	1	0.4	3
	AHX440S-050A05AR	●	○	5	40	58.4	22	1	0.4	3
	AHX440S-050A06AR	●	○	6	40	58.4	22	1	0.4	3
63	**AHX440S-063A05AR**	●	○	5	40	71.4	22	1	0.6	3
	AHX440S-063A06AR	●	○	6	40	71.4	22	1	0.6	3
	AHX440S-063A08AR	●	○	8	40	71.4	22	1	0.5	3
80	**AHX440S-080A06AR**	●	○	6	50	88.4	27	1	1.1	3
	AHX440S-080A08AR	●	○	8	50	88.4	27	1	1.1	3
	AHX440S-080A10AR	●	○	10	50	88.4	27	1	1.1	3
100	**AHX440S-100B07AR**	●	○	7	50	108.4	32	2	1.6	3
	AHX440S-100B10AR	●	○	10	50	108.4	32	2	1.6	3
	AHX440S-100B12AR	●	○	12	50	108.3	32	2	1.6	3
125	**AHX440S-125B08AR**	●	○	8	63	133.4	40	2	3.0	3
	AHX440S-125B12AR	●	○	12	63	133.4	40	2	3.0	3
	AHX440S-125B14AR	●	○	14	63	133.3	40	2	2.9	3
160	**AHX440S-160C10NR**	●	–	10	63	168.4	40	3	4.8	3
	AHX440S-160C14NR	●	–	14	63	168.4	40	3	4.6	3
	AHX440S-160C16NR	●	–	16	63	168.4	40	3	4.7	3

(Note 1) The cutter body does not have a set bolt for an arbor.Please refer to the table below,when ordering.
(Note 2) The above "APMX" will vary depending on the breaker insert.
* Number of Teeth

SET BOLT (SOLD SEPARATELY)

(mm)

Tool Holder Number	Set Bolt: With Coolant Hole Order Number	Set Bolt: With Coolant Hole Order Number	Fig.	Reference Dimensions a	b	c	d	e	f	g
AHX440S-040A○○AR	HSC08025H	HSC08040	1	13	M8×1.25	33	8	5	–	–
AHX440S-050A○○AR	HSC10030H	HSC10035	1	16	M10×1.5	40	10	6	–	–
AHX440S-063A○○AR	HSC10030H	HSC10035	1	16	M10×1.5	40	10	6	–	–
AHX440S-080A○○AR	HSC12035H	HSC12035 HSC12045	1	18	M12×1.75	47 57	12	10	–	–
AHX440S-100B○○AR	MBA16033H	–	2	40	M16×2	43	10	14	6	23
AHX440S-125B○○AR	MBA20040H	–	2	50	M20×2.5	54	14	17	6	27
AHX440S-160C○○NR	No coolant hole	–	2	50	M20×2.5	54	14	17	6	27
AHX440SR080○○CA	HSC12035H	HSC12035 HSC12045	1	18	M12×1.75	47 57	12	10	–	–
AHX440SR100○○DA	MBA16033H	–	2	40	M16×2	43	10	14	6	23
AHX440SR125○○EA	MBA20040H	–	2	50	M20×2.5	54	14	17	6	27
AHX440SR160○○FA	MBA24045H	–	2	65	M24×3	59	14	17	10	37

Geometry

Fig.1

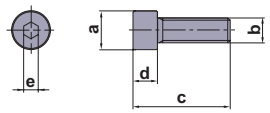
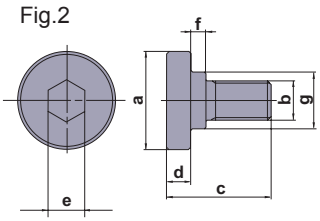


Fig.2

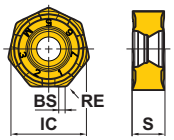


(Note 1) Internal coolant is necessary with the set bolt.

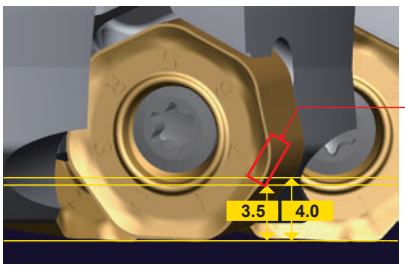
AHX440S

INSERT

(mm)

Application	Shape	Order Number	Class	Honing	Coated MP6120	MP6130	MP7130	MP7140	MC5020	VP15TF	IC	RE	BS	S	APMX	Geometry
Stable Cutting		NNMU130508ZER-L	M	E	●	●	●	●	●	●	13.4	0.8	1	5.77	3	
General Cutting		NNMU130508ZEN-M	M	E	●	●	●	●	●	●	13.4	0.8	1	5.57	*4	
		NNMU130532ZEN-M	M	E	●	●	●	●	●	●	13.4	3.2	—	5.57	*4	
Unstable Cutting		NNMU130532ZEN-R	M	E	●	●	●	●	●	●	13.4	3.2	—	5.47	*4	

* When not using the Wiper, APMX = 3.5mm

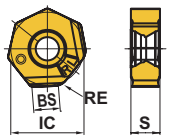


Corner R on Opposite Side

If using corner R on the opposite side, APMX = 4.0 mm
If not using the opposite corner, APMX = 3.5 mm

WIPER INSERTS

(mm)

Application	Shape	Order Number	Class	Honing	Coated MP6120	MC5020	VP15TF				IC	RE	BS	S	APMX	Geometry
Finish Cutting		WNEU1305ZEN4C-M	E	E	●	●	●				13.4	2.7	4	5.1	0.5	

● : Inventory maintained in Japan. (10 inserts in one case)

Instructions for Use of Wiper linserts

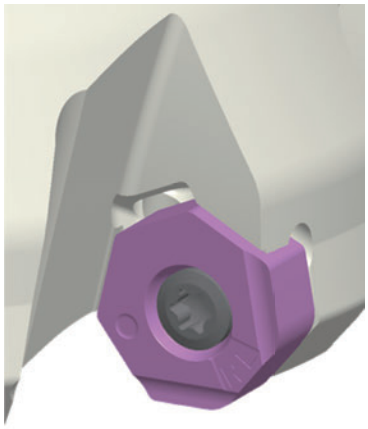


Fig.1

Fig.2

(Note 1) The specifications for these wipers are right hand body 2 corners and left hand body 2 corners. Refer to Figure 1.
(Note 2) A satisfactory finish surface can be achieved with one wiper insert.
However, if the feed rate per revolution will be equal to or greater than the width of the wiper edge, it is recommended to install the second and further wiper inserts spaced evenly within the cutting body.

AHX440S

RECOMMENDED CUTTING CONDITIONS

Dry Cutting

(mm)

	Work Material	Hardness	Grade	vc (m/min)	fz (mm/t.)	ap
P	Mild Steel	≤180HB	**MP6120,VP15TF**	250(200−300)	0.3(0.2−0.4)	≤3
			MP6130	240(190−290)	0.3(0.2−0.4)	≤3
	Carbon Steel,Alloy Steel	180−280HB	**MP6120,VP15TF**	220(170−270)	0.3(0.2−0.4)	≤3
			MP6130	200(150−250)	0.3(0.2−0.4)	≤3
	Carbon Steel,Alloy Steel	280−350HB	**MP6120,VP15TF**	140(100−180)	0.3(0.2−0.4)	≤3
			MP6130	120(90−150)	0.3(0.2−0.4)	≤3
	Alloy Tool Steel	≤350HB (annealing)	**MP6120,VP15TF**	140(100−180)	0.15(0.1−0.2)	≤1
			MP6130	120(90−150)	0.15(0.1−0.2)	≤1
	Pre-hardened Steel	35−45HRC	**MP6120,VP15TF**	140(100−180)	0.15(0.1−0.2)	≤1
			MP6130	120(90−150)	0.15(0.1−0.2)	≤1
M	Austenitic Stainless Steel	≤200HB	**MP7130,VP15TF**	200(150−250)	0.2(0.1−0.3)	≤3
			MP7140	180(120−230)	0.2(0.1−0.3)	≤3
		> 200HB	**MP7130,VP15TF**	150(100−200)	0.2(0.1−0.3)	≤3
			MP7140	130(80−180)	0.2(0.1−0.3)	≤3
	Ferritic and Maltensitic Stainless Steel	≤200HB	**MP7130,VP15TF**	200(150−250)	0.2(0.1−0.3)	≤3
			MP7140	180(120−230)	0.2(0.1−0.3)	≤3
		> 200HB	**MP7130,VP15TF**	150(100−200)	0.2(0.1−0.3)	≤3
			MP7140	130(80−180)	0.2(0.1−0.3)	≤3
	Two-phase Stainless Steel	≤280HB	**MP7130,VP15TF**	140(100−180)	0.15(0.05−0.25)	≤3
			MP7140	120(80−160)	0.15(0.05−0.25)	≤3
	Precipitation Hardening Stainless Steel	< 450HB	**MP7130,VP15TF**	130(100−160)	0.15(0.05−0.25)	≤3
			MP7140	110(80−140)	0.15(0.05−0.25)	≤3
K	Gray Cast Iron	Tensile Strength ≤350MPa	**MC5020**	220(150−300)	0.3(0.2−0.4)	≤3
			VP15TF	180(130−230)	0.3(0.2−0.4)	≤3
	Ductile Cast Ilon	Tensile Strength ≤450MPa	**MC5020**	200(150−250)	0.2(0.1−0.3)	≤3
			VP15TF	170(120−220)	0.2(0.1−0.3)	≤3
	Ductile Cast Ilon	Tensile Strength ≤800MPa	**MC5020**	170(150−200)	0.2(0.1−0.3)	≤3
			VP15TF	140(100−180)	0.2(0.1−0.3)	≤3
H	Hardened Steel	40−55HRC	**VP15TF**	80(60−100)	0.15(0.1−0.2)	≤1

Wet Cutting

(mm)

	Work Material	Hardness	Grade	vc (m/min)	fz (mm/t.)	ap
M	Austenitic Stainless Steel	≤200HB	**MP7130,VP15TF**	125(100−150)	0.15(0.1−0.2)	≤3
			MP7140	100(80−140)	0.15(0.1−0.2)	≤3
		> 200HB	**MP7130,VP15TF**	100(75−125)	0.15(0.1−0.2)	≤3
			MP7140	80(55−105)	0.15(0.1−0.2)	≤3
	Ferritic and Maltensitic Stainless Steel	≤200HB	**MP7130,VP15TF**	125(100−150)	0.15(0.1−0.2)	≤3
			MP7140	100(80−140)	0.15(0.1−0.2)	≤3
		> 200HB	**MP7130,VP15TF**	100(75−125)	0.15(0.1−0.2)	≤3
			MP7140	80(55−105)	0.15(0.1−0.2)	≤3
	Two-phase Stainless Steel	≤280HB	**MP7130,VP15TF**	80(60−100)	0.1(0.05−0.15)	≤3
			MP7140	60(40−80)	0.1(0.05−0.15)	≤3
	Precipitation Hardening Stainless Steel	< 450HB	**MP7130,VP15TF**	70(50−90)	0.1(0.05−0.15)	≤3
			MP7140	50(30−70)	0.1(0.05−0.15)	≤3

AHX440S

Cutting Conditions with Wiper Insert

(mm)

	Work Material	Hardness	Grade	vc (m/min)	fz (mm/t.)	ap
P	Mild Steel	≤180HB	**MP6120,VP15TF**	250(200−300)	0.3(0.2−0.4)	≤0.5
	Carbon Steel,Alloy Steel	180−280HB	**MP6120,VP15TF**	220(170−270)	0.3(0.2−0.4)	≤0.5
		280−350HB	**MP6120,VP15TF**	140(100−180)	0.3(0.2−0.4)	≤0.5
	Alloy Tool Steel	≤350HB (annealing)	**MP6120,VP15TF**	140(100−180)	0.15(0.1−0.2)	≤0.5
	Pre-hardened Steel	35−45HRC	**MP6120,VP15TF**	140(100−180)	0.15(0.1−0.2)	≤0.5
M	Austenitic Stainless Steel	≤200HB	**VP15TF**	125(100−150)	0.15(0.1−0.2)	≤0.5
		> 200HB	**VP15TF**	100(75−125)	0.15(0.1−0.2)	≤0.5
	Ferritic and Maltensitic Stainless Steel	≤200HB	**VP15TF**	125(100−150)	0.15(0.1−0.2)	≤0.5
		> 200HB	**VP15TF**	100(75−125)	0.15(0.1−0.2)	≤0.5
	Two-phase Stainless Steel	≤280HB	**VP15TF**	80(60−100)	0.1(0.05−0.15)	≤0.5
	Precipitation Hardening Stainless Steel	< 450HB	**VP15TF**	70(50−90)	0.1(0.05−0.15)	≤0.5
K	Gray Cast Iron	Tensile Strength ≤350MPa	**MC5020**	320(250−400)	0.3(0.2−0.4)	≤0.5
			VP15TF	220(150−300)	0.3(0.2−0.4)	≤0.5
	Ductile Cast Ilon	Tensile Strength ≤450MPa	**MC5020**	250(200−300)	0.2(0.1−0.3)	≤0.5
			VP15TF	200(150−250)	0.2(0.1−0.3)	≤0.5
		Tensile Strength ≤800MPa	**MC5020**	220(200−250)	0.2(0.1−0.3)	≤0.5
			VP15TF	170(150−200)	0.2(0.1−0.3)	≤0.5
H	Hardened Steel	40−55HRC	**VP15TF**	80(60−100)	0.15(0.1−0.2)	≤0.5

(Note 1) Refer to the above table and set up cutting conditions according to cutting applications.
(Note 2) When placing emphasis on surface finish quality, wet cutting is recommended. (tool life is lowered as compared to dry cutting)
(Note 3) The recommended depth of cut differs according to insert geometry.
(Note 4) When clamp rigidity is low and tool overhang is long, we recommended to reduce the cutting speed and the feed rate by 30%.
(Note 5) Recommended wet cutting for good surface finishing of stainless steel. (Tool life is short compared to wet cutting.)

AHX475S

General High Feed Cutting

Product Information

15° KAPR

Work Material

P K H F R

SYMBOL DESCRIPTIONS >> 1350
TECHNICAL DATA >> 1987
ISO13399 Property >> 1966

KAPR :15° T :16° (When using the R breaker insert)
GAMP :-6° I :9°
GAMF :-10°
DC = mm size, DCON = Inch size

Fig.1

ø50
ø63
ø80
ø100

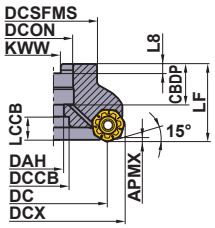
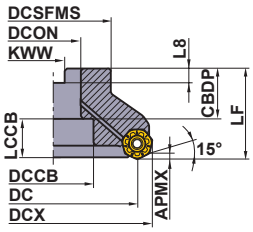


Fig.2

ø125
ø160



Right hand tool holder only.

(mm)

DC	Order Number	Stock	Coolant Hole	* No.T	LF	DCX	DCON	Type (Fig.)	WT(kg)	APMX
50	AHX475S-050A04AR	●	○	4	50	65.7	22	1	0.6	1.6
	AHX475S-050A05AR	●	○	5	50	65.7	22	1	0.6	1.6
63	AHX475S-063A05AR	●	○	5	50	78.7	22	1	1.0	1.6
	AHX475S-063A06AR	●	○	6	50	78.7	22	1	1.0	1.6
80	AHX475SR08006DA	●	○	6	63	95.6	31.75	1	2.0	1.6
	AHX475SR08008DA	●	○	8	63	95.6	31.75	1	2.0	1.6
100	AHX475SR10007DA	●	○	7	63	115.6	31.75	1	3.2	1.6
	AHX475SR10009DA	●	○	9	63	115.6	31.75	1	3.2	1.6
125	AHX475SR12508EA	●	○	8	63	140.6	38.1	2	4.0	1.6
	AHX475SR12510EA	●	○	10	63	140.6	38.1	2	4.0	1.6
160	AHX475SR16010FA	●	○	10	63	175.6	50.8	2	5.5	1.6
	AHX475SR16012FA	●	○	12	63	175.6	50.8	2	5.5	1.6

(Note 1) The cutter body does not have a set bolt for an arbor.
* Number of Teeth

Metric Standard

KAPR :15° T :16° (When using the R breaker insert)
GAMP :-6° I :9°
GAMF :-10°
DC = mm size, DCON = mm size

(mm)

DC	Order Number	Stock	Coolant Hole	* No.T	LF	DCX	DCON	Fig.	WT(kg)	APMX
50	AHX475S-050A04AR	●	○	4	50	65.7	22	1	0.6	1.6
	AHX475S-050A05AR	●	○	5	50	65.7	22	1	0.6	1.6
63	AHX475S-063A05AR	●	○	5	50	78.7	22	1	1.0	1.6
	AHX475S-063A06AR	●	○	6	50	78.7	22	1	1.0	1.6
80	AHX475S-080A06AR	●	○	6	50	95.6	27	1	1.6	1.6
	AHX475S-080A08AR	●	○	8	50	95.6	27	1	1.6	1.6
100	AHX475S-100A07AR	●	○	7	63	115.6	32	1	3.3	1.6
	AHX475S-100A09AR	●	○	9	63	115.6	32	1	3.3	1.6
125	AHX475S-125B08AR	●	○	8	63	140.6	40	2	4.0	1.6
	AHX475S-125B10AR	●	○	10	63	140.6	40	2	4.0	1.6
160	AHX475S-160B10AR	●	○	10	63	175.6	40	2	6.0	1.6
	AHX475S-160B12AR	●	○	12	63	175.6	40	2	6.0	1.6

(Note 1) The cutter body does not have a set bolt for an arbor.
* Number of Teeth

● : **Inventory maintained in Japan.**

AHX475S

SPARE PARTS

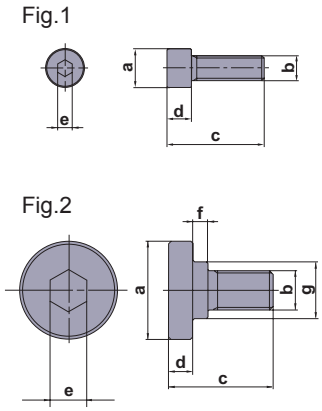
Tool Holder Number	*	
	Clamp Screw	Wrench (Insert)
AHX475S	TS35R	TKY15T

* Clamp Torque (N • m) : TS35R=3.5

SET BOLT (SOLD SEPARATELY)

(mm)

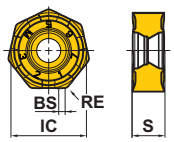
Tool Holder Number	Set Bolt: With Coolant Hole	Set Bolt: Without Coolant Hole	Fig.	Reference Dimensions a	b	c	d	e	f	g	Geometry
	Order Number	Order Number									
AHX475S-050A○○AR	HSC10030H	HSC10035	1	16	M10×1.5	40	10	6	–	–	Fig.1
AHX475S-063A○○AR	HSC10030H	HSC10035	1	16	M10×1.5	40	10	6	–	–	
AHX475S-080A○○AR	HSC12035H	HSC12035 HSC12045	1	18	M12×1.75	47 57	12	10	–	–	
AHX475S-100B○○AR	HSC16040H	–	1	24	M16×2	56	16	14	–	–	
AHX475S-125B○○AR	MBA20040H	–	2	50	M20×2.5	54	14	17	6	27	Fig.2
AHX475S-160C○○AR	MBA20040H	–	2	50	M20×2.5	54	14	17	6	27	
AHX475SR080○○DA	HSC16040H	–	1	24	M16×2	56	16	14	–	–	
AHX475SR100○○DA	HSC16040H	–	1	24	M16×2	56	16	14	–	–	
AHX475SR125○○EA	MBA20040H	–	2	50	M20×2.5	54	14	17	6	27	
AHX475SR160○○FA	MBA24045H	–	2	65	M24×3	59	14	17	10	37	



(Note 1) Internal coolant is necessary with the set bolt.

INSERT

(mm)

Application	Shape	Order Number	Class	Honing	Coated MP6120	MP6130	MC5020	VP15TF			IC	RE	BS	S	APMX	Geometry
General Cutting		**NNMU130532ZEN-M**	M	E	●	●	●	●			13.4	3.2	–	5.57	1.6	
Unstable Cutting		**NNMU130532ZEN-R**	M	E	●	●	●	●			13.4	3.2	–	5.47	1.6	

● : Inventory maintained in Japan. (10 inserts in one case)

AHX475S

RECOMMENDED CUTTING CONDITIONS

Dry Cutting

(mm)

	Work Material	Hardness	Grade	Breaker	vc (m/min)	fz (mm/t.)	ap	ae
P	Mild Steel	≤180HB	**MP6120**	**R**	150(100−200)	0.6	≤1.6	≤0.5DC
			MP6120	**R**	150(100−200)	0.8	≤1.6	0.5−0.8DC
			MP6120	**M**	150(100−200)	1	≤1.6	0.8−1DC
			MP6130	**R**	130(80−180)	0.6	≤1.6	≤0.5DC
			MP6130	**R**	130(80−180)	0.8	≤1.6	0.5−0.8DC
			MP6130	**M**	130(80−180)	1	≤1.6	0.8−1DC
	Carbon Steel,Alloy Steel	180−280HB	**MP6120**	**R**	130(80−180)	0.6	≤1.6	≤0.5DC
			MP6120	**R**	130(80−180)	0.8	≤1.6	0.5−0.8DC
			MP6120	**M**	130(80−180)	1	≤1.6	0.8−1DC
			MP6130	**R**	110(60−160)	0.6	≤1.6	≤0.5DC
			MP6130	**R**	110(60−160)	0.8	≤1.6	0.5−0.8DC
			MP6130	**M**	110(60−160)	1	≤1.6	0.8−1DC
	Carbon Steel,Alloy Steel	280−350HB	**MP6120**	**R**	100(50−150)	0.5	≤1.6	≤0.5DC
			MP6120	**R**	100(50−150)	0.6	≤1.6	0.5−0.8DC
			MP6120	**R**	100(50−150)	0.7	≤1.6	0.8−1DC
			MP6130	**R**	80(30−130)	0.5	≤1.6	≤0.5DC
			MP6130	**R**	80(30−130)	0.6	≤1.6	0.5−0.8DC
			MP6130	**R**	80(30−130)	0.7	≤1.6	0.8−1DC
	Alloy Tool Steel	≤350HB (annealing)	**MP6120**	**R**	100(50−150)	0.5	≤1.6	≤0.5DC
			MP6120	**R**	100(50−150)	0.6	≤1.6	0.5−0.8DC
			MP6120	**R**	100(50−150)	0.7	≤1.6	0.8−1DC
			MP6130	**R**	80(30−120)	0.5	≤1.6	≤0.5DC
			MP6130	**R**	80(30−120)	0.6	≤1.6	0.5−0.8DC
			MP6130	**R**	80(30−120)	0.7	≤1.6	0.8−1DC
	Pre-hardened Steel	35−45HRC	**MP6120**	**R**	100(70−130)	0.5	≤1.6	≤0.5DC
			MP6120	**R**	100(70−130)	0.6	≤1.6	0.5−0.8DC
			MP6120	**R**	100(70−130)	0.7	≤1.6	0.8−1DC
			MP6130	**R**	80(50−110)	0.5	≤1.6	≤0.5DC
			MP6130	**R**	80(50−110)	0.6	≤1.6	0.5−0.8DC
			MP6130	**R**	80(50−110)	0.7	≤1.6	0.8−1DC
K	Gray Cast Iron	Tensile Strength ≤350MPa	**MC5020**	**R**	150(100−200)	0.6	≤1.6	≤0.5DC
			MC5020	**R**	150(100−200)	0.8	≤1.6	0.5−0.8DC
			MC5020	**M**	150(100−200)	1	≤1.6	0.8−1DC
			VP15TF	**M**	120(80−160)	0.6	≤1.6	≤0.5DC
			VP15TF	**M**	120(80−160)	0.8	≤1.6	0.5−0.8DC
			VP15TF	**M**	120(80−160)	1	≤1.6	0.8−1DC
	Ductile Cast Ilon	Tensile Strength ≤450MPa	**MC5020**	**R**	150(100−200)	0.6	≤1.6	≤0.5DC
			MC5020	**R**	150(100−200)	0.8	≤1.6	0.5−0.8DC
			MC5020	**M**	150(100−200)	1	≤1.6	0.8−1DC
			VP15TF	**R**	120(80−160)	0.6	≤1.6	≤0.5DC
			VP15TF	**R**	120(80−160)	0.8	≤1.6	0.5−0.8DC
			VP15TF	**M**	120(80−160)	1	≤1.6	0.8−1DC
	Ductile Cast Ilon	Tensile Strength ≤800MPa	**MC5020**	**R**	150(100−200)	0.5	≤1.6	≤0.5DC
			MC5020	**R**	150(100−200)	0.6	≤1.6	0.5−0.8DC
			MC5020	**R**	150(100−200)	0.7	≤1.6	0.8−1DC
			VP15TF	**R**	120(80−160)	0.5	≤1.6	≤0.5DC
			VP15TF	**R**	120(80−160)	0.6	≤1.6	0.5−0.8DC
			VP15TF	**R**	120(80−160)	0.7	≤1.6	0.8−1DC
H	Hardened Steel	40−55HRC	**VP15TF**	**R**	70(50−90)	0.4	≤1.6	≤0.5DC
			VP15TF	**R**	70(50−90)	0.5	≤1.6	0.5−0.8DC
			VP15TF	**R**	70(50−90)	0.6	≤1.6	0.8−1DC

(Note 1) When clamp rigidity is low and tool overhang is long, we recommended to reduce the cutting speed and the feed rate by 30%.

AHX640S

General Cutting

Product Information

50° KAPR

Work Material

P M K S H F R

SYMBOL DESCRIPTIONS >> 1350
TECHNICAL DATA >> 1987
ISO13399 Property >> 1966

Fig. 1
ø63
ø80

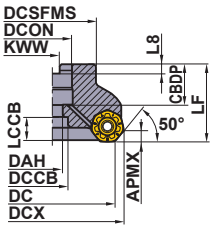


Fig. 2
ø100
ø125
ø160

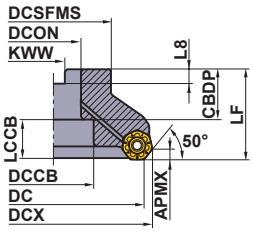
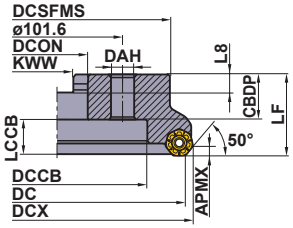
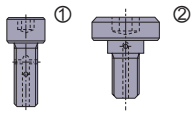


Fig. 3
ø200



Right hand tool holder only.

DC	Set Bolt	Geometry
ϕ63	HSC10030H	①
ϕ80	HSC12035H	
ϕ100	MBA16033H	②
ϕ125	MBA20040H	
ϕ160	MBA24045H	
ϕ200	—	—



KAPR :50° T :10° (When using the MK breaker insert)
GAMP :-6° T :20° (When using MP, MM breaker inserts)
GAMF :-5° I :+9°—+10°
DC=mm size, DCON=Inch size

(mm)

DC	Order Number	Stock	Coolant Hole	* No.T	LF	DCX	DCON	Fig.	WT(kg)	APMX
63	**AHX640S-063A04AR**	●	○	4	50	75.55	22	1	0.7	6
	AHX640S-063A05AR	●	○	5	50	75.55	22	1	0.6	6
80	**AHX640SR08004CA**	●	○	4	50	92.55	25.4	1	1.1	6
	AHX640SR08006CA	●	○	6	50	92.55	25.4	1	1.0	6
100	**AHX640SR10005DA**	●	○	5	50	112.55	31.75	2	1.7	6
	AHX640SR10007DA	●	○	7	50	112.55	31.75	2	1.5	6
125	**AHX640SR12506EA**	●	○	6	63	137.55	38.1	2	3.0	6
	AHX640SR12508EA	●	○	8	63	137.55	38.1	2	2.9	6
160	**AHX640SR16007FA**	●	○	7	63	172.55	50.8	2	4.9	6
	AHX640SR16010FA	●	○	10	63	172.55	50.8	2	4.7	6
200	**AHX640SR20008KN**	●	–	8	63	212.55	47.625	3	8.2	6
	AHX640SR20012KN	●	–	12	63	212.55	47.625	3	7.9	6

* Number of Teeth

● : **Inventory maintained in Japan.**

AHX640S

Fig. 1
ø63
ø80

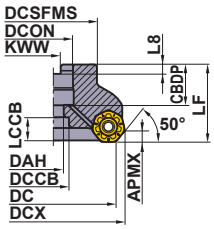


Fig. 2
ø100
ø125

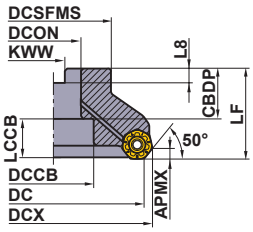


Fig. 3
ø160

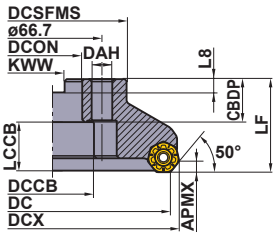
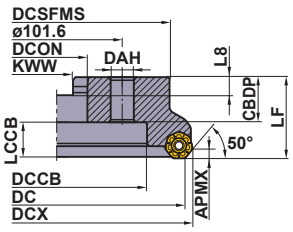
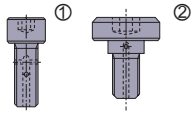


Fig. 4
ø200



Right hand tool holder only.

DC	Set Bolt	Geometry
ϕ63	HSC10030H	①
ϕ80	HSC12035H	①
ϕ100	MBA16033H	②
ϕ125	MBA20040H	②
ϕ160	—	—
ϕ200	—	—



Metric Standard

KAPR :50° T :10° (When using the MK breaker insert)
GAMP :-6° T :20° (When using MP, MM breaker inserts)
GAMF :-5° I :+9°—+10°
DC = mm size, DCON = mm size

(mm)

DC	Order Number	Stock	Coolant Hole	* No.T	LF	DCX	DCON	Fig.	WT(kg)	APMX
63	**AHX640S-063A04AR**	●	○	4	50	75.55	22	1	0.7	6
	AHX640S-063A05AR	●	○	5	50	75.55	22	1	0.6	6
80	**AHX640S-080A04AR**	●	○	4	50	92.55	27	1	1.1	6
	AHX640S-080A06AR	●	○	6	50	92.55	27	1	1.0	6
100	**AHX640S-100B05AR**	●	○	5	50	112.55	32	2	1.7	6
	AHX640S-100B07AR	●	○	7	50	112.55	32	2	1.6	6
125	**AHX640S-125B06AR**	●	○	6	63	137.55	40	2	3.1	6
	AHX640S-125B08AR	●	○	8	63	137.55	40	2	3.0	6
160	**AHX640S-160C07NR**	●	–	7	63	172.55	40	3	5.4	6
	AHX640S-160C10NR	●	–	10	63	172.55	40	3	5.2	6
200	**AHX640S-200C08NR**	●	–	8	63	212.55	60	4	7.8	6
	AHX640S-200C12NR	●	–	12	63	212.55	60	4	7.5	6

* Number of Teeth

SPARE PARTS

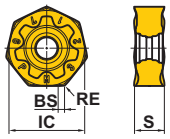
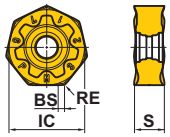
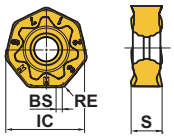
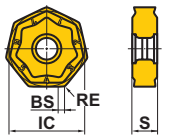
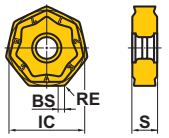
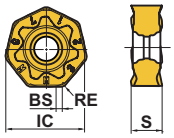
Tool Holder Number	* Clamp Screw	Wrench (Insert)
AHX640S	CS5015060T	TKY20T

* Clamp Torque (N • m) : CS5015060T=5.0

AHX640S

INSERT

(mm)

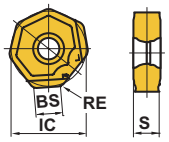
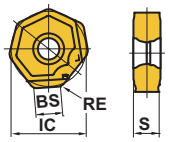
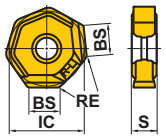
Application	Shape	Order Number	Class	Honing	Coated								IC	RE	BS	S	APMX	Geometry
					MP6120	MP6130	MP7030	MP9120	MP9130	MC5020	VP15TF	VP20RT						
For Steel General Cutting		**NNMU200708ZEN-M**	M	E	●	●							20	0.8	1	8	6	
For Steel General Cutting		**NNMU200708ZEN-MP**	M	E							●		20	0.8	1	8	6	
For Stainless Steel		**NNMU200712ZER-MM**	M	E			●						20	1.2	1	8	6	
For Cast Iron General Cutting		**NNMU200608ZEN-MK**	M	E						●	●	●	20	0.8	1	6.55	6	
For Cast Iron Strong Cutting Edge Type		**NNMU200608ZEN-HK**	M	E						●	●	●	20	0.8	1	6.55	6	
For Titanium Alloy and Heat Resistant Alloy		**NNMU200712ZER-L**	M	E				●	●				20	1.2	1	8	6	

● : Inventory maintained in Japan. (10 inserts in one case)

AHX640S

WIPER INSERTS

(mm)

Application	Shape	Order Number	Class	Honing	Coated								IC	RE	BS	S	APMX	Geometry
					MP6120	MP6130	MP7030	MP9120	MP9130	MC5020	VP15TF	VP20RT						
For Steel		**WNEU2007ZEN7C-M**	E	E	●								20	0.8	7.2	6.9	0.5	
General Cutting		**WNEU2007ZEN7C-WP**	E	E							●		20	0.8	7.1	6.9	0.5	
For Cast Iron		**WNEU2006ZEN7C-WK**	E	E						●			20	0.8	7.4	6.55	0.5	

(Note) The height of cutter when setting MK, HK inserts are different from when setting MP, MM inserts.

Instructions for Use of Wiper Iinserts

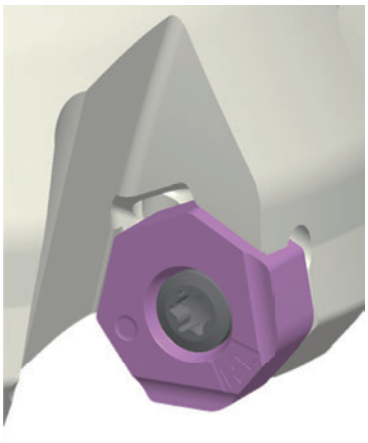


Fig.1

Fig.2

(Note 1) The specifications for these wipers are right hand body 2 corners and left hand body 2 corners. Refer to Figure 1.
(Note 2) A satisfactory finish surface can be achieved with one wiper insert.
However, if the feed rate per revolution will be equal to or greater than the width of the wiper edge, it is recommended to install the second and further wiper inserts spaced evenly within the cutting body.

AHX640S

RECOMMENDED CUTTING CONDITIONS

Dry Cutting

(mm)

	Work Material	Hardness	Grade	Breaker	vc (m/min)	fz (mm/t.)	ap	ae
P	Mild Steel	≤180HB	**MP6120**	**M**	250(200−300)	0.3(0.2−0.4)	≤5	≤0.8DC
			VP15TF	**MP**	250(200−300)	0.3(0.2−0.4)	≤5	≤0.8DC
			MP6130	**M**	220(170−270)	0.4(0.3−0.5)	≤5	≤0.8DC
	Carbon Steel,Alloy Steel	180−280HB	**MP6120**	**M**	220(170−270)	0.3(0.2−0.4)	≤5	≤0.8DC
			VP15TF	**MP**	220(170−270)	0.3(0.2−0.4)	≤5	≤0.8DC
			MP6130	**M**	190(140−240)	0.4(0.3−0.5)	≤5	≤0.8DC
	Carbon Steel,Alloy Steel	280−350HB	**MP6120**	**M**	140(100−180)	0.3(0.2−0.4)	≤5	≤0.8DC
			VP15TF	**MP**	140(100−180)	0.3(0.2−0.4)	≤5	≤0.8DC
			MP6130	**M**	110(70−150)	0.4(0.3−0.5)	≤5	≤0.8DC
	Pre-hardened Steel	≤350HB (annealing)	**MP6120**	**M**	140(100−180)	0.15(0.1−0.2)	≤3	≤0.8DC
			VP15TF	**MP**	140(100−180)	0.15(0.1−0.2)	≤3	≤0.8DC
			MP6130	**M**	110(70−150)	0.25(0.2−0.3)	≤3	≤0.8DC
	Alloy Tool Steel	35−45HRC	**MP6120**	**M**	140(100−180)	0.15(0.1−0.2)	≤3	≤0.8DC
			VP15TF	**MP**	140(100−180)	0.15(0.1−0.2)	≤5	≤0.8DC
			MP6130	**M**	110(70−150)	0.25(0.2−0.3)	≤3	≤0.8DC
M	Austenitic Stainless Steel	≤200HB	**MP7030**	**MM**	200(150−250)	0.2(0.1−0.3)	≤5	≤0.8DC
	Austenitic Stainless Steel	> 200HB	**MP7030**	**MM**	150(100−200)	0.2(0.1−0.3)	≤5	≤0.8DC
	Two-phase Stainless Steel	≤280HB	**MP7030**	**MM**	140(100−180)	0.15(0.05−0.25)	≤5	≤0.8DC
	Ferritic and Maltensitic Stainless Steel	≤200HB	**MP7030**	**MM**	200(150−250)	0.2(0.1−0.3)	≤5	≤0.8DC
	Ferritic and Maltensitic Stainless Steel	> 200HB	**MP7030**	**MM**	150(100−200)	0.2(0.1−0.3)	≤5	≤0.8DC
	Precipitation Hardening Stainless Steel	< 450HB	**MP7030**	**MM**	130(100−160)	0.15(0.05−0.25)	≤5	≤0.8DC
K	Gray Cast Iron	Tensile Strength ≤350MPa	**MC5020**	**MK,HK**	220(150−300)	0.3(0.2−0.4)	≤5	≤0.8DC
			VP15TF,VP20RT	**MK,HK**	180(130−230)	0.3(0.2−0.4)	≤5	≤0.8DC
			VP15TF	**MP**	180(130−230)	0.3(0.2−0.4)	≤5	≤0.8DC
	Ductile Cast Ilon	Tensile Strength ≤450MPa	**MC5020**	**MK,HK**	200(150−250)	0.2(0.1−0.3)	≤5	≤0.8DC
			VP15TF,VP20RT	**MK,HK**	170(120−220)	0.2(0.1−0.3)	≤5	≤0.8DC
			VP15TF	**MP**	170(120−220)	0.2(0.1−0.3)	≤5	≤0.8DC
	Ductile Cast Ilon	Tensile Strength ≤800MPa	**MC5020**	**MK,HK**	170(150−200)	0.2(0.1−0.3)	≤5	≤0.8DC
			VP15TF,VP20RT	**MK,HK**	140(100−180)	0.2(0.1−0.3)	≤5	≤0.8DC
			VP15TF	**MP**	140(100−180)	0.2(0.1−0.3)	≤5	≤0.8DC
H	Hardened Steel	40−55HRC	**VP15TF**	**MP**	80(60−100)	0.15(0.1−0.2)	≤3	≤0.8DC

(Note1) Recommended wet cutting for good surface finishing of stainless steel. (Tool life is short compared to wet cutting.)
(Note2) We recommend wet cutting with internal coolant for titanium alloy and heat resistant alloy.
(Note3) When clamp rigidity is low and tool overhang is long, we recommended to reduce the cutting speed and the feed rate by 30%.

AHX640S

Wet Cutting

(mm)

	Work Material	Hardness	Breaker	Grade	vc (m/min)	fz (mm/t.)	ap	ae
M	Austenitic Stainless Steel	≤200HB	**MP7030**	**MM**	125(100−150)	0.15(0.1−0.2)	≤5	≤0.8DC
	Austenitic Stainless Steel	> 200HB	**MP7030**	**MM**	100(75−125)	0.15(0.1−0.2)	≤5	≤0.8DC
	Two-phase Stainless Steel	≤280HB	**MP7030**	**MM**	80(60−100)	0.1(0.05−0.15)	≤5	≤0.8DC
	Ferritic and Maltensitic Stainless Steel	≤200HB	**MP7030**	**MM**	125(100−150)	0.15(0.1−0.2)	≤5	≤0.8DC
	Ferritic and Maltensitic Stainless Steel	> 200HB	**MP7030**	**MM**	100(75−125)	0.15(0.1−0.2)	≤5	≤0.8DC
	Precipitation Hardening Stainless Steel	< 450HB	**MP7030**	**MM**	70(50−90)	0.1(0.05−0.15)	≤5	≤0.8DC
S	Titanium Alloy	—	**MP7030**	**MM**	40(20−50)	0.15(0.1−0.2)	≤3	≤0.6DC
		—	**MP9120**	**L**	60(50−70)	0.1(0.05−0.15)	≤3	≤0.6DC
		—	**MP9130**	**L**	40(20−50)	0.15(0.1−0.2)	≤3	≤0.6DC
	Heat Resistant Alloy	—	**MP7030**	**MM**	40(20−50)	0.15(0.1−0.2)	≤3	≤0.6DC
		—	**MP9120**	**L**	60(50−70)	0.1(0.05−0.15)	≤3	≤0.6DC
		—	**MP9130**	**L**	40(20−50)	0.15(0.1−0.2)	≤3	≤0.6DC

(Note1) Recommended wet cutting for good surface finishing of stainless steel. (Tool life is short compared to wet cutting.)
(Note2) We recommend wet cutting with internal coolant for titanium alloy and heat resistant alloy.
(Note3) When clamp rigidity is low and tool overhang is long, we recommended to reduce the cutting speed and the feed rate by 30%.

Cutting Conditions with Wiper Insert

(mm)

	Work Material	Hardness	Main Insert	Grade	Wiper Insert	Grade	vc (m/min)	fz (mm/t.)	ap	ae
P	Mild Steel	≤180HB	**VP15TF**	**MP**	**VP15TF**	**WP**	250(200−300)	0.3(0.2−0.4)	≤0.5	≤0.8DC
			MP6120	**M**	**MP6120**	**M**	250(200−300)	0.3(0.2−0.4)	≤0.5	≤0.8DC
	Carbon Steel,Alloy Steel	180−280HB	**VP15TF**	**MP**	**VP15TF**	**WP**	220(170−270)	0.3(0.2−0.4)	≤0.5	≤0.8DC
			MP6120	**M**	**MP6120**	**M**	220(170−270)	0.3(0.2−0.4)	≤0.5	≤0.8DC
	Carbon Steel,Alloy Steel	280−350HB	**VP15TF**	**MP**	**VP15TF**	**WP**	140(100−180)	0.3(0.2−0.4)	≤0.5	≤0.8DC
			MP6120	**M**	**MP6120**	**M**	140(100−180)	0.3(0.2−0.4)	≤0.5	≤0.8DC
K	Gray Cast Iron	Tensile Strength ≤350MPa	**MC5020**	**MK,HK**	**MC5020**	**WK**	320(250−400)	0.3(0.2−0.4)	≤0.5	≤0.8DC
			VP15TF	**MP**	**VP15TF**	**WP**	220(150−300)	0.3(0.2−0.4)	≤0.5	≤0.8DC
	Ductile Cast Ilon	Tensile Strength ≤450MPa	**MC5020**	**MK,HK**	**MC5020**	**WK**	250(200−300)	0.2(0.1−0.3)	≤0.5	≤0.8DC
			VP15TF	**MP**	**VP15TF**	**WP**	200(150−250)	0.2(0.1−0.3)	≤0.5	≤0.8DC
	Ductile Cast Ilon	Tensile Strength ≤800MPa	**MC5020**	**MK,HK**	**MC5020**	**WK**	220(200−250)	0.2(0.1−0.3)	≤0.5	≤0.8DC
			VP15TF	**MP**	**VP15TF**	**WP**	170(150−200)	0.2(0.1−0.3)	≤0.5	≤0.8DC
S	Heat Resistant Alloy	—	**VP15TF**	**MP**	**VP15TF**	**WP**	40(20−50)	0.15(0.1−0.2)	≤0.5	≤0.8DC
H	Hardened Steel	40−55HRC	**VP15TF**	**MP**	**VP15TF**	**WP**	80(60−100)	0.15(0.1−0.2)	≤0.5	≤0.8DC

(Note 1) When clamp rigidity is low and tool overhang is long, we recommended to reduce the cutting speed and the feed rate by 30%.
(Note 2) Please use WP geometry insert in combination with MP or M geometry inserts, and use WK geometry insert in combination with MK or HK geometry inserts

AHX640S

AHX440S, AHX475S, AHX640S Mounting Dimensions

Fig. 1

ø40
ø50
ø63
ø80

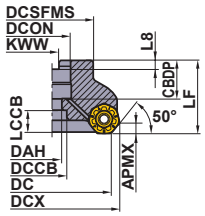


Fig. 2

ø100
ø125
ø160

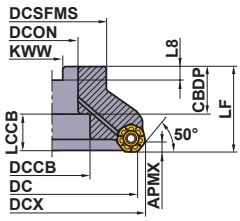
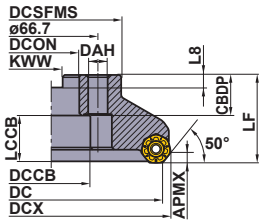


Fig. 3

ø160



Right hand tool holder only.

(mm)

DCON	DC	Order Number	CBDP	DAH	DCCB	LCCB	DCSFMS	KWW	L8	Fig.
16	40	**AHX440S-040A03AR**	18	9	14	13.9	37	8.4	5.6	1
16	40	**AHX440S-040A04AR**	18	9	14	13.9	37	8.4	5.6	1
22	50	**AHX440S-050A04AR**	20	11	17	11.9	47	10.4	6.3	1
22	50	**AHX440S-050A05AR**	20	11	17	11.9	47	10.4	6.3	1
22	50	**AHX440S-050A06AR**	20	11	17	11.9	47	10.4	6.3	1
22	50	**AHX475S-050A04AR**	20	11	17	16.7	47	10.4	6.3	5
22	50	**AHX475S-050A05AR**	20	11	17	16.7	47	10.4	6.3	5
22	63	**AHX440S-063A05AR**	20	11	17	11.9	50	10.4	6.3	1
22	63	**AHX440S-063A06AR**	20	11	17	11.9	50	10.4	6.3	1
22	63	**AHX440S-063A08AR**	20	11	17	11.9	50	10.4	6.3	1
22	63	**AHX475S-063A05AR**	20	11	17	16.7	60	10.4	6.3	5
22	63	**AHX475S-063A06AR**	20	11	17	16.7	60	10.4	6.3	5
22	63	**AHX640S-063A04AR**	20	11	17	16.2	50	10.4	6.3	1
22	63	**AHX640S-063A05AR**	20	11	17	16.2	50	10.4	6.3	1
25.4	80	**AHX440SR08006CA**	26	13	20	14.9	56	9.5	6	1
25.4	80	**AHX440SR08008CA**	26	13	20	14.9	56	9.5	6	1
25.4	80	**AHX440SR08010CA**	26	13	20	14.9	56	9.5	6	1
25.4	80	**AHX640SR08004CA**	26	13	20	14.2	56	9.5	6	1
25.4	80	**AHX640SR08006CA**	26	13	20	14.2	56	9.5	6	1
27	80	**AHX440S-080A06AR**	23	13	20	14.9	56	12.4	7	1
27	80	**AHX440S-080A08AR**	23	13	20	14.9	56	12.4	7	1
27	80	**AHX440S-080A10AR**	23	13	20	14.9	56	12.4	7	1
27	80	**AHX475S-080A06AR**	23	13	20	14.7	76	12.4	7	5
27	80	**AHX475S-080A08AR**	23	13	20	14.7	76	12.4	7	5
27	80	**AHX640S-080A04AR**	23	13	20	15.2	56	12.4	7	1
27	80	**AHX640S-080A06AR**	23	13	20	15.2	56	12.4	7	1
31.75	80	**AHX475SR08006DA**	32	17	26	19.7	76	12.7	8	5
31.75	80	**AHX475SR08008DA**	32	17	26	19.7	76	12.7	8	5
31.75	100	**AHX440SR10007DA**	37	—	45	11.9	70	12.7	8	2
31.75	100	**AHX440SR10010DA**	37	—	45	11.9	70	12.7	8	2
31.75	100	**AHX440SR10012DA**	37	—	45	11.9	70	12.7	8	2
31.75	100	**AHX475SR10007DA**	32	17	26	19.7	96	12.7	8	5
31.75	100	**AHX475SR10009DA**	32	17	26	19.7	96	12.7	8	5
31.75	100	**AHX640SR10005DA**	35	—	45	13.2	70	12.7	8	2
31.75	100	**AHX640SR10007DA**	35	—	45	13.2	70	12.7	8	2

AHX640S

Fig. 4
ø200

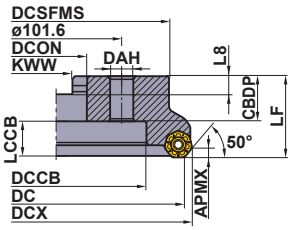


Fig.5
ø50
ø63
ø80
ø100

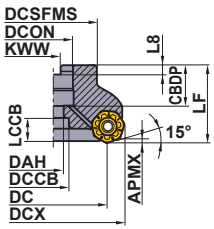
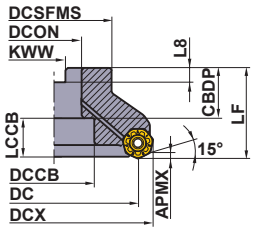


Fig.6
ø125
ø160



Right hand tool holder only.

(mm)

DCON	DC	Order Number	CBDP	DAH	DCCB	LCCB	DCSFMS	KWW	L8	Fig.
32	100	**AHX440S-100B07AR**	32	–	45	16.9	78	14.4	8	2
32	100	**AHX440S-100B10AR**	32	–	45	16.9	78	14.4	8	2
32	100	**AHX440S-100B12AR**	32	–	45	16.9	78	14.4	8	2
32	100	**AHX475S-100A07AR**	26	17	26	25.7	96	14.4	8	5
32	100	**AHX475S-100A09AR**	26	17	26	25.7	96	14.4	8	5
32	100	**AHX640S-100B05AR**	32	–	45	16.2	78	14.4	8	2
32	100	**AHX640S-100B07AR**	32	–	45	16.2	78	14.4	8	2
38.1	125	**AHX440SR12508EA**	42	–	56	19.9	80	15.9	10	2
38.1	125	**AHX440SR12512EA**	42	–	56	19.9	80	15.9	10	2
38.1	125	**AHX440SR12514EA**	42	–	56	19.9	80	15.9	10	2
38.1	125	**AHX475SR12508EA**	42	–	56	19.7	100	15.9	10	6
38.1	125	**AHX475SR12510EA**	42	–	56	19.7	100	15.9	10	6
38.1	125	**AHX640SR12506EA**	42	–	56	19.2	80	15.9	10	2
38.1	125	**AHX640SR12508EA**	42	–	56	19.2	80	15.9	10	2
40	125	**AHX440S-125B08AR**	40	–	56	21.9	89	16.4	9	2
40	125	**AHX440S-125B12AR**	40	–	56	21.9	89	16.4	9	2
40	125	**AHX440S-125B14AR**	40	–	56	21.9	89	16.4	9	2
40	125	**AHX475S-125B08AR**	40	–	56	21.7	100	16.4	9	6
40	125	**AHX475S-125B10AR**	40	–	56	21.7	100	16.4	9	6
40	125	**AHX640S-125B06AR**	42	–	56	19.2	89	16.4	9	2
40	125	**AHX640S-125B08AR**	42	–	56	19.2	89	16.4	9	2
40	160	**AHX440S-160C10NR**	40	14	56	21.9	100	16.4	9	3
40	160	**AHX440S-160C14NR**	40	14	56	21.9	100	16.4	9	3
40	160	**AHX440S-160C16NR**	40	14	56	21.9	100	16.4	9	3
40	160	**AHX475S-160B10AR**	40	–	56	21.7	100	16.4	9	6
40	160	**AHX475S-160B12AR**	40	–	56	21.7	100	16.4	9	6
40	160	**AHX640S-160C07NR**	29	14	56	32.2	120	16.4	9	3
40	160	**AHX640S-160C10NR**	29	14	56	32.2	120	16.4	9	3
47.625	200	**AHX640SR20008KN**	35	18	140	26.2	175	25.4	14.22	4
47.625	200	**AHX640SR20012KN**	35	18	140	26.2	175	25.4	14.22	4
50.8	160	**AHX440SR16010FA**	45	–	72	16.9	100	19.1	11	2
50.8	160	**AHX440SR16014FA**	45	–	72	16.9	100	19.1	11	2
50.8	160	**AHX440SR16016FA**	45	–	72	16.9	100	19.1	11	2
50.8	160	**AHX475SR16010FA**	45	–	72	16.7	100	19.1	11	6
50.8	160	**AHX475SR16012FA**	45	–	72	16.7	100	19.1	11	6
50.8	160	**AHX640SR16007FA**	43	–	72	18.2	100	19.1	11	2
50.8	160	**AHX640SR16010FA**	43	–	72	18.2	100	19.1	11	2
60	200	**AHX640S-200C08NR**	32	18	140	29.2	175	25.7	14.22	4
60	200	**AHX640S-200C12NR**	32	18	140	29.2	175	25.7	14.22	4

AHX640W

High Feed Cutting for Cast Iron

Product Information

50° KAPR

Work Material

K F R

SYMBOL DESCRIPTIONS >> 1350
TECHNICAL DATA >> 1987
ISO13399 Property >> 1966

Fig.1
ø80

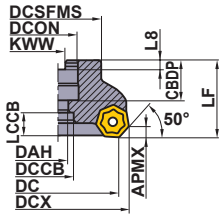


Fig.2
ø100
ø125
ø160

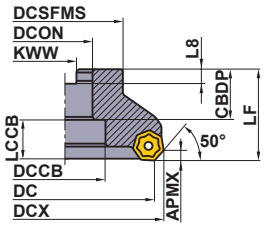


Fig.3
ø200
ø250

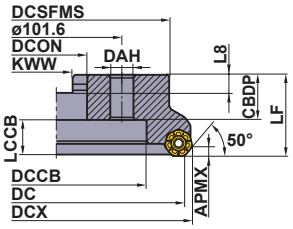
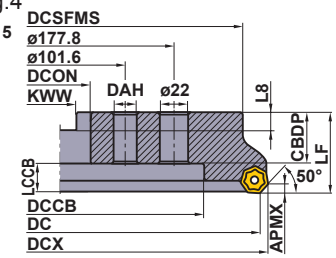


Fig.4
ø315



Right hand tool holder shown.

Arbor Type Right Hand Tool Holder

KAPR :50°
GAMP:-6° T :+10°
GAMF:-4° I :+9°—+10° (T,I : When using the MK breaker insert)
DC = mm size, DCON = Inch size

(mm)

DC	Order Number	Stock	Coolant Hole	* No.T	LF	DCX	DCON	Fig.	WT(kg)	APMX
80	AHX640WR08008C	●	–	8	50	92.6	25.4	1	1.5	6
	AHX640WR08010C	●	–	10	50	92.6	25.4	1	1.5	6
100	AHX640WR10010D	●	–	10	50	112.6	31.75	2	2.1	6
	AHX640WR10014D	●	–	14	50	112.6	31.75	2	2.1	6
125	AHX640WR12512E	●	–	12	63	137.6	38.1	2	3.5	6
	AHX640WR12518E	●	–	18	63	137.6	38.1	2	3.5	6
160	AHX640WR16016F	●	–	16	63	172.6	50.8	2	5.6	6
	AHX640WR16022F	●	–	22	63	172.6	50.8	2	5.6	6
200	AHX640WR20020K	●	–	20	63	212.6	47.625	3	9.0	6
	AHX640WR20028K	●	–	28	63	212.6	47.625	3	9.0	6
250	AHX640WR25024K	●	–	24	63	262.6	47.625	3	14.4	6
	AHX640WR25036K	●	–	36	63	262.6	47.625	3	14.4	6
315	AHX640WR31528P	●	–	28	63	327.6	47.625	4	23.8	6
	AHX640WR31544P	●	–	44	63	327.6	47.625	4	23.8	6

* Number of Teeth

● : **Inventory maintained in Japan.**

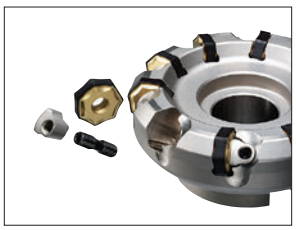
AHX640W

Arbor Type Left Hand Tool Holder

DC=mm size, DCON=Inch size (mm)

DC	Order Number	Stock	Coolant Hole	* No.T	LF	DCX	DCON	Fig.	WT(kg)	APMX
80	**AHX640WL08008C**	●	–	8	50	92.6	25.4	1	1.5	6
	AHX640WL08010C	●	–	10	50	92.6	25.4	1	1.5	6
100	**AHX640WL10010D**	●	–	10	50	112.6	31.75	2	2.1	6
	AHX640WL10014D	●	–	14	50	112.6	31.75	2	2.1	6
125	**AHX640WL12512E**	●	–	12	63	137.6	38.1	2	3.5	6
	AHX640WL12518E	●	–	18	63	137.6	38.1	2	3.5	6
160	**AHX640WL16016F**	●	–	16	63	172.6	50.8	2	5.6	6
	AHX640WL16022F	●	–	22	63	172.6	50.8	2	5.6	6
200	**AHX640WL20020K**	●	–	20	63	212.6	47.625	3	9.0	6
	AHX640WL20028K	●	–	28	63	212.6	47.625	3	9.0	6
250	**AHX640WL25024K**	●	–	24	63	262.6	47.625	3	14.4	6
	AHX640WL25036K	●	–	36	63	262.6	47.625	3	14.4	6
315	**AHX640WL31528P**	●	–	28	63	327.6	47.625	4	23.8	6
	AHX640WL31544P	●	–	44	63	327.6	47.625	4	23.8	6

* Number of Teeth



SPARE PARTS

Tool Holder Number	Wedge	* Clamp Screw	Wrench
AHX640W	CWAHX640WN	LS0622T	TKY15T

* Clamp Torque (N • m) : LS0622T=6.0

AHX640W

Fig.1
ø80

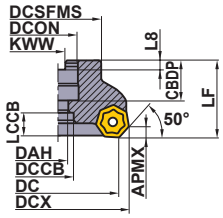


Fig.2
ø100
ø125

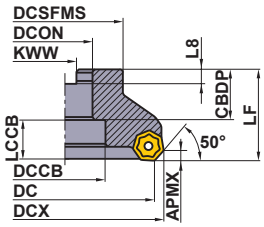


Fig.3
ø160

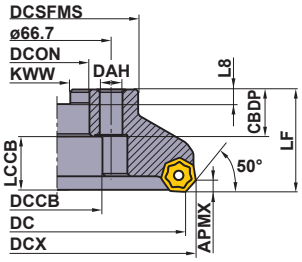


Fig.4
ø200
ø250

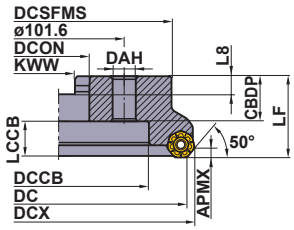
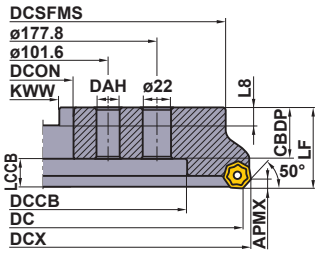


Fig.5
ø315



Right hand tool holder shown.

Metric Standard

Arbor Type Right Hand Tool Holder

KAPR :50°
GAMP:-6° T :+10°
GAMF:-4° I :+9°ー+10° (T,I : When using the MK breaker insert)
DC=mm size, DCON=mm size

(mm)

DC	Order Number	Stock	Coolant Hole	* No.T	LF	DCX	DCON	Fig.	WT(kg)	APMX
80	AHX640W-080A08R	●	–	8	50	92.6	27	1	1.5	6
	AHX640W-080A10R	●	–	10	50	92.6	27	1	1.5	6
100	AHX640W-100B10R	●	–	10	50	112.6	32	2	2.1	6
	AHX640W-100B14R	●	–	14	50	112.6	32	2	2.1	6
125	AHX640W-125B12R	●	–	12	63	137.6	40	2	3.1	6
	AHX640W-125B18R	●	–	18	63	137.6	40	2	3.1	6
160	AHX640W-160C16R	●	–	16	63	172.6	40	3	5.6	6
	AHX640W-160C22R	●	–	22	63	172.6	40	3	5.6	6
200	AHX640W-200C20R	●	–	20	63	212.6	60	4	8	6
	AHX640W-200C28R	●	–	28	63	212.6	60	4	8	6
250	AHX640W-250C24R	●	–	24	63	262.6	60	4	12.6	6
	AHX640W-250C36R	●	–	36	63	262.6	60	4	12.6	6
315	AHX640W-315C28R	●	–	28	80	327.6	60	5	31.5	6
	AHX640W-315C44R	●	–	44	80	327.6	60	5	31.5	6

* Number of Teeth

● : **Inventory maintained in Japan.**

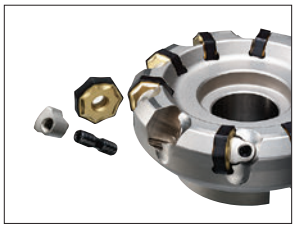
AHX640W

Arbor Type Left Hand Tool Holder

DC = mm size, DCON = mm size (mm)

DC	Order Number	Stock	Coolant Hole	* No.T	LF	DCX	DCON	Fig.	WT(kg)	APMX
80	**AHX640W-080A08L**	●	–	8	50	92.6	27	1	1.5	6
	AHX640W-080A10L	●	–	10	50	92.6	27	1	1.5	6
100	**AHX640W-100B10L**	●	–	10	50	112.6	32	2	2.1	6
	AHX640W-100B14L	●	–	14	50	112.6	32	2	2.1	6
125	**AHX640W-125B12L**	●	–	12	63	137.6	40	2	3.1	6
	AHX640W-125B18L	●	–	18	63	137.6	40	2	3.1	6
160	**AHX640W-160C16L**	●	–	16	63	172.6	40	3	5.6	6
	AHX640W-160C22L	●	–	22	63	172.6	40	3	5.6	6
200	**AHX640W-200C20L**	●	–	20	63	212.6	60	4	8.0	6
	AHX640W-200C28L	●	–	28	63	212.6	60	4	8.0	6
250	**AHX640W-250C24L**	●	–	24	63	262.6	60	4	12.6	6
	AHX640W-250C36L	●	–	36	63	262.6	60	4	12.6	6
315	**AHX640W-315C28L**	●	–	28	80	327.6	60	5	31.5	6
	AHX640W-315C44L	●	–	44	80	327.6	60	5	31.5	6

* Number of Teeth



SPARE PARTS

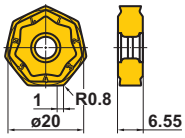
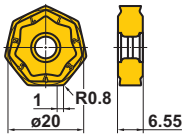
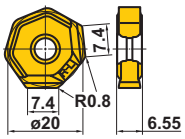
Tool Holder Number	Wedge	* Clamp Screw	Wrench
AHX640W	CWAHX640WN	LS0622T	TKY15T

* Clamp Torque (N • m) : LS0622T=6.0

AHX640W

INSERT

(mm)

Shape	Order Number	Class	Honing	Coated MC5020	Coated VP15TF	Coated VP20RT	Geometry
General Cutting	NNMU200608ZEN-MK	M	E	●	●	●	
Strong Cutting Edge Type	NNMU200608ZEN-HK	M	E	●	●	●	
Wiper	WNEU2006ZEN7C-WK	E	E	●			

● : Inventory maintained in Japan. (10 inserts in one case)

RECOMMENDED CUTTING CONDITIONS

Dry·Wet Cutting

(mm)

	Work Material	Tensile Strength	Grade	vc (m/min)	fz (mm/t.)
K	Gray Cast Iron	≤350MPa	MC5020	220 (150—300)	0.3 (0.2—0.4)
			VP15TF VP20RT	180 (130—250)	0.3 (0.2—0.4)
	Ductile Cast Iron	≤450MPa	MC5020	200 (150—250)	0.2 (0.1—0.3)
			VP15TF VP20RT	170 (120—220)	0.2 (0.1—0.3)
		≤800MPa	MC5020	170 (150—200)	0.2 (0.1—0.3)
			VP15TF VP20RT	140 (100—180)	0.2 (0.1—0.3)

*Please use 2-3 pcs of Wiper inserts in case of 'over 6mm/rev'.

Finishing (Use of Wiper Inserts)

(mm)

	Work Material	Grade	ap	vc (m/min)	fz (mm/t.)
K	Gray Cast Iron	MC5020	<0.5	320 (250—400)	0.2 (0.1—0.3)
			0.5—3	270 (200—350)	
	Ductile Cast Iron		<0.5	270 (200—350)	
			0.5—3	220 (200—250)	

(Note) With reference to the above examples, adjust the cutting conditions according to the use environment.
(Note) Tool life when wet cutting is short compared to dry cutting.

AHX640W

Memo

AHX640W

AHX640W Mounting Dimensions

Fig.1

ø80

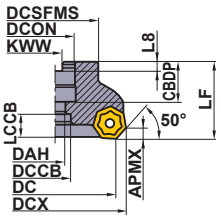
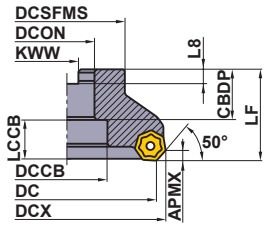


Fig.2

ø100
ø125
ø160



Right hand tool holder shown.

(mm)

DCON	DC	Order Number	CBDP	DAH	DCCB	LCCB	DCSFMS	KWW	L8	Fig.
25.4	80	**AHX640WL08008C**	26	13	20	14.8	56	9.5	6	1
25.4	80	**AHX640WL08010C**	26	13	20	14.8	56	9.5	6	1
25.4	80	**AHX640WR08008C**	26	13	20	14.8	56	9.5	6	1
25.4	80	**AHX640WR08010C**	26	13	20	14.8	56	9.5	6	1
27	80	**AHX640W-080A08L**	23	13	20	14.8	56	12.4	7	1
27	80	**AHX640W-080A08R**	23	13	20	14.8	56	12.4	7	1
27	80	**AHX640W-080A10L**	23	13	20	14.8	56	12.4	7	1
27	80	**AHX640W-080A10R**	23	13	20	14.8	56	12.4	7	1
31.75	100	**AHX640WL10010D**	32	—	45	16.8	70	12.7	8	2
31.75	100	**AHX640WL10014D**	32	—	45	16.8	70	12.7	8	2
31.75	100	**AHX640WR10010D**	32	—	45	16.8	70	12.7	8	2
31.75	100	**AHX640WR10014D**	32	—	45	16.8	70	12.7	8	2
32	100	**AHX640W-100B10L**	32	—	45	16.8	70	14.4	8	2
32	100	**AHX640W-100B10R**	32	—	45	16.8	70	14.4	8	2
32	100	**AHX640W-100B14L**	32	—	45	16.8	70	14.4	8	2
32	100	**AHX640W-100B14R**	32	—	45	16.8	70	14.4	8	2
38.1	125	**AHX640WL12512E**	35	—	56	26.8	80	15.9	10	2
38.1	125	**AHX640WL12518E**	35	—	56	26.8	80	15.9	10	2
38.1	125	**AHX640WR12512E**	35	—	56	26.8	80	15.9	10	2
38.1	125	**AHX640WR12518E**	35	—	56	26.8	80	15.9	10	2
40	125	**AHX640W-125B12L**	32	—	56	29.8	80	16.4	9	2
40	125	**AHX640W-125B12R**	32	—	56	29.8	80	16.4	9	2
40	125	**AHX640W-125B18L**	32	—	56	29.8	80	16.4	9	2
40	125	**AHX640W-125B18R**	32	—	56	29.8	80	16.4	9	2
40	160	**AHX640W-160C16L**	29	14	56	32.8	100	16.4	9	3
40	160	**AHX640W-160C16R**	29	14	56	32.8	100	16.4	9	3
40	160	**AHX640W-160C22L**	29	14	56	32.8	100	16.4	9	3
40	160	**AHX640W-160C22R**	29	14	56	32.8	100	16.4	9	3

AHX640W

Fig.3

ø160

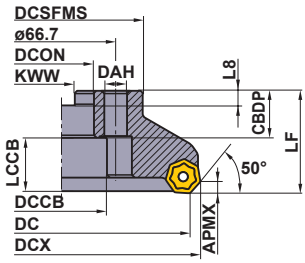


Fig.4

ø200
ø250

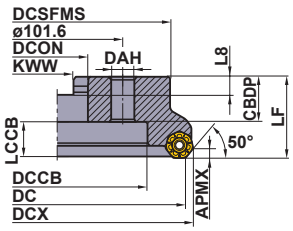
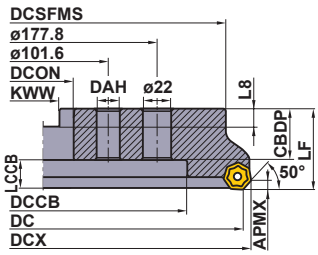


Fig.5

ø315



Right hand tool holder shown.

(mm)

DCON	DC	Order Number	CBDP	DAH	DCCB	LCCB	DCSFMS	KWW	L8	Fig.
47.625	200	**AHX640WL20020K**	35	18	140	26.8	175	25.4	14.22	4
47.625	200	**AHX640WL20028K**	35	18	140	26.8	175	25.4	14.22	4
47.625	200	**AHX640WR20020K**	35	18	140	26.8	175	25.4	14.22	4
47.625	200	**AHX640WR20028K**	35	18	140	26.8	175	25.4	14.22	4
47.625	250	**AHX640WL25024K**	35	18	180	26.8	220	25.4	14.22	4
47.625	250	**AHX640WL25036K**	35	18	180	26.8	220	25.4	14.22	4
47.625	250	**AHX640WR25024K**	35	18	180	26.8	220	25.4	14.22	4
47.625	250	**AHX640WR25036K**	35	18	180	26.8	220	25.4	14.22	4
47.625	315	**AHX640WL31528P**	40	18	225	21.8	285	25.4	14.22	5
47.625	315	**AHX640WL31544P**	40	18	225	21.8	285	25.4	14.22	5
47.625	315	**AHX640WR31528P**	40	18	225	21.8	285	25.4	14.22	5
47.625	315	**AHX640WR31544P**	40	18	225	21.8	285	25.4	14.22	5
50.8	160	**AHX640WL16016F**	38	—	72	23.8	100	19.1	11	2
50.8	160	**AHX640WL16022F**	38	—	72	23.8	100	19.1	11	2
50.8	160	**AHX640WR16016F**	38	—	72	23.8	100	19.1	11	2
50.8	160	**AHX640WR16022F**	38	—	72	23.8	100	19.1	11	2
60	200	**AHX640W-200C20L**	32	18	135	29.8	155	25.7	14.22	4
60	200	**AHX640W-200C20R**	32	18	135	29.8	155	25.7	14.22	4
60	200	**AHX640W-200C28L**	32	18	135	29.8	155	25.7	14.22	4
60	200	**AHX640W-200C28R**	32	18	135	29.8	155	25.7	14.22	4
60	250	**AHX640W-250C24L**	32	18	180	29.8	200	25.7	14.22	4
60	250	**AHX640W-250C24R**	32	18	180	29.8	200	25.7	14.22	4
60	250	**AHX640W-250C36L**	32	18	180	29.8	200	25.7	14.22	4
60	250	**AHX640W-250C36R**	32	18	180	29.8	200	25.7	14.22	4
60	315	**AHX640W-315C28L**	57	18	225	21.8	285	25.7	14.22	5
60	315	**AHX640W-315C28R**	57	18	225	21.8	285	25.7	14.22	5
60	315	**AHX640W-315C44L**	57	18	225	21.8	285	25.7	14.22	5
60	315	**AHX640W-315C44R**	57	18	225	21.8	285	25.7	14.22	5

AOX445

High Efficiency Cutting for Cast Iron

Product Information

45° KAPR

Work Material

K F R

SYMBOL DESCRIPTIONS >> 1350
TECHNICAL DATA >> 1987
ISO13399 Property >> 1966

- **Solid CBN octagonal double sided insert.**
- **Economical 16 cutting edge inserts. (when the depth of cut is 3mm)**
- **For high efficiency roughing through to finishing.**
- **Easy operation and cleansing.**

Fig.1
ø63

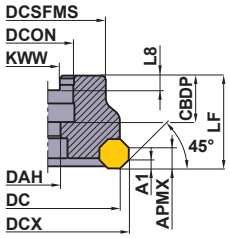
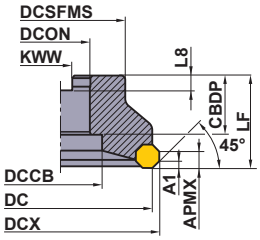


Fig.2
ø80
ø100
ø125
ø160



ARBOR TYPE

KAPR :45°
GAMP:-5° T :-9°—-6°
GAMF :-9°—-6° I :-5°

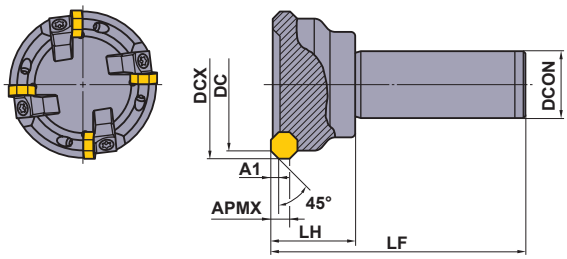
Right hand (R) only for the standard.

Type	Order Number	Stock R	Number of Teeth	Dimensions(mm) DC	DCX	LF	DCON	CBDP	DAH	DCCB	DCSFMS	KWW	L8	WT* (kg)	A1 (mm)	APMX (mm)	Max. Allowable Revolution (min^{-1})	Type (Fig.)
Coarse Pitch	**AOX445063A04R**	●	4	63	70.8	40	22	20	11	—	50	10.4	6.3	0.6	3	8	12000	1
	AOX445R08006C	●	6	80	87.8	50	25.4	26	—	38	60	9.5	6	1.2	3	8	11000	2
	AOX445R10008D	●	8	100	107.8	50	31.75	32	—	45	70	12.7	8	1.8	3	8	9300	2
	AOX445R12510E	●	10	125	132.8	63	38.1	35	—	60	80	15.9	10	3.0	3	8	8300	2
	AOX445R16012F	●	12	160	167.8	63	50.8	38	—	80	100	19.1	11	4.9	3	8	7200	2

(Note) When machining with a depth of cut of 8mm, 16 corners cannot be used.
* WT : Tool Weight

● : **Inventory maintained in Japan.**

AOX445



SHANK TYPE

Right hand (R) only for the standard.

Type	Order Number	Stock R	Number of Teeth	Dimensions(mm) DC	DCX	LF	DCON	LH	WT* (kg)	A1 (mm)	APMX (mm)	Max. Allowable Revolution (min^{-1})
Coarse Pitch	**AOX445R503S32**	●	3	50	57.8	125	32	40	1.1	3	8	13000
	AOX445R634S32	●	4	63	70.8	125	32	40	1.4	3	8	12000

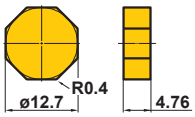
* WT : Tool Weight

SPARE PARTS

Tool Holder Number	Wedge	* Clamp Screw	Wrench
AOX445	CWAOX445N	LS15T	TKY25T

* Clamp Torque (N • m) : LS15T=8.0

INSERTS

Order Number	Class	CBN BC5030		Geometry
SL-ONEN120404ASN	E	●		

● : **Inventory maintained in Japan. (CBN inserts are available in 1 piece in one case.)**

RECOMMENDED CUTTING CONDITIONS

Work Material		Tensile Strength	Grade	Cutting Speed (m/min)	Feed per Tooth (mm/t.)
K	Gray Cast Iron	≤200MPa	**BC5030**	1000 (800—1500)	0.1 (0.05—0.15)
		250—350 MPa			

Note) Dry cutting is recommended.

SE515

HEAVY CUTTING

Product Information

75° KAPR

Work Material

P M K N F R

SYMBOL DESCRIPTIONS >> 1350
TECHNICAL DATA >> 1987
ISO13399 Property >> 1966

- 20°positive insert.
- High rake angle.
- High rigidity due to carbide shim.

Fig.1
ø100

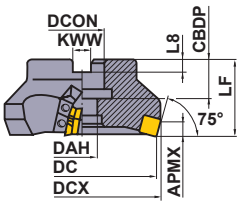
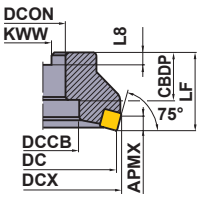


Fig.2
ø125
ø160



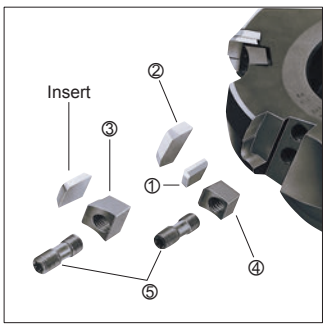
Right hand tool holder only.

KAPR :75°
GAMP:+19° T :+11°
GAMF:+5° I :+17°

Type	Order Number	Stock R	Number of Teeth	Dimensions(mm) DC	DCX	LF	DCON	CBDP	DAH	DCCB	KWW	L8	WT* (kg)	APMX (mm)	Type (Fig.)
Coarse Pitch	SE515R0405D	▲	5	100	108.9	63	31.75	32	17	—	12.7	8	2.3	11.5	1
	SE515R0506E	▲	6	125	133.6	63	38.1	38	—	60	15.9	10	3.5	11.5	2
	SE515R0608F	▲	8	160	168.3	63	50.8	38	—	80	19.1	11	5.6	11.5	2
Close Pitch	SE515R0407D	▲	7	100	108.9	63	31.75	32	17	—	12.7	8	2.3	11.5	1
	SE515R0509E	▲	9	125	133.6	63	38.1	38	—	60	15.9	10	3.5	11.5	2
	SE515R0611F	▲	11	160	168.3	63	50.8	38	—	80	19.1	11	5.6	11.5	2

* WT : Tool Weight

▲ : Inventory maintained in Japan. To be replaced by new products.



SPARE PARTS

Tool Holder Number	① Locator	② Shim	③ Wedge-T	④ Wedge-S	⑤ Clamp Screw*	Wrench	Set Bolt
SE515R0405D 0407D	SPSE515R	STSE515R	CWSE545TR	CWSE545SN	LS15T	TKY25T	HSC16035
SE515R0506E – SE515R0611F							—

* Clamp Torque (N • m) : LS15T=8.0

SE515

RECOMMENDED CUTTING CONDITIONS

	Work Material	Hardness	Grade	Cutting Speed (m/min)	Feed per Tooth (mm/t.)
P	Mild Steel	≤180HB	F7030	200 (160—250)	0.2 (0.1—0.3)
			VP15TF	180 (100—250)	
			NX4545	140 (80—200)	
	Carbon Steel Alloy Steel	180—280HB	F7030	200 (160—250)	0.2 (0.1—0.3)
			VP15TF	180 (100—250)	
			NX4545	140 (80—200)	
		280—350HB	VP15TF	120 (80—160)	0.15 (0.1—0.2)

	Work Material	Hardness	Grade	Cutting Speed (m/min)	Feed per Tooth (mm/t.)
M	Stainless Steel	≤200HB	VP15TF	150 (100—200)	0.2 (0.1—0.3)
K	Cast Iron	Tensile Strength ≤450MPa	MC5020	175 (100—250)	0.2 (0.1—0.3)
			VP15TF	160 (100—220)	
N	Aluminium Alloy	—	MD220	1000 (200—1500)	0.15 (0.05—0.25)
			HTi10	650 (300—1000)	0.12 (0.05—0.2)

● Revolution (min^{-1})=(1000 x Cutting Speed)÷(3.14 x DC)
● Table Feed (mm/min)
=Feed per Tooth x Number of Teeth x Cutter Revolution

INSERTS

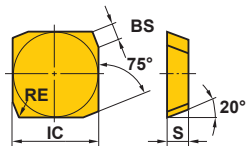
Work Material		F7030	MC5020	VP15TF		NX2525	NX4545	UTi20T	HTi10
P	Steel	◐		◐		●	◐	◐	
M	Stainless Steel	◔		◔		◯	◔	◔	
K	Cast Iron		◐	✠		●		✠	◐
N	Non-ferrous Metal								◐

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✠ : Unstable Cutting

Honing :
E : Round **S** : Chamfer + Hone **T** : Chamfer

Shape	Order Number	Class	Honing	F7030 (Coated)	MC5020 (Coated)	VP15TF (Coated)		NX2525 (Cermet)	NX4545 (Cermet)	UTi20T (Carbide)	HTi10 (Carbide)	IC	S	BS	RE
	SECN1504EFTR1	C	T						●			15.875	4.76	1.4	1.0
	SEEN1504EFER1	E	E			●						15.875	4.76	1.4	1.0
	SEEN1504EFTR1	E	T						●			15.875	4.76	1.4	1.0
	SEEN1504EFSR1	E	S	●								15.875	4.76	1.4	1.0
	SEKN1504EFTR1	K	T							●		15.875	4.76	1.4	—
	SEKN1504EFSR1	K	S	●								15.875	4.76	1.4	—

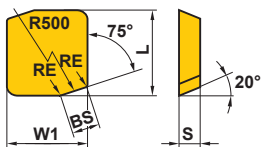
Geometry



WIPER INSERTS

Shape	Order Number	Class	Honing	NX2525 (Cermet)		W1	L	S	BS	RE
	WEC53EFTR5C	C	T	●		15.875	16.903	4.76	5	1.0

Geometry



● : Inventory maintained in Japan. (10 inserts in one case)

SG20

CUTTING FOR DIFFICULT-TO-CUT MATERIALS

Product Information

R KAPR

Work Material

P M K H F R

SYMBOL DESCRIPTIONS >> 1350
TECHNICAL DATA >> 1987
ISO13399 Property >> 1966

- **30° positive insert.**
- **High rake angle.**
- **Round shape insert with a strong cutting edge.**
- **Suitable for difficult-to-cut materials.**

Fig.1
ø80
ø100

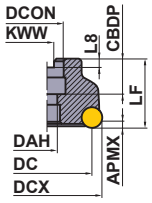
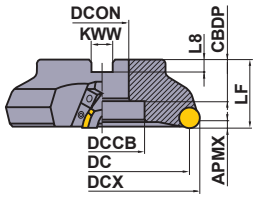


Fig.2
ø125
ø160



Right hand tool holder only.

GAMP:+24° T :+23° (KAPR=45°)
GAMF:+9°

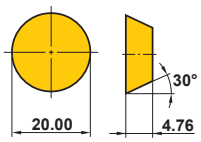
Order Number	Stock	Number of Teeth	Dimensions(mm)									WT* (kg)	APMX (mm)	Type (Fig.)
	R		DC	DCX	LF	DCON	CBDP	DAH	DCCB	KWW	L8			
SG20R0304C	●	4	80	101.2	50	25.4	26	13	—	9.5	6	1.5	8	1
SG20R0405D	●	5	100	121.4	63	31.75	32	17	—	12.7	8	2.9	8	1
SG20R0506E	●	6	125	146.4	63	38.1	38	—	60	15.9	10	3.8	8	2
SG20R0608F	●	8	160	181.4	63	50.8	38	—	80	19.1	11	6.1	8	2

* WT : Tool Weight

● : **Inventory maintained in Japan.**

SG20

INSERTS

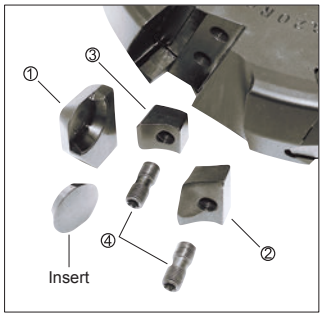
Order Number	Class	Coated			Carbide		Geometry
		F7030	VP15TF	UP20M	UTi20T	HTi10	
RGEN2004M0SN	E	●		●	●	●	
RGEN2004M0EN	E		●				

● : Inventory maintained in Japan. (10 inserts in one case)

RECOMMENDED CUTTING CONDITIONS

Work Material		Hardness	Grade	Cutting Speed (m/min)	Feed per Tooth (mm/t.)	Recommended Max. Depth of Cut (mm)
P	Carbon Steel Alloy Steel	≤180HB	VP15TF	180 (100—250)	0.35 (0.2—0.5)	4.5
			NX2525	175 (150—200)	0.25 (0.2—0.3)	4.5
		280—350HB	VP15TF	180 (100—250)	0.3 (0.2—0.4)	4.5
			NX2525	165 (130—200)	0.25 (0.2—0.3)	4.5
M	Stainless Steel	≤200HB	VP15TF	150 (100—200)	0.35 (0.2—0.5)	3
K	Gray Cast Iron	Tensile Strength ≤350MPa	VP15TF	160 (100—220)	0.4 (0.3—0.5)	4.5
H	Hardened Steel	40—60HRC	VP15TF	80 (50—100)	0.2 (0.1—0.3)	2

● Revolution (min^{-1})=(1000 x Cutting Speed)÷(3.14 x DC)
● Table Feed (mm/min)
=Feed per Tooth x Number of Teeth x Cutter Revolution



SPARE PARTS

Tool Holder Number	① Locator	② Wedge-T	③ Wedge-S	④ Clamp Screw *	Wrench	Set Bolt
SG20R0304C	SPSG20R	CWSG20TR	CWSG20SN	LS15T	TKY25T	–
SG20R0405D						HSC16035
SG20R0506E						–
SG20R0608F						

* Clamp Torque (N • m) : LS15T=8.0

FMAX

HIGH FEED FINISHING

Product Information

90° KAPR

Work Material

N F

SYMBOL DESCRIPTIONS >> 1350
TECHNICAL DATA >> 1987
ISO13399 Property >> 1966

Fig.1
ø50
ø63

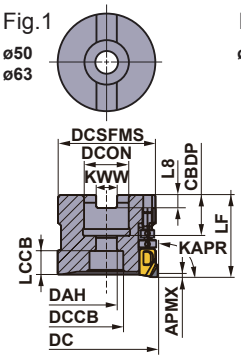


Fig.2
ø80

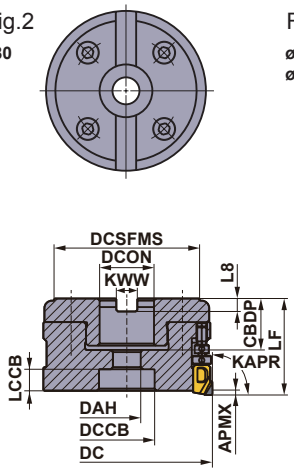
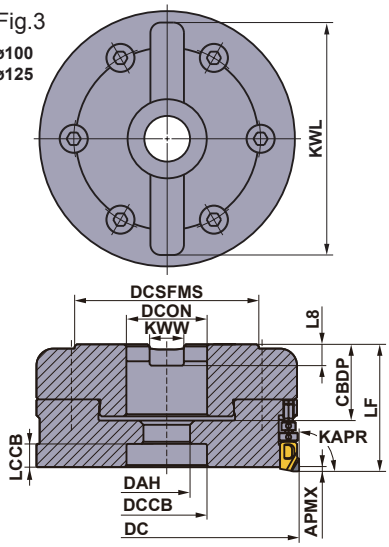


Fig.3
ø100
ø125



Right hand tool holder only.

Cutter Body

DC=mm size, DCON=Inch size (DC=50,63 mm)

KAPR : 90° GAMP : +5°
GAMF : -5°—0°
With Coolant Hole

(mm)

DC	Order Number	Stock	*3 No.T	LF	DCON	WT (kg)	APMX	RPMX (min^{-1})	Type (Fig.)
50	**FMAX-050A08R**	●	8	40	22	0.37	2	30000	1
50	**FMAX-050A10R**	●	10	40	22	0.35	2	30000	1
63	**FMAX-063A10R**	●	10	40	22	0.67	2	27000	1
63	**FMAX-063A12R**	●	12	40	22	0.66	2	27000	1
80	**FMAXR08010C**	●	10	45	25.4	1.11	2	24500	2
80	**FMAXR08014C**	●	14	45	25.4	1.09	2	24500	2
100	**FMAXR10012D**	●	12	50	31.75	1.85	2	22000	3
100	**FMAXR10018D**	●	18	50	31.75	1.81	2	22000	3
125	**FMAXR12516E**	●	16	60	38.1	3.33	2	19600	3
125	**FMAXR12524E**	●	24	60	38.1	3.27	2	19600	3

*1 2 mm or less is the recommended maximum depth of cut for ultra high efficiency machining.
*2 The combinated cutter body from the aluminium and the special alloy steel suits for DC 80mm or more size.
*3 Number of Teeth

● : **Inventory maintained in Japan.**

FMAX

Metric Standard

DC=DC=mm size, DCON=mm size

KAPR : 90° GAMP : +5°
GAMF : 0°
With Coolant Hole

(mm)

DC	Order Number	Stock	*2 No.T	LF	DCON	WT (kg)	APMX	RPMX (min^{-1})	Type (Fig.)
50	**FMAX-050A08R**	●	8	40	22	0.37	2	30000	1
50	**FMAX-050A10R**	●	10	40	22	0.35	2	30000	1
63	**FMAX-063A10R**	●	10	40	22	0.67	2	27000	1
63	**FMAX-063A12R**	●	12	40	22	0.66	2	27000	1
80	**FMAX-080B14R**	●	14	45	27	1.08	2	24500	2
100	**FMAX-100B18R**	●	18	50	32	1.81	2	22000	3
125	**FMAX-125B24R**	●	24	60	40	3.26	2	19600	3

*1 2 mm or less is the recommended maximum depth of cut for ultra high efficiency machining.
*2 Number of Teeth

SPARE PARTS

(mm)

DC	Tool Holder Type	Insert Clamp Screw	Micro Adjustment Nut	Large Adjustment Screw	Balance Adjustment Screw	Cutter Set Bolt	Wrench T10	Wrench ø2.5
50	**FMAX-050**	TSS04505S	KSN2	KSS2	HSS04004G	HSC10030H	TKY10T	RKY25S
63	**FMAX-063**	TSS04505S	KSN2	KSS2	HSS04004G	HSC10030H	TKY10T	RKY25S
80	**FMAX-080**	TSS04505S	KSN2	KSS2	HSS05005G	HSCX12030H	TKY10T	RKY25S
80	**FMAXR080**	TSS04505S	KSN2	KSS2	HSS05005G	HSCX12030H	TKY10T	RKY25S
100	**FMAX-100**	TSS04505S	KSN2	KSS2	HSS06006G	HSCX16035H	TKY10T	RKY25S
100	**FMAXR100**	TSS04505S	KSN2	KSS2	HSS06006G	HSCX16035H	TKY10T	RKY25S
125	**FMAX-125**	TSS04505S	KSN2	KSS2	HSS08008G	HSCX20035H	TKY10T	RKY25S
125	**FMAXR125**	TSS04505S	KSN2	KSS2	HSS08008G	HSCX20035H	TKY10T	RKY25S

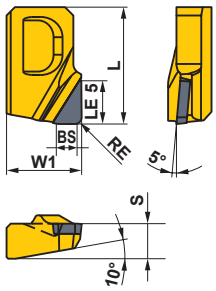
* Clamp Torque (N • m) : TSS04505S = 3.5
* Please refer to the instruction manual included in the cutter body for how to locate the insert and adjust the run-out.

FMAX

INSERTS

(mm)

Shape	Order Number	Class	Stock	L	W1	S	BS	RE
	GOER1404PXFR2	MD2030	●	14.0	9.0	4.2	2.0	0.4
	GOER1408PXFR2	MD2030	●	14.0	9.0	4.2	2.0	0.8



● : Inventory maintained. (PCD inserts are available in 1 piece in one case)

RECOMMENDED CUTTING CONDITIONS

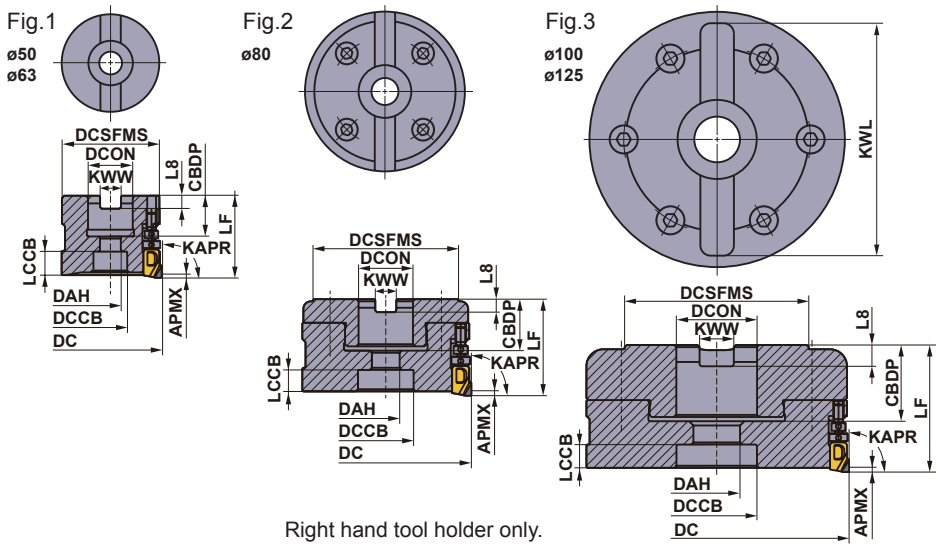
(mm)

Work Material		Characteristics	Grade	vc (m/min)	ae	ap	fz (mm/t.)
N	Aluminum Alloy	Si < 12.5%	MD2030	2500 (2000—3000)	≤ 0.2 DC	≤ 2 (0.5—3)	0.08 (0.05—0.2)
					≤ 0.5 DC	≤ 2 (0.5—2.5)	
					≤ 0.8 DC	≤ 2 (0.5—2.0)	
		Si ≥ 12.5%	MD2030	600 (400—800)	≤ 0.2 DC	≤ 2 (0.5—3)	0.08 (0.05—0.2)
					≤ 0.5 DC	≤ 2 (0.5—2.5)	
					≤ 0.8 DC	≤ 2 (0.5—2.0)	

* Please adjust the depth of cut depending on the width of cut.

FMAX

Mounting Dimension



Right hand tool holder only.

(mm)

DCON	DC	Order Number	*1 No.T	CBDP	DAH	DCCB	LCCB	DCSFMS	KWW	L8	KWL	Fig.
22	50	**FMAX-050A08R**	8	20	11	17	12	47	10.4	6.3	—	1
22	50	**FMAX-050A10R**	10	20	11	17	12	47	10.4	6.3	—	1
22	63	**FMAX-063A10R**	10	20	11	17	12	60	10.4	6.3	—	1
22	63	**FMAX-063A12R**	12	20	11	17	12	60	10.4	6.3	—	1
25.4	80	**FMAXR08010C**	10	24	13	26	11	68	9.5	6	—	2
25.4	80	**FMAXR08014C**	14	24	13	26	11	68	9.5	6	—	2
27	80	**FMAX-080B14R**	14	24	13	26	11	68	12.4	7	—	2
31.75	100	**FMAXR10012D**	12	32	17	32	10	79	12.7	8	90	3
31.75	100	**FMAXR10018D**	18	32	17	32	10	79	12.7	8	90	3
32	100	**FMAX-100B18R**	18	32	17	32	10	79	14.4	8	90	3
38.1	125	**FMAXR12516E**	16	36	22	38	12	88	15.9	10	112	3
38.1	125	**FMAXR12524E**	24	36	22	38	12	88	15.9	10	112	3
40	125	**FMAX-125B24R**	24	36	22	38	12	88	16.4	9	112	3

*1 Number of Teeth

V10000

HIGH SPEED FINISHING
ALUMINIUM ALLOY

Product Information

90° KAPR

Work Material

N F

SYMBOL DESCRIPTIONS >> 1350
TECHNICAL DATA >> 1987
ISO13399 Property >> 1966

- Insert with PCD.
- Light weight, strong aluminium alloy cutter body.
- Anti-Fly insert mechanism enables high speed milling.
- Adjustable cutting edge run-out function.

Fig.1
ø63

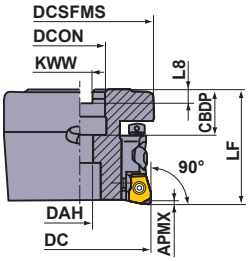
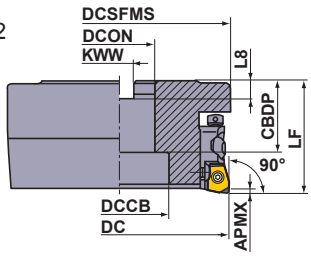


Fig.2
ø80
ø100
ø125



Right hand tool holder only.

KAPR :90°
GAMP:+8°
GAMF:+8°

Order Number	Stock R	Number of Teeth	Dimensions (mm) DC	LF	DCON	CBDP	DAH	DCCB	DCSFMS	KWW	L8	WT* (kg)	APMX (mm)	Max. Allowable Revolution (min⁻¹)	Type (Fig.)
V10000-063A04R	●	4	63	50	22	20	11	—	66.1	10.4	6.3	0.5	1.5	25000	1
V10000R0305C	●	5	80	50	25.4	26	—	38	81.7	9.5	6	0.6	1.5	22300	2
V10000R0406D	●	6	100	50	31.75	32	—	45	100.88	12.7	8	0.9	1.5	20000	2
V10000R0508E	●	8	125	63	38.1	35	—	60	125.22	15.9	10	1.8	1.5	17800	2

* WT : Tool Weight

● : **Inventory maintained in Japan.**

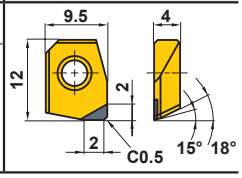
SPARE PARTS

Tool Holder Number	Cartridge	Cartridge Clamp Screw-A *	Cartridge Clamp Screw-B *	Insert Clamp Screw *	Run-out Adjust Screw	Balance Adjust Screw	Wrench	Wrench
V10000-063A04R ~ V10000R0508E	VCT13R	HBH06016	HBH04008	CS350790T	KS1	HSS05005	HKY25R HKY40R	TKY10R

* Clamp Torque (N • m) : CS350790T=3.5, HBH06016=8.0, HBH04008=4.0

V10000

INSERTS

Order Number	Class	PCD MD220	Geometry
NP-GDCW1240PDFR2	C	●	

● : Inventory maintained in Japan. (1 insert in one case)

RECOMMENDED CUTTING CONDITIONS

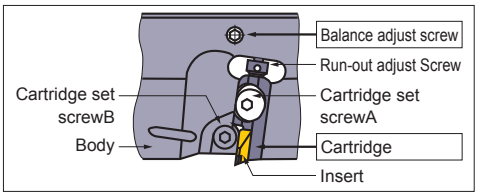
Work Material		Silicon (%)	Cutting Speed (m/min)	Feed per Tooth (mm/t.)	Depth of Cut (mm)
N	Aluminium Alloy	≤16	−6500	−0.2	−0.5
		≥16	−1000		

NOTE ON ROTATIONAL BALANCE

- At the time of shipping, the cutter body is balanced by using a special high accuracy master insert in order that it will conform to balance quality G6.3 based on ISO 1940/1 (approximate value at the maximum revolution for each cutter diameter). In order to keep good rotational balance, do not adjust the balance screw (HSS05005) located on the outer surface of the body.
- Rotational balance will change after exchanging cartridges. If you use the cutter at the same revolution as that of the following table or higher, re-balancing is necessary after exchanging cartridges. Please contact Mitsubishi Materials to re-balance the cutter.

(Note 1) If the revolution is the same as or lower than the value indicated above, the cutter can be used with a standard arbor. (Do not use long shank type arbors or special arbors, as the overhang could make it dangerous to use.)

(Note 2) If the revolution is higher than the value indicated above, please set the balance as follows : (Arbor + cutter)≤G6.3



Diameter of cutter (mm)	Revolution requiring re-balancing (min^{-1})
63	17000
80	14500
100	14000
125	Re-balancing not necessary up to the max. revolution

NF10000

For aluminium alloy and cast iron / high feed rate and finishing

Product Information

90° KAPR

Work Material

K N F

SYMBOL DESCRIPTIONS >> 1350
TECHNICAL DATA >> 1987
ISO13399 Property >> 1966

- **Suitable for high-speed finishing of light alloy and cast iron.**
- **Adjustable cutting edge run-out function.**

Fig.1
ø80
ø100

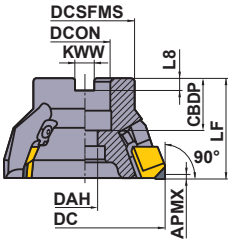
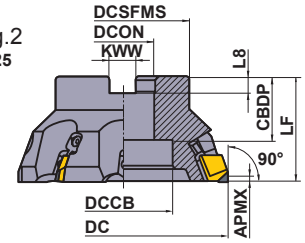


Fig.2
ø125



Right hand tool holder only.

KAPR :90°
GAMP:+10°
GAMF:+5°

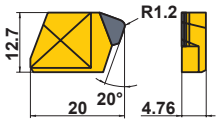
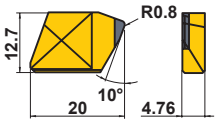
Type	Order Number	Stock R	Number of Teeth	Dimensions (mm) DC	LF	DCON	CBDP	DAH	DCCB	DCSFMS	KWW	L8	WT*2 (kg)	APMX (mm) PCD	CBN	Max.*1 Allowable Revolution (min^{-1})	Type (Fig.)
Coarse Pitch	**NF10000R0305C**	●	5	80	50	25.4	26	13	—	80.2	9.5	6	1.0	4.0	1.0	16000	1
	NF10000R0406D	●	6	100	63	31.75	32	17	—	100.2	12.7	8	1.8	4.0	1.0	14000	1
	NF10000R0508E	●	8	125	63	38.1	38	—	60	125.2	15.9	10	2.7	4.0	1.0	12000	2
Fine Pitch	**NF10000R0306C**	●	6	80	50	25.4	26	13	—	80.2	9.5	6	1.0	4.0	1.0	16000	1
	NF10000R0408D	●	8	100	63	31.75	32	17	—	100.2	12.7	8	1.8	4.0	1.0	14000	1
	NF10000R0510E	●	10	125	63	38.1	38	—	60	125.2	15.9	10	2.7	4.0	1.0	12000	2

*1 Ensure max. spindle speed is achieved under the conditions that the cutter is clamped by a machine clamping force of 18kN with a standard type arbor. (HSK 63A-FMA○○○-60) The figure varies in actual machining depending on cutting conditions, such as the length of overhang or if there is insufficient drawing force from the arbor.
*2 WT : Tool Weight

● : **Inventory maintained in Japan.**

NF10000

INSERTS

Order Number	Class	PCD MD220		CBN MB730		Geometry
GDCN2004PDFR3	C	●				
NP-GDCN2004PDSR3	C			●		

● : Inventory maintained in Japan. (1 insert in one case)

SPARE PARTS

Tool Holder Number	Wedge	Clamp Screw *	Wrench
NF10000R0305C - NF10000R0510E	CWAF10R1	LS10T	TKY25T

* Clamp Torque (N • m) : LS10T=8.0

RECOMMENDED CUTTING CONDITIONS

	Work Material	Grade	Cutting Speed (m/min)	Feed per Tooth (mm/t.)
N	Aluminium Alloy	**MD220**	3500 (1000—4500)	0.12 (0.05—0.20)
K	Gray Cast Iron	**MB730**	1000 (800—1500)	0.15 (0.05—0.5)

● Revolution (min^{-1})=(1000 x Cutting Speed)÷(3.14 x DC)
● Table Feed (mm/min)=Feed per Tooth x Number of Teeth x Cutter Revolution

FF3000

GENERAL HIGH FEED FINISHING

Product Information

90° KAPR

Work Material

P M K N F

SYMBOL DESCRIPTIONS >> 1350
TECHNICAL DATA >> 1987
ISO13399 Property >> 1966

- 11°positive insert.
- 1000－3000mm/min high feed machining.
- For finishing of steel machining.
- Adjustable cutting edge run-out function.

Fig.1

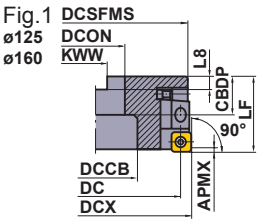
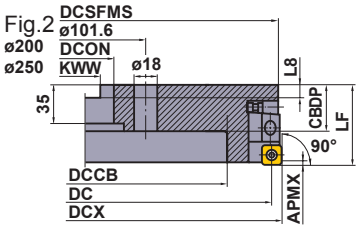


Fig.2



Right hand tool holder only.

KAPR :90°
GAMP:+5° T :+15°
GAMF:-15° I :+5°

Order Number	Stock R	Number of Teeth	Dimensions (mm) DC	DCX	LF	DCON	CBDP	DCCB	DCSFMS	KWW	L8	WT* (kg)	APMX (mm)	Type (Fig.)
FF3000R0502E	●	2	125	140.4	75	38.1	38	60	132.8	15.9	10	5.8	0.3	1
FF3000R0602F	●	2	160	175.4	75	50.8	38	80	165.6	19.1	11	9.0	0.3	1
FF3000R0802K	●	2	200	215.4	75	47.625	45	134	204.1	25.4	14	12.6	0.3	2
FF3000R1002K	●	2	250	265.4	75	47.625	45	182	252.8	25.4	14	19.5	0.3	2

* WT : Tool Weight

● : **Inventory maintained in Japan.**

SPARE PARTS

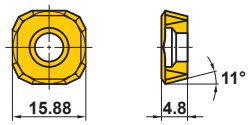
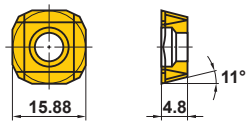
Tool Holder Number	Cartridge	Shim	Lock Pin *	Cartridge Clamp Screw *	Washer	Radial Spring
FF3000R0502E - FF3000R1002K	FFCSR	FFSS	FFP	HBH08040	FFW	FFRP

Tool Holder Number	Adjusting Wedge	Adjusting Screw	Lever	Lever Screw	Axial Spring	Wrench
FF3000R0502E - FF3000R1002K	FFAWR	LS3	FFL	FFLB	HP3	①HKY25L ②HKY40T

* Clamp Torque (N • m) : FFP=2.2, HBH08040=9.5

FF3000

INSERTS

Geometry	Class	Order Number		Cermet NX2525		Carbide HTi05T	
	C	**SPCA53Z**		●			
		Work Material	Steel	○			
			Stainless Steel	◎			
			Cast Iron	○			
			Aluminium Alloy	–			
	C	**SPCG53Z**		●		●	
		Work Material	Steel	◎		–	
			Stainless Steel	○		–	
			Cast Iron	◎		◎	
			Aluminium Alloy	–		◎	

◎ : 1st Recommendation, ○ : 2nd Recommendation, ー : No recommendations

● : Inventory maintained in Japan. (10 inserts in one case)

RECOMMENDED CUTTING CONDITIONS

	Work Material	Hardness	Grade	Cutting Speed (m/min)	Feed per Tooth (mm/t.)
P	Mild Steel	≤180HB	**NX2525 (SPCG)**	280 (250—300)	2.25 (2—2.5)
	Carbon Steel Alloy Steel	180—280HB	**NX2525 (SPCG)**	180 (150—220)	2.25 (2—2.5)
	High Alloy Steel	200—280HB	**NX2525 (SPCA)**	120 (80—150)	2.25 (2—2.5)
M	Stainless Steel	≤200HB	**NX2525 (SPCA)**	250 (230—280)	3.0 (2.5—3.5)
K	Cast Iron	Tensile Strength ≤450MPa	**NX2525 (SPCG)**	180 (130—200)	2.25 (2—2.5)
			HTi05T	120 (100—150)	
N	Aluminium Alloy	—	**HTi05T**	≤500	0.85 (0.7—1.0)

● Revolution (min^{-1})=(1000 x Cutting Speed)÷(3.14 x DC)
● Table Feed (mm/min)
=Feed per Tooth x Number of Teeth x Cutter Revolution

VOX400

FOR CAST IRON

Product Information

90° KAPR

Work Material

SYMBOL DESCRIPTIONS >> 1350
TECHNICAL DATA >> 1987
ISO13399 Property >> 1966

- Vertical inserts with high strength cutting edge.
- Economical 8 cutting edge inserts.
- Screw-on type.

Fig.1

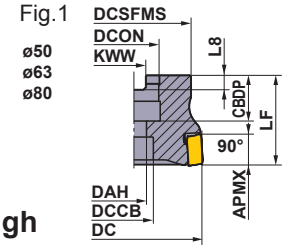


Fig.2

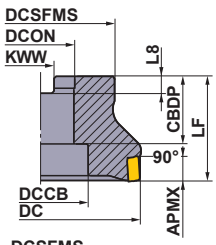
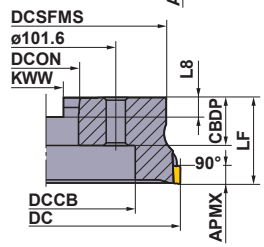


Fig.3



ARBOR TYPE

KAPR :90°

Right hand tool holder only.

Type	Order Number	Stock R	Number of Teeth	Dimensions(mm) DC	LF	DCON	CBDP	DAH	DCCB	DCSFMS	KWW	L8	*2 WT (kg)	APMX (mm)	Type(Fig.)	*1 Clamp Screw	Wrench
Coarse Pitch	VOX400-050A03R	●	3	50	40	22	20	11	17	41	10.4	6.3	0.3	10	1	CS401160T	TKY15T
	VOX400-063A04R	●	4	63	40	22	20	11	17	50	10.4	6.3	0.6	10	1	CS401160T	TKY15T
	VOX400R08004C	●	4	80	50	25.4	26	13	20	55	9.5	6	1.0	10	1	CS401160T	TKY15T
	VOX400R10006D	●	6	100	50	31.75	32	—	45	70	12.7	8	1.5	10	2	CS401160T	TKY15T
	VOX400R12508E	●	8	125	63	38.1	40	—	60	80	15.9	10	2.7	10	2	CS401160T	TKY15T
	VOX400R16010F	●	10	160	63	50.8	43	—	80	120	19.1	11	5.3	10	2	CS401160T	TKY15T
	VOX400R20012K	●	12	200	63	47.625	35	—	130	175	25.4	14.22	8.5	10	3	CS401160T	TKY15T
	VOX400R25016K	●	16	250	63	47.625	35	—	180	220	25.4	14.22	13.3	10	3	CS401160T	TKY15T
Fine Pitch	VOX400-050A05R	●	5	50	40	22	20	11	17	41	10.4	6.3	0.3	10	1	CS401160T	TKY15T
	VOX400-063A06R	●	6	63	40	22	20	11	17	50	10.4	6.3	0.6	10	1	CS401160T	TKY15T
	VOX400R08008C	●	8	80	50	25.4	26	13	20	55	9.5	6	1.0	10	1	CS401160T	TKY15T
	VOX400R10010D	●	10	100	50	31.75	32	—	45	70	12.7	8	1.5	10	2	CS401160T	TKY15T
	VOX400R12512E	●	12	125	63	38.1	40	—	60	80	15.9	10	2.7	10	2	CS401160T	TKY15T
	VOX400R16016F	●	16	160	63	50.8	43	—	80	120	19.1	11	5.3	10	2	CS401160T	TKY15T
	VOX400R20020K	●	20	200	63	47.625	35	—	130	175	25.4	14.22	8.5	10	3	CS401160T	TKY15T
	VOX400R25024K	●	24	250	63	47.625	35	—	180	220	25.4	14.22	13.3	10	3	CS401160T	TKY15T
Extra Fine Pitch	VOX400-063A08R	●	8	63	40	22	20	11	17	50	10.4	6.3	0.5	10	1	CS401160T	TKY15T
	VOX400R08010C	●	10	80	50	25.4	26	13	20	55	9.5	6	1.0	10	1	CS401160T	TKY15T
	VOX400R10012D	●	12	100	50	31.75	32	—	45	70	12.7	8	1.4	10	2	CS401160T	TKY15T
	VOX400R12516E	●	16	125	63	38.1	40	—	60	80	15.9	10	2.6	10	2	CS401160T	TKY15T
	VOX400R16020F	●	20	160	63	50.8	43	—	80	120	19.1	11	5.1	10	2	CS401160T	TKY15T
	VOX400R20026K	●	26	200	63	47.625	35	—	130	175	25.4	14.22	8.2	10	3	CS401160T	TKY15T
	VOX400R25034K	●	34	250	63	47.625	35	—	180	220	25.4	14.22	13.0	10	3	CS401160T	TKY15T

*1 Clamp Torque (N • m) : CS401160T=3.5

*2 WT : Tool Weight

● : **Inventory maintained in Japan.**

VOX400

Fig.1

ø50
ø63
ø80

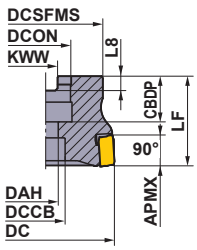


Fig.2

ø100
ø125

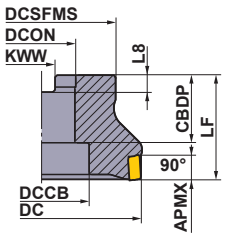
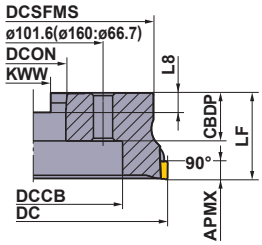


Fig.3

ø160
ø200
ø250



Right hand tool holder only.

For metric arbor

The cutter bore diameter DCON is indicated in millimetre.

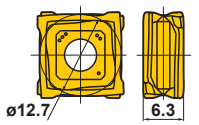
ARBOR TYPE

Type	Order Number	Stock R	Number of Teeth	Dimensions(mm) DC	LF	DCON	CBDP	DAH	DCCB	DCSFMS	KWW	L8	*2 WT (kg)	APMX (mm)	Type(Fig.)	*1 Clamp Screw	Wrench
Coarse Pitch	VOX400-050A03R	●	3	50	40	22	20	11	17	41	10.4	6.3	0.3	10	1	CS401160T	TKY15T
	VOX400-063A04R	●	4	63	40	22	20	11	17	50	10.4	6.3	0.6	10	1	CS401160T	TKY15T
	VOX400-080A04R	●	4	80	50	27	23	13	20	56	12.4	7	1	10	1	CS401160T	TKY15T
	VOX400-100B06R	●	6	100	50	32	32	—	45	78	14.4	8	1.7	10	2	CS401160T	TKY15T
	VOX400-125B08R	●	8	125	63	40	32	—	56	89	16.4	9	3	10	2	CS401160T	TKY15T
	VOX400-160C10R	●	10	160	63	40	29	—	56	120	16.4	9	5.4	10	3	CS401160T	TKY15T
	VOX400-200C12R	●	12	200	63	60	32	—	130	175	25.7	14.22	8.1	10	3	CS401160T	TKY15T
	VOX400-250C16R	●	16	250	63	60	32	—	180	210	25.7	14.22	11.8	10	3	CS401160T	TKY15T
Fine Pitch	VOX400-050A05R	●	5	50	40	22	20	11	17	41	10.4	6.3	0.3	10	1	CS401160T	TKY15T
	VOX400-063A06R	●	6	63	40	22	20	11	17	50	10.4	6.3	0.6	10	1	CS401160T	TKY15T
	VOX400-080A08R	●	8	80	50	27	23	13	20	56	12.4	7	1	10	1	CS401160T	TKY15T
	VOX400-100B10R	●	10	100	50	32	32	—	45	78	14.4	8	1.7	10	2	CS401160T	TKY15T
	VOX400-125B12R	●	12	125	63	40	32	—	56	89	16.4	9	3	10	2	CS401160T	TKY15T
	VOX400-160C16R	●	16	160	63	40	29	—	56	120	16.4	9	5.4	10	3	CS401160T	TKY15T
	VOX400-200C20R	●	20	200	63	60	32	—	130	175	25.7	14.22	8.1	10	3	CS401160T	TKY15T
	VOX400-250C24R	●	24	250	63	60	32	—	180	210	25.7	14.22	11.8	10	3	CS401160T	TKY15T
Extra Fine Pitch	VOX400-063A08R	●	8	63	40	22	20	11	17	50	10.4	6.3	0.5	10	1	CS401160T	TKY15T
	VOX400-080A10R	●	10	80	50	27	23	13	20	56	12.4	7	1.0	10	1	CS401160T	TKY15T
	VOX400-100B12R	●	12	100	50	32	32	—	45	78	14.4	8	1.6	10	2	CS401160T	TKY15T
	VOX400-125B16R	●	16	125	63	40	32	—	56	89	16.4	9	2.8	10	2	CS401160T	TKY15T
	VOX400-160C20R	●	20	160	63	40	29	—	56	120	16.4	9	5.2	10	3	CS401160T	TKY15T
	VOX400-200C26R	●	26	200	63	60	32	—	130	175	25.7	14.22	7.9	10	3	CS401160T	TKY15T
	VOX400-250C34R	●	34	250	63	60	32	—	180	210	25.7	14.22	11.5	10	3	CS401160T	TKY15T

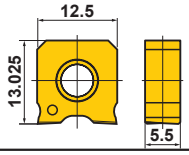
*1 Clamp Torque (N • m) : CS401160T=3.5
*2 WT : Tool Weight

VOX400

INSERT

Shape	Order Number	Class	Horning	Coated MC5020	Coated VP15TF	Geometry
	SONX1206PER	N	E	●	●	 Right hand tool holder shown.
	SONX1206PEL	N	E		●	

WIPER INSERT

Shape	Order Number	Class	Horning	Coated VP15TF	Geometry
	WOEX1206PER5C	E	E	●	

* Left hand insert use for the side cutter (special products).
Please refer to the TOOLS NEWS B242.

● : **Inventory maintained in Japan.**

RECOMMENDED CUTTING CONDITIONS

VOX400 (Standard pitch)

	Work Material	Tensile Strength	Insert Grade	Cutting Speed (m/min)	ϕ50－ϕ250 Radial Depth of Cut ae (mm)	Depth of Cut ap (mm)	Feed per Tooth fz (mm/tooth)
K	Gray Cast Iron	≤200MPa	MC5020	300(250－350)	≤DC	≤10	0.4(0.3－0.5)
			VP15TF	250(200－300)	≤DC	≤10	0.4(0.3－0.5)
		≤350MPa	MC5020	220(150－300)	≤DC	≤10	0.3(0.2－0.4)
			VP15TF	200(150－300)	≤DC	≤10	0.3(0.2－0.4)
	Ductile Cast Iron	≤450MPa	MC5020	200(150－250)	≤DC	≤10	0.3(0.2－0.4)
			VP15TF	170(150－200)	≤DC	≤10	0.3(0.2－0.4)
		≤800MPa	MC5020	170(150－200)	≤DC	≤10	0.2(0.1－0.3)
			VP15TF	150(100－200)	≤DC	≤10	0.2(0.1－0.3)

VOX400 (Fine pitch)

	Work Material	Tensile Strength	Insert Grade	Cutting Speed (m/min)	ϕ50,ϕ63 Radial Depth of Cut ae (mm)	Depth of Cut ap (mm)	Feed per Tooth fz (mm/t.)	ϕ80 Radial Depth of Cut ae (mm)	Depth of Cut ap (mm)	Feed per Tooth fz (mm/t.)
K	Gray Cast Iron	≤200MPa	MC5020	300(250－350)	≤DC	≤10	0.4(0.3－0.5)	≤DC	≤10	0.4(0.3－0.5)
			VP15TF	250(200－300)	≤DC	≤10	0.4(0.3－0.5)	≤DC	≤10	0.4(0.3－0.5)
		≤350MPa	MC5020	220(150－300)	≤DC	≤10	0.3(0.2－0.4)	≤DC	≤10	0.3(0.2－0.4)
			VP15TF	200(150－300)	≤DC	≤10	0.3(0.2－0.4)	≤DC	≤10	0.3(0.2－0.4)
	Ductile Cast Iron	≤450MPa	MC5020	200(150－250)	≤0.8DC	≤10	0.3(0.2－0.4)	≤0.6DC	≤10	0.3(0.2－0.4)
			VP15TF	170(150－200)	≤0.8DC	≤10	0.3(0.2－0.4)	≤0.6DC	≤10	0.3(0.2－0.4)
		≤800MPa	MC5020	170(150－200)	≤0.8DC	≤10	0.2(0.1－0.3)	≤0.6DC	≤10	0.2(0.1－0.3)
			VP15TF	150(100－200)	≤0.8DC	≤10	0.2(0.1－0.3)	≤0.6DC	≤10	0.2(0.1－0.3)

	Work Material	Tensile Strength	Insert Grade	Cutting Speed (m/min)	ϕ100 Radial Depth of Cut ae (mm)	Depth of Cut ap (mm)	Feed per Tooth fz (mm/t.)	ϕ125 Radial Depth of Cut ae (mm)	Depth of Cut ap (mm)	Feed per Tooth fz (mm/t.)
K	Gray Cast Iron	≤200MPa	MC5020	300(250－350)	≤DC	≤10	0.4(0.3－0.5)	≤DC	≤10	0.4(0.3－0.5)
			VP15TF	250(200－300)	≤DC	≤10	0.4(0.3－0.5)	≤DC	≤10	0.4(0.3－0.5)
		≤350MPa	MC5020	220(150－300)	≤DC	≤10	0.3(0.2－0.4)	≤DC	≤10	0.3(0.2－0.4)
			VP15TF	200(150－300)	≤DC	≤10	0.3(0.2－0.4)	≤DC	≤10	0.3(0.2－0.4)
	Ductile Cast Iron	≤450MPa	MC5020	200(150－250)	≤0.5DC	≤10	0.3(0.2－0.4)	≤0.4DC	≤10	0.3(0.2－0.4)
			VP15TF	170(150－200)	≤0.5DC	≤10	0.3(0.2－0.4)	≤0.4DC	≤10	0.3(0.2－0.4)
		≤800MPa	MC5020	170(150－200)	≤0.5DC	≤10	0.2(0.1－0.3)	≤0.4DC	≤10	0.2(0.1－0.3)
			VP15TF	150(100－200)	≤0.5DC	≤10	0.2(0.1－0.3)	≤0.4DC	≤10	0.2(0.1－0.3)

VOX400

	Work Material	Tensile Strength	Insert Grade	Cutting Speed (m/min)	ϕ160			ϕ200−ϕ250		
					Radial Depth of Cut ae (mm)	Depth of Cut ap (mm)	Feed per Tooth fz (mm/t.)	Radial Depth of Cut ae (mm)	Depth of Cut ap (mm)	Feed per Tooth fz (mm/t.)
K	Gray Cast Iron	≤200MPa	MC5020	300(250−350)	≤DC	≤10	0.4(0.3−0.5)	≤DC	≤10	0.4(0.3−0.5)
			VP15TF	250(200−300)	≤DC	≤10	0.4(0.3−0.5)	≤DC	≤10	0.4(0.3−0.5)
		≤350MPa	MC5020	220(150−300)	≤DC	≤10	0.3(0.2−0.4)	≤DC	≤10	0.3(0.2−0.4)
			VP15TF	200(150−300)	≤DC	≤10	0.3(0.2−0.4)	≤DC	≤10	0.3(0.2−0.4)
	Ductile Cast Iron	≤450MPa	MC5020	200(150−250)	≤0.3DC	≤10	0.3(0.2−0.4)	≤0.2DC	≤10	0.3(0.2−0.4)
			VP15TF	170(150−200)	≤0.3DC	≤10	0.3(0.2−0.4)	≤0.2DC	≤10	0.3(0.2−0.4)
		≤800MPa	MC5020	170(150−200)	≤0.3DC	≤10	0.2(0.1−0.3)	≤0.2DC	≤10	0.2(0.1−0.3)
			VP15TF	150(100−200)	≤0.3DC	≤10	0.2(0.1−0.3)	≤0.2DC	≤10	0.2(0.1−0.3)

(Note 1) DC is cutter diameter.
(Note 2) When using wiper insert, please reduce the feed per tooth to half the normal rate.

VOX400 (Extra fine pitch)

	Work Material	Tensile Strength	Insert Grade	Cutting Speed (m/min)	ϕ63			ϕ80		
					Radial Depth of Cut ae (mm)	Depth of Cut ap (mm)	Feed per Tooth fz (mm/t.)	Radial Depth of Cut ae (mm)	Depth of Cut ap (mm)	Feed per Tooth fz (mm/t.)
K	Gray Cast Iron	≤200MPa	MC5020	300(250−350)	≤DC	≤10	0.4(0.3−0.5)	≤DC	≤10	0.4(0.3−0.5)
			VP15TF	250(200−300)	≤DC	≤10	0.4(0.3−0.5)	≤DC	≤10	0.4(0.3−0.5)
		≤350MPa	MC5020	220(150−300)	≤DC	≤10	0.3(0.2−0.4)	≤DC	≤10	0.3(0.2−0.4)
			VP15TF	200(150−300)	≤DC	≤10	0.3(0.2−0.4)	≤DC	≤10	0.3(0.2−0.4)
	Ductile Cast Iron	≤450MPa	MC5020	200(150−250)	≤0.6DC	≤10	0.3(0.2−0.4)	≤0.5DC	≤10	0.3(0.2−0.4)
			VP15TF	170(150−200)	≤0.6DC	≤10	0.3(0.2−0.4)	≤0.5DC	≤10	0.3(0.2−0.4)
		≤800MPa	MC5020	170(150−200)	≤0.6DC	≤10	0.2(0.1−0.3)	≤0.5DC	≤10	0.2(0.1−0.3)
			VP15TF	150(100−200)	≤0.6DC	≤10	0.2(0.1−0.3)	≤0.5DC	≤10	0.2(0.1−0.3)

	Work Material	Tensile Strength	Insert Grade	Cutting Speed (m/min)	ϕ100			ϕ125		
					Radial Depth of Cut ae (mm)	Depth of Cut ap (mm)	Feed per Tooth fz (mm/t.)	Radial Depth of Cut ae (mm)	Depth of Cut ap (mm)	Feed per Tooth fz (mm/t.)
K	Gray Cast Iron	≤200MPa	MC5020	300(250−350)	≤DC	≤10	0.4(0.3−0.5)	≤DC	≤10	0.4(0.3−0.5)
			VP15TF	250(200−300)	≤DC	≤10	0.4(0.3−0.5)	≤DC	≤10	0.4(0.3−0.5)
		≤350MPa	MC5020	220(150−300)	≤DC	≤10	0.3(0.2−0.4)	≤DC	≤10	0.3(0.2−0.4)
			VP15TF	200(150−300)	≤DC	≤10	0.3(0.2−0.4)	≤DC	≤10	0.3(0.2−0.4)
	Ductile Cast Iron	≤450MPa	MC5020	200(150−250)	≤0.4DC	≤10	0.3(0.2−0.4)	≤0.3DC	≤10	0.3(0.2−0.4)
			VP15TF	170(150−200)	≤0.4DC	≤10	0.3(0.2−0.4)	≤0.3DC	≤10	0.3(0.2−0.4)
		≤800MPa	MC5020	170(150−200)	≤0.4DC	≤10	0.2(0.1−0.3)	≤0.3DC	≤10	0.2(0.1−0.3)
			VP15TF	150(100−200)	≤0.4DC	≤10	0.2(0.1−0.3)	≤0.3DC	≤10	0.2(0.1−0.3)

	Work Material	Tensile Strength	Insert Grade	Cutting Speed (m/min)	ϕ160			ϕ200−ϕ250		
					Radial Depth of Cut ae (mm)	Depth of Cut ap (mm)	Feed per Tooth fz (mm/t.)	Radial Depth of Cut ae (mm)	Depth of Cut ap (mm)	Feed per Tooth fz (mm/t.)
K	Gray Cast Iron	≤200MPa	MC5020	300(250−350)	≤DC	≤10	0.4(0.3−0.5)	≤DC	≤10	0.4(0.3−0.5)
			VP15TF	250(200−300)	≤DC	≤10	0.4(0.3−0.5)	≤DC	≤10	0.4(0.3−0.5)
		≤350MPa	MC5020	220(150−300)	≤DC	≤10	0.3(0.2−0.4)	≤DC	≤10	0.3(0.2−0.4)
			VP15TF	200(150−300)	≤DC	≤10	0.3(0.2−0.4)	≤DC	≤10	0.3(0.2−0.4)
	Ductile Cast Iron	≤450MPa	MC5020	200(150−250)	≤0.25DC	≤10	0.3(0.2−0.4)	≤0.15DC	≤10	0.3(0.2−0.4)
			VP15TF	170(150−200)	≤0.25DC	≤10	0.3(0.2−0.4)	≤0.15DC	≤10	0.3(0.2−0.4)
		≤800MPa	MC5020	170(150−200)	≤0.25DC	≤10	0.2(0.1−0.3)	≤0.15DC	≤10	0.2(0.1−0.3)
			VP15TF	150(100−200)	≤0.25DC	≤10	0.2(0.1−0.3)	≤0.15DC	≤10	0.2(0.1−0.3)

(Note 1) DC is cutter diameter.
(Note 2) When using wiper insert, please reduce the feed per tooth to half the normal rate.

ASX400

General Cutting

Product Information

90° KAPR

Work Material

P M K N S H F R

SYMBOL DESCRIPTIONS >> 1350
TECHNICAL DATA >> 1987
ISO13399 Property >> 1966

- High tolerance M-class inserts.
- Economical 4 cutting edge inserts.
- Curved cutting edge and high rigidity holder.
- Screw-on type.

Fig.1
ø50
ø63

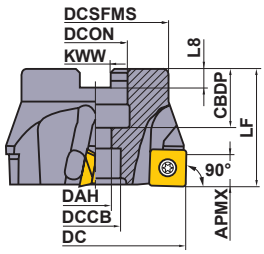


Fig.2
ø80
ø100
ø125
ø160

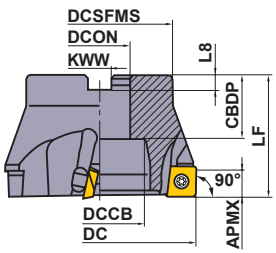
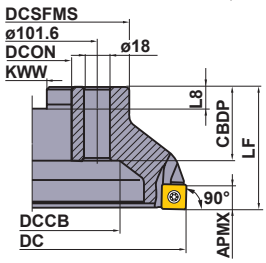


Fig.3
ø200
ø250



ARBOR TYPE

KAPR :90°
GAMP :+11° T :-9°—-11°
GAMF :-9°—-11° I :+11°

Right hand tool holder only.

Type	Order Number	Stock R	Number of Teeth	Dimensions(mm) DC	LF	DCON	CBDP	DAH	DCSFMS	KWW	L8	DCCB	WT * (kg)	APMX (mm)	Type (Fig.)
Coarse Pitch	ASX400-050A03R	●	3	50	40	22	20	11	41	10.4	6.3	17	0.3	10	1
	ASX400-063A04R	●	4	63	40	22	20	11	50	10.4	6.3	17	0.5	10	1
	ASX400R08004C	●	4	80	50	25.4	26	—	60	9.5	6	38	1.0	10	2
	ASX400R10005D	●	5	100	50	31.75	32	—	70	12.7	8	45	1.5	10	2
	ASX400R12506E	●	6	125	63	38.1	35	—	80	15.9	10	60	2.5	10	2
	ASX400R16008F	●	8	160	63	50.8	38	—	100	19.1	11	90	4.0	10	2
	ASX400R20010K	●	10	200	63	47.625	35	—	160	25.4	14.22	135	7.0	10	3
	ASX400R25012K	●	12	250	63	47.625	35	—	210	25.4	14.22	180	12.0	10	3
Fine Pitch	ASX400-050A04R	●	4	50	40	22	20	11	41	10.4	6.3	17	0.3	10	1
	ASX400-063A05R	●	5	63	40	22	20	11	50	10.4	6.3	17	0.5	10	1
	ASX400R08006C	●	6	80	50	25.4	26	—	60	9.5	6	38	1.0	10	2
	ASX400R10007D	●	7	100	50	31.75	32	—	70	12.7	8	45	1.5	10	2
	ASX400R12508E	●	8	125	63	38.1	35	—	80	15.9	10	60	2.5	10	2
	ASX400R16012F	●	12	160	63	50.8	38	—	100	19.1	11	90	4.0	10	2
	ASX400R20016K	●	16	200	63	47.625	35	—	160	25.4	14.22	135	7.0	10	3
	ASX400R25018K	●	18	250	63	47.625	35	—	210	25.4	14.22	180	12.0	10	3

* WT : Tool Weight

SPARE PARTS

Tool Holder Number	Shim	Shim Screw *	Clamp Screw *	Wrench (Insert)	Wrench (Shim)
ASX400	STASX400N	WCS503507H	TPS35	TIP15T	HKY35R

* Clamp Torque (N • m) : WCS503507H=5.0, TPS35=3.5

● : **Inventory maintained in Japan.**

ASX400

Fig.1

ø50
ø63

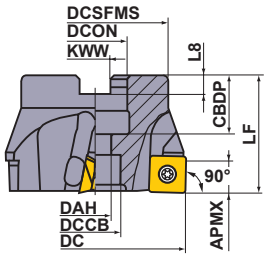


Fig.2

ø80
ø100
ø125

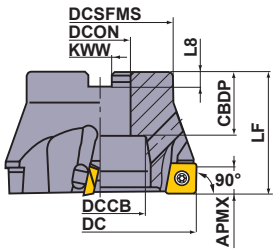


Fig.3

ø160

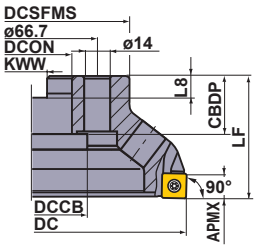
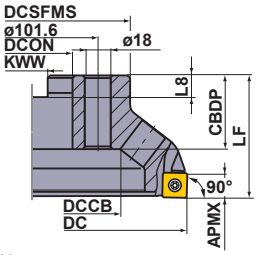


Fig.4

ø200
ø250



Right hand tool holder only.

For metric arbor

The cutter bore diameter DCON is indicated in millimetre.

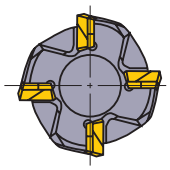
ARBOR TYPE

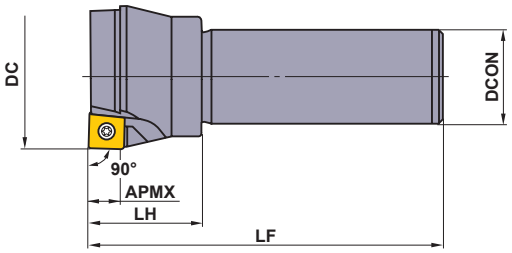
KAPR :90°
GAMP:+11° T :-9°—-11°
GAMF :-9°—-11° I :+11°

Type	Order Number	Stock R	Number of Teeth	Dimensions(mm) DC	LF	DCON	CBDP	DAH	DCSFMS	KWW	L8	DCCB	WT * (kg)	APMX (mm)	Type (Fig.)
Coarse Pitch	ASX400-050A03R	●	3	50	40	22	20	11	41	10.4	6.3	17	0.3	10	1
	ASX400-063A04R	●	4	63	40	22	20	11	50	10.4	6.3	17	0.5	10	1
	ASX400-080B04R	●	4	80	50	27	29	—	60	12.4	7	38	0.9	10	2
	ASX400-100B05R	●	5	100	50	32	32	—	70	14.4	8	45	1.4	10	2
	ASX400-125B06R	●	6	125	63	40	32	—	80	16.4	9	60	2.3	10	2
	ASX400-160C08R	●	8	160	63	40	29	—	100	16.4	9	56	3.6	10	3
	ASX400-200C10R	●	10	200	63	60	32	—	160	25.7	14.22	135	6.3	10	4
	ASX400-250C12R	●	12	250	63	60	32	—	210	25.7	14.22	180	10.8	10	4
Fine Pitch	ASX400-050A04R	●	4	50	40	22	20	11	41	10.4	6.3	17	0.3	10	1
	ASX400-063A05R	●	5	63	40	22	20	11	50	10.4	6.3	17	0.5	10	1
	ASX400-080B06R	●	6	80	50	27	29	—	60	12.4	7	38	0.9	10	2
	ASX400-100B07R	●	7	100	50	32	32	—	70	14.4	8	45	1.4	10	2
	ASX400-125B08R	●	8	125	63	40	32	—	80	16.4	9	60	2.2	10	2
	ASX400-160C12R	●	12	160	63	40	29	—	100	16.4	9	56	3.5	10	3
	ASX400-200C16R	●	16	200	63	60	32	—	160	25.7	14.22	135	6.2	10	4
	ASX400-250C18R	●	18	250	63	60	32	—	210	25.7	14.22	180	10.7	10	4
Extra Fine Pitch	ASX400-050A05R	●	5	50	40	22	20	11	41	10.4	6.3	17	0.3	10	1
	ASX400-063A06R	●	6	63	40	22	20	11	50	10.4	6.3	17	0.5	10	1
	ASX400-080B08R	●	8	80	50	27	29	—	60	12.4	7	38	0.9	10	2
	ASX400-100B10R	●	10	100	50	32	32	—	70	14.4	8	45	1.4	10	2
	ASX400-125B12R	●	12	125	63	40	32	—	80	16.4	9	60	2.1	10	2
	ASX400-160C15R	●	15	160	63	40	29	—	100	16.4	9	56	3.4	10	3
	ASX400-200C19R	●	19	200	63	60	32	—	160	25.7	14.22	135	6.2	10	4
	ASX400-250C22R	●	22	250	63	60	32	—	210	25.7	14.22	180	10.5	10	4

* WT : Tool Weight

ASX400





SHANK TYPE

Right hand tool holder only.

Type	Order Number	Stock	Number of Teeth	Dimensions(mm)				
		R		DC	LF	DCON	LH	APMX
Coarse Pitch	**ASX400R403S32**	●	3	40	125	32	40	10
	ASX400R503S32	●	3	50	125	32	40	10
	ASX400R634S32	●	4	63	125	32	40	10
	ASX400R804S32	●	4	80	125	32	40	10
Fine Pitch	**ASX400R504S32**	●	4	50	125	32	40	10
	ASX400R635S32	●	5	63	125	32	40	10
	ASX400R806S32	●	6	80	125	32	40	10

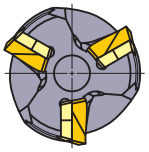
● : Inventory maintained in Japan.

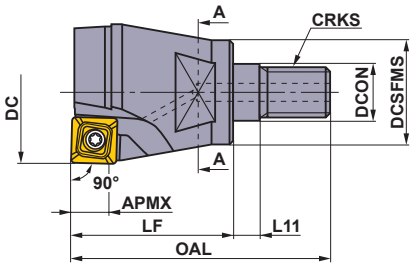
SPARE PARTS

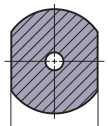
Tool Holder Number		*	*		
	Shim	Shim Screw	Clamp Screw	Wrench (Insert)	Wrench (Shim)
ASX400	STASX400N	WCS503507H	TPS35	TIP15T	HKY35R

* Clamp Torque (N • m) : WCS503507H=5.0, TPS35=3.5

ASX400







SCREW-IN TYPE

Right hand tool holder only.

Order Number	Stock	Coolant Hole	Number of Teeth	Dimensions (mm)									*1 WT		*2	*2		
	R			DC	DCON	DCSFMS	OAL	LF	L11	H	CRKS	APMX	(kg)	Shim	Shim Screw	Clamp Screw	Wrench (Insert)	Wrench (Shim)
ASX400R322AM1640	●	○	2	32	17	29	63	40	6	24	M16	10	0.3	—	WCS503507H	TPS35	TIP15T	HKY35R
ASX400R403AM1645	●	○	3	40	17	29	68	45	6	24	M16	10	0.3	STASX400N	WCS503507H	TPS35	TIP15T	HKY35R

*1 WT : Tool Weight

*2 Clamp Torque (N • m) : WCS503507H=5.0, TPS35=3.5

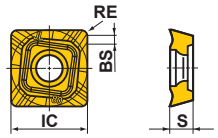
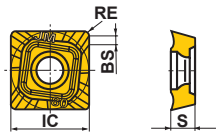
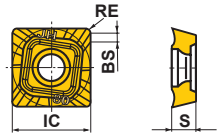
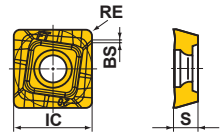
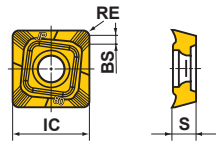
ASX400

INSERT

Work Material		F7030	MC5020	MP6120	MP6130	MP7130	MP7140	MP9120	MP9130	VP15TF	VP30RT	NX4545		HTi10	
P	Steel	◐		◐	✠					◐	✠	◐			
M	Stainless Steel	◐				◐	✠			◐	✠	◐			
K	Cast Iron		◐							✠				◐	
N	Non-ferrous Metal													◐	
S	Heat-resistant Alloy, Titanium Alloy							◐	✠	◐					
H	Hardened Steel									◐					

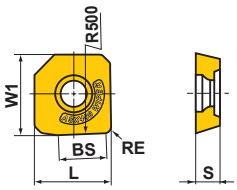
Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting
✠ : Unstable Cutting

Honing :
E : Round **F** : Sharp **T** : Chamfer

Application	Shape	Order Number	Class	Honing	F7030	MC5020	MP6120	MP6130	MP7130	MP7140	MP9120	MP9130	VP15TF	VP30RT	NX4545		HTi10		IC	S	BS	RE	Geometry
					Coated										Cermet		Carbide		Dimensions (mm)				
Finish–Light Cutting	JL Breaker	SOET12T308PEER-JL	E	E	●		●	●	●	●	●	●	●	●	●				12.7	3.97	1.4	0.8	
Light–Rough Cutting	JM Breaker	SOMT12T308PEER-JM	M	E	●	●	●	●	●	●	●	●	●	●	●				12.7	3.97	1.4	0.8	
Medium–Heavy Cutting	JH Breaker	SOMT12T308PEER-JH	M	E	●	●	●	●	●	●	●	●	●	●					12.7	3.97	1.4	0.8	
Heavy Interrupted Cutting	FT Breaker	SOMT12T320PEER-FT	M	E		●	●				●	●	●						12.7	3.97	0.5	2.0	
For Aluminium Alloy	JP Breaker	SOGT12T308PEFR-JP	G	F													●		12.7	3.97	1.4	0.8	

■ = MIRACLE SIGMA

WIPER INSERTS

Shape	Order Number	Class	Honing	NX2525		HTi05T		L	W1	S	BS	RE	Geometry
				Cermet		Carbide		Dimensions(mm)					
	WOEW12T308PEER8C	E	E			●		12.5	13.2	3.97	8	0.8	
	WOEW12T308PETR8C	E	T	●				12.5	13.2	3.97	8	0.8	

● : Inventory maintained in Japan. (10 inserts in one case)

ASX400

RECOMMENDED CUTTING CONDITIONS

	Work Material	Hardness	Grade	Cutting Speed (SFM)	Finish—Light Cutting		Light—Rough Cutting		Medium—Heavy Cutting	
					Feed per Tooth (mm/t.)	Breaker	Feed per Tooth (mm/t.)	Breaker	Feed per Tooth (mm/t.)	Breaker
P	Mild Steel	≤180HB	F7030	280 (210—350)	0.18 (0.08—0.28)	JL	0.20 (0.10—0.30)	JM	0.25 (0.10—0.35)	JH
			MP6120 VP15TF	250 (200—300)	0.18 (0.08—0.28)	JL	0.20 (0.10—0.30)	JM	0.25 (0.10—0.35)	JH FT
			MP6130	240 (190—290)	0.18 (0.08—0.28)	JL	0.20 (0.10—0.30)	JM	0.25 (0.10—0.35)	JH
			VP30RT	230 (180—280)	0.18 (0.08—0.28)	JL	0.20 (0.10—0.30)	JM	0.25 (0.10—0.35)	JH
			NX4545	180 (130—230)	0.15 (0.07—0.23)	JL	0.18 (0.10—0.28)	JM	—	—
	Carbon Steel Alloy Steel	180—280HB	F7030	250 (200—300)	0.15 (0.07—0.23)	JL	0.18 (0.10—0.28)	JM	0.20 (0.10—0.30)	JH
			MP6120 VP15TF	220 (170—270)	0.15 (0.07—0.23)	JL	0.18 (0.10—0.28)	JM	0.20 (0.10—0.30)	JH FT
			MP6130	180 (150—230)	0.15 (0.07—0.23)	JL	0.18 (0.10—0.28)	JM	0.20 (0.10—0.30)	JH
			VP30RT	150 (120—180)	0.15 (0.07—0.23)	JL	0.18 (0.10—0.28)	JM	0.20 (0.10—0.30)	JH
			NX4545	150 (120—180)	0.13 (0.06—0.20)	JL	0.15 (0.10—0.25)	JM	—	—
		280—350HB	F7030	180 (130—230)	0.13 (0.06—0.20)	JL	0.15 (0.10—0.25)	JM	0.18 (0.10—0.28)	JH
			MP6120 VP15TF	140 (100—180)	0.13 (0.06—0.20)	JL	0.15 (0.10—0.25)	JM	0.18 (0.10—0.28)	JH FT
			MP6130	120 (90—150)	0.13 (0.06—0.20)	JL	0.15 (0.10—0.25)	JM	0.18 (0.10—0.28)	JH
			VP30RT	100 (80—160)	0.13 (0.06—0.20)	JL	0.15 (0.10—0.25)	JM	0.18 (0.10—0.28)	JH
			NX4545	100 (80—160)	0.10 (0.05—0.15)	JL	0.13 (0.10—0.20)	JM	—	—
M	Stainless Steel	≤270HB	MP7130 VP15TF	220 (170—270)	0.15 (0.07—0.23)	JL	0.18 (0.10—0.28)	JM	0.20 (0.10—0.30)	JH FT
			MP7140 VP30RT	200 (150—250)	0.15 (0.07—0.23)	JL	0.18 (0.10—0.28)	JM	0.20 (0.10—0.30)	JH
			NX4545	150 (120—180)	0.15 (0.07—0.23)	JL	0.18 (0.10—0.28)	JM	—	—
K	Cast Iron Ductile Cast Iron	Tensile Strength ≤450MPa	MC5020	200 (150—250)	—	—	0.20 (0.10—0.30)	JM	0.25 (0.10—0.35)	JH FT
			VP15TF	180 (130—230)	0.18 (0.10—0.28)	JL	0.20 (0.10—0.30)	JM	0.25 (0.10—0.35)	JH FT
N	Aluminium Alloy	—	HTi10	650 (300—1000)	0.15 (0.10—0.20)	JP	0.20 (0.10—0.30)	JP	0.30 (0.20—0.40)	JP
S	Titanium Alloy	—	MP9120 VP15TF	50 (40—60)	0.12 (0.05—0.20)	JL	0.15 (0.05—0.20)	JM	0.18 (0.10—0.28)	JH FT
			MP9130	45 (30—55)	0.10 (0.05—0.20)	JL	0.15 (0.05—0.20)	JM	0.18 (0.10—0.28)	JH FT
	Heat Resistant Alloy (Inconel etc.)	—	MP9120 VP15TF	40 (20—50)	0.12 (0.05—0.20)	JL	0.15 (0.05—0.20)	JM	0.18 (0.10—0.28)	JH FT
			MP9130	35 (15—45)	0.10 (0.05—0.20)	JL	0.15 (0.05—0.20)	JM	0.18 (0.10—0.28)	JH FT
H	Hardened Steel	40—55HRC	VP15TF	80 (60—100)	0.08 (0.04—0.13)	JL	0.10 (0.05—0.15)	JM	0.12 (0.07—0.17)	JH FT

●Revolution (min^{-1})=(1000 x Cutting Speed)÷(3.14 x DC) ●Table Feed (mm/min)=Feed per Tooth x Number of Teeth x Cutter Revolution

INSTRUCTIONS FOR USING INSERTS

Instructions for use of the JP breaker

- The JP breaker has sharp cutting edges. Wear gloves when handling.
- When machining aluminium alloy, welding to the cutting edge tends to occur, often leading to insert failure. To prevent this, wet cutting is recommended.

Instructions for use of wiper inserts

- Wiper inserts for the ASX400 are single-cornered.
- When installing the wiper insert, place the insert so that the small chamfer is located as shown.
- The peripheral cutting edge of the wiper insert is located back than general inserts. Beware of wear of the insert just behind the wiper insert.
- When using wiper set the following standard conditions. Depth of Cut (ap)≤0.5mm, Feed per Tooth (fz)≤0.2mm/t.

BAP300

For Shoulder Milling

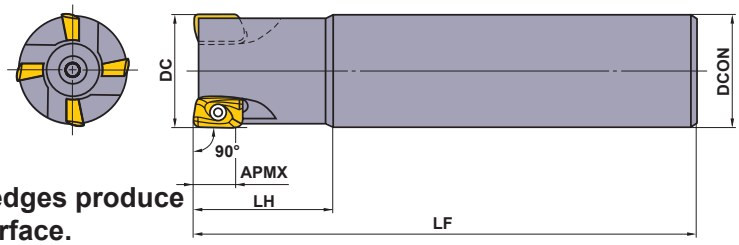
Product Information

90° KAPR

Work Material

P M K N S H R

SYMBOL DESCRIPTIONS >> 1350
TECHNICAL DATA >> 1987
ISO13399 Property >> 1966



- 11° positive insert.
- Inserts with wiper edges produce optimal finished surface.
- Multi insert design for high feed machining.

SHANK TYPE

KAPR :90°

Right hand tool holder only.

Type	Order Number	Stock R	Number of Teeth	Dimensions(mm) DC	LF	DCON	LH	APMX	* Clamp Screw	Wrench	Insert
Standard	BAP300R101S16	●	1	10	85	16	25	9	TS25	TKY08F	APG/MT1135PD◌R-◌◌
	BAP300R121S16	●	1	12	85	16	25	9	TS25	TKY08F	
	BAP300R141S16	●	1	14	85	16	25	9	TS25	TKY08F	
	BAP300R162S16	●	2	16	85	16	25	9	TS25	TKY08F	
	BAP300R182S16	●	2	18	85	16	25	9	TS25	TKY08F	
	BAP300R203S20	●	3	20	100	20	30	9	TS25	TKY08F	
	BAP300R223S20	●	3	22	100	20	30	9	TS25	TKY08F	
	BAP300R254S25	●	4	25	115	25	35	9	TS25	TKY08F	
	BAP300R284S25	●	4	28	115	25	35	9	TS25	TKY08F	
	BAP300R304S32	●	4	30	125	32	45	9	TS25	TKY08F	
	BAP300R325S32	●	5	32	125	32	45	9	TS25	TKY08F	
	BAP300R406S32	●	6	40	125	32	45	9	TS25	TKY08F	
	BAP300R507S32	●	7	50	125	32	45	9	TS25	TKY08F	
	BAP300R638S32	●	8	63	125	32	45	9	TS25	TKY08F	
Long	BAP300R202LS20	●	2	20	150	20	60	9	TS25	TKY08F	APG/MT1135PD◌R-◌◌
	BAP300R253LS25	●	3	25	170	25	70	9	TS25	TKY08F	
	BAP300R323LS32	●	3	32	190	32	90	9	TS25	TKY08F	
	BAP300R403LS32	●	3	40	190	32	90	9	TS25	TKY08F	

* Clamp Torque (N • m) : TS25=1.0

● : Inventory maintained in Japan.

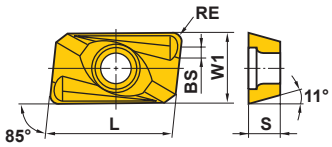
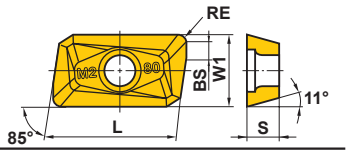
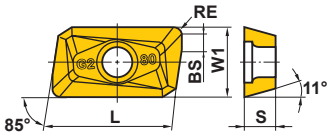
BAP300

INSERTS

Work Material		F7030	VP15TF			NX2525	NX4545	HTi10	
P	Steel	◐	◐			●	◐		
M	Stainless Steel	◔	◔			◯	◔		
K	Cast Iron		✠			●		◐	
N	Non-ferrous Metal							◐	
S	Heat-resistant Alloy, Titanium Alloy		◐						
H	Hardened Steel		◐						

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✠ : Unstable Cutting

Honing :
E : Round **F** : Sharp

Shape	Order Number	Class	Honing	Coated F7030	Coated VP15TF			Cermet NX2525	Cermet NX4545	Carbide HTi10		Dimensions(mm) L	W1	S	BS	RE	Geometry
	APMT1135PDER-H1	M	E	●	●			●	●	●		11	6.35	3.5	1.5	0.4	
	APMT1135PDER-H2	M	E	●	●			●	●	●		11	6.35	3.5	1.2	0.8	
	APMT1135PDER-H3	M	E	●								11	6.35	3.5	0.8	1.2	
	APMT1135PDER-H4	M	E	●								11	6.35	3.5	0.4	1.6	
	APMT1135PDER-H6	M	E	●								11	6.35	3.5	0.4	2.4	
	APMT1135PDER-M0	M	E	●								11	6.35	3.5	1.8	0.2	
	APMT1135PDER-M1	M	E	●								11	6.35	3.5	1.5	0.4	
	APMT1135PDER-M2	M	E	●	●				●			11	6.35	3.5	1.2	0.8	
	APGT1135PDFR-G2	G	F							●		11	6.35	3.5	1.2	0.8	

● : Inventory maintained in Japan. (10 inserts in one case)

BAP300

RECOMMENDED CUTTING CONDITIONS

	Work Material	Hardness	Grade	Breaker	Cutting Mode	Cutting Speed (m/min)	Feed per Tooth (mm/t.)
P	Mild Steel	≤180HB	NX4545	H	Finish Cutting	160 (120—180)	0.1 (0.05—0.15)
			F7030	M	General Cutting	180 (150—200)	0.15 (0.1—0.2)
	Carbon Steel Alloy Steel	180—280HB	NX4545	H	Finish Cutting	120 (100—160)	0.08 (0.05—0.1)
			F7030	M	General Cutting	150 (120—200)	0.15 (0.1—0.2)
			F7030	H	Unstable Cutting	120 (100—160)	0.15 (0.1—0.2)
		280—350HB	NX4545	H	Finish Cutting	100 (80—120)	0.08 (0.05—0.1)
			F7030	M	General Cutting	140 (120—160)	0.15 (0.1—0.2)
			F7030	H	Unstable Cutting	100 (80—120)	0.2 (0.1—0.25)
M	Stainless Steel	≤200HB	F7030	M	General Cutting	140 (120—160)	0.15 (0.1—0.2)
			F7030	H	Unstable Cutting	120 (80—140)	0.2 (0.1—0.25)
K	Gray Cast Iron	Tensile Strength ≤350MPa	VP15TF	M	General Cutting	140 (120—160)	0.15 (0.1—0.2)
			HTi10	H	General Cutting	120 (100—140)	0.2 (0.1—0.25)
	Ductile Cast Iron (≤JIS FCD450)	Tensile Strength ≤450MPa	VP15TF	M	General Cutting	120 (100—140)	0.15 (0.1—0.2)
			HTi10	H	General Cutting	100 (80—120)	0.2 (0.1—0.25)
	Ductile Cast Iron (≥JIS FCD500)	Tensile Strength 500—800MPa	VP15TF	M	General Cutting	100 (80—120)	0.1 (0.05—0.15)
			HTi10	H	General Cutting	80 (60—100)	0.15 (0.1—0.2)
N	Aluminium Alloy	—	HTi10	G	General Cutting	500 (200—1000)	0.2 (0.1—0.3)
S	Ti Alloy	≥350HB	HTi10	G	General Cutting	40 (30—60)	0.2 (0.1—0.3)
	Heat Resistant Alloy	—	F7030	M	General Cutting	30 (20—40)	0.15 (0.1—0.2)
H	Hardened Steel	≥40HRC	VP15TF	M	General Cutting	70 (50—100)	0.1 (0.05—0.15)

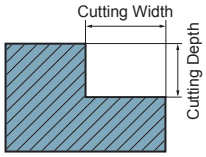
- Revolution (min^{-1})=(1000 x Cutting Speed)÷(3.14 x DC)
- Table Feed (mm/min)=Feed per Tooth x Number of Teeth x Cutter Revolution

BAP300

CUTTING PERFORMANCE

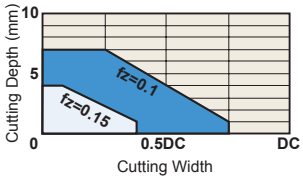
Cemented carbide/Coated carbide

Shoulder Milling

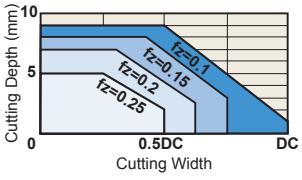


Workpiece : **JIS S50C**
Grade : **F7030**

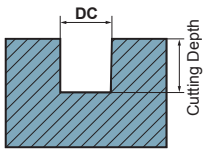
●φ10−φ14



●φ16−φ100

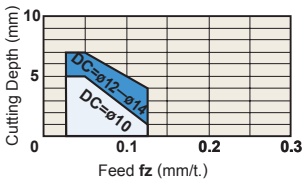


Slot Milling

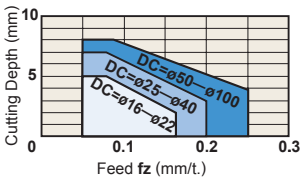


Workpiece : **JIS S50C**
Grade : **F7030**

●φ10−φ14

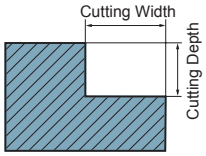


●φ16−φ100



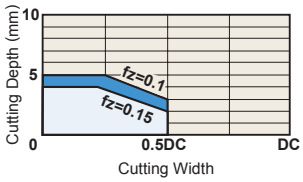
Cermet

Shoulder Milling

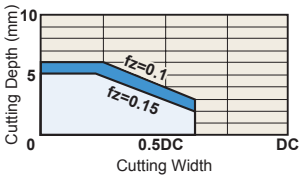


Workpiece : **JIS S50C**
Grade : **NX2525**

●φ10−φ14



●φ16−φ100



(Note 1) In each of the adove graphs cutting performance is shown for carbon steel (JIS S50C).
In case of alloy steels, reduce the conditions by 20−30%.
(Note 2) In the case of deep slot milling, air blow should be used.
(Note 3) The diameter "DC" is taken from the tools peripheral cutting edge.

VAS400/500

SIDE CUTTER SERIES

Product Information

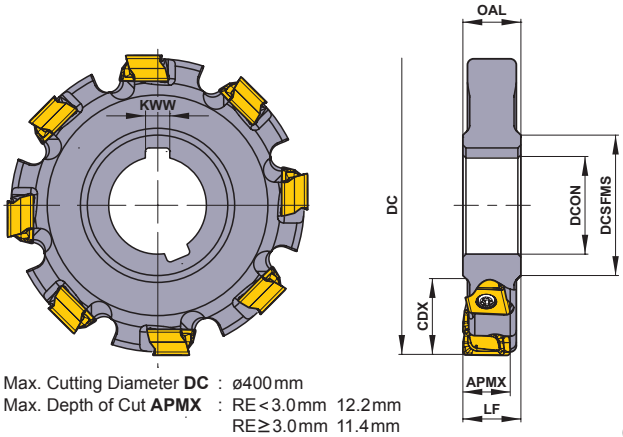
90° KAPR

Work Material

P M K M R

SYMBOL DESCRIPTIONS >> 1350
TECHNICAL DATA >> 1987
ISO13399 Property >> 1966

·VAS400

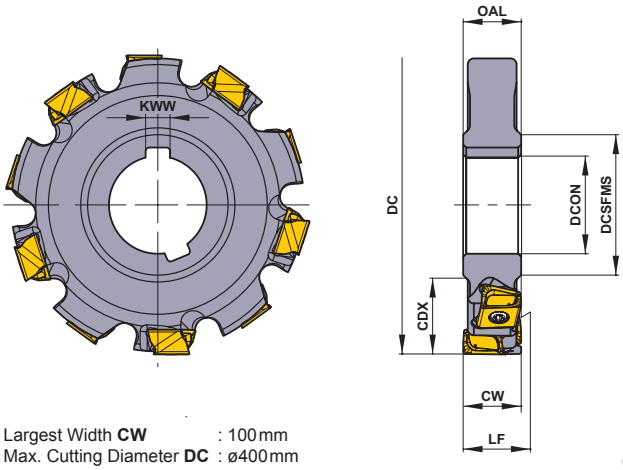


Max. Cutting Diameter **DC** : ø400mm
Max. Depth of Cut **APMX** : RE<3.0mm 12.2mm
RE≥3.0mm 11.4mm

HALF SIDE

(mm)

DC	Effective No. of Teeth	LF	CDX	DCON	DCSFMS	OAL	KWW	Insert Type
80	8	≥18	20	27	40	≥18	7	LNGU13
100	10	≥18	27	32	46	≥18	8	LNGU13
125	12	≥18	35	40	55	≥18	10	LNGU13
160	14	≥18	52.5	40	55	≥18	10	LNGU13



Largest Width **CW** : 100mm
Max. Cutting Diameter **DC** : ø400mm

FULL SIDE

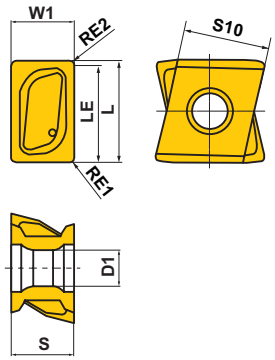
(mm)

DC	Effective No. of Teeth	Total No. of Teeth	LF *1	CW *2	CDX	DCON	DCSFMS	OAL	KWW	Insert Type
80	4	8	≥18	18－24	20	27	40	≥18	7	LNGU13
100	5	10	≥18	18－24	27	32	46	≥18	8	LNGU13
125	6	12	≥18	18－24	35	40	55	≥18	10	LNGU13
160	7	14	≥18	18－24	52.5	40	55	≥18	10	LNGU13

*1 In case of adjustment piece specification. LF : ≥24
*2 CW of RE<3.0mm is 24mm, and RE≤3.0mm is 22.8mm. Multilevel designs available for CW over each sizes.
* Please contact us for details of any geometry of half sides and full sides.

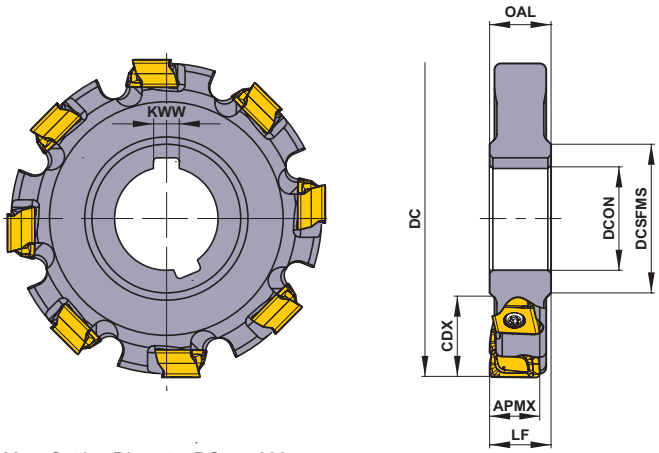
INSERT

(mm)

Shape	Order Number	Hand	Class	Honing	Coated MP6120	Coated VP15TF		L	LE	S	S10	RE1	RE2	W1	D1	Geometry
	LNGU130804PNER-M	R	G	E		●		13.0	12.2	8.0	11.0	0.4	0.8	8.0	4.5	
	LNGU130804PNEL-M	L	G	E		●		13.0	12.2	8.0	11.0	0.4	0.8	8.0	4.5	
	LNGU130808PNER-M	R	G	E		●		13.0	12.2	8.0	11.0	0.8	0.8	8.0	4.5	
	LNGU130808PNEL-M	L	G	E		●		13.0	12.2	8.0	11.0	0.8	0.8	8.0	4.5	
	LNGU130812PNER-M	R	G	E		●		13.0	12.2	8.0	11.0	1.2	0.8	8.0	4.5	
	LNGU130812PNEL-M	L	G	E		●		13.0	12.2	8.0	11.0	1.2	0.8	8.0	4.5	
	LNGU130816PNER-M	R	G	E		●		13.0	12.2	8.0	11.0	1.6	0.8	8.0	4.5	
	LNGU130816PNEL-M	L	G	E		●		13.0	12.2	8.0	11.0	1.6	0.8	8.0	4.5	
	LNGU130820PNER-M	R	G	E		●		13.0	12.2	8.0	11.0	2.0	0.8	8.0	4.5	
	LNGU130820PNEL-M	L	G	E		●		13.0	12.2	8.0	11.0	2.0	0.8	8.0	4.5	
	LNGU130824PNER-M	R	G	E		●		13.0	12.2	8.0	11.0	2.4	0.8	8.0	4.5	
	LNGU130824PNEL-M	L	G	E		●		13.0	12.2	8.0	11.0	2.4	0.8	8.0	4.5	
	LNGU130830PNER-M	R	G	E		●		13.0	11.4	8.0	11.0	3.0	1.6	8.0	4.5	
	LNGU130830PNEL-M	L	G	E		●		13.0	11.4	8.0	11.0	3.0	1.6	8.0	4.5	
	LNGU130840PNER-M	R	G	E		●		13.0	11.4	8.0	11.0	4.0	1.6	8.0	4.5	
	LNGU130840PNEL-M	L	G	E		●		13.0	11.4	8.0	11.0	4.0	1.6	8.0	4.5	
	LNGU130850PNER-M	R	G	E		●		13.0	11.4	8.0	11.0	5.0	1.6	8.0	4.5	
	LNGU130850PNEL-M	L	G	E		●		13.0	11.4	8.0	11.0	5.0	1.6	8.0	4.5	Right hand insert shown.

● : Inventory maintained in Japan. (10 inserts in one case)

·VAS500



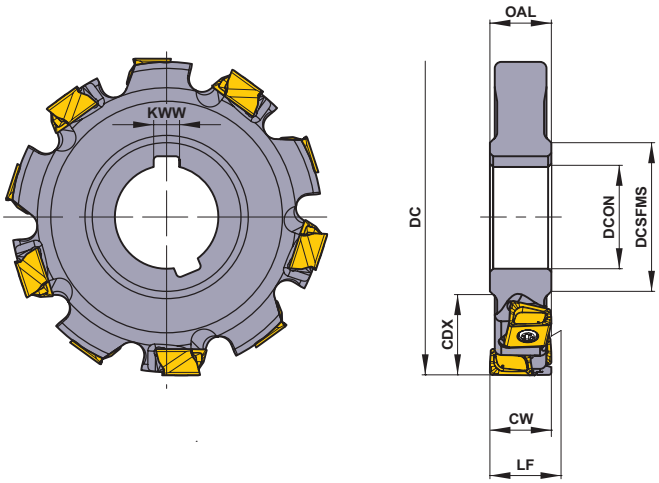
Max. Cutting Diameter **DC** : ø660mm
Max. Depth of Cut **APMX** : RE<3.0mm 16.2mm
RE≥3.0mm 15.4mm

HALF SIDE

(mm)

DC	Effective No. of Teeth	LF	CDX	DCON	DCSFMS	OAL	KWW	Insert Type
100	8	≥23	27	32	46	≥23	8	LNGU17
125	10	≥23	35	40	55	≥23	10	LNGU17
160	12	≥23	52.5	40	55	≥23	10	LNGU17
200	16	≥23	65	50	70	≥23	12	LNGU17

∗ In case of adjustment piece specification. **LF** : ≥29



Largest Width **CW** : 100mm
Max. Cutting Diameter **DC** : ø660mm

FULL SIDE

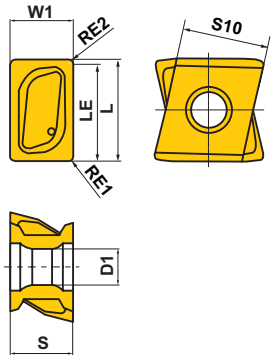
(mm)

DC	Effective No. of Teeth	Total No. of Teeth	LF ∗1	CW ∗2	CDX	DCON	DCSFMS	OAL	KWW	Insert Type
100	4	8	≥23	23 – 32	27	32	46	≥23	8	LNGU17
125	5	10	≥23	23 – 32	35	40	55	≥23	10	LNGU17
160	6	12	≥23	23 – 32	52.5	40	55	≥23	10	LNGU17
200	8	16	≥23	23 – 32	65	50	70	≥23	12	LNGU17

∗1 In case of adjustment piece specification. **LF** : ≥29
∗2 **CW** of RE<3.0mm is 32mm, and RE≤3.0mm is 30.8mm.
∗ Please contact us for details of any geometry of half sides and full sides.

INSERTS

(mm)

Shape	Order Number	Hand	Class	Honing	Coated MP6120	Coated VP15TF		L	LE	S	S10	RE1	RE2	W1	D1	Geometry
	LNGU171004PNER-R	R	G	E	●	●		17.0	16.2	10.0	13.0	0.4	0.8	10.0	5.5	
	LNGU171004PNEL-R	L	G	E	●	●		17.0	16.2	10.0	13.0	0.4	0.8	10.0	5.5	
	LNGU171008PNER-R	R	G	E	●	●		17.0	16.2	10.0	13.0	0.8	0.8	10.0	5.5	
	LNGU171008PNEL-R	L	G	E	●	●		17.0	16.2	10.0	13.0	0.8	0.8	10.0	5.5	
	LNGU171012PNER-R	R	G	E	●	●		17.0	16.2	10.0	13.0	1.2	0.8	10.0	5.5	
	LNGU171012PNEL-R	L	G	E	●	●		17.0	16.2	10.0	13.0	1.2	0.8	10.0	5.5	
	LNGU171016PNER-R	R	G	E	●	●		17.0	16.2	10.0	13.0	1.6	0.8	10.0	5.5	
	LNGU171016PNEL-R	L	G	E	●	●		17.0	16.2	10.0	13.0	1.6	0.8	10.0	5.5	
	LNGU171020PNER-R	R	G	E	●	●		17.0	16.2	10.0	13.0	2.0	0.8	10.0	5.5	
	LNGU171020PNEL-R	L	G	E	●	●		17.0	16.2	10.0	13.0	2.0	0.8	10.0	5.5	
	LNGU171024PNER-R	R	G	E	●	●		17.0	16.2	10.0	13.0	2.4	0.8	10.0	5.5	
	LNGU171024PNEL-R	L	G	E	●	●		17.0	16.2	10.0	13.0	2.4	0.8	10.0	5.5	
	LNGU171030PNER-R	R	G	E	●	●		17.0	15.4	10.0	13.0	3.0	1.6	10.0	5.5	
	LNGU171030PNEL-R	L	G	E	●	●		17.0	15.4	10.0	13.0	3.0	1.6	10.0	5.5	
	LNGU171040PNER-R	R	G	E	●	●		17.0	15.4	10.0	13.0	4.0	1.6	10.0	5.5	
	LNGU171040PNEL-R	L	G	E	●	●		17.0	15.4	10.0	13.0	4.0	1.6	10.0	5.5	
	LNGU171050PNER-R	R	G	E	●	●		17.0	15.4	10.0	13.0	5.0	1.6	10.0	5.5	
	LNGU171050PNEL-R	L	G	E	●	●		17.0	15.4	10.0	13.0	5.0	1.6	10.0	5.5	
	LNGU171060PNER-R	R	G	E	●	●		17.0	15.4	10.0	13.0	6.0	1.6	10.0	5.5	
	LNGU171060PNEL-R	L	G	E	●	●		17.0	15.4	10.0	13.0	6.0	1.6	10.0	5.5	
	LNGU171070PNER-R	R	G	E	●	●		17.0	15.4	10.0	13.0	7.0	1.6	10.0	5.5	
	LNGU171070PNEL-R	L	G	E	●	●		17.0	15.4	10.0	13.0	7.0	1.6	10.0	5.5	Right hand insert shown.

● : Inventory maintained in Japan. (10 inserts in one case)

VOS400

General Cutting

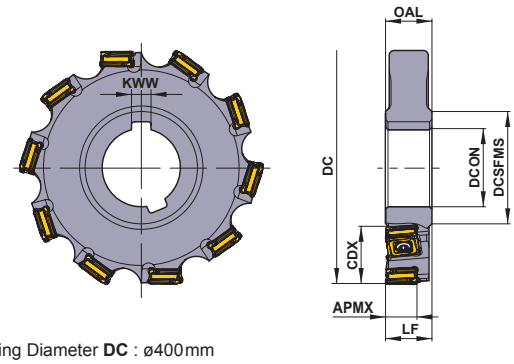
Product Information

90° KAPR

Work Material

K M R

SYMBOL DESCRIPTIONS >> 1350
TECHNICAL DATA >> 1987
ISO13399 Property >> 1966

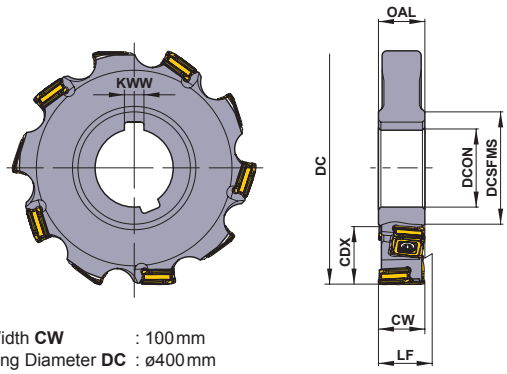


HALF SIDE

Max. Cutting Diameter **DC** : ø400mm

(mm)

DC	Effective No. of Teeth	LF	CDX	DCON	DCSFMS	OAL	KWW	APMX
80	8	≥16	20	27	40	≥16.8	7	10.0
100	10	≥16	27	32	46	≥16.8	8	10.0
125	12	≥16	35	40	55	≥16.8	10	10.0
160	14	≥16	52.5	40	55	≥16.8	10	10.0



FULL SIDE

Largest Width **CW** : 100mm
Max. Cutting Diameter **DC** : ø400mm

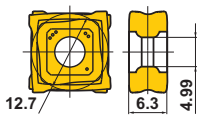
(mm)

DC	Effective No. of Teeth	Total No. of Teeth	LF	CW	CDX	DCON	DCSFMS	OAL	KWW
80	4	8	≥16	16 – 20	20	27	40	≥16	7
100	5	10	≥16	16 – 20	27	32	46	≥16	8
125	6	12	≥16	16 – 20	35	40	55	≥16	10
160	7	14	≥16	16 – 20	52.5	40	55	≥16	10

* Multilevel designs available for CW over 20mm.
* Please contact us for detail of any geometry of half sides and full sides.

INSERTS

(mm)

Shape	Order Number	Hand	Class	Horning	Coated VP15TF		Geometry
	SONX1206PER	R	N	E	●		 Right hand tool holder shown.
	SONX1206PEL	L	N	E	●		

● : Inventory maintained in Japan. (10 inserts in one case)

ASX400

General Cutting

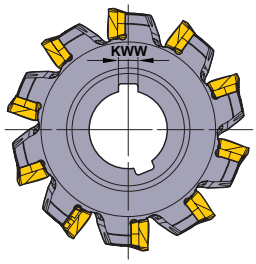
Product Information

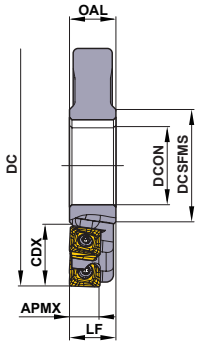
90° KAPR

Work Material

P M K M R

SYMBOL DESCRIPTIONS >> 1350
TECHNICAL DATA >> 1987
ISO13399 Property >> 1966



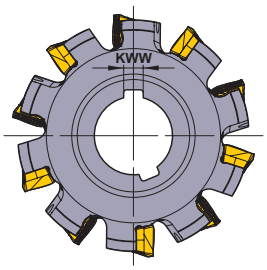


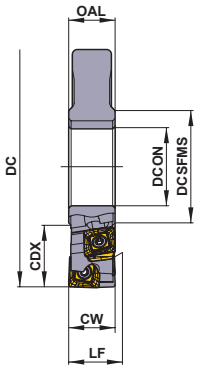
HALF SIDE

Max. Cutting Diameter **DC** : ø400mm

(mm)

DC	Effective No. of Teeth	LF	CDX	DCON	DCSFMS	OAL	KWW	APMX
80	8	≥16	20	27	40	≥16.8	7	10.0
100	10	≥16	27	32	46	≥16.8	8	10.0
125	12	≥16	35	40	55	≥16.8	10	10.0
160	14	≥16	52.5	40	55	≥16.8	10	10.0





FULL SIDE

Largest Width **CW** : 100mm
Max. Cutting Diameter **DC** : ø400mm

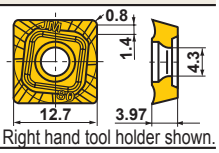
(mm)

DC	Effective No. of Teeth	Total No. of Teeth	LF	CW	CDX	DCON	DCSFMS	OAL	KWW
80	4	8	≥16	16 – 20	20	27	40	≥16	7
100	5	10	≥16	16 – 20	27	32	46	≥16	8
125	6	12	≥16	16 – 20	35	40	55	≥16	10
160	7	14	≥16	16 – 20	52.5	40	55	≥16	10

* Multilevel designs available for CW over 20mm.
* Please contact us for detail of any geometry of half sides and full sides.

INSERTS

(mm)

Shape	Order Number	Hand	Class	Horning	Coated VP15TF		Geometry
	SOMT12T308PEER-JM	R	M	E	●		 Right hand tool holder shown.
	SOMT12T308PEEL-JM	L	M	E	●		

● : Inventory maintained in Japan. (10 inserts in one case)

APX3000

Multi Functional Milling

Product Information

90° KAPR

Work Material

P M K N S H F R

SYMBOL DESCRIPTIONS >> 1350
TECHNICAL DATA >> 1987
ISO13399 Property >> 1966

- High accuracy, high quality vertical wall.
- Low cutting force insert.
- With through air & coolant holes.

Fig.1

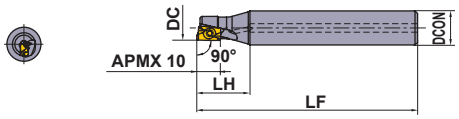


Fig.2

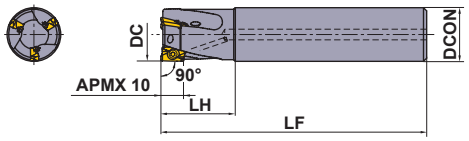
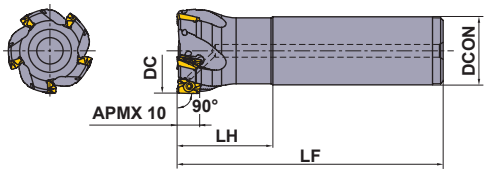


Fig.3



SHANK TYPE

KAPR :90°

Right hand tool holder only.

Type	Order Number	Stock R	Number of Teeth	Dimensions(mm) DC	DCON	LF	LH	*2 RMPX	Max. Allowable Revolution (min⁻¹)	Type(Fig.)	*1 Clamp Screw	Wrench	Anti-seize Lubricant	Inserts
Standard	APX3000R121SA16SA	●	1	12	16	85	25	6.0°	10500	1	TPS25	TIP07F	MK1KS	AOMT 1236○○ PEER-○ / AOGT 1236○○ PEFR-GM
	APX3000R141SA16SA	●	1	14	16	85	25	6.0°	9000	1	TPS25	TIP07F	MK1KS	
	APX3000R162SA16SA	●	2	16	16	85	25	11.3°	20900	2	TPS25	TIP07F	MK1KS	
	APX3000R182SA16SA	●	2	18	16	85	25	8.6°	19600	3	TPS25	TIP07F	MK1KS	
	APX3000R202SA20SA	●	2	20	20	100	30	6.9°	18500	2	TPS25	TIP07F	MK1KS	
	APX3000R203SA20SA	●	3	20	20	100	30	6.9°	18500	2	TPS25	TIP07F	MK1KS	
	APX3000R223SA20SA	●	3	22	20	115	30	5.7°	17600	3	TPS25−1	TIP07F	MK1KS	
	APX3000R252SA25SA	●	2	25	25	115	35	4.6°	16400	2	TPS25−1	TIP07F	MK1KS	
	APX3000R253SA25SA	●	3	25	25	115	35	4.6°	16400	2	TPS25−1	TIP07F	MK1KS	
	APX3000R254SA25SA	●	4	25	25	115	35	4.6°	16400	2	TPS25−1	TIP07F	MK1KS	
	APX3000R284SA25SA	●	4	28	25	115	35	3.8°	15500	3	TPS25−1	TIP07F	MK1KS	
	APX3000R304SA32SA	●	4	30	32	125	45	3.4°	14900	2	TPS25−1	TIP07F	MK1KS	
	APX3000R323SA32SA	●	3	32	32	125	45	3.1°	14400	2	TPS25−1	TIP07F	MK1KS	
	APX3000R324SA32SA	●	4	32	32	125	45	3.1°	14400	2	TPS25−1	TIP07F	MK1KS	
	APX3000R325SA32SA	●	5	32	32	125	45	3.1°	14400	2	TPS25−1	TIP07F	MK1KS	
	APX3000R403SA32SA	●	3	40	32	125	45	2.2°	12800	3	TPS25−1	TIP07F	MK1KS	
	APX3000R405SA32SA	●	5	40	32	125	45	2.2°	12800	3	TPS25−1	TIP07F	MK1KS	
	APX3000R406SA32SA	●	6	40	32	125	45	2.2°	12800	3	TPS25−1	TIP07F	MK1KS	
	APX3000R507SA32SA	●	7	50	32	125	45	1.7°	11300	3	TPS25−1	TIP07F	MK1KS	
	APX3000R638SA32SA	●	8	63	32	125	45	1.3°	10000	3	TPS25−1	TIP07F	MK1KS	

(Note 1) Additional machining is needed for this unit when using a corner insert of R2.4 or greater.
(Note 2) The maximum allowable revolutions are set to ensure tool and insert stability.
(Note 3) When using the tool at high spindle speeds, ensure that the tool and arbor are correctly balanced.
*1 Clamp Torque (N • m) : TPS25=1.0, TPS25−1=1.0 *2 RMPX : Max. Ramping Angle

● : **Inventory maintained in Japan.**

APX3000

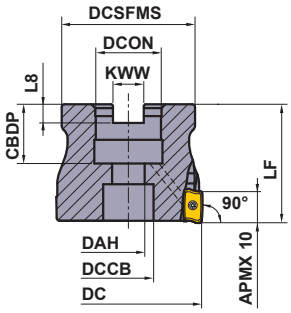
SHANK TYPE

Right hand tool holder only.

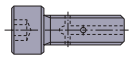
Type	Order Number	Stock R	Number of Teeth	Dimensions(mm) DC	DCON	LF	LH	*2 RMPX	Max. Allowable Revolution (min^{-1})	Type(Fig.)	*1 Clamp Screw	Wrench	Anti-seize Lubricant	Inserts
Long	**APX3000R182SA16LA**	●	2	18	16	120	25	8.6°	19600	3	TPS25	TIP07F	MK1KS	AOMT 1236○○ PEER-○
	APX3000R202SA20LA	●	2	20	20	150	60	6.9°	18500	2	TPS25	TIP07F	MK1KS	
	APX3000R222SA20LA	●	2	22	20	150	30	5.7°	17600	3	TPS25−1	TIP07F	MK1KS	
	APX3000R252SA25LA	●	2	25	25	170	70	4.6°	16400	2	TPS25−1	TIP07F	MK1KS	
	APX3000R253SA25LA	●	3	25	25	170	70	4.6°	16400	2	TPS25−1	TIP07F	MK1KS	
	APX3000R282SA25LA	●	2	28	25	170	35	3.8°	15500	3	TPS25−1	TIP07F	MK1KS	
	APX3000R283SA25LA	●	3	28	25	170	35	3.8°	15500	3	TPS25−1	TIP07F	MK1KS	
	APX3000R322SA32LA	●	2	32	32	190	90	3.1°	14400	2	TPS25−1	TIP07F	MK1KS	
	APX3000R323SA32LA	●	3	32	32	190	90	3.1°	14400	2	TPS25−1	TIP07F	MK1KS	
	APX3000R352SA32LA	●	2	35	32	190	45	2.7°	13700	3	TPS25−1	TIP07F	MK1KS	
	APX3000R353SA32LA	●	3	35	32	190	45	2.7°	13700	3	TPS25−1	TIP07F	MK1KS	
Extra Long	**APX3000R182SA16ELA**	●	2	18	16	180	25	8.6°	19600	3	TPS25	TIP07F	MK1KS	AOGT 1236○○ PEFR-GM
	APX3000R202SA20ELA	●	2	20	20	200	70	6.9°	18500	2	TPS25	TIP07F	MK1KS	
	APX3000R222SA20ELA	●	2	22	20	200	30	5.7°	17600	3	TPS25−1	TIP07F	MK1KS	
	APX3000R252SA25ELA	●	2	25	25	220	80	4.6°	16400	2	TPS25−1	TIP07F	MK1KS	
	APX3000R253SA25ELA	●	3	25	25	220	80	4.6°	16400	2	TPS25−1	TIP07F	MK1KS	
	APX3000R282SA25ELA	●	2	28	25	220	35	3.8°	15500	3	TPS25−1	TIP07F	MK1KS	
	APX3000R283SA25ELA	●	3	28	25	220	35	3.8°	15500	3	TPS25−1	TIP07F	MK1KS	
	APX3000R322SA32ELA	●	2	32	32	260	100	3.1°	14400	2	TPS25−1	TIP07F	MK1KS	
	APX3000R323SA32ELA	●	3	32	32	260	100	3.1°	14400	2	TPS25−1	TIP07F	MK1KS	
	APX3000R352SA32ELA	●	2	35	32	260	45	2.7°	13700	3	TPS25−1	TIP07F	MK1KS	
	APX3000R353SA32ELA	●	3	35	32	260	45	2.7°	13700	3	TPS25−1	TIP07F	MK1KS	

(Note 1) Additional machining is needed for this unit when using a corner insert of R2.4 or greater.
(Note 2) The maximum allowable revolutions are set to ensure tool and insert stability.
(Note 3) When using the tool at high spindle speeds, ensure that the tool and arbor are correctly balanced.
*1 Clamp Torque (N • m) : TPS25=1.0, TPS25−1=1.0 *2 RMPX : Max. Ramping Angle

APX3000



Right hand tool holder only.

Cutter Diameter DC	Set Bolt	Geometry
φ32, φ40	HSC08030H	
φ50, φ63	HSC10030H	
φ80	HSC12035H	
φ100	HSC16040H	

ARBOR TYPE

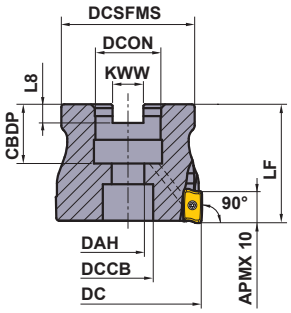
KAPR :90°
GAMP:+7°—+21° T :+15°—+27°
GAMF :+15°—+27° I :+7°—+21°

Order Number	Stock R	Number of Teeth	Dimensions(mm) DC	LF	DCON	CBDP	DAH	DCSFMS	KWW	L8	DCCB	WT*3 (kg)	RMPX*2	Max. Allowable Revolution (min⁻¹)	*1 Clamp Screw	Wrench	Anti-seize Lubricant	Inserts
APX3000-032A05RA	●	5	32	40	16	18	9	30	8.4	5.6	14	0.2	3.1°	14400	TPS25–1	TIP07F	MK1KS	AOMT 1236□□ PEER-□
APX3000-040A06RA	●	6	40	40	16	18	9	34	8.4	5.6	14	0.3	2.2°	12800	TPS25–1	TIP07F	MK1KS	
APX3000-050A07RA	●	7	50	40	22	20	11	45	10.4	6.3	17	0.4	1.7°	11300	TPS25–1	TIP07F	MK1KS	
APX3000-063A08RA	●	8	63	40	22	20	11	55	10.4	6.3	17	0.7	1.3°	10000	TPS25–1	TIP07F	MK1KS	AOGT 1236□□ PEFR-GM
APX3000R08009CA	●	9	80	50	25.4	26	13	70	9.5	6	20	1.3	1.0°	8800	TPS25–1	TIP07F	MK1KS	
APX3000R10011DA	●	11	100	63	31.75	32	17	80	12.7	8	26	2.2	0.8°	7800	TPS25–1	TIP07F	MK1KS	

(Note 1) Additional machining is needed for this unit when using a corner insert of R2.4 or greater.
(Note 2) The maximum allowable revolutions are set to ensure tool and insert stability.
(Note 3) When using the tool at high spindle speeds, ensure that the tool and arbor are correctly balanced.
*1 Clamp Torque (N • m) : TPS25—1=1.0
*2 RMPX : Max. Ramping Angle
*3 WT : Tool Weight

● : Inventory maintained in Japan.

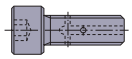
APX3000



Right hand tool holder only.

For metric arbor

The cutter bore diameter DCON is indicated in millimetre.

Cutter Diameter DC	Set Bolt	Geometry
ϕ32, ϕ40	HSC08030H	
ϕ50, ϕ63	HSC10030H	
ϕ80	HSC12035H	
ϕ100	HSC16040H	

ARBOR TYPE

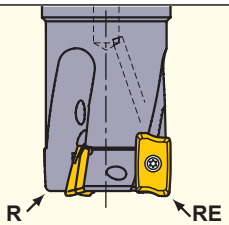
KAPR :90°
GAMP:+7°—+21° T :+15°—+27°
GAMF :+15°—+27° I :+7°—+21°

Order Number	Stock R	Number of Teeth	Dimensions(mm) DC	LF	DCON	CBDP	DAH	DCSFMS	KWW	L8	DCCB	WT*3 (kg)	RMPX*2	Max. Allowable Revolution (min-1)	*1 Clamp Screw	Wrench	Anti-seize Lubricant	Inserts
APX3000-032A05RA	●	5	32	40	16	18	9	30	8.4	5.6	14	0.2	3.1°	14400	TPS25−1	TIP07F	MK1KS	AOMT 1236□□ PEER-□
APX3000-040A06RA	●	6	40	40	16	18	9	34	8.4	5.6	14	0.3	2.2°	12800	TPS25−1	TIP07F	MK1KS	
APX3000-050A07RA	●	7	50	40	22	20	11	45	10.4	6.3	17	0.4	1.7°	11300	TPS25−1	TIP07F	MK1KS	
APX3000-063A08RA	●	8	63	40	22	20	11	55	10.4	6.3	17	0.7	1.3°	10000	TPS25−1	TIP07F	MK1KS	AOGT 1236□□ PEFR-GM
APX3000-080A09RA	●	9	80	50	27	23	13	70	12.4	7	20	1.3	1.0°	8800	TPS25−1	TIP07F	MK1KS	
APX3000-100A11RA	●	11	100	63	32	26	17	80	14.4	8	26	2.2	0.8°	7800	TPS25−1	TIP07F	MK1KS	

(Note 1) Additional machining is needed for this unit when using a corner insert of R2.4 or greater.
(Note 2) The maximum allowable revolutions are set to ensure tool and insert stability.
(Note 3) When using the tool at high spindle speeds, ensure that the tool and arbor are correctly balanced.
*1 Clamp Torque (N • m) : TPS25−1=1.0 *2 RMPX : Max. Ramping Angle
*3 WT : Tool Weight

NOTE ON USE OF INSERTS WITH LARGE CORNER RADII

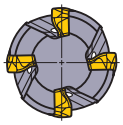
When using inserts with corner radius RE≥R2.4, please machine the holder with a radius form as shown on the right.

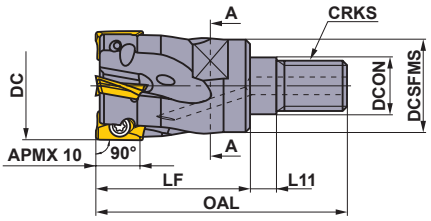


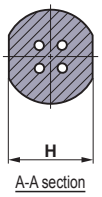
RE (mm)	R (mm)
2.4	1.9
3.0	2.5
3.2	2.7

R : Holder end radius
RE : Insert corner radius

APX3000







● With through air & coolant holes.

SCREW-IN TYPE

KAPR :90°

Right hand tool holder only.

Order Number	Stock	Number of Teeth	Dimensions(mm)								*2 WT (kg)	*1 Clamp Screw	Wrench	Anti-seize Lubricant	Inserts
	R		DC	DCON	DCSFMS	OAL	LF	L11	H	CRKS					
APX3000R162M08A30	●	2	16	8.5	13	48	30	6	10	M8	0.1	TPS25	TIP07F	MK1KS	AOMT 1236○○ PEER-○ / AOGT 1236○○ PEFR-GM
APX3000R182M08A30	●	2	18	8.5	13	48	30	6	10	M8	0.1	TPS25	TIP07F	MK1KS	
APX3000R203M10A30	●	3	20	10.5	18	49	30	6	14	M10	0.1	TPS25	TIP07F	MK1KS	
APX3000R223M10A30	●	3	22	10.5	18	49	30	6	14	M10	0.1	TPS25−1	TIP07F	MK1KS	
APX3000R254M12A35	●	4	25	12.5	21	57	35	6	19	M12	0.2	TPS25−1	TIP07F	MK1KS	
APX3000R284M12A35	●	4	28	12.5	21	57	35	6	19	M12	0.2	TPS25−1	TIP07F	MK1KS	
APX3000R304M16A40	●	4	30	17	29	63	40	6	24	M16	0.3	TPS25−1	TIP07F	MK1KS	
APX3000R325M16A40	●	5	32	17	29	63	40	6	24	M16	0.3	TPS25−1	TIP07F	MK1KS	
APX3000R355M16A40	●	5	35	17	29	63	40	6	24	M16	0.3	TPS25−1	TIP07F	MK1KS	
APX3000R406M16A40	●	6	40	17	29	63	40	6	24	M16	0.3	TPS25−1	TIP07F	MK1KS	

(Note 1) Additional machining is needed for this unit when using a corner insert of R2.4 or greater.

*1 Clamp Torque (N • m) : TPS25=1.0, TPS25−1=1.0

*2 WT : Tool Weight

● : **Inventory maintained in Japan.**

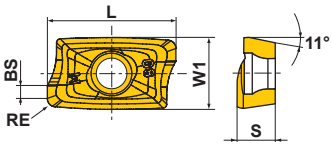
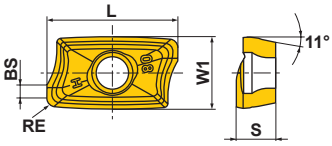
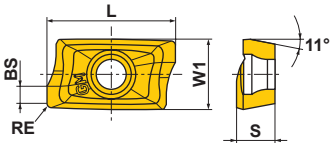
APX3000

INSERTS

Work Material		MC5020	MP6120	MP6130	MP7130	MP9120	MP9130	VP15TF	VP20RT	TF15
P	Steel		◐	✠				◐	◐	
M	Stainless Steel				◔			◔	◔	
K	Cast Iron	◐						✠	✠	
N	Non-ferrous Metal									◐
S	Heat-resistant Alloy, Titanium Alloy					◐	✠	◐		
H	Hardened Steel							◔		

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✠ : Unstable Cutting

Honing :
E : Round **F** : Sharp

Shape	Order Number	Class	Honing	Coated								Carbide		Dimensions (mm)					Geometry
				MC5020	MP6120	MP6130	MP7130	MP9120	MP9130	VP15TF	VP20RT	TF15		L	W1	S	BS	RE*	
General **M** Breaker	**AOMT123602PEER-M**	M	E		●	●	●	●	●	●	●			12	6.6	3.6	1.8	0.2	
	AOMT123604PEER-M	M	E		●	●	●	●	●	●	●			12	6.6	3.6	1.6	0.4	
	AOMT123608PEER-M	M	E		●	●	●	●	●	●	●			12	6.6	3.6	1.2	0.8	
	AOMT123610PEER-M	M	E		●	●	●	●	●	●	●			12	6.6	3.6	1.0	1.0	
	AOMT123612PEER-M	M	E		●	●	●	●	●	●	●			12	6.6	3.6	0.8	1.2	
	AOMT123616PEER-M	M	E		●	●	●	●	●	●	●			12	6.6	3.6	0.4	1.6	
	AOMT123620PEER-M	M	E		●	●	●	●	●	●	●			12	6.6	3.6	0.4	2.0	
	AOMT123624PEER-M	M	E		●	●	●	●	●	●	●			12	6.6	3.6	0.4	2.4	
	AOMT123630PEER-M	M	E		●	●	●	●	●	●	●			12	6.6	3.6	0.4	3.0	
	AOMT123632PEER-M	M	E		●	●	●	●	●	●	●			12	6.6	3.6	0.4	3.2	
Strong Cutting Edge Type **H** Breaker	**AOMT123604PEER-H**	M	E	●	●	●	●	●	●	●	●			12	6.6	3.6	1.6	0.4	
	AOMT123608PEER-H	M	E	●	●	●	●	●	●	●	●			12	6.6	3.6	1.2	0.8	
	AOMT123616PEER-H	M	E	●	●	●	●	●	●	●	●			12	6.6	3.6	0.4	1.6	
For Machining of Aluminium Alloys **GM** Breaker	**AOGT123602PEFR-GM**	G	F									●		12	6.6	3.6	1.8	0.2	
	AOGT123604PEFR-GM	G	F									●		12	6.6	3.6	1.6	0.4	
	AOGT123608PEFR-GM	G	F									●		12	6.6	3.6	1.2	0.8	

* Nose R is different from the workpiece of R shape depending on the axial rake angle of the body.

■ = MIRACLE SIGMA

● : **Inventory maintained in Japan. (10 inserts in one case)**

APX3000

RECOMMENDED CUTTING CONDITIONS

CUTTING SPEED

	Work Material	Hardness	Insert Grade 1st Recommenedation	Insert Grade 2nd Recommenedation	Breaker		Cutting Width ae (mm) ≤0.25DC	0.25–0.5DC	0.5–0.75DC	DC (Slot)
							Cutting Speed vc (m/min)			
P	Mild Steel	≤180HB	MP6120	VP15TF	M	H	230(180–270)	220(170–260)	180(140–210)	180(140–210)
			MP6130	VP20RT	M	H	200(150–240)	190(140–230)	150(110–180)	150(110–180)
	Carbon Steel Alloy Steel	180–350HB	MP6120	VP15TF	M	H	180(140–210)	170(130–200)	140(110–160)	140(110–160)
			MP6130	VP20RT	M	H	150(110–180)	140(100–170)	110(80–130)	110(80–130)
M	Stainless Steel	≤270HB	MP7130	VP20RT	M	H	180(140–210)	170(130–200)	140(110–160)	140(110–160)
K	Gray Cast Iron	≤350MPa	MC5020	VP15TF	H		250(200–300)	240(190–290)	210(160–260)	140(110–160)
	Ductile, Cast Iron	≤800MPa	MC5020	VP15TF	H		130(100–150)	120(90–140)	100(80–120)	100(80–120)
N	Aluminium Alloy	–	TF15		GM		500(200–1000)	500(200–1000)	500(200–1000)	500(200–1000)
S	Titanium Alloy	≤350HB	MP9120	VP15TF	M	H	50(40–70)			50(40–70)
			MP9130	VP20RT	M	H	40(30–60)			40(30–60)
	Heat-resistant Alloy	–	MP9120	VP15TF	M	H	40(30–60)			40(30–60)
			MP9130	VP20RT	M	H	30(20–40)			30(20–40)
H	Hardened Steel	40–55HRC	VP15TF		H		90(70–100)	85(60–100)	70(50–80)	70(50–80)

DEPTH OF CUT AND FEED

	Work Material	Hardness	Cutting Width ae (mm)	Cutter Diameter (mm) ø12–ø16 Depth of Cut ap (mm)	ø12–ø16 Feed per Tooth fz (mm/t.)	ø18–ø25 Depth of Cut ap (mm)	ø18–ø25 Feed per Tooth fz (mm/t.)	ø28–ø100 Depth of Cut ap (mm)	ø28–ø100 Feed per Tooth fz (mm/t.)
P	Mild Steel Carbon Steel Alloy Steel	≤180HB 180–350HB	≤0.25DC	≤4	0.15	≤5	0.25	≤5	0.20
				4–7	0.10	5–7	0.20	5–7	0.15
						7–8.5	0.15	7–8.5	0.10
						8.5–10	0.10	8.5–10	0.07
			0.25–0.5DC	≤2	0.15	≤3	0.25	≤3	0.20
				2–5	0.10	3–5.5	0.20	3–5.5	0.15
						5.5–8	0.15	5.5–8	0.10
						8–10	0.10	8–10	0.07
			0.5–0.75DC	≤4	0.10	≤4	0.15	≤3	0.10
						4–10	0.10	3–7	0.07
			DC (Slot)	≤3	0.10	≤4	0.10	≤3	0.10
						4–7	0.07	3–5	0.07
M	Stainless Steel	≤270HB	≤0.25DC	≤4	0.15	≤5	0.20	≤5	0.20
				4–7	0.10	5–7	0.15	5–7	0.15
						7–8.5	0.10	7–8.5	0.10
						8.5–10	0.07	8.5–10	0.07
			0.25–0.5DC	≤2	0.15	≤3	0.20	≤3	0.20
				2–5	0.10	3–5.5	0.15	3–5.5	0.15
						5.5–8	0.10	5.5–8	0.10
						8–10	0.07	8–10	0.07
			0.5–0.75DC	≤4	0.10	≤4	0.10	≤3	0.10
						4–10	0.07	3–7	0.07
			DC (Slot)	≤3	0.10	≤4	0.10	≤3	0.10
						4–7	0.07	3–5	0.07
K	Gray Cast Iron	Tensile Strength ≤350MPa	≤0.25DC	≤4	0.15	≤5	0.25	≤5	0.20
				4–7	0.10	5–7	0.20	5–7	0.15
						7–8.5	0.15	7–8.5	0.10
						8.5–10	0.10	8.5–10	0.07
			0.25–0.5DC	≤2	0.15	≤3	0.25	≤3	0.20
				2–5	0.10	3–5.5	0.20	3–5.5	0.15
						5.5–8	0.15	5.5–8	0.10
						8–10	0.10	8–10	0.07
			0.5–0.75DC	≤4	0.10	≤4	0.15	≤3	0.10
						4–10	0.10	3–7	0.07
			DC (Slot)	≤3	0.10	≤4	0.10	≤3	0.10
						4–7	0.07	3–5	0.07
	Ductile, Cast Iron	Tensile Strength ≤800MPa	≤0.25DC	≤4	0.10	≤5	0.20	≤5	0.20
				4–7	0.07	5–7	0.15	5–7	0.15
						7–8.5	0.10	7–8.5	0.10
						8.5–10	0.07	8.5–10	0.07
			0.25–0.5DC	≤2	0.10	≤3	0.20	≤3	0.20
				2–5	0.07	3–5.5	0.15	3–5.5	0.15
						5.5–8	0.10	5.5–8	0.10
						8–10	0.07	8–10	0.07
			0.5–0.75DC	≤4	0.07	≤4	0.10	≤3	0.10
						4–10	0.07	3–7	0.07
			DC (Slot)	≤3	0.07	≤4	0.10	≤3	0.10
						4–7	0.07	3–5	0.07

APX3000

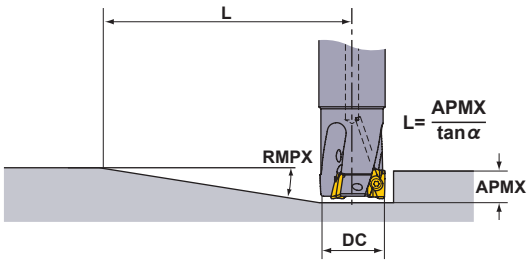
Work Material		Hardness	Cutting Width ae (mm)	Cutter Diameter (mm) ø12—ø16 Depth of Cut ap (mm)	ø12—ø16 Feed per Tooth fz (mm/t.)	ø18—ø25 Depth of Cut ap (mm)	ø18—ø25 Feed per Tooth fz (mm/t.)	ø28—ø100 Depth of Cut ap (mm)	ø28—ø100 Feed per Tooth fz (mm/t.)
N	Aluminium Alloy	—	≤0.25DC	≤4	0.15	≤4	0.25	≤4	0.20
				4—7	0.10	4—7	0.15	4—7	0.10
			0.25—0.5DC	≤4	0.15	≤4	0.20	≤4	0.20
				4—7	0.10	4—7	0.10	4—7	0.10
			0.5—0.75DC	≤5	0.10	≤5	0.15	≤5	0.10
			DC (Slot)	≤5	0.10	≤5	0.20	≤5	0.15
S	Titanium Alloy	≤350HB	≤0.25DC	≤4	0.15	≤4	0.15	≤4	0.10
				4—7	0.10	4—7	0.10	4—7	0.07
			0.25—0.5DC	≤3	0.05	≤3	0.05	≤3	0.05
	Heat-resistant Alloy	—	0.5—0.75DC	≤2	0.10	≤2	0.05	≤2	0.05
			DC (Slot)	≤1	0.05	≤1	0.05	≤1	0.05
H	Hardened Steel	40—55HRC	≤0.25DC	≤4	0.10	≤5	0.15	≤5	0.15
				4—7	0.07	5—7	0.10	5—7	0.10
						7—8.5	0.07		
			0.25—0.5DC	≤2	0.10	≤3	0.15	≤3	0.15
				2—5	0.07	3—5.5	0.10		
			0.5—0.75DC	≤4	0.07	≤4	0.07	≤3	0.07
			DC (Slot)	≤3	0.07	≤4	0.07	≤3	0.07

(Note 1) These cutting conditions are a guide to the standard shank type and the arbor type.
Please make adjustments according to the machining conditions.
(Note 2) Vibration is liable to occur in certain cases. Please reduce the depth of cut and / or reduce cutting conditions in the following cases.
- When using the long shank type and extra long shank type.
- When using long tool overhang with the standard or arbor type.
- When the application has poor clamping rigidity or when using a low rigidity machine.

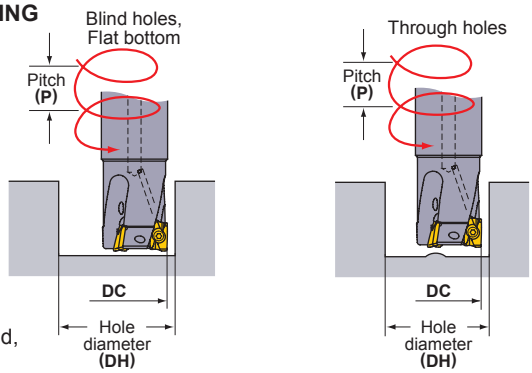
(Note 3) In case of coarse and fine pitch cutters, the coarse pitch type is recommended to prevent vibration.
(Note 4) For heavy interrupted and unstable cutting, the H breaker is first recommendation.

RAMPING/HELICAL CUTTING

RAMPING



HELICAL CUTTING



Refer to the table below for cutting conditions. For feed per tooth and cutting speed, follow the cutting conditions for slot milling.

Cutting Edge Diameter DC(mm)	Ramping: Maximum Ramping Angle RMPX	Ramping: Minimum Distance*1 L(mm)	Helical Cutting (Blind Hole, Flat Bottom): Maximum Hole Diameter*2 DH max.(mm)	Helical Cutting (Blind Hole, Flat Bottom): Maximum Pitch P max.(mm)	Helical Cutting (Blind Hole, Flat Bottom): Minimum Hole Diameter DH min.(mm)	Helical Cutting (Blind Hole, Flat Bottom): Maximum Pitch P max.(mm)	Helical Cutting (Through Hole): Minimum Hole Diameter DH min.(mm)	Helical Cutting (Through Hole): Maximum Pitch P max.(mm)
12	6.0°	95	22	2.5	20.5	2	14	0.5
14	6.0°	95	26	2.5	24.5	2	18	1
16	11.3°	50	30	9	28	7	21	2
18	8.6°	66	34	5	32	4.5	25	2
20	6.9°	83	38	5	36	4.5	29	2
22	5.7°	100	42	5	40	4.5	33	2
25	4.6°	124	48	6	46	5	39	3
28	3.8°	151	54	4.5	52	4	45	2
30	3.4°	168	58	4.5	56	4	49	2
32	3.1°	185	62	4.5	60	4	53	2
35	2.7°	212	68	4	66	3.5	59	2
40	2.2°	260	78	4	76	3.5	69	2
50	1.7°	337	98	2	96	2	89	2
63	1.3°	441	124	2	122	2	115	2
80	1.0°	573	158	2	156	2	149	2
100	0.8°	716	198	1	196	1	189	1

(Note) When machining highly ductile materials with ramping angles above, chips could be continuous.
In this case, decrease the ramping angle or feed per tooth.
*1 L (=10 / tan α). Cutters' moving distance until depth of cut reaches 10mm at a maximum ramping angle.
*2 In case corner radius of 0.8mm. Other than that, find with the below formula.
{(cutting edge diameter DC)−(corner radius)−0.2)}×2

APX4000

Multi Functional Milling

Product Information

90° KAPR

Work Material

P M K S H F R

SYMBOL DESCRIPTIONS >> 1350
TECHNICAL DATA >> 1987
ISO13399 Property >> 1966

- High accuracy, high quality vertical wall.
- Low cutting force insert.
- With through air & coolant holes.

Fig.1

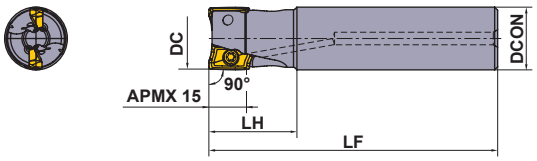
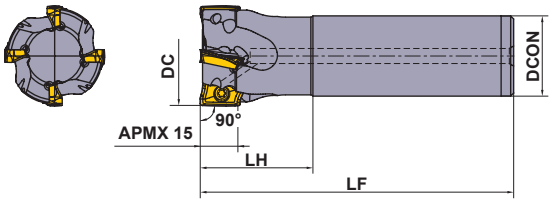


Fig.2



SHANK TYPE

KAPR :90°

Right hand tool holder only.

Type	Order Number	Stock R	Number of Teeth	Dimensions(mm) DC	DCON	LF	LH	*2 RMPX	Max. Allowable Revolution (min^{-1})	Type (Fig.)	*1 Clamp Screw	Wrench	Anti-seize Lubricant	Inserts
Standard	APX4000R252SA25SA	●	2	25	25	115	35	11°	18900	1	TPS4	TIP15W	MK1KS	AOMT 1848□□ PEER-□
	APX4000R322SA32SA	●	2	32	32	125	45	7°	16300	1	TPS4	TIP15W	MK1KS	
	APX4000R323SA32SA	●	3	32	32	125	45	7°	16300	1	TPS4	TIP15W	MK1KS	
	APX4000R403SA32SA	●	3	40	32	125	45	6°	14200	2	TPS43	TIP15W	MK1KS	
	APX4000R404SA32SA	●	4	40	32	125	45	6°	14200	2	TPS43	TIP15W	MK1KS	
	APX4000R504SA32SA	●	4	50	32	125	45	4°	12400	2	TPS43	TIP15W	MK1KS	
	APX4000R505SA32SA	●	5	50	32	125	45	4°	12400	2	TPS43	TIP15W	MK1KS	
	APX4000R634SA32SA	●	4	63	32	125	45	3°	10800	2	TPS43	TIP15W	MK1KS	
	APX4000R636SA32SA	●	6	63	32	125	45	3°	10800	2	TPS43	TIP15W	MK1KS	
Long	APX4000R252SA25LA	●	2	25	25	170	35	11°	18900	1	TPS4	TIP15W	MK1KS	
	APX4000R282SA25LA	●	2	28	25	170	35	9°	17700	2	TPS4	TIP15W	MK1KS	
	APX4000R322SA32LA	●	2	32	32	190	45	7°	16300	1	TPS4	TIP15W	MK1KS	
	APX4000R323SA32LA	●	3	32	32	190	45	7°	16300	1	TPS4	TIP15W	MK1KS	
	APX4000R352SA32LA	●	2	35	32	190	45	6°	15400	2	TPS4	TIP15W	MK1KS	
	APX4000R353SA32LA	●	3	35	32	190	45	6°	15400	2	TPS4	TIP15W	MK1KS	
	APX4000R402SA32LA	●	2	40	32	190	45	6°	14200	2	TPS43	TIP15W	MK1KS	
	APX4000R403SA32LA	●	3	40	32	190	45	6°	14200	2	TPS43	TIP15W	MK1KS	
	APX4000R404SA32LA	●	4	40	32	190	45	6°	14200	2	TPS43	TIP15W	MK1KS	

(Note 1) Additional machining is needed for this unit when using a corner insert of R3.2 or greater.
(Note 2) The maximum allowable revolutions are set to ensure tool and insert stability.
(Note 3) When using the tool at high spindle speeds, ensure that the tool and arbor are correctly balanced.
*1 Clamp Torque (N • m) : TPS4=4.0, TPS43=4.0
*2 RMPX : Max. Ramping Angle

● : Inventory maintained in Japan.

APX4000

SHANK TYPE

Right hand tool holder only.

Type	Order Number	Stock R	Number of Teeth	Dimensions(mm) DC	DCON	LF	LH	*2 RMPX	Max. Allowable Revolution (min^{-1})	Type (Fig.)	*1 Clamp Screw	Wrench	Anti-seize Lubricant	Inserts
Extra Long	**APX4000R252SA25ELA**	●	2	25	25	220	80	11°	18900	1	TPS4	TIP15W	MK1KS	AOMT 1848○○ PEER-○
	APX4000R282SA25ELA	●	2	28	25	220	35	9°	17700	2	TPS4	TIP15W	MK1KS	
	APX4000R322SA32ELA	●	2	32	32	260	100	7°	16300	1	TPS4	TIP15W	MK1KS	
	APX4000R323SA32ELA	●	3	32	32	260	100	7°	16300	1	TPS4	TIP15W	MK1KS	
	APX4000R352SA32ELA	●	2	35	32	260	45	6°	15400	2	TPS4	TIP15W	MK1KS	
	APX4000R353SA32ELA	●	3	35	32	260	45	6°	15400	2	TPS4	TIP15W	MK1KS	
	APX4000R402SA32ELA	●	2	40	32	260	45	6°	14200	2	TPS43	TIP15W	MK1KS	
	APX4000R403SA32ELA	●	3	40	32	260	45	6°	14200	2	TPS43	TIP15W	MK1KS	
	APX4000R404SA32ELA	●	4	40	32	260	45	6°	14200	2	TPS43	TIP15W	MK1KS	

(Note 1) Additional machining is needed for this unit when using a corner insert of R3.2 or greater.
(Note 2) The maximum allowable revolutions are set to ensure tool and insert stability.
(Note 3) When using the tool at high spindle speeds, ensure that the tool and arbor are correctly balanced.
*1 Clamp Torque (N • m) : TPS4=4.0, TPS43=4.0
*2 RMPX : Max. Ramping Angle

APX4000

Fig.1

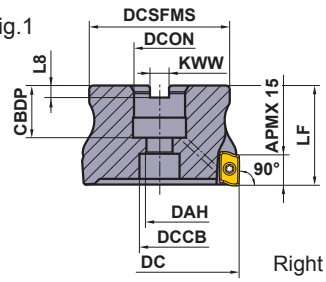
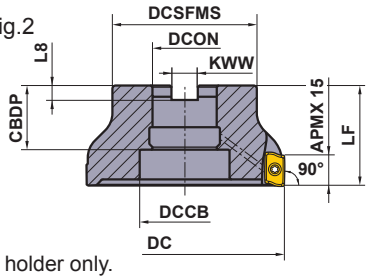
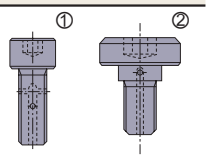


Fig.2



Right hand tool holder only.

Cutter Diameter DC	Set Bolt	Geometry
ϕ40	HSC08030H	①
ϕ50, ϕ63	HSC10030H	①
ϕ80	HSC12035H	①
ϕ100	HSC16040H	①
ϕ125	MBA20040H	②
ϕ160	MBA24045H	②



ARBOR TYPE

KAPR :90°
GAMP:+15°—+22° T :+21°—+28°
GAMF:+21°—+28° I :+15°—+22°

Order Number	Stock R	Number of Teeth	Dimensions(mm) DC	LF	DCON	CBDP	DAH	DCSFMS	KWW	L8	DCCB	WT *3 (kg)	RMPX *2	Max. Allowable Revolution (min⁻¹)	Type(Fig.)	Clamp Screw *1	Wrench	Anti-seize Lubricant	Insert
APX4000-040A04RA	●	4	40	40	16	18	9	34	8.4	5.6	14	0.2	6°	14200	1	TPS43	TIP15W	MK1KS	AOMT 1848□□ PEER-□
APX4000-050A05RA	●	5	50	40	22	20	11	45	10.4	6.3	17	0.3	4°	12400	1	TPS43	TIP15W	MK1KS	
APX4000-063A06RA	●	6	63	40	22	20	11	50	10.4	6.3	17	0.5	3°	10800	1	TPS43	TIP15W	MK1KS	
APX4000R08007CA	●	7	80	50	25.4	26	13	70	9.5	6	20	1.2	2°	9300	1	TPS43	TIP15W	MK1KS	
APX4000R10008DA	●	8	100	63	31.75	32	17	80	12.7	8	26	2.1	1.5°	8100	1	TPS43	TIP15W	MK1KS	
APX4000R12509EA	●	9	125	63	38.1	40	—	100	15.9	10	56	3.3	1°	7100	2	TPS43	TIP15W	MK1KS	
APX4000R16010FA	●	10	160	63	50.8	40	—	100	19.1	11	72	4.8	1°	6100	2	TPS43	TIP15W	MK1KS	

(Note 1) Additional machining is needed for this unit when using a corner insert of R3.2 or greater.
(Note 2) The maximum allowable revolutions are set to ensure tool and insert stability.
(Note 3) When using the tool at high spindle speeds, ensure that the tool and arbor are correctly balanced.
*1 Clamp Torque (N • m) : TPS43=4.0
*2 RMPX : Max. Ramping Angle
*3 WT : Tool Weight

● : Inventory maintained in Japan.

APX4000

Fig.1

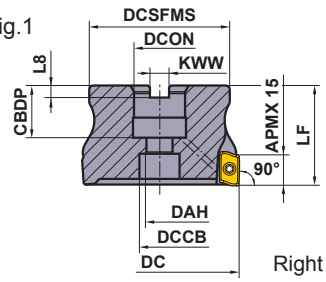
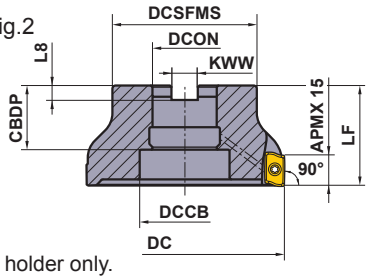
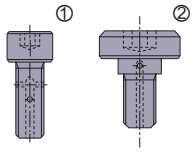


Fig.2



Right hand tool holder only.

Cutter Diameter DC	Set Bolt	Geometry
ϕ40	HSC08030H	①
ϕ50, ϕ63	HSC10030H	①
ϕ80	HSC12035H	①
ϕ100	HSC16040H	①
ϕ125	MBA20040H	②
ϕ160	MBA20040H	②



For metric arbor

The cutter bore diameter DCON is indicated in millimetre.

ARBOR TYPE

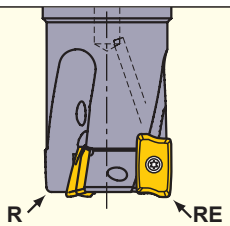
KAPR :90°
GAMP:+15°—+22° T :+21°—+28°
GAMF:+21°—+28° I :+15°—+22°

Order Number	Stock R	Number of Teeth	Dimensions(mm) DC	LF	DCON	CBDP	DAH	DCSFMS	KWW	L8	DCCB	WT*3 (kg)	RMPX*2	Max. Allowable Revolution (min⁻¹)	Type(Fig.)	*1 Clamp Screw	Wrench	Anti-seize Lubricant	Insert
APX4000-040A04RA	●	4	40	40	16	18	9	34	8.4	5.6	14	0.2	6°	14200	1	TPS43	TIP15W	MK1KS	AOMT 1848□□ PEER-□
APX4000-050A05RA	●	5	50	40	22	20	11	45	10.4	6.3	17	0.3	4°	12400	1	TPS43	TIP15W	MK1KS	
APX4000-063A06RA	●	6	63	40	22	20	11	50	10.4	6.3	17	0.5	3°	10800	1	TPS43	TIP15W	MK1KS	
APX4000-080A07RA	●	7	80	50	27	23	13	60	12.4	7	20	1.2	2°	9300	1	TPS43	TIP15W	MK1KS	
APX4000-100A08RA	●	8	100	50	32	26	17	70	14.4	8	27	2.1	1.5°	8100	1	TPS43	TIP15W	MK1KS	
APX4000-125A09RA	●	9	125	63	40	40	—	90	16.4	9	56	3.3	1°	7100	2	TPS43	TIP15W	MK1KS	
APX4000-160A10RA	●	10	160	63	40	40	—	100	16.4	9	72	4.8	1°	6100	2	TPS43	TIP15W	MK1KS	

(Note 1) Additional machining is needed for this unit when using a corner insert of R3.2 or greater.
(Note 2) The maximum allowable revolutions are set to ensure tool and insert stability.
(Note 3) When using the tool at high spindle speeds, ensure that the tool and arbor are correctly balanced.
*1 Clamp Torque (N • m) : TPS43=4.0 *2 RMPX : Max. Ramping Angle
*3 WT : Tool Weight

NOTE ON USE OF INSERTS WITH LARGE CORNER RADII

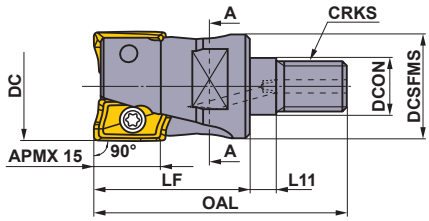
When using inserts with corner radius RE≥R3.2, please machine the holder with a radius form as shown on the right.

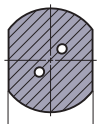


RE (mm)	R (mm)
3.2	2.0
4.0	2.5
5.0	3.5
6.35	5.0

R : Holder end radius
RE : Insert corner radius

APX4000





● With through air & coolant holes.

SCREW-IN TYPE

Right hand tool holder only.

Order Number	Stock	Number of Teeth	Dimensions(mm)								*2 WT (kg)	*1 Clamp Screw	Wrench	Anti-seize Lubricant	Insert
	R		DC	DCON	DCSFMS	OAL	LF	L11	H	CRKS					
APX4000R252M12A35	●	2	25	12.5	23.5	57	35	6	19	M12	0.2	TPS4	TIP15W	MK1KS	AOMT 1848○○ PEER-○
APX4000R282M12A35	●	2	28	12.5	23.5	57	35	6	19	M12	0.2	TPS4	TIP15W	MK1KS	
APX4000R322M16A40	●	2	32	17	28.5	63	40	6	24	M16	0.3	TPS4	TIP15W	MK1KS	
APX4000R323M16A40	●	3	32	17	28.5	63	40	6	24	M16	0.3	TPS4	TIP15W	MK1KS	
APX4000R352M16A40	●	2	35	17	28.5	63	40	6	24	M16	0.3	TPS4	TIP15W	MK1KS	
APX4000R353M16A40	●	3	35	17	28.5	63	40	6	24	M16	0.3	TPS4	TIP15W	MK1KS	
APX4000R403M16A40	●	3	40	17	28.5	63	40	6	24	M16	0.3	TPS43	TIP15W	MK1KS	
APX4000R404M16A40	●	4	40	17	28.5	63	40	6	24	M16	0.3	TPS43	TIP15W	MK1KS	

(Note 1) Additional machining is needed for this unit when using a corner insert of R3.2 or greater.
*1 Clamp Torque (N • m) : TPS4=4.0, TPS43=4.0
*2 WT : Tool Weight

● : **Inventory maintained in Japan.**

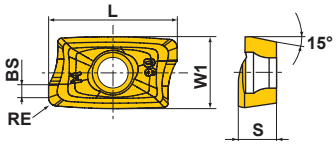
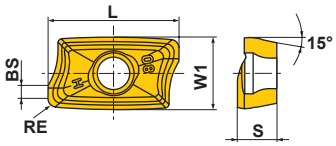
APX4000

INSERTS

Work Material		MC5020	MP6120	MP6130	MP7130	MP9120	MP9130	VP15TF	VP20RT
P	Steel		◐	✠				◐	◐
M	Stainless Steel				◔			◔	◔
K	Cast Iron	◐						✠	✠
S	Heat-resistant Alloy, Titanium Alloy					◐	✠	◐	
H	Hardened Steel							◔	

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✠ : Unstable Cutting

Honing :
E : Round

Shape	Order Number	Class	Honing	MC5020	MP6120	MP6130	MP7130	MP9120	MP9130	VP15TF	VP20RT	L	W1	S	BS	RE*	Geometry
				Coated								Dimensions (mm)					
General **M** Breaker	**AOMT184804PEER-M**	M	E		●	●	●	●	●	●	●	18	9	4.8	1.8	0.4	
	AOMT184808PEER-M	M	E		●	●	●	●	●	●	●	18	9	4.8	1.4	0.8	
	AOMT184810PEER-M	M	E		●			●	●	●		18	9	4.8	1.0	1.0	
	AOMT184812PEER-M	M	E		●			●	●	●		18	9	4.8	0.8	1.2	
	AOMT184816PEER-M	M	E		●	●	●	●	●	●	●	18	9	4.8	0.4	1.6	
	AOMT184820PEER-M	M	E		●			●	●	●		18	9	4.8	0.4	2.0	
Strong Cutting Edge Type **H** Breaker	**AOMT184804PEER-H**	M	E	●	●	●	●	●	●	●	●	18	9	4.8	1.8	0.4	
	AOMT184808PEER-H	M	E	●	●	●	●	●	●	●	●	18	9	4.8	1.4	0.8	
	AOMT184816PEER-H	M	E	●	●	●	●	●	●	●	●	18	9	4.8	0.4	1.6	
	AOMT184832PEER-H	M	E			●	●				●	18	9	4.8	0.4	3.2	
	AOMT184840PEER-H	M	E			●	●				●	18	9	4.8	0.4	4.0	
	AOMT184850PEER-H	M	E			●	●				●	18	9	4.8	—	5.0	
	AOMT184864PEER-H	M	E			●	●				●	18	9	4.8	—	6.35	

* Nose R is different from the workpiece of R shape depending on the axial rake angle of the body.

■ = MIRACLE SIGMA

● : **Inventory maintained in Japan. (10 inserts in one case)**

APX4000

RECOMMENDED CUTTING CONDITIONS

CUTTING SPEED

	Work Material	Hardness	Insert Grade 1st Recommenedation	Insert Grade 2nd Recommenedation	Breaker		Cutting Width **ae** (mm) ≤0.25DC	0.25—0.5DC	0.5—0.75DC	DC (Slot)
							Cutting Speed **vc** (m/min)			
P	Mild Steel	≤180HB	MP6120	VP15TF	M	H	230(180—270)	220(170—260)	180(140—210)	180(140—210)
			MP6130	VP20RT	M	H	200(150—240)	190(140—230)	150(110—180)	150(110—180)
	Carbon Steel Alloy Steel	180—350HB	MP6120	VP15TF	M	H	180(140—210)	170(130—200)	140(110—160)	140(110—160)
			MP6130	VP20RT	M	H	150(110—180)	140(100—170)	110(80—130)	110(80—130)
M	Stainless Steel	≤270HB	MP7130	VP20RT	M	H	180(140—210)	170(130—200)	140(110—160)	140(110—160)
K	Gray Cast Iron	≤350MPa	MC5020	VP15TF	H		250(200—300)	240(190—290)	210(160—260)	140(110—160)
	Ductile, Cast Iron	≤800MPa	MC5020	VP15TF	H		130(100—150)	120(90—140)	100(80—120)	100(80—120)
S	Titanium Alloy	≤350HB	MP9120	VP15TF	H	M	50(40—70)			50(40—70)
			MP9130	VP20RT	H	M	40(30—60)			40(30—60)
	Heat-resistant Alloy	—	MP9120	VP15TF	H	M	40(30—60)			40(30—60)
			MP9130	VP20RT	H	M	30(20—40)			30(20—40)
H	Hardened Steel	40—55HRC	VP15TF		H		90(70—100)	85(60—100)	70(50—80)	70(50—80)

DEPTH OF CUT AND FEED

	Work Material	Hardness	Cutting Width **ae** (mm)	Depth of Cut **ap** (mm)	Feed per Tooth **fz** (mm/t.) Cutter Diameter (mm) ø25—ø40	ø50—ø80	ø100—ø160
P	Mild Steel Carbon Steel Alloy Steel	≤180HB 180—350HB	≤0.5DC	≤5	0.30	0.30	0.25
				5—7.5	0.25	0.25	0.20
				7.5—10	0.20	0.20	0.15
				10—12.5	0.15	0.15	0.10
				12.5—15	0.10	0.10	0.07
			0.5—0.75DC	≤5	0.20	0.20	0.15
				5—10	0.15	0.15	0.10
				10—15	0.10	0.10	0.07
			DC (Slot)	≤5	0.15	0.15	0.15
				5—7.5	0.10	0.10	0.10
				7.5—10	0.07	0.07	0.07
M	Stainless Steel	≤270HB	≤0.5DC	≤5	0.30	0.25	0.25
				5—7.5	0.25	0.20	0.20
				7.5—10	0.20	0.15	0.15
				10—12.5	0.15	0.10	0.10
				12.5—15	0.10	0.07	0.07
			0.5—0.75DC	≤5	0.20	0.15	0.15
				5—10	0.15	0.10	0.10
				10—15	0.10	0.07	0.07
			DC (Slot)	≤5	0.15	0.15	0.15
				5—7.5	0.10	0.10	0.10
				7.5—10	0.07	0.07	0.07
K	Gray Cast Iron	Tensile Strength ≤350MPa	≤0.5DC	≤5	0.30	0.30	0.25
				5—7.5	0.25	0.25	0.20
				7.5—10	0.20	0.20	0.15
				10—12.5	0.15	0.15	0.10
				12.5—15	0.10	0.10	0.07
			0.5—0.75DC	≤5	0.20	0.20	0.15
				5—10	0.15	0.15	0.10
				10—15	0.10	0.10	0.07
			DC (Slot)	≤5	0.15	0.15	0.15
				5—7.5	0.10	0.10	0.10
				7.5—10	0.07	0.07	0.07
	Ductile, Cast Iron	Tensile Strength ≤800MPa	≤0.5DC	≤5	0.25	0.25	0.25
				5—7.5	0.20	0.20	0.20
				7.5—10	0.15	0.15	0.15
				10—12.5	0.10	0.10	0.10
				12.5—15	0.07	0.07	0.07
			0.5—0.75DC	≤5	0.20	0.20	0.15
				5—10	0.15	0.15	0.10
				10—15	0.10	0.10	0.07
			DC (Slot)	≤5	0.15	0.15	0.15
				5—7.5	0.10	0.10	0.10
				7.5—10	0.07	0.07	0.07

APX4000

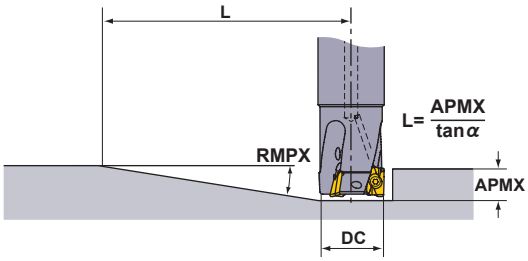
	Work Material	Hardness	Cutting Width **ae** (mm)	Depth of Cut **ap** (mm)	Feed per Tooth **fz** (mm/t.) Cutter Diameter (mm) ø25—ø40	ø50—ø80	ø100—ø160
S	Titanium Alloy	≤350HB	≤0.25DC	≤5	0.15	0.10	0.10
				5—7.5	0.10	0.05	0.05
				7.5—10	0.05	—	—
			DC (Slot)	≤5	0.05	0.05	0.05
	Heat-resistant Alloy	—	≤0.25DC	≤2	0.10	0.05	0.05
			DC (Slot)	≤1	0.05	0.05	0.05
H	Hardened Steel	40—55HRC	≤0.25DC	≤5	0.15	0.15	0.15
				5—7.5	0.10	0.10	0.10
				7.5—10	0.07	0.07	0.07
			0.25—0.5DC	≤5	0.10	0.10	0.10
				5—7.5	0.07	0.07	0.07
			0.5—0.75DC	≤5	0.07	0.07	0.07
			DC (Slot)	≤5	0.07	0.07	0.07

(Note 1) These cutting conditions are a guide to the standard shank type and the arbor type.
Please make adjustments according to the machining conditions.
(Note 2) Vibration is liable to occur in certain cases. Please reduce the depth of cut and / or reduce cutting conditions in the following cases.
- When using the long shank type and extra long shank type.
- When using long tool overhang with the standard or arbor type.
- When the application has poor clamping rigidity or when using a low rigidity machine.

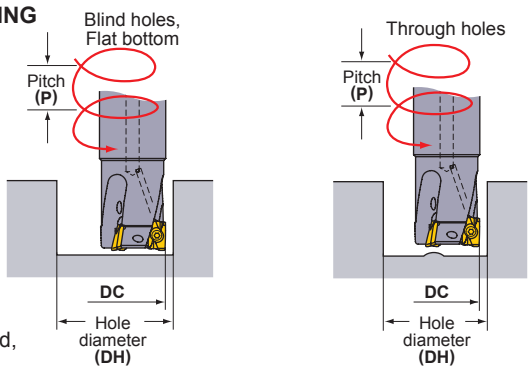
(Note 3) In case of coarse and fine pitch cutters, the coarse pitch type is recommended to prevent vibration.
(Note 4) For heavy interrupted and unstable cutting, the H breaker is first recommendation.

RAMPING/HELICAL CUTTING

RAMPING



HELICAL CUTTING



Refer to the table below for cutting conditions. For feed per tooth and cutting speed, follow the cutting conditions for slot milling.

Cutting Edge Diameter **DC** (mm)	Ramping: Maximum Ramping Angle **RMPX**	Ramping: Minimum Distance *1 **L** (mm)	Helical Cutting (Blind Hole, Flat Bottom): Maximum Hole Diameter *2 **DH max.** (mm)	Maximum Pitch **P max.** (mm)	Minimum Hole Diameter **DH min.** (mm)	Maximum Pitch **P max.** (mm)	Helical Cutting (Through Hole): Minimum Hole Diameter **DH min.** (mm)	Maximum Pitch **P max.** (mm)
25	11°	85	48	14	45	12	32	4
28	9°	105	54	12	51	11	38	4
32	7°	135	62	11	59	10	46	5
35	6°	158	68	10	65	9	52	5
40	6°	158	78	12	75	11	62	7
50	4°	238	98	10	95	9	82	7
63	3°	318	124	10	121	9	108	7
80	2°	477	158	8	155	8	142	6
100	1.5°	636	198	8	195	7	182	6
125	1°	954	248	6	245	6	232	5
160	1°	954	318	8	315	8	302	7

(Note) When machining highly ductile materials with ramping angles above, chips could be continuous.
In this case, decrease the ramping angle or feed per tooth.
*1 L (=15 / tan α). Cutters' moving distance until depth of cut reaches 15mm at a maximum ramping angle.
*2 In case corner radius of 0.8mm. Other than that, find with the below formula.
{(cutting edge diameter DC)−(corner radius)−0.2}×2

AXD4000

Aluminium Alloy to Difficult-to-cut Material Cutting

Product Information

90° KAPR

Work Material

P N S F R

SYMBOL DESCRIPTIONS >> 1350
TECHNICAL DATA >> 1987
ISO13399 Property >> 1966

Fig.1

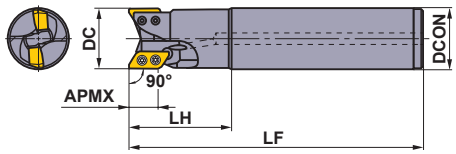
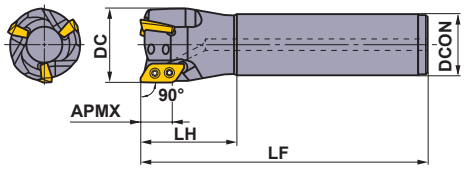


Fig.2



SHANK TYPE

Right hand tool holder only.

Type	Insert Corner Radius RE	Order Number	Stock R	Number of Teeth	Dimensions(mm) DC	LF	LH	DCON	APMX (mm)	Max. Allowable Revolution (min^{-1})	Type(Fig.)	* Clamp Screw	Wrench	Anti-seize Lubricant	Insert
A Type	0.4 | 3.2	**AXD4000R201SA20SA**	●	1	20	110	35	20	15.5	15000	1	TS3SBS	TKY08D	MK1KS	XDGX1750○○ PD○R-○○
		AXD4000R252SA25SA	●	2	25	125	50	25	15.5	49000	1	TS3SB	TKY08D	MK1KS	
		AXD4000R252SA25LA	●	2	25	170	80	25	15.5	49000	1	TS3SB	TKY08D	MK1KS	
		AXD4000R282SA25SA	●	2	28	125	50	25	15.5	48500	2	TS3SB	TKY08D	MK1KS	
		AXD4000R282SA25ELA	●	2	28	220	50	25	15.5	48500	2	TS3SB	TKY08D	MK1KS	
		AXD4000R322SA32SA	●	2	32	150	50	32	15.5	48000	1	TS3SB	TKY08D	MK1KS	
		AXD4000R322SA32LA	●	2	32	200	80	32	15.5	48000	1	TS3SB	TKY08D	MK1KS	
		AXD4000R352SA32SA	●	2	35	150	50	32	15.5	45000	2	TS3SB	TKY08D	MK1KS	
		AXD4000R352SA32ELA	●	2	35	250	50	32	15.5	45000	2	TS3SB	TKY08D	MK1KS	
		AXD4000R403SA32SA	●	3	40	150	50	32	15.5	41000	2	TS3SB	TKY08D	MK1KS	
		AXD4000R403SA42SA	●	3	40	170	80	42	15.5	41000	1	TS3SB	TKY08D	MK1KS	
		AXD4000R403SA32ELA	●	3	40	250	50	32	15.5	41000	2	TS3SB	TKY08D	MK1KS	

(Note 1) The maximum allowable revolutions are set to ensure tool and insert stability.
(Note 2) When using the tool at high spindle speeds, ensure that the tool and chuck are correctly balanced.
(Note 3) Note for inserts with a corner radius of 1.6 and above, as corner radius increases the LF and LH dimensions decrease.
* Clamp Torque (N • m) : TS3SBS=1.5, TS3SB=1.5
* Use the clamp screw by setting the bundled screw.

● : **Inventory maintained in Japan.**

AXD4000

SHANK TYPE

Type	Insert Corner Radius RE	Order Number	Stock R	Number of Teeth	Dimensions(mm) DC	LF	LH	DCON	APMX (mm)	Max. Allowable Revolution (min^{-1})	Type(Fig.)	* Clamp Screw	Wrench	Anti-seize Lubricant	Insert
B Type	4.0 | 5.0	**AXD4000R201SA20SB**	●	1	20	110	35	20	14.8	15000	1	TS3SBS	TKY08D	MK1KS	XDGX1750◌◌ PD◌R-◌◌
		AXD4000R252SA25SB	●	2	25	125	50	25	14.8	49000	1	TS3SB	TKY08D	MK1KS	
		AXD4000R252SA25LB	●	2	25	170	80	25	14.8	49000	1	TS3SB	TKY08D	MK1KS	
		AXD4000R282SA25SB	●	2	28	125	50	25	14.8	48500	2	TS3SB	TKY08D	MK1KS	
		AXD4000R282SA25ELB	●	2	28	220	50	25	14.8	48500	2	TS3SB	TKY08D	MK1KS	
		AXD4000R322SA32SB	●	2	32	150	50	32	14.8	48000	1	TS3SB	TKY08D	MK1KS	
		AXD4000R322SA32LB	●	2	32	200	80	32	14.8	48000	1	TS3SB	TKY08D	MK1KS	
		AXD4000R352SA32SB	●	2	35	150	50	32	14.8	45000	2	TS3SB	TKY08D	MK1KS	
		AXD4000R352SA32ELB	●	2	35	250	50	32	14.8	45000	2	TS3SB	TKY08D	MK1KS	
		AXD4000R403SA32SB	●	3	40	150	50	32	14.8	41000	2	TS3SB	TKY08D	MK1KS	
		AXD4000R403SA42SB	●	3	40	170	80	42	14.8	41000	1	TS3SB	TKY08D	MK1KS	
		AXD4000R403SA32ELB	●	3	40	250	50	32	14.8	41000	2	TS3SB	TKY08D	MK1KS	

(Note 1) The maximum allowable revolutions are set to ensure tool and insert stability.
(Note 2) When using the tool at high spindle speeds, ensure that the tool and chuck are correctly balanced.
(Note 3) Note for inserts with a corner radius of 1.6 and above, as corner radius increases the LF and LH dimensions decrease.
* Clamp Torque (N • m) : TS3SBS=1.5, TS3SB=1.5
* Use the clamp screw by setting the bundled screw.

AXD4000

Fig. 1

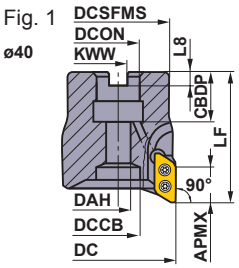


Fig. 2

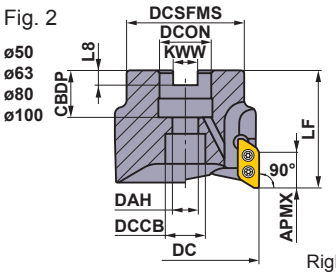
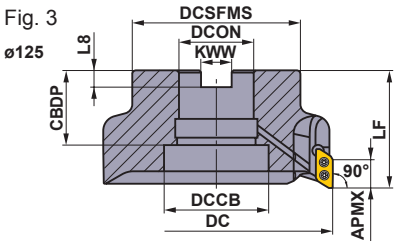
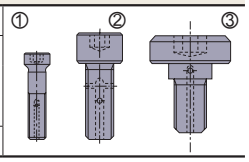


Fig. 3



Right hand tool holder only.

Cutter Diameter DC	Set Bolt	Geometry
ϕ40	HFF08043H	①
ϕ50, ϕ63	HSC10030H	②
ϕ80	HSC12035H	②
ϕ100	HSC16040H	②
ϕ125	MBA20040H	③



KAPR :90°
GAMP:+14°−15° T :+21°−+26°
GAMF:+21°−+26° I :+14°−+15°

ARBOR TYPE

Type	Insert Corner Radius RE	Order Number	Stock R	Number of Teeth	DC	LF	DCON	CBDP	DAH	DCSFMS	KWW	L8	DCCB	WT*2 (kg)	APMX (mm)	Max. Allowable Revolution (min^{-1})	Type(Fig.)	Clamp Screw *1	Wrench	Anti-seize Lubricant	Insert
A Type	0.4 I 3.2	**AXD4000-040A02RA**	●	2	40	50	16	18	8.5	34	8.4	5.6	12	0.3	15.5	41000	1	TS3SB	TKY08D	MK1KS	XDGX1750○○ PD○R-○○
		AXD4000-040A03RA	●	3	40	50	16	18	8.5	34	8.4	5.6	12	0.3	15.5	41000	1	TS3SB	TKY08D	MK1KS	
		AXD4000-050A02RA	●	2	50	50	22	20	11	45	10.4	6.3	17	0.4	15.5	35000	2	TS3SB	TKY08D	MK1KS	
		AXD4000-050A04RA	●	4	50	50	22	20	11	45	10.4	6.3	17	0.4	15.5	35000	2	TS3SB	TKY08D	MK1KS	
		AXD4000-063A05RA	●	5	63	50	22	20	11	50	10.4	6.3	17	0.6	15.5	30000	2	TS3SB	TKY08D	MK1KS	
		AXD4000R08005CA	●	5	80	50	25.4	26	13	60	9.5	6	20	1.0	15.5	27000	2	TS3SB	TKY08D	MK1KS	
		AXD4000R10006DA	●	6	100	63	31.75	32	17	70	12.7	8	26	2.0	15.5	23000	2	TS3SB	TKY08D	MK1KS	
		AXD4000R12507EA	●	7	125	63	38.1	40	—	90	15.9	10	56	2.8	15.5	20000	3	TS3SB	TKY08D	MK1KS	
B Type	4.0 I 5.0	**AXD4000-040A02RB**	●	2	40	50	16	18	8.5	34	8.4	5.6	12	0.3	14.8	41000	1	TS3SB	TKY08D	MK1KS	
		AXD4000-040A03RB	●	3	40	50	16	18	8.5	34	8.4	5.6	12	0.3	14.8	41000	1	TS3SB	TKY08D	MK1KS	
		AXD4000-050A02RB	●	2	50	50	22	20	11	45	10.4	6.3	17	0.4	14.8	35000	2	TS3SB	TKY08D	MK1KS	
		AXD4000-050A04RB	●	4	50	50	22	20	11	45	10.4	6.3	17	0.4	14.8	35000	2	TS3SB	TKY08D	MK1KS	
		AXD4000-063A05RB	●	5	63	50	22	20	11	50	10.4	6.3	17	0.6	14.8	30000	2	TS3SB	TKY08D	MK1KS	
		AXD4000R08005CB	●	5	80	50	25.4	26	13	60	9.5	6	20	1.0	14.8	27000	2	TS3SB	TKY08D	MK1KS	
		AXD4000R10006DB	●	6	100	63	31.75	32	17	70	12.7	8	26	2.0	14.8	23000	2	TS3SB	TKY08D	MK1KS	
		AXD4000R12507EB	●	7	125	63	38.1	40	—	90	15.9	10	56	2.8	14.8	20000	3	TS3SB	TKY08D	MK1KS	

(Note 1) The maximum allowable spindle speeds are set to ensure tool and insert stability.
(Note 2) When using the tool at high spindle speeds, ensure that the tool and arbor are correctly balanced.
(Note 3) Note for inserts with a corner radius of 1.6 and above, as corner radius increases the LF dimension decrease.
*1 Clamp Torque (N • m) : TS3SB=1.5
*1 Use the clamp screw by setting the bundled screw.
*2 WT : Tool Weight

● : **Inventory maintained in Japan.**

AXD4000

METRIC Standard

For metric arbor

ARBOR TYPE

KAPR :90°
GAMP:+14°−15°　T :+21°−+26°
GAMF:+21°−+26°　I :+14°−+15°

Type	Insert Corner Radius RE	Order Number	Stock R	Number of Teeth	Dimensions(mm) DC	LF	DCON	CBDP	DAH	DCSFMS	KWW	L8	DCCB	WT *2 (kg)	APMX (mm)	Max. Allowable Revolution (min⁻¹)	Type(Fig.)	Clamp Screw *1	Wrench	Anti-seize Lubricant	Insert
A Type	0.4 I 3.2	**AXD4000-040A02RA**	●	2	40	50	16	18	8.5	34	8.4	5.6	12	0.3	15.5	41000	1	TS3SB	TKY08D	MK1KS	XDGX1750○○ PD○R-○○
		AXD4000-040A03RA	●	3	40	50	16	18	8.5	34	8.4	5.6	12	0.3	15.5	41000	1	TS3SB	TKY08D	MK1KS	
		AXD4000-050A02RA	●	2	50	50	22	20	11	45	10.4	6.3	17	0.4	15.5	35000	2	TS3SB	TKY08D	MK1KS	
		AXD4000-050A04RA	●	4	50	50	22	20	11	45	10.4	6.3	17	0.4	15.5	35000	2	TS3SB	TKY08D	MK1KS	
		AXD4000-063A05RA	●	5	63	50	22	20	11	50	10.4	6.3	17	0.6	15.5	30000	2	TS3SB	TKY08D	MK1KS	
		AXD4000-080A05RA	●	5	80	50	27	23	13	60	12.4	7	20	1.0	15.5	27000	2	TS3SB	TKY08D	MK1KS	
		AXD4000-100A06RA	●	6	100	63	32	26	17	78	14.4	8	26	2.0	15.5	23000	2	TS3SB	TKY08D	MK1KS	
		AXD4000-125B07RA	●	7	125	63	40	40	—	90	16.4	9	56	2.8	15.5	20000	3	TS3SB	TKY08D	MK1KS	
B Type	4.0 I 5.0	**AXD4000-040A02RB**	●	2	40	50	16	18	8.5	34	8.4	5.6	12	0.3	14.8	41000	1	TS3SB	TKY08D	MK1KS	
		AXD4000-040A03RB	●	3	40	50	16	18	8.5	34	8.4	5.6	12	0.3	14.8	41000	1	TS3SB	TKY08D	MK1KS	
		AXD4000-050A02RB	●	2	50	50	22	20	11	45	10.4	6.3	17	0.4	14.8	35000	2	TS3SB	TKY08D	MK1KS	
		AXD4000-050A04RB	●	4	50	50	22	20	11	45	10.4	6.3	17	0.4	14.8	35000	2	TS3SB	TKY08D	MK1KS	
		AXD4000-063A05RB	●	5	63	50	22	20	11	50	10.4	6.3	17	0.6	14.8	30000	2	TS3SB	TKY08D	MK1KS	
		AXD4000-080A05RB	●	5	80	50	27	23	13	60	12.4	7	20	1.0	14.8	27000	2	TS3SB	TKY08D	MK1KS	
		AXD4000-100A06RB	●	6	100	63	32	26	17	78	14.4	8	26	2.0	14.8	23000	2	TS3SB	TKY08D	MK1KS	
		AXD4000-125B07RB	●	7	125	63	40	40	—	90	16.4	9	56	2.8	14.8	20000	3	TS3SB	TKY08D	MK1KS	

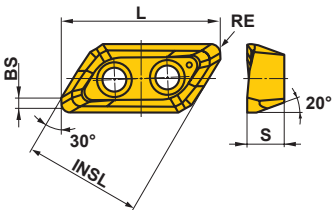
(Note 1) The maximum allowable spindle speeds are set to ensure tool and insert stability.
(Note 2) When using the tool at high spindle speeds, ensure that the tool and arbor are correctly balanced.
(Note 3) Note for inserts with a corner radius of 1.6 and above, as corner radius increases the LF dimension decrease.
*1 Clamp Torque (N • m) : TS3SB=1.5
*1 Use the clamp screw by setting the bundled screw.
*2 WT : Tool Weight

AXD4000

INSERTS

Work Material			LC15TF	MP6120	MP9120		TF15	
	P	Steel	◐	●	✠		◐	
	N	Aluminium Alloy			◐			
	S	Titanium Alloy						

Cutting Conditions (Guide):
● :Stable Cutting ◐ :General Cutting ✠ :Unstable Cutting
Honing:
F :Sharp **E** :Round

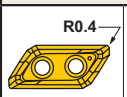
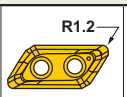
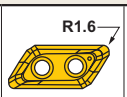
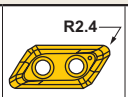
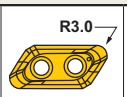
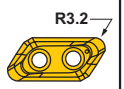
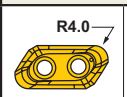
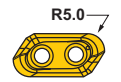
Shape	Order Number	Class	Honing	Stock: Coated LC15TF	Coated MP6120	Coated MP9120		Carbide TF15		Dimensions (mm) L	INSL	S	BS	RE*	Geometry
	XDGX175004PDFR-GL	G	F	●				●		23.0	17.5	5	1.7	0.4	
	XDGX175008PDFR-GL	G	F	●				●		23.0	17.5	5	1.3	0.8	
	XDGX175012PDFR-GL	G	F	●				●		23.0	17.5	5	0.9	1.2	
	XDGX175016PDFR-GL	G	F	●				●		22.0	17.5	5	1.4	1.6	
	XDGX175020PDFR-GL	G	F	●				●		22.0	17.5	5	1.0	2.0	
	XDGX175024PDFR-GL	G	F	●				●		22.0	17.5	5	0.6	2.4	
	XDGX175030PDFR-GL	G	F	●				●		21.1	17.5	5	0.8	3.0	
	XDGX175032PDFR-GL	G	F	●				●		21.1	17.5	5	0.6	3.2	
	XDGX175040PDFR-GL	G	F	●				●		20.0	17.5	5	0.8	4.0	
	XDGX175050PDFR-GL	G	F	●				●		19.4	17.5	5	0.4	5.0	
	XDGX175004PDER-GM	G	E		●	●				23.0	17.5	5	1.7	0.4	
	XDGX175008PDER-GM	G	E		●	●				23.0	17.5	5	1.3	0.8	
	XDGX175012PDER-GM	G	E		●	●				23.0	17.5	5	0.9	1.2	
	XDGX175016PDER-GM	G	E		●	●				22.0	17.5	5	1.4	1.6	
	XDGX175020PDER-GM	G	E		●	●				22.0	17.5	5	1.0	2.0	
	XDGX175024PDER-GM	G	E		●	●				22.0	17.5	5	0.6	2.4	
	XDGX175030PDER-GM	G	E		●	●				21.1	17.5	5	0.8	3.0	
	XDGX175032PDER-GM	G	E		●	●				21.1	17.5	5	0.6	3.2	
	XDGX175040PDER-GM	G	E		●	●				20.0	17.5	5	0.5	4.0	
	XDGX175050PDER-GM	G	E		●	●				19.4	17.5	5	0.4	5.0	
	XDGX175004PDFR-GM	G	F					●		23.0	17.5	5	1.7	0.4	
	XDGX175008PDFR-GM	G	F					●		23.0	17.5	5	1.3	0.8	
	XDGX175012PDFR-GM	G	F					●		23.0	17.5	5	0.9	1.2	
	XDGX175016PDFR-GM	G	F					●		22.0	17.5	5	1.4	1.6	
	XDGX175020PDFR-GM	G	F					●		22.0	17.5	5	1.0	2.0	
	XDGX175024PDFR-GM	G	F					●		22.0	17.5	5	0.6	2.4	
	XDGX175030PDFR-GM	G	F					●		21.1	17.5	5	0.8	3.0	
	XDGX175032PDFR-GM	G	F					●		21.1	17.5	5	0.6	3.2	
	XDGX175040PDFR-GM	G	F					●		20.0	17.5	5	0.5	4.0	
	XDGX175050PDFR-GM	G	F					●		19.4	17.5	5	0.4	5.0	

* Be careful because corner R(RE) has a different shape than machined workpiece R.
When a GM breaker is recommended, stress the dimensional precision of the workpiece shape.

■ = MIRACLE SIGMA

● : **Inventory maintained in Japan. (10 inserts in one case)**

Holder And Insert Corner Radius Combination

Holder	A Type Holder								B Type Holder	
	AXD4000–○○○○○○○A AXD4000R○○○○○○○A								AXD4000–○○○○○○B AXD4000R○○○○○○B	
Applicable Insert Corner R (RE)	R0.4	R0.8	R1.2	R1.6	R2.0	R2.4	R3.0	R3.2	R4.0	R5.0
										
	XDGX 175004PD○R-○○	XDGX 175008PD○R-○○	XDGX 175012PD○R-○○	XDGX 175016PD○R-○○	XDGX 175020PD○R-○○	XDGX 175024PD○R-○○	XDGX 175030PD○R-○○	XDGX 175032PD○R-○○	XDGX 175040PD○R-○○	XDGX 175050PD○R-○○

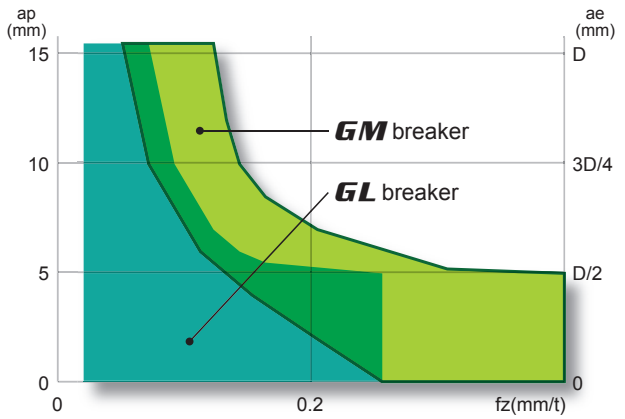
Not interchangeable with the corresponding inserts of the A type and B type holders.

AXD4000

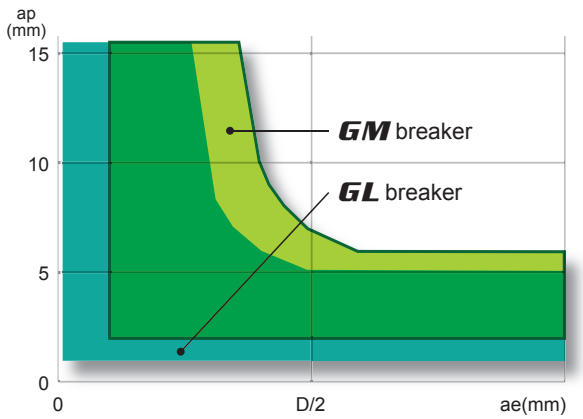
AXD4000 Selection of insert

It is necessary to choose the best insert according to the cutting conditions. Please select an insert from the tables below.
1st recommendation for stable cutting condition is the GL breaker with a strong cutting edge.

Selection of insert according to the feed per tooth and the required cutting depth

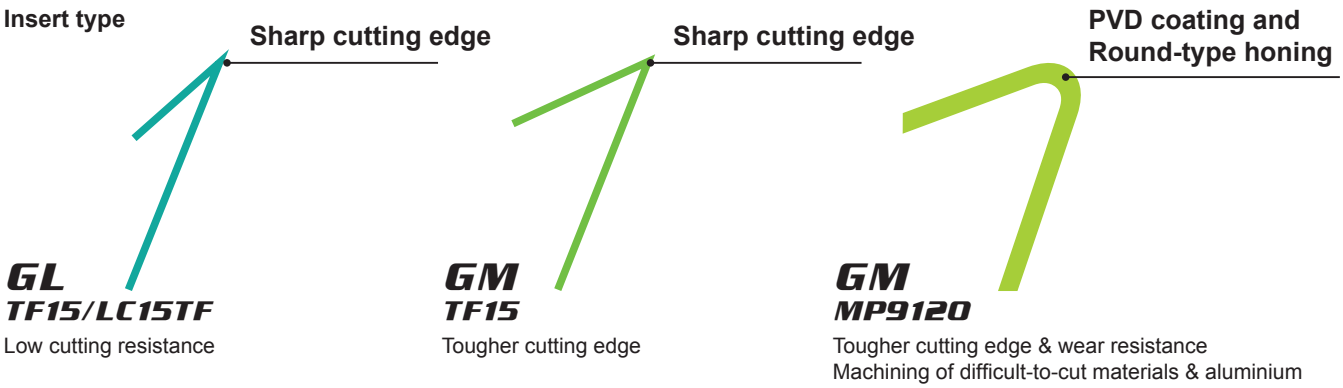


Selection of insert according to the width of cut and the required cutting depth

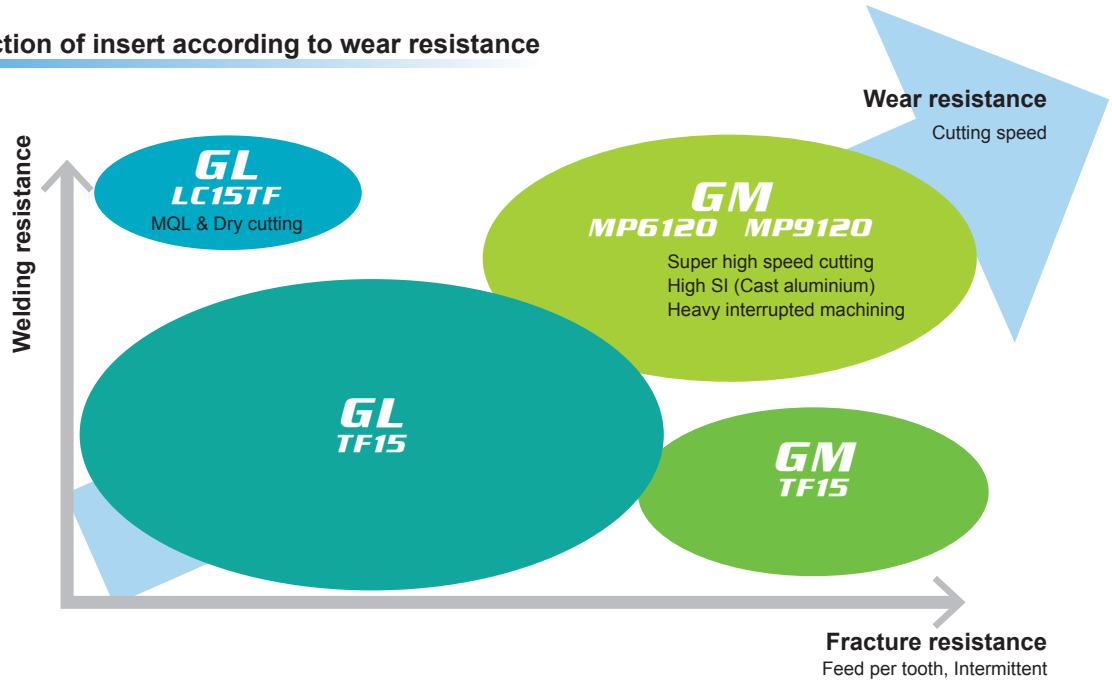


1st recommendation for machining aluminium alloys is GL breaker.
Under high-load conditions such as deep or high feed cutting, it is advisable to use the GM breaker.

Selection of insert according to cutting edge



Selection of insert according to wear resistance



AXD4000

Cutting Speed

	Work Material		Greade	Breaker	Cutting Speed **vc** (mm/min)
P	Mild Steel (ASTM A36,AISI 1010)	**≤180HB**	**MP6120**	**GM**	200 (150–220)
P	Carbon Steel, Alloy Steel (AISI 1045,AISI 4140)	**180–280HB**	**MP6120**	**GM**	200 (150–220)
N	Aluminium Alloy (A6061, A7075 etc)	**Si<5%**	**TF15 LC15TF**	**GL**	1000 (200–3000)
N			**TF15 MP9120**	**GM**	1000 (200–3000)
N	Aluminium Alloy (AC4B, ADC12, A390 etc)	**5%≤Si≤10% Si>10%**	**MP9120**	**GM**	1000 (200–3000)
S	Titanium Alloy (Ti-6Al-4V etc)		**MP9120**	**GM**	40 (30–60)

RECOMMENDED CUTTING CONDITIONS

	Work Material		Breaker	Cutting Width **ae** (mm)	Depth of Cut **ap** (mm)	Feed per Tooth (mm/t.) Cutting Edge Diameter **DC** 20	25, 28	32, 35	40	50, 63, 80	100, 125
P	Mild Steel (ASTM A36,AISI 1010)	**≤180HB**	**GM**	≤0.25 DC	≤ 5	≤ 0.05	≤ 0.15	≤ 0.15	≤ 0.18	≤ 0.18	≤ 0.18
					≤ 10	≤ 0.05	≤ 0.12	≤ 0.12	≤ 0.15	≤ 0.15	≤ 0.15
					≤ 14.5	≤ 0.05	≤ 0.10	≤ 0.10	≤ 0.12	≤ 0.12	–
				≤0.5 DC	≤ 5	≤ 0.05	≤ 0.12	≤ 0.15	≤ 0.15	≤ 0.18	≤ 0.18
					≤ 10	–	≤ 0.10	≤ 0.12	≤ 0.12	≤ 0.15	≤ 0.15
					≤ 14.5	–	≤ 0.08	≤ 0.10	≤ 0.10	≤ 0.12	–
				≤0.75 DC	≤ 5	≤ 0.05	≤ 0.12	≤ 0.12	≤ 0.15	≤ 0.15	≤ 0.15
					≤ 10	–	≤ 0.10	≤ 0.10	≤ 0.12	≤ 0.12	≤ 0.12
				DC (Slot)	≤ 5	≤ 0.05	≤ 0.10	≤ 0.12	≤ 0.12	≤ 0.15	≤ 0.15
	Carbon Steel, Alloy Steel (AISI 1045,AISI 4140)	**180–280HB**	**GM**	≤0.25 DC	≤ 5	≤ 0.05	≤ 0.15	≤ 0.15	≤ 0.18	≤ 0.18	≤ 0.18
					≤ 10	≤ 0.05	≤ 0.12	≤ 0.12	≤ 0.15	≤ 0.15	≤ 0.15
					≤ 14.5	≤ 0.05	≤ 0.10	≤ 0.10	≤ 0.12	≤ 0.12	–
				≤0.5 DC	≤ 5	≤ 0.05	≤ 0.12	≤ 0.15	≤ 0.15	≤ 0.18	≤ 0.18
					≤ 10	–	≤ 0.10	≤ 0.12	≤ 0.12	≤ 0.15	≤ 0.15
					≤ 14.5	–	≤ 0.08	≤ 0.10	≤ 0.10	≤ 0.12	–
				≤0.75 DC	≤ 5	≤ 0.05	≤ 0.12	≤ 0.12	≤ 0.15	≤ 0.15	≤ 0.15
					≤ 10	–	≤ 0.10	≤ 0.10	≤ 0.12	≤ 0.12	≤ 0.12
				DC (Slot)	≤ 5	≤ 0.05	≤ 0.10	≤ 0.12	≤ 0.12	≤ 0.15	≤ 0.15

(Note 1) The above cutting conditions are determined based on high workpiece and machine rigidity, where no vibration occurred.
If vibrations occur make adjustments according to the machining conditions.
(Note 2) Note, vibrations may occur in the following conditions.
- When using long tool overhang.
- When pocket machining corner radii.
- When the workpiece has poor clamping rigidity or when the machine rigidity or workpiece rigidity is low, vibrations can occur easily, if so, reduce cutting conditions such as width and depth of cut and feed per tooth.

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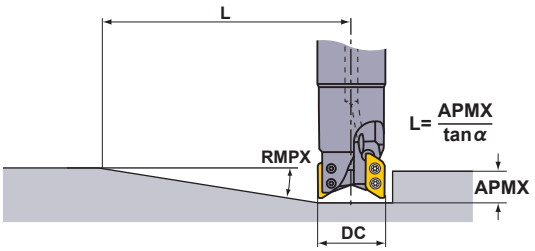
Work Material			Breaker	Cutting Width **ae** (mm)	Depth of Cut **ap** (mm)	Feed per Tooth (mm/t.) Cutting Edge Diameter **DC** 20	25, 28	32, 35	40	50, 63, 80	100, 125
N	Aluminium Alloy (A6061, A7075 etc)	Si<5%	GL	≤0.25 DC	≤ 5	≤ 0.05	≤ 0.25	≤ 0.25	≤ 0.25	≤ 0.25	≤ 0.25
					≤ 10	≤ 0.05	≤ 0.2	≤ 0.2	≤ 0.2	≤ 0.2	≤ 0.2
					≤ 14.5	≤ 0.05	≤ 0.15	≤ 0.15	≤ 0.15	≤ 0.15	≤ 0.15
				≤0.5 DC	≤ 5	≤ 0.05	≤ 0.25	≤ 0.25	≤ 0.25	≤ 0.25	≤ 0.25
					≤ 10	–	≤ 0.2	≤ 0.2	≤ 0.2	≤ 0.2	≤ 0.2
					≤ 14.5	–	≤ 0.15	≤ 0.15	≤ 0.15	≤ 0.15	≤ 0.15
				≤0.75 DC	≤ 5	≤ 0.05	≤ 0.25	≤ 0.25	≤ 0.25	≤ 0.25	≤ 0.25
					≤ 10	–	≤ 0.2	≤ 0.2	≤ 0.2	≤ 0.2	≤ 0.2
					≤ 14.5	–	≤ 0.15	≤ 0.15	≤ 0.15	≤ 0.15	≤ 0.15
				DC (Slot)	≤ 5	≤ 0.05	≤ 0.25	≤ 0.25	≤ 0.25	≤ 0.25	≤ 0.25
	Aluminium Alloy (A6061, A7075 etc)	Si<5%	GM	≤0.25 DC	≤ 5	≤ 0.05	≤ 0.35	≤ 0.35	≤ 0.4	≤ 0.4	≤ 0.4
					≤ 10	≤ 0.05	≤ 0.3	≤ 0.3	≤ 0.35	≤ 0.35	≤ 0.35
					≤ 14.5	≤ 0.05	≤ 0.25	≤ 0.25	≤ 0.3	≤ 0.3	≤ 0.3
				≤0.5 DC	≤ 5	≤ 0.05	≤ 0.35	≤ 0.35	≤ 0.35	≤ 0.4	≤ 0.4
					≤ 10	–	≤ 0.3	≤ 0.3	≤ 0.3	≤ 0.35	≤ 0.35
					≤ 14.5	–	≤ 0.2	≤ 0.25	≤ 0.25	≤ 0.3	≤ 0.3
				≤0.75 DC	≤ 5	≤ 0.05	≤ 0.3	≤ 0.3	≤ 0.3	≤ 0.35	≤ 0.35
					≤ 10	–	≤ 0.25	≤ 0.25	≤ 0.25	≤ 0.3	≤ 0.3
					≤ 14.5	–	≤ 0.2	≤ 0.2	≤ 0.2	≤ 0.25	≤ 0.25
				DC (Slot)	≤ 5	≤ 0.05	≤ 0.25	≤ 0.25	≤ 0.3	≤ 0.35	≤ 0.35
	Aluminium Alloy (AC4B etc) Aluminium Alloy (ADC12, A390 etc)	5%≤Si≤10% Si>10%	GM	≤0.25 DC	≤ 5	≤ 0.05	≤ 0.35	≤ 0.35	≤ 0.4	≤ 0.4	≤ 0.4
					≤ 10	≤ 0.05	≤ 0.3	≤ 0.3	≤ 0.35	≤ 0.35	≤ 0.35
					≤ 14.5	≤ 0.05	≤ 0.25	≤ 0.25	≤ 0.3	≤ 0.3	≤ 0.3
				≤0.5 DC	≤ 5	≤ 0.05	≤ 0.35	≤ 0.35	≤ 0.35	≤ 0.4	≤ 0.4
					≤ 10	–	≤ 0.3	≤ 0.3	≤ 0.3	≤ 0.35	≤ 0.35
					≤ 14.5	–	≤ 0.2	≤ 0.25	≤ 0.25	≤ 0.3	≤ 0.3
				≤0.75 DC	≤ 5	≤ 0.05	≤ 0.3	≤ 0.3	≤ 0.3	≤ 0.35	≤ 0.35
					≤ 10	–	≤ 0.25	≤ 0.25	≤ 0.25	≤ 0.3	≤ 0.3
					≤ 14.5	–	≤ 0.2	≤ 0.2	≤ 0.2	≤ 0.25	≤ 0.25
				DC (Slot)	≤ 5	≤ 0.05	≤ 0.25	≤ 0.25	≤ 0.3	≤ 0.35	≤ 0.35
S	Titanium Alloy (Ti-6Al-4V etc)		GM	≤0.25 DC	≤ 5	≤ 0.05	≤ 0.1	≤ 0.1	≤ 0.1	≤ 0.1	≤ 0.1
					≤ 10	≤ 0.05	≤ 0.1	≤ 0.1	≤ 0.1	≤ 0.1	≤ 0.1
					≤ 14.5	≤ 0.05	≤ 0.1	≤ 0.1	≤ 0.1	≤ 0.1	≤ 0.1
				≤0.5 DC	≤ 5	≤ 0.05	≤ 0.08	≤ 0.1	≤ 0.1	≤ 0.1	≤ 0.1
					≤ 10	–	≤ 0.08	≤ 0.1	≤ 0.1	≤ 0.1	≤ 0.1
					≤ 14.5	–	≤ 0.08	≤ 0.1	≤ 0.1	≤ 0.1	≤ 0.1
				≤0.75 DC	≤ 5	≤ 0.05	≤ 0.05	≤ 0.08	≤ 0.1	≤ 0.1	≤ 0.1
					≤ 10	–	≤ 0.05	≤ 0.08	≤ 0.1	≤ 0.1	≤ 0.1
					≤ 14.5	–	≤ 0.05	≤ 0.08	≤ 0.1	≤ 0.1	≤ 0.1
				DC (Slot)	≤ 5	≤ 0.05	≤ 0.05	≤ 0.05	≤ 0.05	≤ 0.05	≤ 0.05

(Note 1) The above cutting conditions are determined based on high workpiece and machine rigidity, where no vibration occurred.
If vibrations occur make adjustments according to the machining conditions.
(Note 2) Note, vibrations may occur in the following conditions.
- When using long tool overhang.
- When pocket machining corner radii.
- When the workpiece has poor clamping rigidity or when the machine rigidity or workpiece rigidity is low, vibrations can occur easily, if so, reduce cutting conditions such as width and depth of cut and feed per tooth.

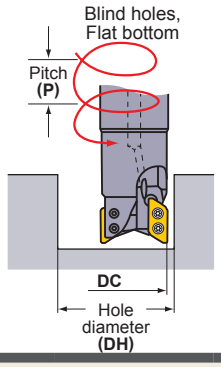
AXD4000

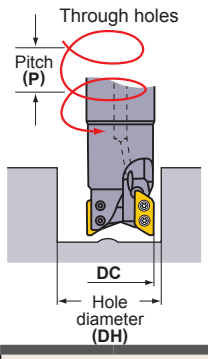
RAMPING/HELICAL CUTTING

● RAMPING



● HELICAL CUTTING





RAMPING/HELICAL CUTTING (Aluminium Alloy)

Holder Type	Cutting Edge Diameter DC (mm)	Insert Corner R RE (mm)	Ramping: Maximum Ramping Angle RMPX	Ramping: Minimum Distance L *1 (mm)	Helical Milling (Blind Hole, Flat Bottom): Maximum Hole Diameter DH max. (mm)	Helical Milling (Blind Hole, Flat Bottom): Maximum Pitch P max. (mm)	Helical Milling (Blind Hole, Flat Bottom): Minimum Hole Diameter DH min. (mm)	Helical Milling (Blind Hole, Flat Bottom): Maximum Pitch P max. (mm)	Helical Milling: Minimum Hole Diameter DH min. (mm)	Helical Milling: Maximum Pitch P max. (mm)
A type	20	0.4—1.2	20.7°	42	37.1 *2	14	36.1	14	22	2
		1.6—2.4	19.9°	43	34.7 *3	13	34.6	13	22	2
		3.0—3.2	18.9°	46	33.1 *4	12	33.3	12	22	1
	25	0.4—1.2	23.1°	37	47.1 *2	14	46	14	31.6	8
		1.6—2.4	22.0°	39	44.7 *3	13	44.4	13	31.6	8
		3.0—3.2	18.7°	46	43.1 *4	12	43	12	31.6	7
	28	0.4—1.2	19.2°	45	53.1 *2	14	52	14	36	8
		1.6—2.4	18.5°	47	50.7 *3	13	50.4	13	36	8
		3.0—3.2	16.7°	52	49.1 *4	12	48.9	12	36	7
	32	0.4—1.2	15.4°	57	61.1 *2	14	59.9	14	45.5	11
		1.6—2.4	14.7°	60	58.7 *3	13	58.3	13	45.5	11
		3.0—3.2	13.8°	64	57.1 *4	12	56.8	12	45.5	10
	35	0.4—1.2	13.4°	66	67.1 *2	14	65.8	14	50	11
		1.6—2.4	12.7°	69	64.7 *3	13	64.3	13	50	10
		3.0—3.2	11.8°	75	63.1 *4	12	62.8	12	50	9
	40	0.4—1.2	11.1°	80	76.7 *2	14	75.9	14	61.5	13
		1.6—2.4	10.4°	85	74.3 *3	13	74.2	13	61.5	12
		3.0—3.2	9.7°	91	72.7 *4	12	72.7	12	61.5	11
	50	0.4—1.2	8.2°	108	96.7 *2	14	95.6	14	81.4	14
		1.6—2.4	7.6°	117	94.3 *3	13	94	13	81.4	13
		3.0—3.2	6.9°	129	92.7 *4	12	92.4	12	81.4	11
	63	0.4—1.2	6.1°	146	122.7 *2	14	121.6	14	107.4	14
		1.6—2.4	5.6°	159	120.3 *3	13	119.9	13	107.4	13
		3.0—3.2	5.2°	171	118.7 *4	12	118.4	12	107.4	12
	80	0.4—1.2	4.6°	193	156.7 *2	14	155.6	14	141.4	14
		1.6—2.4	4.2°	212	154.3 *3	13	153.9	13	141.4	13
		3.0—3.2	3.8°	234	152.7 *4	12	152.4	12	141.4	12
	100	0.4—1.2	3.5°	254	196.7 *2	14	195.5	14	181.5	14
		1.6—2.4	3.2°	278	194.3 *3	13	193.9	13	181.5	13
		3.0—3.2	2.9°	306	192.7 *4	12	192.3	12	181.5	12
	125	0.4—1.2	2.7°	329	246.7 *2	14	245.5	14	231.5	14
		1.6—2.4	2.5°	356	244.3 *3	13	243.8	13	231.5	13
		3.0—3.2	2.3°	386	242.7 *4	12	242.3	12	231.5	12

AXD4000

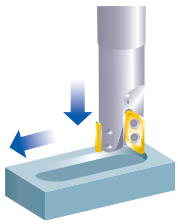
Holder Type	Cutting Edge Diameter **DC** (mm)	Insert Corner R **RE** (mm)	Ramping		Helical Milling (Blind Hole, Flat Bottom)				Helical Milling	
			Maximum Ramping Angle **RMPX**	Minimum Distance **L** *1 (mm)	Maximum Hole Diameter **DH max.** (mm)	Maximum Pitch **P max.** (mm)	Minimum Hole Diameter **DH min.** (mm)	Maximum Pitch **P max.** (mm)	Minimum Hole Diameter **DH min.** (mm)	Maximum Pitch **P max.** (mm)
B type	20	4	17.5°	47	31.5	10	31.8	10	22	1
		5	16.6°	71	29.5	6	31.1	7	22	1
	25	4	15.1°	55	41.5	10	41.4	10	31.7	5
		5	13.7°	61	39.5	9	40.6	9	31.7	5
	28	4	14.1°	59	47.5	10	47.2	10	36	6
		5	13°	65	45.5	9	46.4	9	36	5
	32	4	12.7°	66	55.5	10	55.1	10	45.5	9
		5	12°	70	53.5	9	54.3	9	45.5	8
	35	4	10.8°	78	61.5	10	61	10	50	8
		5	10.2°	83	59.5	9	60.2	9	50	8
	40	4	8.8°	96	71.1	10	70.9	10	61.5	10
		5	8.2°	103	69.1	9	70.1	9	61.5	9
	50	4	6.3°	135	91.1	10	90.6	10	81.3	10
		5	5.8°	146	89.1	9	89.8	9	81.3	9
	63	4	4.6°	184	117.1	10	116.6	10	107.4	10
		5	4.2°	202	115.1	9	115.7	9	107.3	9
	80	4	3.4°	250	151.1	10	150.5	10	141.4	10
		5	3.1°	274	149.1	9	149.6	9	141.4	9
	100	4	2.6°	326	191.1	10	190.5	10	181.4	10
		5	2.4°	354	189.1	9	189.6	9	181.4	9
	125	4	2°	424	241.1	10	240.5	10	231.4	10
		5	1.8°	471	239.1	9	239.6	9	229.9	9

(Note 1) The recommended ramping feed is 0.05mm/tooth or under.
*1) Using the maximum ramping angle, the distance to reach the maximum depth of cut is as follows:
L= (maximum depth of cut APMX/tan α). Maximum depth of cut A type is 15.5mm, B type is 14.8mm.
*2) Corner radius of 1.2mm. For other corner radii, use the following formula. {(cutting edge diameter DC)–(corner radius RE)–0.25}×2
*3) Corner radius of 2.4mm. For other corner radii, use the following formula. {(cutting edge diameter DC)–(corner radius RE)–0.25}×2
*4) Corner radius of 3.2mm. For other corner radii, use the following formula. {(cutting edge diameter DC)–(corner radius RE)–0.25}×2

Max.Drilling Depth (Aluminium Alloy)

Type	Insert Corner R **RE** (mm)	Max.Drilling Depth (mm)					
		Cutting Edge Diameter **DC**					
		ϕ20	**ϕ25**	**ϕ28**	**ϕ32**	**ϕ35**	**ϕ40–ϕ125**
A type	0.4	5.3	5.2	5.2	5.2	5.3	5.3
	0.8	5.3	5.2	5.2	5.2	5.3	5.3
	1.2	5.3	5.2	5.2	5.2	5.3	5.3
	1.6	4.8	4.6	4.7	4.7	4.9	4.8
	2.0	4.8	4.6	4.7	4.7	4.9	4.8
	2.4	4.8	4.6	4.7	4.7	4.9	4.8
	3.0	4.3	3.7	4.2	4.2	4.4	4.4
	3.2	4.3	3.7	4.2	4.2	4.4	4.4
B type	4.0	3.7	2.7	3.7	3.6	3.8	3.8
	5.0	3.4	2.3	3.3	3.3	3.5	3.5

AXD4000 can be effectively used for pocket machining without the need for a prepared hole.



AXD7000

For Aluminium Alloy

Product Information

90° KAPR

Work Material

P N S F R

SYMBOL DESCRIPTIONS >> 1350
TECHNICAL DATA >> 1987
ISO13399 Property >> 1966

- Low resistance chipbreaker.
- Low resistance insert and high rigidity design for excellent performance.
- For high-speed machining.
- Multi-functional machining.

Fig.1

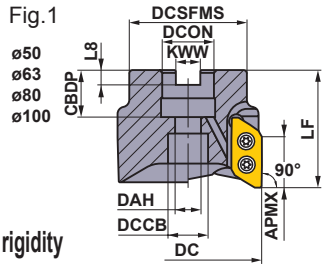
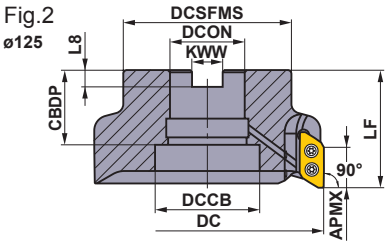
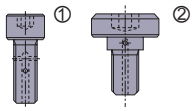


Fig.2



Right hand tool holder only.

Cutter Diameter DC	Set Bolt	Geometry
ϕ50, ϕ63	HSC10030H	①
ϕ80	HSC12035H	①
ϕ100	HSC16040H	①
ϕ125	MBA20040H	②



ARBOR TYPE

KAPR :90°
GAMP:+11° T :+26°—+29°
GAMF:+26°—+29° I :+11°

Type	Insert Corner Radius RE	Order Number	Stock R	Number of Teeth	Dimensions (mm) DC	LF	DCON	CBDP	DAH	DCSFMS	KWW	L8	DCCB	*2 WT (kg)	APMX (mm)	Max. Allowable Revolution (min⁻¹)	Type (Fig.)	*1 Clamp Screw	Wrench	Anti-seize Lubricant	Insert
A Type	0.8 I 3.2	AXD7000-050A03RA	●	3	50	50	22	20	11	45	10.4	6.3	17	0.4	21	30000	1	TS4SBL	TKY15D	MK1KS	XDGX2270○○ PDFR-GL
		AXD7000-063A03RA	●	3	63	50	22	20	11	50	10.4	6.3	17	0.5	21	25000	1	TS4SBL	TKY15D	MK1KS	
		AXD7000R08004CA	●	4	80	63	25.4	26	13	63	9.5	6	20	1.2	21	23000	1	TS4SBL	TKY15D	MK1KS	
		AXD7000R10005DA	●	5	100	63	31.75	32	17	70	12.7	8	26	1.8	21	19000	1	TS4SBL	TKY15D	MK1KS	
		AXD7000R12506EA	●	6	125	63	38.1	40	—	90	15.9	10	56	2.7	21	16000	2	TS4SBL	TKY15D	MK1KS	
B Type	4.0 I 5.0	AXD7000-050A03RB	●	3	50	50	22	20	11	45	10.4	6.3	17	0.4	20.4	30000	1	TS4SBL	TKY15D	MK1KS	
		AXD7000-063A03RB	●	3	63	50	22	20	11	50	10.4	6.3	17	0.5	20.4	25000	1	TS4SBL	TKY15D	MK1KS	
		AXD7000R08004CB	●	4	80	63	25.4	26	13	63	9.5	6	20	1.2	20.4	23000	1	TS4SBL	TKY15D	MK1KS	
		AXD7000R10005DB	●	5	100	63	31.75	32	17	70	12.7	8	26	1.8	20.4	19000	1	TS4SBL	TKY15D	MK1KS	
		AXD7000R12506EB	●	6	125	63	38.1	40	—	90	15.9	10	56	2.7	20.4	16000	2	TS4SBL	TKY15D	MK1KS	

(Note 1) The maximum allowable revolutions are set to ensure tool and insert stability.
(Note 2) When using the tool at high spindle speeds, ensure that the tool and chuck are correctly balanced.
(Note 3) Note for inserts with a corner radius of 3.0 and above, as corner radius increases the LF and LH dimensions decreases.
*1 Clamp Torque (N • m) : TS4SB=3.5, TS4SBL=3.5
*1 Use the clamp screw by setting the bundled screw.
*2 WT : Tool Weight

● : **Inventory maintained in Japan.**

AXD7000

Fig.1

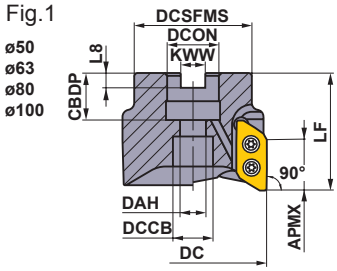
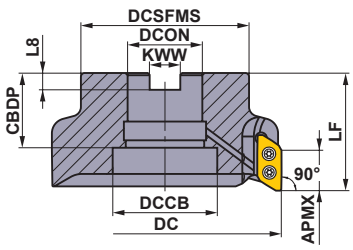


Fig.2

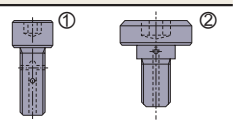


Right hand tool holder only.

For metric arbor

The cutter bore diameter DCON is indicated in millimetre.

Cutter Diameter DC	Set Bolt	Geometry
ϕ50, ϕ63	HSC10030H	①
ϕ80	HSC12035H	①
ϕ100	HSC16040H	①
ϕ125	MBA20040H	②



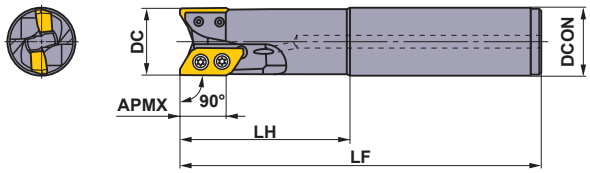
ARBOR TYPE

KAPR :90°
GAMP:+11°
GAMF:+26°—+29°
T :+26°—+29°
I :+11°

Type	Insert Corner Radius RE	Order Number	Stock R	Number of Teeth	Dimensions (mm) DC	LF	DCON	CBDP	DAH	DCSFMS	KWW	L8	DCCB	*2 WT (kg)	APMX (mm)	Max. Allowable Revolution (min⁻¹)	Type (Fig.)	*1 Clamp Screw	Wrench	Anti-seize Lubricant	Insert
A Type	0.8 I 3.2	AXD7000-050A03RA	●	3	50	50	22	20	11	45	10.4	6.3	17	0.4	21	30000	1	TS4SBL	TKY15D	MK1KS	XDGX2270□□ PDFR-GL
		AXD7000-063A03RA	●	3	63	50	22	20	11	50	10.4	6.3	17	0.5	21	25000	1	TS4SBL	TKY15D	MK1KS	
		AXD7000-080A04RA	●	4	80	63	27	23	13	63	12.4	7	20	1.2	21	23000	1	TS4SBL	TKY15D	MK1KS	
		AXD7000-100A05RA	●	5	100	63	32	26	17	70	14.4	8	26	1.8	21	19000	1	TS4SBL	TKY15D	MK1KS	
		AXD7000-125B06RA	●	6	125	63	40	40	—	90	16.4	9	56	2.7	21	16000	2	TS4SBL	TKY15D	MK1KS	
B Type	4.0 I 5.0	AXD7000-050A03RB	●	3	50	50	22	20	11	45	10.4	6.3	17	0.4	20.4	30000	1	TS4SBL	TKY15D	MK1KS	
		AXD7000-063A03RB	●	3	63	50	22	20	11	50	10.4	6.3	17	0.5	20.4	25000	1	TS4SBL	TKY15D	MK1KS	
		AXD7000-080A04RB	●	4	80	63	27	23	13	63	12.4	7	20	1.2	20.4	23000	1	TS4SBL	TKY15D	MK1KS	
		AXD7000-100A05RB	●	5	100	63	32	26	17	70	14.4	8	26	1.8	20.4	19000	1	TS4SBL	TKY15D	MK1KS	
		AXD7000-125B06RB	●	6	125	63	40	40	—	90	16.4	9	56	2.7	20.4	16000	2	TS4SBL	TKY15D	MK1KS	

(Note 1) The maximum allowable revolutions are set to ensure tool and insert stability.
(Note 2) When using the tool at high spindle speeds, ensure that the tool and chuck are correctly balanced.
(Note 3) Note for inserts with a corner radius of 3.0 and above, as corner radius increases the LF and LH dimensions decreases.
*1 Clamp Torque (N • m) : TS4SB=3.5, TS4SBL=3.5
*1 Use the clamp screw by setting the bundled screw.
*2 WT : Tool Weight

AXD7000



SHANK TYPE

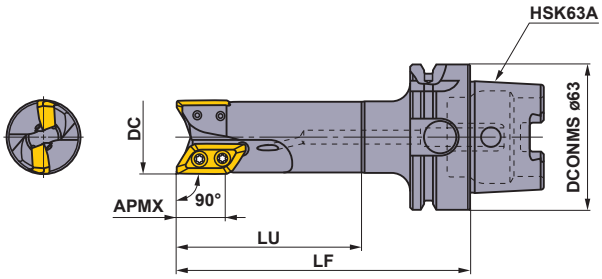
Right hand tool holder only.

Type	Insert Corner Radius RE	Order Number	Stock R	Number of Teeth	Dimensions (mm) DC	LF	LH	DCON	APMX (mm)	Max. Allowable Revolution (min^{-1})	*1 Clamp Screw	Wrench	Anti-seize Lubricant	Insert
A Type	0.8 – 3.2	**AXD7000R322SA32SA**	●	2	32	170	80	32	21	41000	TS4SB	TKY15D	MK1KS	XDGX2270○○ PDFR-GL
		AXD7000R402SA42SA	●	2	40	170	80	42	21	36000	TS4SBL	TKY15D	MK1KS	
B Type	4.0 – 5.0	**AXD7000R322SA32SB**	●	2	32	170	80	32	20.4	41000	TS4SB	TKY15D	MK1KS	
		AXD7000R402SA42SB	●	2	40	170	80	42	20.4	36000	TS4SBL	TKY15D	MK1KS	

(Note 1) The maximum allowable revolutions are set to ensure tool and insert stability.
(Note 2) When using the tool at high spindle speeds, ensure that the tool and chuck are correctly balanced.
(Note 3) Note for inserts with a corner radius of 3.0 and above, as corner radius increases the LF and LH dimensions decreases.
*1 Clamp Torque (N • m) : TS4SB=3.5, TS4SBL=3.5
*1 Use the clamp screw by setting the bundled screw.
*2 WT : Tool Weight

● : **Inventory maintained in Japan.**

AXD7000



HSK63A SHANK TYPE

Right hand tool holder only.

Type	Insert Corner Radius RE	Order Number	Stock R	Number of Teeth	Dimensions (mm) DC	LF	LU	APMX (mm)	Max. Allowable Revolution (min^{-1})	*1 Clamp Screw	Wrench	Anti-seize Lubricant	Insert
A Type	0.8 I 3.2	**AXD7000R03202A-H63A**	●	2	32	127	80	21	41000	TS4SB	TKY15D	MK1KS	XDGX2270□□ PDFR-GL
		AXD7000R04002A-H63A	●	2	40	132	85	21	36000	TS4SBL	TKY15D	MK1KS	
		AXD7000R05003A-H63A	●	3	50	137	90	21	30000	TS4SBL	TKY15D	MK1KS	

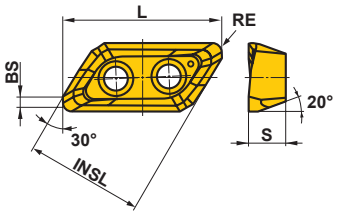
(Note 1) The maximum allowable revolutions are set to ensure tool and insert stability.
(Note 2) When using the tool at high spindle speeds, ensure that the tool and arbor are correctly balanced.
(Note 3) Note for inserts with a corner radius of 3.0 and above, as corner radius increases the LF and LU dimensions decreases.
(Note 4) No hole for data carrier.
*1 Clamp Torque (N • m) : TS4SB=3.5, TS4SBL=3.5
*1 Use the clamp screw by setting the bundled screw.
*2 WT : Tool Weight

AXD7000

INSERTS

Work Material			LC15TF	MP6120	MP9120		TF15	
	P	Steel	◐	●	✠		◐	
	N	Aluminium Alloy	◐		✠		◐	
	S	Titanium Alloy			◐			

Cutting Conditions (Guide):
● :Stable Cutting ◐ :General Cutting ✠ :Unstable Cutting
Honing :
E : Round **F :** Sharp

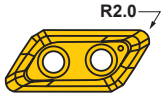
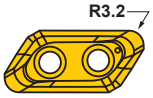
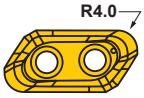
Shape	Order Number	Class	Honing	Stock: Coated LC15TF	Coated MP6120	Coated MP9120		Carbide TF15		Dimensions (mm) L	INSL	S	BS	RE *	Geometry
	XDGX227008PDFR-GL	G	F	●				●		30	22.5	7	2	0.8	
	XDGX227016PDFR-GL	G	F	●				●		30	22.5	7	1.2	1.6	
	XDGX227020PDFR-GL	G	F	●				●		30	22.5	7	0.8	2	
	XDGX227024PDER-GL	G	F	●				●		30	22.5	7	0.8	2.4	
	XDGX227030PDFR-GL	G	F	●				●		28.8	22.5	7	0.8	3	
	XDGX227032PDFR-GL	G	F	●				●		28.8	22.5	7	0.6	3.2	
	XDGX227040PDFR-GL	G	F	●				●		27.5	22.5	7	0.9	4	
	XDGX227050PDFR-GL	G	F	●				●		27	22.5	7	0.4	5	
	XDGX227008PDER-GLA	G	E		●	●				30	22.5	7	2	0.8	
	XDGX227016PDER-GLA	G	E		●	●				30	22.5	7	1.2	1.6	
	XDGX227020PDER-GLA	G	E		●	●				30	22.5	7	0.8	2	
	XDGX227024PDER-GLA	G	E		●	●				30	22.5	7	0.8	2.4	
	XDGX227030PDER-GLA	G	E		●	●				28.8	22.5	7	0.8	3	
	XDGX227032PDER-GLA	G	E		●	●				28.8	22.5	7	0.6	3.2	
	XDGX227040PDER-GLA	G	E		●	●				27.5	22.5	7	0.9	4	
	XDGX227050PDER-GLA	G	E		●	●				27	22.5	7	0.4	5	

* GLA breaker corner R (RE) is designed with almost same corner R as a mechined corner R of workpiece.
* Be careful because corner R (RE) has a different shape machined workpiece R.

■ = MIRACLE SIGMA

● : **Inventory maintained in Japan. (10 inserts in one case)**

HOLDER AND INSERT CORNER RADIUS COMBINATION

Holder	A Holder					B Holder	
	AXD7000–□□□□□□□A AXD7000R□□□□□□□A AXD7000R□□□□A-H63A					AXD7000–□□□□□□□B AXD7000R□□□□□□□B	
Insert Corner Radius (RE)	R0.8	R1.6	R2.0 	R3.0	R3.2 	R4.0 	R5.0
	XDGX 227008PDFR-GL	XDGX 227016PDFR-GL	XDGX 227020PDFR-GL	XDGX 227030PDFR-GL	XDGX 227032PDFR-GL	XDGX 227040PDFR-GL	XDGX 227050PDFR-GL

Not interchangeable with the corresponding inserts of the A type and B type holders.

Cutting Speed

	Work Material		Greade	Breaker	Cutting Speed vc (mm/min)
P	Mild Steel (ASTM A36,AISI 1010)	≤180HB	MP6120	GLA	200 (150—220)
P	Carbon Steel, Alloy Steel (AISI 1045,AISI 4140)	180—280HB	MP6120	GLA	200 (150—220)
N	Aluminium Alloy (A6061, A7075 etc)	Si<5%	LC15TF	GL	1000 (200—3000)
N	Aluminium Alloy (A6061, A7075 etc)	Si<5%	TF15	GL	1000 (200—3000)
N	Aluminium Alloy (AC4B, ADC12, A390 etc)	5%≤Si≤10% Si>10%	LC15TF	GL	1000 (200—3000)
S	Titanium Alloy (Ti-6A-4V)		MP9120	GLA	40 (30—60)

AXD7000

RECOMMENDED CUTTING CONDITIONS

Work Material			Breaker	Cutting Width **ae** (mm)	Depth of Cut **ap** (mm)	Feed per Tooth (mm/t.) Cutting Edge Diameter **DC** 32	40	50, 63, 80	100, 125
P	Mild Steel (ASTM A36, AISI 1010)	≤180HB	GLA	≤0.25 DC	≤ 5	≤ 0.18	≤ 0.2	≤ 0.2	≤ 0.2
					≤ 10	≤ 0.15	≤ 0.18	≤ 0.18	≤ 0.18
					≤ 15	≤ 0.12	≤ 0.15	≤ 0.15	≤ 0.15
					≤ 20	≤ 0.1	≤ 0.12	≤ 0.12	—
				≤0.5 DC	≤ 5	≤ 0.18	≤ 0.2	≤ 0.2	≤ 0.2
					≤ 10	≤ 0.15	≤ 0.18	≤ 0.18	≤ 0.18
					≤ 15	≤ 0.12	≤ 0.15	≤ 0.15	≤ 0.15
					≤ 20	≤ 0.1	≤ 0.12	≤ 0.12	—
				≤0.75 DC	≤ 5	≤ 0.15	≤ 0.15	≤ 0.18	≤ 0.18
					≤ 10	≤ 0.12	≤ 0.12	≤ 0.15	≤ 0.15
					≤ 15	≤ 0.1	≤ 0.1	≤ 0.12	≤ 0.12
				DC (Slot)	≤ 5	≤ 0.12	≤ 0.15	≤ 0.18	≤ 0.18
					≤ 10	≤ 0.1	≤ 0.12	≤ 0.15	≤ 0.15
	Carbon Steel Alloy Steel (AISI 1045, AISI 4140 etc)	180—280HB	GLA	≤0.25 DC	≤ 5	≤ 0.18	≤ 0.2	≤ 0.2	≤ 0.2
					≤ 10	≤ 0.15	≤ 0.18	≤ 0.18	≤ 0.18
					≤ 15	≤ 0.12	≤ 0.15	≤ 0.15	≤ 0.15
					≤ 20	≤ 0.1	≤ 0.12	≤ 0.12	—
				≤0.5 DC	≤ 5	≤ 0.18	≤ 0.2	≤ 0.2	≤ 0.2
					≤ 10	≤ 0.15	≤ 0.18	≤ 0.18	≤ 0.18
					≤ 15	≤ 0.12	≤ 0.15	≤ 0.15	≤ 0.15
					≤ 20	≤ 0.1	≤ 0.12	≤ 0.12	—
				≤0.75 DC	≤ 5	≤ 0.15	≤ 0.15	≤ 0.18	≤ 0.18
					≤ 10	≤ 0.12	≤ 0.12	≤ 0.15	≤ 0.15
					≤ 15	≤ 0.1	≤ 0.1	≤ 0.12	≤ 0.12
				DC (Slot)	≤ 5	≤ 0.12	≤ 0.15	≤ 0.18	≤ 0.18
					≤ 10	≤ 0.1	≤ 0.12	≤ 0.15	≤ 0.15

(Note 1) The above cutting conditions are determined based on high workpiece and machine rigidity, where no vibration occurred.
If vibrations occur make adjustments according to the machining conditions.

(Note 2) Note, vibrations may occur in the following conditions.
- When using long tool overhang.
- When pocket machining corner radii.
- When the workpiece has poor clamping rigidity or when the machine rigidity or workpiece rigidity is low, vibrations can occur easily, if so, reduce cutting conditions such as width and depth of cut and feed per tooth.

AXD7000

RECOMMENDED CUTTING CONDITIONS

	Work Material		Breaker	Cutting Width **ae** (mm)	Depth of Cut **ap** (mm)	Feed per Tooth (mm/t.) Cutting Edge Diameter **DC** 32	40	50, 63, 80	100, 125
N	Aluminium Alloy (A6061, A7075 etc)	**Si<5%**	**GL**	≤0.25 DC	≤ 5	≤ 0.35	≤ 0.4	≤ 0.4	≤ 0.4
					≤ 10	≤ 0.3	≤ 0.35	≤ 0.35	≤ 0.35
					≤ 15	≤ 0.25	≤ 0.3	≤ 0.3	≤ 0.3
					≤ 20	≤ 0.2	≤ 0.25	≤ 0.25	≤ 0.25
				≤0.5 DC	≤ 5	≤ 0.35	≤ 0.35	≤ 0.4	≤ 0.4
					≤ 10	≤ 0.3	≤ 0.3	≤ 0.35	≤ 0.35
					≤ 15	≤ 0.25	≤ 0.25	≤ 0.3	≤ 0.3
					≤ 20	≤ 0.2	≤ 0.2	≤ 0.25	≤ 0.25
				≤0.75 DC	≤ 5	≤ 0.3	≤ 0.3	≤ 0.35	≤ 0.35
					≤ 10	≤ 0.25	≤ 0.25	≤ 0.3	≤ 0.3
					≤ 15	≤ 0.2	≤ 0.2	≤ 0.25	≤ 0.25
					≤ 20	≤ 0.15	≤ 0.15	≤ 0.2	≤ 0.2
				DC (Slot)	≤ 5	≤ 0.25	≤ 0.3	≤ 0.35	≤ 0.35
					≤ 10	≤ 0.2	≤ 0.25	≤ 0.3	≤ 0.3
					≤ 15	≤ 0.15	≤ 0.2	≤ 0.25	≤ 0.25
					≤ 20	≤ 0.1	≤ 0.15	≤ 0.2	≤ 0.2
	Aluminium Alloy (AC4B etc) Aluminium Alloy (ADC12, A390 etc)	**5%≤Si≤10%** **Si>10%**	**GL**	≤0.25 DC	≤ 5	≤ 0.35	≤ 0.4	≤ 0.4	≤ 0.4
					≤ 10	≤ 0.3	≤ 0.35	≤ 0.35	≤ 0.35
					≤ 15	≤ 0.25	≤ 0.3	≤ 0.3	≤ 0.3
					≤ 20	≤ 0.2	≤ 0.25	≤ 0.25	≤ 0.25
				≤0.5 DC	≤ 5	≤ 0.35	≤ 0.35	≤ 0.4	≤ 0.4
					≤ 10	≤ 0.3	≤ 0.3	≤ 0.35	≤ 0.35
					≤ 15	≤ 0.25	≤ 0.25	≤ 0.3	≤ 0.3
					≤ 20	≤ 0.2	≤ 0.2	≤ 0.25	≤ 0.25
				≤0.75 DC	≤ 5	≤ 0.3	≤ 0.3	≤ 0.35	≤ 0.35
					≤ 10	≤ 0.25	≤ 0.25	≤ 0.3	≤ 0.3
					≤ 15	≤ 0.2	≤ 0.2	≤ 0.25	≤ 0.25
					≤ 20	≤ 0.15	≤ 0.15	≤ 0.2	≤ 0.2
				DC (Slot)	≤ 5	≤ 0.25	≤ 0.3	≤ 0.35	≤ 0.35
					≤ 10	≤ 0.2	≤ 0.25	≤ 0.3	≤ 0.3
					≤ 15	≤ 0.15	≤ 0.2	≤ 0.25	≤ 0.25
					≤ 20	≤ 0.1	≤ 0.15	≤ 0.2	≤ 0.2
S	Titanium Alloy (Ti-6Al-4V etc)		**GLA**	≤0.25 DC	≤ 5	≤ 0.1	≤ 0.12	≤ 0.12	—
					≤ 10	≤ 0.1	≤ 0.12	≤ 0.12	—
					≤ 15	≤ 0.1	≤ 0.12	≤ 0.12	—
					≤ 20	≤ 0.1	≤ 0.12	≤ 0.12	—
				≤0.5 DC	≤ 5	≤ 0.1	≤ 0.12	≤ 0.12	—
					≤ 10	≤ 0.1	≤ 0.12	≤ 0.12	—
					≤ 15	≤ 0.1	≤ 0.12	≤ 0.12	—
					≤ 20	—	≤ 0.1	≤ 0.1	—
				≤0.75 DC	≤ 5	≤ 0.1	≤ 0.12	≤ 0.12	—
					≤ 10	≤ 0.1	≤ 0.12	≤ 0.12	—
					≤ 15	≤ 0.1	≤ 0.12	≤ 0.12	—
					≤ 20	—	≤ 0.1	≤ 0.1	—
				DC (Slot)	≤ 5	≤ 0.08	≤ 0.08	≤ 0.08	—
					≤ 10	≤ 0.05	≤ 0.08	≤ 0.08	—

(Note 1) The above cutting conditions are determined based on high workpiece and machine rigidity, where no vibration occurred.
If vibrations occur make adjustments according to the machining conditions.
(Note 2) Note, vibrations may occur in the following conditions.
- When using long tool overhang.
- When pocket machining corner radii.
- When the workpiece has poor clamping rigidity or when the machine rigidity or workpiece rigidity is low, vibrations can occur easily, if so, reduce cutting conditions such as width and depth of cut and feed per tooth.

AXD7000

CAUTION FOR USE

Procedure for attaching inserts

1) Clean the seat by air blowing or with a brush before installing the insert.
2) Tighten the clamp screw using the accessory wrench while pressing the insert against the seat.
3) Tighten the clamp screw as shown in Figure 1.
4) Coat the clamp screw with anti-seize compound and tighten it to the specified tightening torque.
   The tightening torque is shown below.
   AXD7000 3.5N•m(2.58ft•lb)
   AXD4000 1.5N•m(1.11ft•lb)
5) The clamp screw is an important part in ensuring safety.
   Purchase an official product from Mitsubishi Materials.
   When using over the revolution shown in Table 2, replacing the clamp screw simultaneously with insert replacement is recommended.

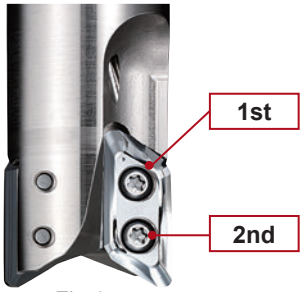
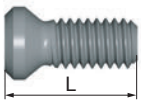


Fig.1

Type	AXD4000		AXD7000	
Cutting Edge Diameter **DC**(mm)	ø20	ø25−ø125	ø32	ø40−ø125
Clamp Screw Number	TS3SBS	TS3SB	TS4SB	TS4SBL
Overall Length **L**(mm)	6.5	8	9	10.5

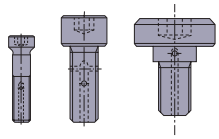


6) Check that there is no clearance at the insert seat surface.

Installation of arbor type

1) Clean carefully the inside and face of the hole and the arbor face before installing the body to the arbor.
2) Set the body at the arbor and tighten it with the accessory. Refer to the table shown below for the tightening torque.
3) The set bolt supplied with the AXD is a special coolant through compatible nozzle. Be careful not to lose it.

AXD4000

Geometry	Set Bolt	Clamp Torque (N • m)	Cutting Edge Diameter **DC**(mm)	Fig
Fig.1 Fig.2 Fig.3 	HFF08043H	11	ø40	1
	HSC10030H	40	ø50, ø63	2
	HSC12035H	80	ø80	2
	HSC16040H	150	ø100	2
	MBA20040H	320	ø120	3

AXD7000

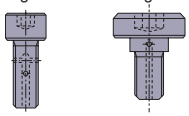
Geometry	Set Bolt	Clamp Torque (N•m)	Cutting Edge Diameter **DC**(mm)	Fig
Fig.1 Fig.2 	HSC10030H	40	ø50, ø63	1
	HSC12035H	80	ø80	1
	HSC16040H	150	ø100	1
	MBA20040H	320	ø120	2

Table 1 Max. Allowable Revolution

AXD4000

Cutting Edge Diameter **DC**(mm)	ø25	ø32	ø40	ø50	ø63	ø80	ø100	ø125
Max. Allowable Revolution (min^{-1})	49000	48000	41000	35000	30000	27000	23000	20000

AXD7000

Cutting Edge Diameter **DC**(mm)	ø32	ø40	ø50	ø63	ø80	ø100	ø125
Max. Allowable Revolution (min^{-1})	41000	36000	30000	25000	23000	19000	16000

● Even when operating under the maximum allowable spindle speed, if the spindle speed is equal to or higher than the values shown in table 2, it is recommended that the balance quality (with the arbor or milling chuck) conforms to G6.3 or betterbased on ISO1940. It is also recommended to replace the clamp screws with new ones when changing inserts. Furthermore,ensure to use machines that are provided with safety measures in case of cutter breakage.

(Note) The balance quality of the holder (without inserts and clamp screws) is G6.3 or better at 10,000min^{-1}.

Table 2 Maximum spindle speed when balancing with the arbor or milling chuck has not been achieved

AXD4000

Cutting Edge Diameter **DC**(mm)	ø25	ø32	ø40	ø50	ø63	ø80	ø100	ø125
Max. Allowable Revolution (min^{-1})	12000	9500	7600	6000	4800	3800	3000	2400

AXD7000

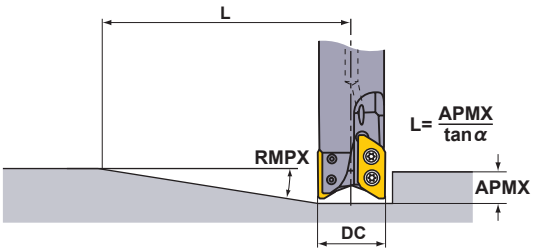
Cutting Edge Diameter **DC**(mm)	ø32	ø40	ø50	ø63	ø80	ø100	ø125
Max. Allowable Revolution (min^{-1})	9500	7600	6000	4800	3800	3000	2400

● When setting the spindle speed, take into consideration the maximum allowable spindle speed of the arbor or milling chuck.
● Use the specified set bolt when using the arbor type with through coolant.
● The inserts have sharp cutting edges and handling them with bare hands may cause injuries.
Always wear safety gloves whenhandling the indexable inserts.

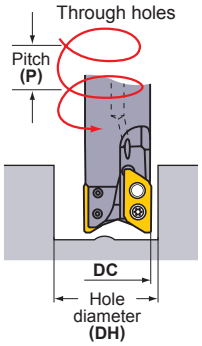
AXD7000

RAMPING/HELICAL CUTTING

RAMPING



HELICAL CUTTING



RAMPING/HELICAL CUTTING (ALUNIMIUM ALLOY)

Type	DC (mm)	RE (mm)	Ramping	
			RMPX	L (mm) *1
A type	32	0.8 - 2.4	19°	61
		3,3.2	18°	65
	40	0.8 - 2.4	14°	85
		3, 3.2	13°	91
	50	0.8 - 2.4	10°	120
		3, 3.2	9°	133
	63	0.8 - 2.4	8°	150
		3, 3.2	7°	172
	80	0.8 - 2.4	6°	200
		3, 3.2	5°	241
	100	0.8 - 2.4	4°	301
		3, 3.2	4°	301
	125	0.8 - 2.4	3°	401
		3, 3.2	3°	401
B type	32	4, 5	18°	63
	40	4, 5	11°	105
	50	4, 5	8°	146
	63	4, 5	6°	195
	80	4, 5	4°	292
	100	4, 5	3°	390
	125	4, 5	2°	585

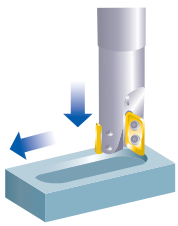
Type	DC (mm)	RE (mm)	Helical Milling	
			DH min. (mm)	P max. (mm)
A type	32	0.8 - 2.4	41	8
		3, 3.2	41	7
	40	0.8 - 2.4	57	10
		3, 3.2	57	9
	50	0.8 - 2.4	77	12
		3, 3.2	77	11
	63	0.8 - 2.4	103	13
		3, 3.2	103	12
	80	0.8 - 2.4	137	14
		3, 3.2	137	12
	100	0.8 - 2.4	177	14
		3, 3.2	177	13
	125	0.8 - 2.4	227	15
		3, 3.2	227	13
B type	32	4	41	7
		5	41	6
	40	4	57	9
		5	57	8
	50	4	77	10
		5	77	9
	63	4	103	10
		5	103	10
	80	4	137	11
		5	137	10
	100	4	177	11
		5	177	10
	125	4	227	11
		5	227	11

(Note) The recommended ramping feed is 0.05mm/tooth or under.
*1 L (Max. Depth of Cut =15 / tan α). Cutters' moving distance until depth of cut reaches APMX at a maximum ramping angle.
Maximum depth of cut A type is 21mm, B type is 20.4mm.
*2 The maximum diameter when machining a blind hole with a flat face using a corner radius of 0.8mm for A type and 4mm for B type.
Other than that, find with the below formula.
{(cutting edge diameter DC)−(corner radius)−0.3}×2
*3 The minimum diameter when machining a blind hole with a flat face using a corner radius of 0.8mm for A type and 4mm for B type.
Other than that, find with the below formula.
{(cutting edge diameter DC)−(corner radius)−(Width of wiper edge BS)−0.1}×2

Max. Drilling Depth (Alunimium Alloy)

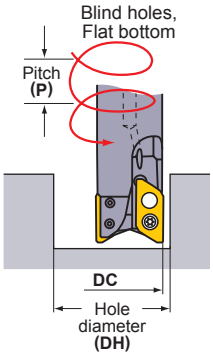
Type	Insert corner radius RE (mm)	Max. Drilling Depth (mm)
Type A	0.8−2.4	5
	3, 3.2	4.5
Type B	4	4
	5	3.5

AXD7000 can be effectively used for pocket machining without the need for a prepared hole.



AXD7000

● HELICAL CUTTING



RAMPING/HELICAL CUTTING (ALUNIMIUM ALLOY)

Type	DC (mm)	RE (mm)	BS (mm)	Helical Cutting (Blind Hole, Flat Bottom)			
				DH max. (mm) *2	P max. (mm)	DH min. (mm) *3	P max. (mm)
A type	32	0.8	2	61.9	20	58.3	20
		1.6	1.2	60.3	19	58.3	19
		2	0.8	59.5	18	58.3	18
		2.4	0.4	58.7	18	58.3	18
		3	0.8	57.5	17	56.2	17
		3.2	0.6	57.1	17	56.2	17
	40	0.8	2	77.9	20	74.3	20
		1.6	1.2	76.3	19	74.3	19
		2	0.8	75.5	18	74.3	18
		2.4	0.4	74.7	18	74.3	18
		3	0.8	73.5	17	72.2	17
		3.2	0.6	73.1	17	72.2	17
	50	0.8	2	97.5	20	94.1	20
		1.6	1.2	95.9	19	94.1	19
		2	0.8	95.1	18	94.1	18
		2.4	0.4	94.3	18	94.1	18
		3	0.8	93.1	17	92.1	17
		3.2	0.6	92.7	17	92.1	17
	63	0.8	2	123.5	20	120.1	19
		1.6	1.2	121.9	19	120.1	19
		2	0.8	121.1	18	120.1	18
		2.4	0.4	120.3	18	120.1	18
		3	0.8	119.1	17	118	16
		3.2	0.6	118.7	17	118	16
	80	0.8	2	157.5	19	154.1	18
		1.6	1.2	155.9	19	154.1	18
		2	0.8	155.1	18	154.1	18
		2.4	0.4	154.3	18	154.1	18
		3	0.8	153.1	16	152	16
		3.2	0.6	152.7	16	152	16
	100	0.8	2	197.5	18	194.1	18
		1.6	1.2	195.9	18	194.1	18
		2	0.8	195.1	18	194.1	18
		2.4	0.4	194.3	18	194.1	18
		3	0.8	193.1	15	192	15
		3.2	0.6	192.7	15	192	15
	125	0.8	2	247.5	18	244.1	17
		1.6	1.2	245.9	17	244.1	17
		2	0.8	245.1	17	244.1	17
		2.4	0.4	244.3	17	244.1	17
		3	0.8	243.1	15	242	15
		3.2	0.6	242.7	15	242	15
B type	32	4	0.9	55.5	16	54	16
		5	0.4	53.5	15	53.1	15
	40	4	0.9	71.5	16	70	16
		5	0.4	69.5	15	69	14
	50	4	0.9	91.1	15	89.8	15
		5	0.4	89.1	14	88.9	14
	63	4	0.9	117.1	14	115.8	14
		5	0.4	115.1	13	114.9	13
	80	4	0.9	151.1	14	149.8	13
		5	0.4	149.1	12	148.9	12
	100	4	0.9	191.1	13	189.8	13
		5	0.4	189.1	12	188.8	12
	125	4	0.9	241.1	13	239.8	13
		5	0.4	239.1	12	238.8	12

(Note) The recommended ramping feed is 0.05mm/tooth or under.

*1 L (Max. Depth of Cut =15 / tan α). Cutters' moving distance until depth of cut reaches APMX at a maximum ramping angle.
Maximum depth of cut A type is 21mm, B type is 20.4mm.

*2 The maximum diameter when machining a blind hole with a flat face using a corner radius of 0.8mm for A type and 4mm for B type.Other than that, find with the below formula.
{(cutting edge diameter DC)−(corner radius)−0.3}×2

*3 The minimum diameter when machining a blind hole with a flat face using a corner radius of 0.8mm for A type and 4mm for B type.Other than that, find with the below formula.
{(cutting edge diameter DC)−(corner radius)−(Width of wiper edge BS)−0.1}×2

BXD4000

Aluminium Alloy to Difficult-to-cut Material Cutting

Product Information

90° KAPR

Work Material

P M K N S H F R

SYMBOL DESCRIPTIONS >> 1350
TECHNICAL DATA >> 1987
ISO13399 Property >> 1966

- Curved cutting edge and high rigidity holder produce high wall accuracy.
- Low resistance insert and high rigidity design for excellent performance.
- With through coolant holes to ensure smooth chip discharge.
- For high-speed machining.

Fig.1 ø40

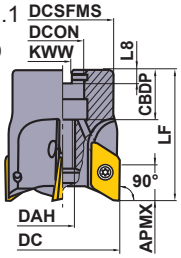


Fig.2 ø50 ø63 ø80 ø100

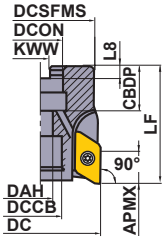
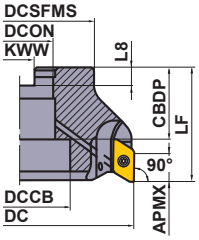
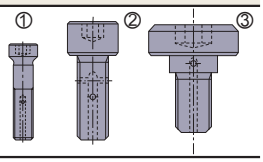


Fig.3 ø125



Right hand tool holder only.

Cutter Diameter DC	Set Bolt	Geometry
ϕ40	HFF08043H	①
ϕ50, ϕ63	HSC10030H	②
ϕ80	HSC12035H	②
ϕ100	HSC16040H	②
ϕ125	MBA20040H	③



●The set bolts in the right table are supplied with respective cutter.

ARBOR TYPE

KAPR :90°
GAMP:+11°—+15° T :+8°—+16°
GAMF:+8°—+16° I :+11°—+15°

Type	Insert Radius RE	Order Number	Stock R	Number of Teeth	DC	LF	DCON	CBDP	DAH	DCSFMS	KWW	L8	DCCB	WT*3 (kg)	APMX (mm)	RMPX*2	Max. Allowable Revolution (min⁻¹)	Type(Fig.)	Clamp Screw (*1)	Wrench	Insert
A type	0.4 — 3.2	BXD4000-040A03RA	●	3	40	50	16	18	8.5	32	8.4	5.6	—	0.3	15	9°	29000	1	TS4SL	TKY15W	XDGT1550 PD○R-G○○
		BXD4000-050A04RA	●	4	50	50	22	20	11	41	10.4	6.3	17	0.4	15	6°	24000	2	TS4SL	TKY15W	
		BXD4000-063A05RA	●	5	63	50	22	20	11	50	10.4	6.3	17	0.7	15	5°	21000	2	TS4SL	TKY15W	
		BXD4000R08005CA	●	5	80	50	25.4	26	13	60	9.5	6	20	1.1	15	3°	19000	2	TS4SL	TKY15W	XDGT1550 PD○R-GL○○
		BXD4000R10006DA	●	6	100	63	31.75	32	17	70	12.7	8	26	2.0	15	3°	16000	2	TS4SL	TKY15W	
		BXD4000R12507EA	●	7	125	63	38.1	40	—	80	15.9	10	56	2.8	15	2°	14000	3	TS4SL	TKY15W	
B type	4.0 — 5.0	BXD4000-040A03RB	●	3	40	50	16	18	8.5	32	8.4	5.6	—	0.3	15	9°	29000	1	TS4SL	TKY15W	XDGT1550 PD○R-G○○
		BXD4000-050A04RB	●	4	50	50	22	20	11	41	10.4	6.3	17	0.4	15	6°	24000	2	TS4SL	TKY15W	
		BXD4000-063A05RB	●	5	63	50	22	20	11	50	10.4	6.3	17	0.7	15	5°	21000	2	TS4SL	TKY15W	
		BXD4000R08005CB	●	5	80	50	25.4	26	13	60	9.5	6	20	1.1	15	3°	19000	2	TS4SL	TKY15W	
		BXD4000R10006DB	●	6	100	63	31.75	32	17	70	12.7	8	26	2.0	15	3°	16000	2	TS4SL	TKY15W	
		BXD4000R12507EB	●	7	125	63	38.1	40	—	80	15.9	10	56	2.8	15	2°	14000	3	TS4SL	TKY15W	

(Note 1) The maximum allowable revolutions are set to ensure tool and insert stability.
(Note 2) When using the tool at high spindle speeds, ensure that the tool and arbor are correctly balanced.
*1 Clamp Torque (N • m) : TS4SL=4.0
*2 RMPX : Max. Ramping Angle
*3 WT : Tool Weight

● : **Inventory maintained in Japan.**

BXD4000

Fig.1 ø40

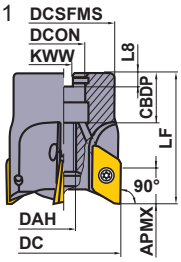


Fig.2 ø50 ø63 ø80 ø100

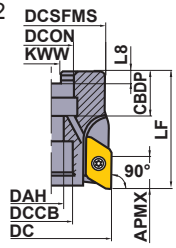
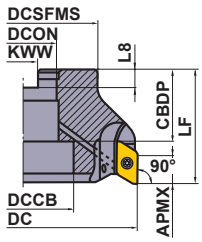
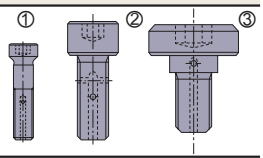


Fig.3 ø125



Right hand tool holder only.

Cutter Diameter DC	Set Bolt	Geometry
ϕ40	HFF08043H	①
ϕ50, ϕ63	HSC10030H	②
ϕ80	HSC12035H	②
ϕ100	HSC16040H	②
ϕ125	MBA20040H	③



For metric arbor

The cutter bore diameter DCON is indicated in millimetre.

ARBOR TYPE

KAPR :90°
GAMP:+11°—+15° T :+8°—+16°
GAMF :+8°—+16° I :+11°—+15°

Type	Insert Radius RE	Order Number	Stock R	Number of Teeth	Dimensions(mm) DC	LF	DCON	CBDP	DAH	DCSFMS	KWW	L8	DCCB	WT*3 (kg)	APMX (mm)	RMPX*2	Max. Allowable Revolution (min-1)	Type(Fig.)	*1 Clamp Screw	Wrench	Insert
A type	0.4 – 3.2	BXD4000-040A03RA	●	3	40	50	16	18	8.5	32	8.4	5.6	—	0.3	15	9°	29000	1	TS4SL	TKY15W	XDGT1550 PD○R-G○○
		BXD4000-050A04RA	●	4	50	50	22	20	11	41	10.4	6.3	17	0.4	15	6°	24000	2	TS4SL	TKY15W	
		BXD4000-063A05RA	●	5	63	50	22	20	11	50	10.4	6.3	17	0.7	15	5°	21000	2	TS4SL	TKY15W	
		BXD4000-080A05RA	●	5	80	50	27	23	13	60	12.4	7	20	1.1	15	3°	19000	2	TS4SL	TKY15W	
		BXD4000-100A06RA	●	6	100	63	32	26	17	70	14.4	8	26	2.0	15	3°	16000	2	TS4SL	TKY15W	
		BXD4000-125B07RA	●	7	125	63	40	40	—	80	16.4	9	56	2.8	15	2°	14000	3	TS4SL	TKY15W	
B type	4.0 – 5.0	BXD4000-040A03RB	●	3	40	50	16	18	8.5	32	8.4	5.6	—	0.3	15	9°	29000	1	TS4SL	TKY15W	XDGT1550 PD○R-G○○
		BXD4000-050A04RB	●	4	50	50	22	20	11	41	10.4	6.3	17	0.4	15	6°	24000	2	TS4SL	TKY15W	
		BXD4000-063A05RB	●	5	63	50	22	20	11	50	10.4	6.3	17	0.7	15	5°	21000	2	TS4SL	TKY15W	
		BXD4000-080A05RB	●	5	80	50	27	23	13	60	12.4	7	20	1.1	15	3°	19000	2	TS4SL	TKY15W	
		BXD4000-100A06RB	●	6	100	63	32	26	17	70	14.4	8	26	2.0	15	3°	16000	2	TS4SL	TKY15W	
		BXD4000-125B07RB	●	7	125	63	40	40	—	80	16.4	9	56	2.8	15	2°	14000	3	TS4SL	TKY15W	

(Note 1) The maximum allowable revolutions are set to ensure tool and insert stability.
(Note 2) When using the tool at high spindle speeds, ensure that the tool and arbor are correctly balanced.
*1 Clamp Torque (N • m) : TS4SL=4.0 *2 RMPX : Max. Ramping Angle *3 WT : Tool Weight

CAUTION FOR USE

- Only use the inserts and parts provided by Mitsubishi Materials with this tool. Use of the correct insert clamp screws is especially important to ensure overall tool safety. Do not use damaged or worn clamp screws.
- The maximum allowable spindle speeds are shown in Table 1. Ensure that the cutter operates under the maximum allowable spindle speed. The maximum allowable spindle speeds for safety purposes are determined in accordance with ISO15641 (Milling Cutters for high speed machining–Safety requirements).

Table 1 Max. Allowable Revolution

Cutting Edge Diameter DC(mm)	ø20	ø25	ø28	ø32	ø35	ø40	ø50	ø63	ø80	ø100	ø125
Max. Allowable Revolution (min-1)	15000*	38000	35000	33000	31000	29000	24000	21000	19000	16000	14000

* ϕ20mm with one tooth balancing is necessary to adjust sensitively.

- Even when operating under the maximum allowable spindle speed, if the spindle speed is equal to or higher than the values shown in table 2, it is recommended that the balance quality (with the arbor or milling chuck) conforms to G40 or betterbased on ISO1940. It is also recommended to replace the clamp screws with new ones when changing inserts. Furthermore,ensure to use machines that are provided with safety measures in case of cutter breakage.

Table 2 Maximum spindle speed when balancing with the arbor or milling chuck has not been achieved

Cutting Edge Diameter DC(mm)	ø20	ø25	ø28	ø32	ø35	ø40	ø50	ø63	ø80	ø100	ø125
Max. Allowable Revolution (min-1)	15000	12000	10800	9500	8700	7600	6000	4800	3800	3000	2400

- When setting the spindle speed, take into consideration the maximum allowable spindle speed of the arbor or milling chuck.
- Use the specified set bolt when using the arbor type with through coolant.
- The inserts have sharp cutting edges and handling them with bare hands may cause injuries. Always wear safety gloves whenhandling the indexable inserts.

BXD4000

Fig.1 Straight Shank

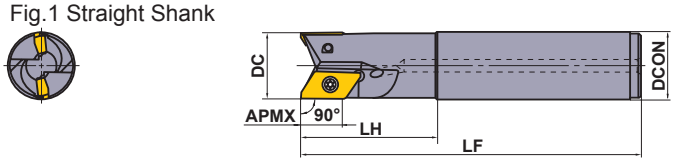
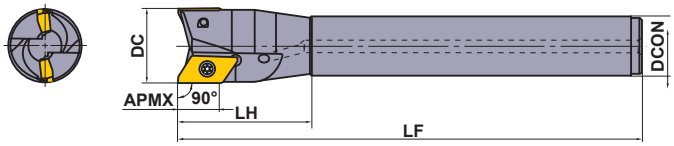


Fig.2 Offset Shank



SHANK TYPE

KAPR :90°

Right hand tool holder only.

Type	Insert Radius RE	Shank Type	Order Number	Stock R	Number of Teeth	Dimensions(mm) DC	APMX	LF	LH	DCON	*2 RMPX	Max. Allowable Revolution (min^{-1})	Type(Fig.)	*1 Clamp Screw	Wrench	Insert
Type A	0.4 – 3.2	Standard	BXD4000R201SA20SA	●	1	20	15	110	35	20	28	15000	1	TS4SL	TKY15W	XDGT1550 PD◌R-G◌◌ / XDGT1550 PD◌R-GL◌◌
			BXD4000R252SA25SA	●	2	25	15	125	50	25	20	38000	1	TS4SL	TKY15W	
			BXD4000R282SA25SA	●	2	28	15	125	50	25	17	35000	2	TS4SL	TKY15W	
			BXD4000R322SA32SA	●	2	32	15	150	50	32	13	33000	1	TS4SL	TKY15W	
			BXD4000R352SA32SA	●	2	35	15	150	50	32	11	31000	2	TS4SL	TKY15W	
			BXD4000R403SA32SA	●	3	40	15	170	80	32	9	29000	2	TS4SL	TKY15W	
			BXD4000R403SA42SA	●	3	40	15	170	80	42	9	29000	1	TS4SL	TKY15W	
		Long	BXD4000R252SA25LA	●	2	25	15	170	80	25	20	38000	1	TS4SL	TKY15W	
			BXD4000R322SA32LA	●	2	32	15	200	80	32	13	33000	1	TS4SL	TKY15W	
		Extra Long	BXD4000R282SA25ELA	●	2	28	15	220	50	25	17	35000	2	TS4SL	TKY15W	
			BXD4000R352SA32ELA	●	2	35	15	250	50	32	11	31000	2	TS4SL	TKY15W	
			BXD4000R403SA32ELA	●	3	40	15	250	65	32	9	29000	2	TS4SL	TKY15W	
Type B	4.0 – 5.0	Standard	BXD4000R201SA20SB	●	1	20	15	110	35	20	28	15000	1	TS4SL	TKY15W	XDGT1550 PD◌R-G◌◌
			BXD4000R252SA25SB	●	2	25	15	125	50	25	20	38000	1	TS4SL	TKY15W	
			BXD4000R282SA25SB	●	2	28	15	125	50	25	17	35000	2	TS4SL	TKY15W	
			BXD4000R322SA32SB	●	2	32	15	150	50	32	13	33000	1	TS4SL	TKY15W	
			BXD4000R352SA32SB	●	2	35	15	150	50	32	11	31000	2	TS4SL	TKY15W	
			BXD4000R403SA32SB	●	3	40	15	170	80	32	9	29000	2	TS4SL	TKY15W	
			BXD4000R403SA42SB	●	3	40	15	170	80	42	9	29000	1	TS4SL	TKY15W	
		Long	BXD4000R252SA25LB	●	2	25	15	170	80	25	20	38000	1	TS4SL	TKY15W	
			BXD4000R322SA32LB	●	2	32	15	200	80	32	13	33000	1	TS4SL	TKY15W	
		Extra Long	BXD4000R282SA25ELB	●	2	28	15	220	50	25	17	35000	2	TS4SL	TKY15W	
			BXD4000R352SA32ELB	●	2	35	15	250	50	32	11	31000	2	TS4SL	TKY15W	
			BXD4000R403SA32ELB	●	3	40	15	250	65	32	9	29000	2	TS4SL	TKY15W	

(Note 1) The maximum allowed revolutions are set to ensure tool and insert stability.
(Note 2) When using the tool at high revolutions, ensure that the tool and arbor are correctly balanced.
*1 Clamp Torque (N • m) : TS4SL=4.0 *2 RMPX : Max. Ramping Angle

● : **Inventory maintained in Japan.**

HOLDER AND INSERT CORNER RADIUS COMBINATION

Holder	A Holder							B Holder	
	BXD4000R◌◌◌◌◌◌◌◌A							BXD4000R◌◌◌◌◌◌◌◌B	
Insert Corner Radius (RE)	R 0.4	R 0.8	R 1.2	R 1.6	R 2.0	R 3.0	R 3.2	R 4.0	R 5.0
	XDGT.....-G04 XDGT.....-GL04	XDGT.....-G08 XDGT.....-GL08	XDGT.....-G12	XDGT.....-G16	XDGT.....-G20	XDGT.....-G30	XDGT.....-G32	XDGT.....-G40	XDGT.....-G50

(Note 1) Please only use the holder and insert corner radius combinations shown above.
(Note 2) XDGT....-GL08 and -G12 inserts are compatible only with the BXD4000R◌◌◌◌◌◌◌◌A type holder.

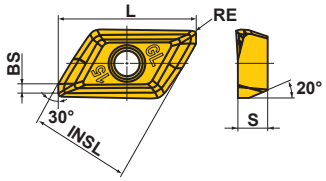
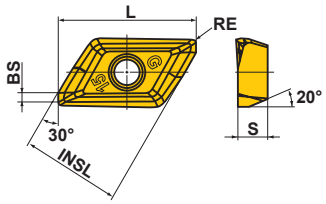
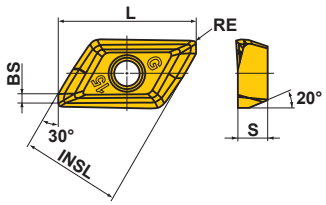
BXD4000

INSERTS

Work Material			VP15TF	LC15TF			TF15	
	P	Steel	◐					
	M	Stainless Steel	◔					
	K	Cast Iron	✠					
	N	Non-ferrous Metal		◐			◐	
	S	Heat-resistant Alloy, Titanium Alloy	◐					
	H	Hardened Steel	◐					

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✠ : Unstable Cutting

Honing :
E : Round **F** : Sharp

Shape	Order Number	Class	Honing	Stock: Coated VP15TF	Coated LC15TF	Coated	Coated	Carbide TF15	Carbide	Dimensions(mm) L	INSL	S	BS	RE	Geometry
Low Resistance Type	**XDGT1550PDFR-GL04**	G	F					●		22	16	5	1.5	0.4	
	XDGT1550PDFR-GL08	G	F					●		22	16	5	1.1	0.8	
	XDGT1550PDFR-G04	G	F		●			●		22	16	5	1.5	0.4	
	XDGT1550PDFR-G08	G	F		●			●		22	16	5	1.1	0.8	
	XDGT1550PDFR-G12	G	F		●			●		22	16	5	0.7	1.2	
	XDGT1550PDFR-G16	G	F		●			●		22	16	5	0.4	1.6	
	XDGT1550PDFR-G20	G	F		●			●		21.7	16	5	0.2	2.0	
	XDGT1550PDFR-G30	G	F		●			●		20	16	5	0.6	3.0	
	XDGT1550PDFR-G32	G	F		●			●		20	16	5	0.4	3.2	
	XDGT1550PDFR-G40	G	F		●			●		19	16	5	0.5	4.0	
	XDGT1550PDFR-G50	G	F		●			●		18	16	5	0.4	5.0	
	XDGT1550PDER-G04	G	E	●						22	16	5	1.5	0.4	
	XDGT1550PDER-G08	G	E	●						22	16	5	1.1	0.8	
	XDGT1550PDER-G12	G	E	●						22	16	5	0.7	1.2	
	XDGT1550PDER-G16	G	E	●						22	16	5	0.4	1.6	
	XDGT1550PDER-G20	G	E	●						21.7	16	5	0.2	2.0	
	XDGT1550PDER-G30	G	E	●						20	16	5	0.6	3.0	
	XDGT1550PDER-G32	G	E	●						20	16	5	0.4	3.2	
	XDGT1550PDER-G40	G	E	●						19	16	5	0.5	4.0	
	XDGT1550PDER-G50	G	E	●						18	16	5	0.4	5.0	

● : Inventory maintained in Japan. (10 inserts in one case)

RECOMMENDED CUTTING CONDITIONS

	Work Material	Hardness	Grade	Cutting Speed (m/min)	Feed per Tooth (mm/t.)
P	Mild Steel	≤180HB	**VP15TF**	180 (150—200)	0.15 (0.1—0.2)
	Carbon Steel Alloy Steel	≤280HB	**VP15TF**	150 (120—200)	0.15 (0.1—0.2)
		280—350HB	**VP15TF**	140 (120—160)	0.15 (0.1—0.2)
M	Stainless Steel	≤270HB	**VP15TF**	140 (120—160)	0.2 (0.1—0.3)
N	Aluminium Alloy	—	**LC15TF TF15**	1000 (200—3000)	0.3 (0.1—0.5)
S	Ti Alloy	—	**VP15TF**	40 (30—60)	0.1 (0.1—0.3)
	Heat Resistance Alloy (Inconel etc.)	—	**VP15TF**	30 (20—40)	0.15 (0.1—0.2)
H	Hardened Steel	40—60HRC	**VP15TF**	70 (50—100)	0.1 (0.05—0.15)

●Figures above are a guide lines for optimum general use. They may vary depending on machine rigidity, work clamping and length of tool overhang.
●When using ϕ20 shank type, set the table feed at under 0.05mm/t. and maintain observation during cutting.
●Please adjust the table feed when using long- and extra-long-shank types.
●Please adjust the table feed when ramp machining (Recommended feed:0.05 mm/t. under).

AQX

Multi Functional Milling

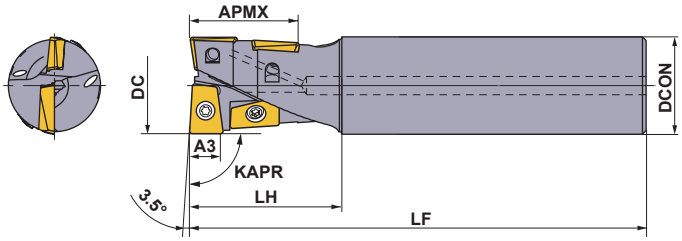
Product Information

90° KAPR

Work Material

P M K N S H R

SYMBOL DESCRIPTIONS >> 1350
TECHNICAL DATA >> 1987
ISO13399 Property >> 1966



Right hand tool holder only.

STANDARD EDGE TYPE

Number of Teeth : **4**
KAPR : 90°

(mm)

Type	Order Number	Stock R	Coolant Hole	DC	LF	DCON	LH	A3 *1	APMX	Clamp Screw *2	Wrench ①②③	Insert
Standard	**AQXR164SA16S**	●	○	16	120	16	30	4.5	17.6	TS2A	①TKY06F	QOG/MT0830R-G1/M2
	AQXR164SN16S	●	–	16	120	16	30	4.5	17.6	TS2A	①TKY06F	
	AQXR174SA16S	●	○	17	120	16	30	4.5	17.6	TS2A	①TKY06F	
	AQXR174SN16S	●	–	17	120	16	30	4.5	17.6	TS2A	①TKY06F	
	AQXR204SA20S	●	○	20	130	20	35	6	22	TS25	①TKY08F	QOG/MT1035R-G1/M2
	AQXR204SN20S	●	–	20	130	20	35	6	22	TS25	①TKY08F	
	AQXR214SA20S	●	○	21	130	20	35	6	22	TS25	①TKY08F	
	AQXR214SN20S	●	–	21	130	20	35	6	22	TS25	①TKY08F	
	AQXR254SA25S	●	○	25	140	25	40	7.5	27.5	TS33	②TKY08D	QOG/MT1342R-G1/M2
	AQXR254SN25S	●	–	25	140	25	40	7.5	27.5	TS33	②TKY08D	
	AQXR264SA25S	●	○	26	140	25	40	7.5	27.5	TS33	②TKY08D	
	AQXR264SN25S	●	–	26	140	25	40	7.5	27.5	TS33	②TKY08D	
	AQXR324SA32S	●	○	32	150	32	50	9.5	35.2	TS407	②TKY15D	QOG/MT1651R-G1/M2
	AQXR324SN32S	●	–	32	150	32	50	9.5	35.2	TS407	②TKY15D	
	AQXR334SA32S	●	○	33	150	32	50	9.5	35.2	TS407	②TKY15D	
	AQXR334SN32S	●	–	33	150	32	50	9.5	35.2	TS407	②TKY15D	
	AQXR354SA32S	●	○	35	150	32	50	11	40	TS407	②TKY15D	QOG/MT1856R-G1/M2
	AQXR354SN32S	●	–	35	150	32	50	11	40	TS407	②TKY15D	
	AQXR404SA32S	●	○	40	160	32	60	12	44	TS55	②TKY25D	QOG/MT2062R-G1/M2
	AQXR404SN32S	●	–	40	160	32	60	12	44	TS55	②TKY25D	
	AQXR504SA42S	●	○	50	170	42	70	15	55	TS6S	③TKY30T	QOG/MT2576R-G1/M2
	AQXR504SN42S	●	–	50	170	42	70	15	55	TS6S	③TKY30T	

*1 Dimension A3 represents the depth of cut when the cutting edge consists of 2 inserts.
*2 Clamp Torque (N • m) : TS2A=0.5, TS25=1.0, TS33=1.5, TS407=3.5, TS55=7.5, TS6S=8.5

● : **Inventory maintained in Japan.**

AQX

(mm)

Type	Order Number	Stock R	Coolant Hole	DC	LF	DCON	LH	A3 *1	APMX	Clamp Screw *2	Wrench ① ② ③	Insert
Long	**AQXR164SA16L**	●	○	16	175	16	50	4.5	17.6	TS2A	①TKY06F	QOG/MT0830R-G1/M2
	AQXR164SN16L	●	–	16	175	16	50	4.5	17.6	TS2A	①TKY06F	
	AQXR174SA16L	●	○	17	175	16	30	4.5	17.6	TS2A	①TKY06F	
	AQXR174SN16L	●	–	17	175	16	30	4.5	17.6	TS2A	①TKY06F	
	AQXR204SA20L	●	○	20	185	20	60	6	22	TS25	①TKY08F	QOG/MT1035R-G1/M2
	AQXR204SN20L	●	–	20	185	20	60	6	22	TS25	①TKY08F	
	AQXR214SA20L	●	○	21	185	20	35	6	22	TS25	①TKY08F	
	AQXR214SN20L	●	–	21	185	20	35	6	22	TS25	①TKY08F	
	AQXR254SA25L	●	○	25	220	25	75	7.5	27.5	TS33	②TKY08D	QOG/MT1342R-G1/M2
	AQXR254SN25L	●	–	25	220	25	75	7.5	27.5	TS33	②TKY08D	
	AQXR264SA25L	●	○	26	220	25	40	7.5	27.5	TS33	②TKY08D	
	AQXR264SN25L	●	–	26	220	25	40	7.5	27.5	TS33	②TKY08D	
	AQXR324SA32L	●	○	32	230	32	90	9.5	35.2	TS407	②TKY15D	QOG/MT1651R-G1/M2
	AQXR324SN32L	●	–	32	230	32	90	9.5	35.2	TS407	②TKY15D	
	AQXR334SA32L	●	○	33	230	32	50	9.5	35.2	TS407	②TKY15D	
	AQXR334SN32L	●	–	33	230	32	50	9.5	35.2	TS407	②TKY15D	
	AQXR354SA32L	●	○	35	230	32	50	11	40	TS407	②TKY15D	QOG/MT1856R-G1/M2
	AQXR354SN32L	●	–	35	230	32	50	11	40	TS407	②TKY15D	
	AQXR404SA32L	●	○	40	240	32	60	12	44	TS55	②TKY25D	QOG/MT2062R-G1/M2
	AQXR404SN32L	●	–	40	240	32	60	12	44	TS55	②TKY25D	
	AQXR504SA42L	●	○	50	250	42	70	15	55	TS6S	③TKY30T	QOG/MT2576R-G1/M2
	AQXR504SN42L	●	–	50	250	42	70	15	55	TS6S	③TKY30T	

*1 Dimension A3 represents the depth of cut when the cutting edge consists of 2 inserts.
*2 Clamp Torque (N • m) : TS2A=0.5, TS25=1.0, TS33=1.5, TS407=3.5, TS55=7.5, TS6S=8.5

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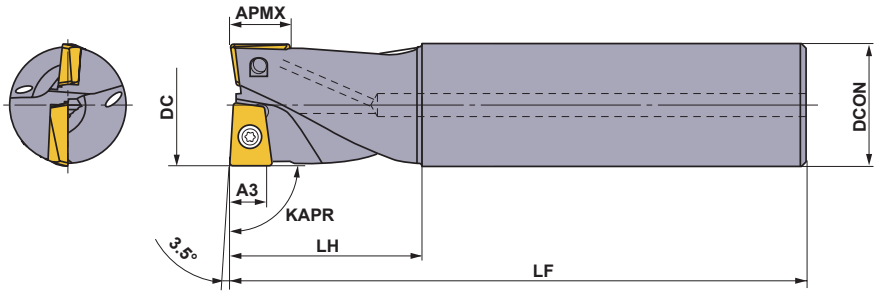

Right hand tool holder only.

SHORT EDGE TYPE

Number of Teeth : **2**
KAPR : 90°

(mm)

Type	Order Number	Stock R	Coolant Hole	DC	LF	DCON	LH	A3 *1	APMX	Clamp Screw *2	Wrench ① ② ③	Insert
Standard	**AQXR162SA16S**	●	○	16	120	16	30	4.5	7.4	TS2A	①TKY06F	QOG/MT0830R-G1/M2
	AQXR162SN16S	●	–	16	120	16	30	4.5	7.4	TS2A	①TKY06F	
	AQXR172SA16S	●	○	17	120	16	30	4.5	7.4	TS2A	①TKY06F	
	AQXR172SN16S	●	–	17	120	16	30	4.5	7.4	TS2A	①TKY06F	
	AQXR202SA20S	●	○	20	130	20	35	6	9.2	TS25	①TKY08F	QOG/MT1035R-G1/M2
	AQXR202SN20S	●	–	20	130	20	35	6	9.2	TS25	①TKY08F	
	AQXR212SA20S	●	○	21	130	20	35	6	9.2	TS25	①TKY08F	
	AQXR212SN20S	●	–	21	130	20	35	6	9.2	TS25	①TKY08F	
	AQXR252SA25S	●	○	25	140	25	40	7.5	11.5	TS33	②TKY08D	QOG/MT1342R-G1/M2
	AQXR252SN25S	●	–	25	140	25	40	7.5	11.5	TS33	②TKY08D	
	AQXR262SA25S	●	○	26	140	25	40	7.5	11.5	TS33	②TKY08D	
	AQXR262SN25S	●	–	26	140	25	40	7.5	11.5	TS33	②TKY08D	
	AQXR322SA32S	●	○	32	150	32	50	9.5	14.5	TS407	②TKY15D	QOG/MT1651R-G1/M2
	AQXR322SN32S	●	–	32	150	32	50	9.5	14.5	TS407	②TKY15D	
	AQXR332SA32S	●	○	33	150	32	50	9.5	14.5	TS407	②TKY15D	
	AQXR332SN32S	●	–	33	150	32	50	9.5	14.5	TS407	②TKY15D	
	AQXR352SA32S	●	○	35	150	32	50	11	16	TS407	②TKY15D	QOG/MT1856R-G1/M2
	AQXR352SN32S	●	–	35	150	32	50	11	16	TS407	②TKY15D	
	AQXR402SA32S	●	○	40	160	32	60	12	18	TS55	②TKY25D	QOG/MT2062R-G1/M2
	AQXR402SN32S	●	–	40	160	32	60	12	18	TS55	②TKY25D	
	AQXR502SA42S	●	○	50	170	42	70	15	23	TS6S	③TKY30T	QOG/MT2576R-G1/M2
	AQXR502SN42S	●	–	50	170	42	70	15	23	TS6S	③TKY30T	

*1 Dimension A3 represents the depth of cut when the cutting edge consists of 2 inserts.
*2 Clamp Torque (N • m) : TS2A=0.5, TS25=1.0, TS33=1.5, TS407=3.5, TS55=7.5, TS6S=8.5

● : **Inventory maintained in Japan.**

AQX

(mm)

Type	Order Number	Stock R	Coolant Hole	DC	LF	DCON	LH	A3 *1	APMX	Clamp Screw *2	Wrench ① ② ③	Insert
Long	**AQXR162SA16L**	●	○	16	175	16	50	4.5	7.4	TS2A	①TKY06F	QOG/MT0830R-G1/M2
	AQXR162SN16L	●	–	16	175	16	50	4.5	7.4	TS2A	①TKY06F	
	AQXR172SA16L	●	○	17	175	16	30	4.5	7.4	TS2A	①TKY06F	
	AQXR172SN16L	●	–	17	175	16	30	4.5	7.4	TS2A	①TKY06F	
	AQXR202SA20L	●	○	20	185	20	60	6	9.2	TS25	①TKY08F	QOG/MT1035R-G1/M2
	AQXR202SN20L	●	–	20	185	20	60	6	9.2	TS25	①TKY08F	
	AQXR212SA20L	●	○	21	185	20	35	6	9.2	TS25	①TKY08F	
	AQXR212SN20L	●	–	21	185	20	35	6	9.2	TS25	①TKY08F	
	AQXR252SA25L	●	○	25	220	25	75	7.5	11.5	TS33	②TKY08D	QOG/MT1342R-G1/M2
	AQXR252SN25L	●	–	25	220	25	75	7.5	11.5	TS33	②TKY08D	
	AQXR262SA25L	●	○	26	220	25	40	7.5	11.5	TS33	②TKY08D	
	AQXR262SN25L	●	–	26	220	25	40	7.5	11.5	TS33	②TKY08D	
	AQXR322SA32L	●	○	32	230	32	90	9.5	14.5	TS407	②TKY15D	QOG/MT1651R-G1/M2
	AQXR322SN32L	●	–	32	230	32	90	9.5	14.5	TS407	②TKY15D	
	AQXR332SA32L	●	○	33	230	32	50	9.5	14.5	TS407	②TKY15D	
	AQXR332SN32L	●	–	33	230	32	50	9.5	14.5	TS407	②TKY15D	
	AQXR352SA32L	●	○	35	230	32	50	11	16	TS407	②TKY15D	QOG/MT1856R-G1/M2
	AQXR352SN32L	●	–	35	230	32	50	11	16	TS407	②TKY15D	
	AQXR402SA32L	●	○	40	240	32	60	12	18	TS55	②TKY25D	QOG/MT2062R-G1/M2
	AQXR402SN32L	●	–	40	240	32	60	12	18	TS55	②TKY25D	
	AQXR502SA42L	●	○	50	250	42	70	15	23	TS6S	③TKY30T	QOG/MT2576R-G1/M2
	AQXR502SN42L	●	–	50	250	42	70	15	23	TS6S	③TKY30T	

*1 Dimension A3 represents the depth of cut when the cutting edge consists of 2 inserts.
*2 Clamp Torque (N • m) : TS2A=0.5, TS25=1.0, TS33=1.5, TS407=3.5, TS55=7.5, TS6S=8.5

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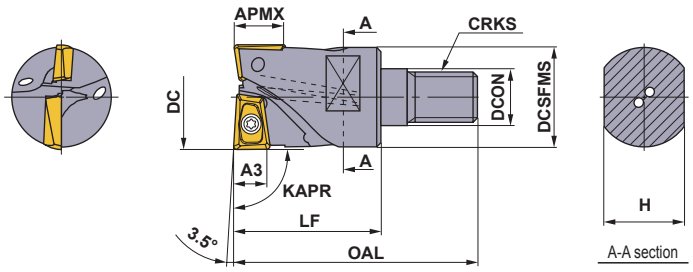


SCREW-IN TYPE

Number of Teeth : **2**
KAPR : 90°

Right hand tool holder only.

(mm)

Order Number	Stock R	Coolant Hole	DC	DCON	DCSFMS	OAL	LF	H	CRKS	A3 *1	APMX	WT (kg)	Clamp Screw *2	Wrench	Insert Type
AQXR162M08A30	●	○	16	8.5	14.7	48	30	10	M8	4.5	7.4	0.1	TS2A	①TKY06F	QO◌T0830R
AQXR172M08A30	●	○	17	8.5	14.5	48	30	10	M8	4.5	7.4	0.1	TS2A	①TKY06F	
AQXR202M10A30	●	○	20	10.5	18.6	49	30	14	M10	6	9.2	0.2	TS25	①TKY08F	QO◌T1035R
AQXR212M10A30	●	○	21	10.5	18.5	49	30	14	M10	6	9.2	0.2	TS25	①TKY08F	
AQXR252M12A35	●	○	25	12.5	23.5	57	35	19	M12	7.5	11.5	0.2	TS33	②TKY08D	QO◌T1342R
AQXR262M12A35	●	○	26	12.5	23.5	57	35	19	M12	7.5	11.5	0.2	TS33	②TKY08D	
AQXR322M16A40	●	○	32	17	28.5	63	40	24	M16	9.5	14.5	0.3	TS407	②TKY15D	QO◌T1651R
AQXR332M16A40	●	○	33	17	28.5	63	40	24	M16	9.5	14.5	0.3	TS407	②TKY15D	
AQXR352M16A40	●	○	35	17	28.5	63	40	24	M16	11	16	0.3	TS407	②TKY15D	QO◌T1856R
AQXR402M16A45	●	○	40	17	28.5	68	45	24	M16	12	18	0.3	TS55	②TKY25D	QO◌T2062R

*1 Dimension A3 represents the depth of cut when the cutting edge consists of 2 inserts.
*2 Clamp Torque (N • m) : TS2A=0.5, TS25=1.0, TS33=1.5, TS407=3.5, TS55=7.5

● : **Inventory maintained in Japan.**

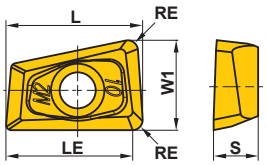
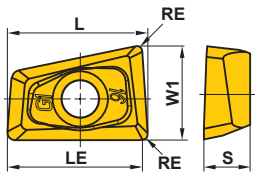
INSERTS

(mm)

Work Material			MP6120	MP6130	MP7130	MP7140	MP9120	VP15TF	VP30RT	HTi10
	P	Steel	●	◐				◐	✠	
	M	Stainless Steel			◐	◐		◐	✠	
	K	Cast Iron						✠		◐
	N	Non-ferrous Metal								◐
	S	Heat-resistant Alloy, Titanium Alloy					●	◐		
	H	Hardened Materials						◐		

Cutting Conditions (Guide):
●:Stable Cutting ◐:General Cutting ✠:Unstable Cutting

Honing:
E:Round F:Sharp

Shape	Order Number	DC	Class	Honing	MP6120	MP6130	MP7130	MP7140	MP9120	VP15TF	VP30RT	HTi10	L	LE	W1	S	RE	Geometry
	QOMT0830R-M2	ϕ16,17	M	E	●	●	●	●	●	●	●		8.4	7.4	5.5	3	0.8	
	QOMT1035R-M2	ϕ20,21	M	E	●	●	●	●	●	●	●		10.6	9.2	7	3.5	0.8	
	QOMT1342R-M2	ϕ25,26	M	E	●	●	●	●	●	●	●		13.1	11.5	8.7	4.2	0.8	
	QOMT1651R-M2	ϕ32,33	M	E	●	●	●	●	●	●	●		16.5	14.5	11	5.1	0.8	
	QOMT1856R-M2	ϕ35	M	E	●	●	●	●	●	●	●		18	16	12	5.6	0.8	
	QOMT2062R-M2	ϕ40	M	E	●	●	●	●	●	●	●		20.4	18	13.6	6.2	0.8	
	QOMT2576R-M2	ϕ50	M	E	●	●	●	●	●	●	●		25.8	23	17.2	7.6	0.8	
	QOGT0830R-G1	ϕ16,17	G	E*	●				●	●		●	8.4	7.4	5.5	3	0.4	
	QOGT1035R-G1	ϕ20,21	G	E*	●				●	●		●	10.6	9.2	7	3.5	0.4	
	QOGT1342R-G1	ϕ25,26	G	E*	●				●	●		●	13.1	11.5	8.7	4.2	0.4	
	QOGT1651R-G1	ϕ32,33	G	E*	●				●	●		●	16.5	14.5	11	5.1	0.4	
	QOGT1856R-G1	ϕ35	G	E*	●				●	●		●	18	16	12	5.6	0.4	
	QOGT2062R-G1	ϕ40	G	E*	●				●	●		●	20.4	18	13.6	6.2	0.4	
	QOGT2576R-G1	ϕ50	G	E*	●				●	●		●	25.8	23	17.2	7.6	0.4	

* HTi10 insert honing is "F" type.

■ = MIRACLE SIGMA

● : **Inventory maintained in Japan. (10 inserts in one case)**

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RECOMMENDED CUTTING CONDITIONS

CUTTING SPEED

vc = m/min

Work Material	No.	Hardness	Breaker	Cutting Speed for Different Grades **vc** (m/min)		
P				**MP6120**	**VP15TF**	**MP6130**
Mild Steel (ASTM A36, AISI 1010 etc.)	1	≤180HB	**M2**	200 (170—240)	180 (150—220)	160 (130—200)
Carbon Steel Alloy Steel (AISI 1045, AISI 4140 etc.)	2	180—350HB	**M2**	180 (140—220)	160 (120—200)	140 (100—180)
M				**MP7130**	**MP7140**	**VP30RT (VP15TF)**
Austenitic Stainless Steel (AISI 304, AISI 316 etc.)	1	≤200HB	**M2**	170 (120—200)	160 (100—180)	150 (120—180)
Austenitic Stainless Steel (AISI 304LN, AISI 316LN etc.)	2	>200HB	**M2**			
Ferritic and Martensitic Stainless Steel (AISI 410, AISI 430 etc.)	3	≤200HB	**M2**			
Ferritic and Martensitic Stainless Steel (AISI 431, AISI 420 etc.)	4	>200HB	**M2**			
K				**VP15TF**		
Gray Cast Iron (AISI No45B etc.)	1	≤350MPa	**M2**	180 (150—220)	—	—
Ductile Cast Iron (FCD450 etc.)	2	≤450MPa	**M2**	180 (150—220)	—	—
N				**HTi10**		
Aluminum Alloy (A6061, A7075 etc.)	1	Si<5%	**G1**	500 (200—800)	—	—
Aluminum Alloy (AC4B etc.)	2	5%≤Si≤10%	**G1**	100 (50—300)	—	—
Aluminum Alloy (ADC12, A390 etc.)	3	Si>5%	**G1**	100 (50—300)	—	—
S				**MP9120**		
Titanium Alloy (Ti-6Al-4V etc.)	1	—	**M2**	50 (30—70)	—	—
H				**VP15TF**		
Hardened Steel (AISI H13, AISI L6 etc.)	1	40—55HRC	**M2**	80 (50—120)	—	—

* Wet cutting is recommended for Titanium alloy.

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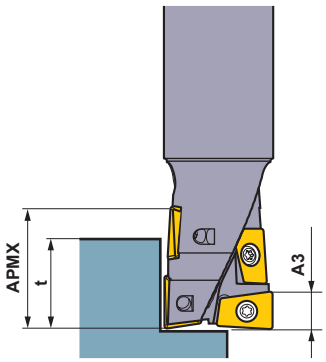
RECOMMENDED CUTTING CONDITIONS

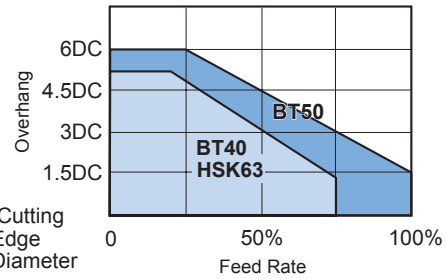


∗ Figures for A3 and APMX are shown in the standard holder tables on the previous pages.

- A3 is the depth of cut for the full dual insert portion at the end of the cutting edge.
- Beyond the range of A3 where overlapping occurs, there is an area where the cutting edge becomes a single insert, not forming full dual insert configuration. As such, please pay special attention to the relationship between depth of cut and feed.
- In general, the edge at the border of cut tends to suffer from damages. At large depth of cut operations, applying the following depth of cut (t), at which the edge is full dual insert at the border of cut, is recommended to prevent damage to the cutting edge.

(mm)

Tool diameter	Recommended depth of cut t (mm)
ϕ16,17	12 – 14
ϕ20,21	14 – 17
ϕ25,26	17 – 22
ϕ32,33	22 – 28
ϕ35	25 – 32
ϕ40	28 – 35
ϕ50	35 – 45



- Chatter vibration and other problems tend to occur at operations where overhang length is large and/or machine rigidity is low, resulting in unstable machining.
- Please reduce feed accordingly, using the above chart as a guideline.

CUTTING CONDITIONS FOR SHOULDER MILLING

(mm)

	Work Material	No.	Hardness	ϕ16, 17			ϕ20, 21			ϕ25, 26		
				ap	ae	f (mm/rev)	ap	ae	f (mm/rev)	ap	ae	f (mm/rev)
P	Mild Steel	1	≤180HB	≤4.5	≤8	0.25	≤6	≤10	0.3	≤7.5	≤12.5	0.35
				4.5–12	≤5	0.16	6–14	≤7	0.25	7.5–17	≤8	0.28
				12–17	≤3	0.1	14–22	≤4	0.18	17–27	≤5	0.2
	Carbon Steel Alloy Steel	2	180–350HB	≤4.5	≤8	0.2	≤6	≤10	0.25	≤7.5	≤12.5	0.3
				4.5–12	≤4	0.14	6–14	≤6	0.2	7.5–17	≤7	0.25
				12–17	≤2	0.08	14–22	≤3	0.16	17–27	≤4	0.18
M	Stainless Steel	1,2,3,4	–	≤4.5	≤8	0.2	≤6	≤10	0.25	≤7.5	≤12.5	0.3
				4.5–12	≤4	0.14	6–14	≤6	0.2	7.5–17	≤7	0.25
				12–17	≤2	0.08	14–22	≤3	0.16	17–27	≤4	0.18
K	Cast Iron	1,2	–	≤4.5	≤8	0.25	≤6	≤10	0.3	≤7.5	≤12.5	0.35
				4.5–12	≤5	0.16	6–14	≤7	0.25	7.5–17	≤8	0.28
				12–17	≤3	0.1	14–22	≤4	0.18	17–27	≤5	0.2
N	Aluminum Alloy	1,2,3	–	≤4.5	≤11	0.3	≤6	≤14	0.35	≤7.5	≤12.5	0.4
				4.5–12	≤8	0.21	6–14	≤10	0.3	7.5–17	≤7	0.33
				12–17	≤5	0.15	14–22	≤6	0.23	17–27	≤4	0.25
S	Titanium Alloy	1	–	≤4.5	≤8	0.14	≤6	≤10	0.18	≤7.5	≤17.5	0.21
				4.5–12	≤4	0.1	6–14	≤6	0.14	7.5–17	≤12.5	0.18
				12–17	≤2	0.06	14–22	≤3	0.11	17–27	≤7.5	0.13
H	Hardened Steel	1	40–55HRC	≤4.5	≤5	0.16	≤6	≤6	0.2	≤7.5	≤7	0.22
				4.5–12	≤3	0.1	6–14	≤4	0.16	7.5–17	≤4	0.18
				12–17	≤1	0.06	14–22	≤2	0.12	17–27	≤2	0.14

	Work Material	No.	Hardness	ϕ32, 33			ϕ35			ϕ40			ϕ50		
				ap	ae	f (mm/rev)	ap	ae	f (mm/rev)	ap	ae	f (mm/rev)	ap	ae	f (mm/rev)
P	Mild Steel	1	≤180HB	≤9.5	≤16	0.4	≤11	≤17.5	0.45	≤12	≤20	0.5	≤15	≤25	0.6
				9.5–22	≤11	0.32	11–25	≤12	0.35	12–28	≤13	0.4	15–35	≤16	0.5
				22–35	≤6	0.25	25–40	≤6.5	0.28	28–44	≤7	0.3	35–55	≤10	0.35
	Carbon Steel Alloy Steel	2	180–350HB	≤9.5	≤16	0.35	≤11	≤17.5	0.37	≤12	≤20	0.4	≤15	≤25	0.5
				9.5–22	≤10	0.28	11–25	≤11	0.3	12–28	≤12	0.32	15–35	≤14	0.4
				22–35	≤5	0.2	25–40	≤5.5	0.22	28–44	≤6	0.25	35–55	≤8	0.3
M	Stainless Steel	1,2,3,4	–	≤9.5	≤16	0.35	≤11	≤17.5	0.37	≤12	≤20	0.4	≤15	≤25	0.5
				9.5–22	≤10	0.28	11–25	≤12	0.3	12–28	≤12	0.32	15–35	≤14	0.4
				22–35	≤5	0.2	25–40	≤6.5	0.22	28–44	≤6	0.25	35–55	≤8	0.3
K	Cast Iron	1,2	–	≤9.5	≤16	0.4	≤11	≤17.5	0.45	≤12	≤20	0.5	≤15	≤25	0.6
				9.5–22	≤11	0.32	11–25	≤12	0.35	12–28	≤13	0.4	15–35	≤16	0.5
				22–35	≤6	0.25	25–40	≤6.5	0.28	28–44	≤7	0.3	35–55	≤10	0.35
N	Aluminum Alloy	1,2,3	–	≤9.5	≤16	0.45	≤11	≤17.5	0.5	≤12	≤20	0.55	≤15	≤25	0.65
				9.5–22	≤10	0.37	11–25	≤12	0.4	12–28	≤12	0.45	15–35	≤14	0.55
				22–35	≤5	0.3	25–40	≤6.5	0.32	28–44	≤6	0.35	35–55	≤8	0.4
S	Titanium Alloy	1	–	≤9.5	≤23	0.25	≤11	≤24.5	0.26	≤12	≤28	0.28	≤15	≤35	0.35
				9.5–22	≤16	0.2	11–25	≤17.5	0.21	12–28	≤20	0.22	15–35	≤25	0.28
				22–35	≤10	0.14	25–40	≤10.5	0.15	28–44	≤12	0.18	35–55	≤15	0.21
H	Hardened Steel	1	40–55HRC	≤9.5	≤8	0.25	≤11	≤9	0.28	≤12	≤10	0.3	≤15	≤14	0.35
				9.5–22	≤5	0.2	11–25	≤5.5	0.22	12–28	≤6	0.24	15–35	≤8	0.3
				22–35	≤2	0.16	25–40	≤2	0.17	28–44	≤2	0.18	35–55	≤4	0.22

∗1 Please pay special attention on the depth of cut when using the short edge type.
∗2 When using the G1 breaker (VP15TF), please reduce the feed rate by 20%.
∗3 For more information on "No.", please refer to cutting speed.

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SLOT MILLING

(mm)

	Work Material	No.	Hardness	ϕ16, 17		ϕ20, 21		ϕ25, 26	
				ap	f (mm/rev)	ap	f (mm/rev)	ap	f (mm/rev)
P	Mild Steel	1	≤180HB	≤4.5	0.16	≤6	0.18	≤7.5	0.2
				4.5−12	0.1	6−14	0.14	7.5−17	0.16
				12−17	0.07	14−22	0.1	17−27	0.12
	Carbon Steel Alloy Steel	2	180−350HB	≤4.5	0.14	≤6	0.16	≤7.5	0.18
				4.5−12	0.09	6−14	0.12	7.5−17	0.14
				12−17	0.05	14−22	0.1	17−27	0.1
M	Stainless Steel	1,2,3,4	–	≤4.5	0.14	≤6	0.16	≤7.5	0.18
				4.5−12	0.09	6−14	0.12	7.5−17	0.14
				12−17	0.05	14−22	0.1	17−27	0.1
K	Gray Cast Iron	1	≤350MPa	≤4.5	0.16	≤6	0.18	≤7.5	0.2
				4.5−12	0.1	6−14	0.14	7.5−17	0.16
				12−17	0.07	14−22	0.1	17−27	0.12
N	Aluminum Alloy	1,2,3	–	≤4.5	0.18	≤6	0.2	≤7.5	0.22
				4.5−12	0.12	6−14	0.16	7.5−17	0.18
				12−17	0.09	14−22	0.12	17−27	0.14
S	Titanium Alloy	1	–	≤4.5	0.1	≤6	0.12	≤7.5	0.15
				4.5−12	0.05	6−14	0.08	7.5−17	0.1
				12−17	0.03	14−22	0.05	17−27	0.08
H	Hardened Steel	1	40−55HRC	≤4.5	0.1	≤6	0.12	≤7.5	0.14
				4.5−12	0.07	6−14	0.1	7.5−17	0.12
				–	–	–	–	–	–

	Work Material	No.	Hardness	ϕ32, 33		ϕ35		ϕ40		ϕ50	
				ap	f (mm/rev)	ap	f (mm/rev)	ap	f (mm/rev)	ap	f (mm/rev)
P	Mild Steel	1	≤180HB	≤9.5	0.25	≤11	0.27	≤12	0.3	≤15	0.35
				9.5−22	0.2	11−25	0.22	12−28	0.25	15−35	0.3
				22−35	0.14	25−40	0.16	28−44	0.18	35−55	0.22
	Carbon Steel Alloy Steel	2	180−350HB	≤9.5	0.2	≤11	0.22	≤12	0.25	≤15	0.3
				9.5−22	0.16	11−25	0.18	12−28	0.2	15−35	0.25
				22−35	0.12	25−40	0.13	28−44	0.14	35−55	0.16
M	Stainless Steel	1,2,3,4	–	≤9.5	0.2	≤11	0.22	≤12	0.25	≤15	0.3
				9.5−22	0.16	11−25	0.18	12−28	0.2	15−35	0.25
				22−35	0.12	25−40	0.13	28−44	0.14	35−55	0.16
K	Gray Cast Iron	1	≤350MPa	≤9.5	0.25	≤11	0.27	≤12	0.3	≤15	0.35
				9.5−22	0.2	11−25	0.22	12−28	0.25	15−35	0.3
				22−35	0.14	25−40	0.16	28−44	0.18	35−55	0.22
N	Aluminum Alloy	1,2,3	–	≤9.5	0.27	≤11	0.3	≤12	0.32	≤15	0.37
				9.5−22	0.22	11−25	0.25	12−28	0.27	15−35	0.32
				22−35	0.16	25−40	0.18	28−44	0.2	35−55	0.25
S	Titanium Alloy	1	–	≤9.5	0.18	≤11	0.2	≤12	0.23	≤15	0.25
				9.5−22	0.12	11−25	0.15	12−28	0.2	15−35	0.23
				22−35	0.1	25−40	0.12	28−44	0.15	35−55	0.18
H	Hardened Steel	1	40−55HRC	≤9.5	0.16	≤11	0.17	≤12	0.18	≤15	0.22
				9.5−22	0.12	11−25	0.13	12−28	0.14	15−35	0.16
				–	–	–	–	–	–	–	–

*1 Please pay special attention on the depth of cut when using the short edge type.
*2 When using the G1 breaker (VP15TF), please reduce the feed rate by 20%.
*3 For more information on "No.", please refer to cutting speed.

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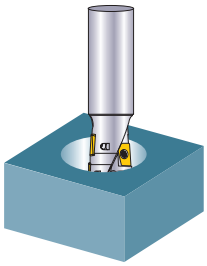
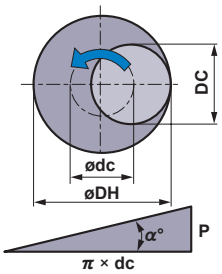
RECOMMENDED CUTTING CONDITIONS

FOR HELICAL CUTTING





- How to derive a locus of the center of the tool.
- Depth of cut for each pass.

$$\text{Ø dc} = \text{Ø DH} - \text{DC}$$

Locus of the center of the tool — Desired hole diameter — Cutting edge diameter

$$P = \pi \times dc \times \tan \alpha°$$

(Note) $\alpha° \leq 3°$

- Min. machined hole diameter for helical cutting : 1.2DC
  Max. machined hole diameter for helical cutting : 1.8DC
- For efficient chip discharge, always apply air blow.
- When using a G1 breaker insert (VP15TF), please reduce the feed rate by 20%.

(mm)

	Work Material	No.	Hardness	ϕ16, 17				ϕ20, 21				ϕ25, 26			
				DH	APMX	f (mm/rev)	P (mm/pass)	DH	APMX	f (mm/rev)	P (mm/pass)	DH	APMX	f (mm/rev)	P (mm/pass)
P	Mild Steel	1	≤180HB	20	8	0.16	0.44	24	10	0.18	0.44	30	12.5	0.2	0.55
				25	12	0.14	0.99	30	15	0.16	1.1	38	19	0.18	1.43
				29	16	0.12	1.43	36	20	0.14	1.76	45	25	0.16	2.2
	Carbon Steel Alloy Steel	2	180−350HB	20	8	0.14	0.33	24	10	0.16	0.33	30	12.5	0.18	0.41
				25	12	0.12	0.74	30	15	0.14	0.82	38	19	0.16	1.07
				29	16	0.1	1.07	36	20	0.12	1.32	45	25	0.14	1.65
M	Stainless Steel	1,2,3,4	–	20	3	0.14	0.22	24	4	0.16	0.22	30	5	0.18	0.27
				25	5	0.12	0.49	30	7	0.14	0.55	38	9	0.16	0.71
				29	8	0.1	0.71	36	10	0.12	0.88	45	12.5	0.14	1.1
K	Gray Cast Iron	1	≤350MPa	20	10	0.16	0.55	24	14	0.18	0.55	30	18	0.2	0.69
				25	13	0.14	1.23	30	17	0.16	1.37	38	21	0.18	1.78
				29	16	0.12	1.78	36	20	0.14	2.19	45	25	0.16	2.74
N	Aluminum Alloy	1,2,3	–	20	10	0.18	0.44	24	14	0.2	0.44	30	18	0.22	0.55
				25	13	0.16	0.99	30	17	0.18	1.1	38	21	0.2	1.43
				29	16	0.14	1.43	36	20	0.16	1.76	45	25	0.18	2.2
S	Titanium Alloy	1	–	20	3	0.1	0.22	24	4	0.11	0.22	30	5	0.13	0.27
				25	5	0.08	0.49	30	7	0.1	0.55	38	9	0.11	0.71
				29	8	0.07	0.71	36	10	0.08	0.88	45	12.5	0.1	1.1
H	Hardened Steel	1	40−55HRC	20	3	0.1	0.22	24	4	0.12	0.22	30	5	0.14	0.27
				25	5	0.08	0.49	30	7	0.1	0.55	38	9	0.12	0.71
				29	8	0.06	0.71	36	10	0.08	0.88	45	12.5	0.1	1.1

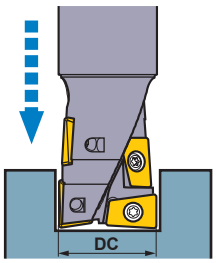
	Work Material	No.	Hardness	ϕ32, 33				ϕ35				ϕ40				ϕ50			
				DH	APMX	f (mm/rev)	P (mm/pass)	DH	APMX	f (mm/rev)	P (mm/pass)	DH	APMX	f (mm/rev)	P (mm/pass)	DH	APMX	f (mm/rev)	P (mm/pass)
P	Mild Steel	1	≤180HB	38	16	0.25	0.66	42	18	0.28	0.77	48	20	0.3	0.88	60	25	0.35	1.1
				48	24	0.22	1.76	53	27	0.24	1.97	60	30	0.26	2.19	75	38	0.3	2.74
				58	32	0.2	2.85	63	35	0.21	3.07	72	40	0.22	3.51	90	50	0.26	4.39
	Carbon Steel Alloy Steel	2	180−350HB	38	16	0.2	0.49	42	18	0.22	0.58	48	20	0.25	0.66	60	25	0.28	0.82
				48	24	0.18	1.32	53	27	0.2	1.48	60	30	0.22	1.65	75	38	0.26	2.06
				58	32	0.16	2.14	63	35	0.18	2.3	72	40	0.2	2.63	90	50	0.24	3.29
M	Stainless Steel	1,2,3,4	–	38	6	0.2	0.33	42	7	0.22	0.38	48	8	0.25	0.44	60	10	0.28	0.55
				48	11	0.18	0.88	53	13	0.2	0.99	60	14	0.22	1.1	75	18	0.26	1.37
				58	16	0.16	1.43	63	18	0.18	1.53	72	20	0.2	1.75	90	25	0.27	2.19
K	Gray Cast Iron	1	≤350MPa	38	22	0.25	0.82	42	25	0.28	0.95	48	28	0.3	1.1	60	35	0.35	1.37
				48	27	0.22	2.19	53	30	0.24	2.47	60	34	0.26	2.74	75	43	0.3	3.43
				58	32	0.2	3.57	63	35	0.21	3.84	72	40	0.22	4.39	90	50	0.26	5.49
N	Aluminum Alloy	1,2,3	–	38	22	0.27	0.66	42	25	0.3	0.77	48	28	0.32	0.88	60	35	0.37	1.1
				48	27	0.24	1.76	53	30	0.26	1.97	60	34	0.28	2.19	75	43	0.32	2.74
				58	32	0.22	2.85	63	35	0.21	3.07	72	40	0.24	3.51	90	50	0.27	4.39
S	Titanium Alloy	1	–	38	6	0.14	0.33	42	7	0.15	0.38	48	8	0.18	0.44	60	10	0.2	0.55
				48	11	0.13	0.88	53	13	0.14	0.99	60	14	0.15	1.1	75	18	0.18	1.37
				58	16	0.11	1.43	63	18	0.13	1.53	72	20	0.14	1.75	90	25	0.17	2.19
H	Hardened Steel	1	40−55HRC	38	6	0.16	0.33	42	7	0.17	0.38	48	8	0.18	0.44	60	10	0.2	0.55
				48	11	0.14	0.88	53	13	0.15	0.99	60	14	0.16	1.1	75	18	0.18	1.37
				58	16	0.12	1.43	63	18	0.13	1.53	72	20	0.14	1.75	90	25	0.16	2.19

(Note) Helical grooving is strongly recommended for machining tempered steel.
*1 When using G1 breaker (VP15TF), please reduce the feed rate by 20%.
*2 For more information on "No.", please refer to cutting speed.

AQX

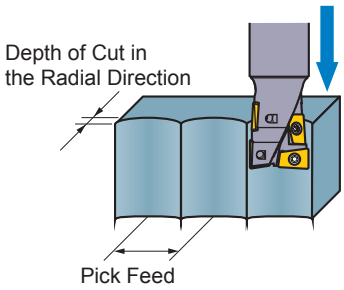
FOR DRILLING AND PLUNGING

Drilling



- The recommended drilling depth is less than 0.5DC.
- Use step feed when drilling (0.25−0.5mm) to ensure that the chips are effectively broken.
- Use internal or external cooling to ensure that the chip disposal is sufficiently achieved.
- The chips generated can dispel in any direction, so ensure that adequate safety precautions are taken.

Plunging



- The feed for plunging is the same as the feed for drilling.
- No step feed necessary.
- Please refer to the following table for the depth of cut at plunging operations.

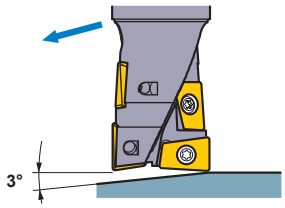
Depth of Cut in the Radial Direction	≤ 0.4DC
Pick Feed	≤ 0.5DC

(mm)

	Work Material	No.	Hardness	ϕ16, 17		ϕ20, 21		ϕ25, 26		ϕ32, 33, 35		ϕ40		ϕ50	
				f (mm/rev)	Step	f (mm/rev)	Step	f (mm/rev)	Step	f (mm/rev)	Step	f (mm/rev)	Step	f (mm/rev)	Step
P	Mild Steel	1	≤180HB	0.035	0.2	0.045	0.3	0.05	0.3	0.055	0.3	0.06	0.3	0.065	0.3
P	Carbon Steel Alloy Steel	2	180−350HB	0.03	0.2	0.04	0.3	0.045	0.3	0.05	0.3	0.055	0.3	0.06	0.3
M	Stainless Steel	1,2,3,4	−	0.03	0.15	0.04	0.25	0.045	0.25	0.05	0.25	0.055	0.25	0.06	0.25
K	Gray Cast Iron	1	≤350MPa	0.04	0.4	0.05	0.5	0.06	0.5	0.065	0.5	0.07	0.5	0.075	0.5
N	Aluminum Alloy	1,2,3	−	0.04	0.2	0.05	0.3	0.06	0.3	0.065	0.3	0.07	0.3	0.075	0.3
H	Hardened Steel	1	40−55HRC	0.02	0.15	0.03	0.25	0.035	0.25	0.04	0.25	0.045	0.25	0.05	0.25

(Note) Helical grooving is strongly recommended for machining tempered steel.
*1 When using G1 breaker (VP15TF), please reduce the feed rate by 20%.
*2 For more information on "No.", please refer to cutting speed.

FOR RAMPING



- When machining steel the recommended ramping angle is 3°. If a ramping angle larger than 3° is used, then the chips may not be broken effectively resulting in chips wrapping around the tool.
- During ramping, it is recommended to reduce the feed rate by 40% from the cutting conditions.

AJX

Radius Cutter

Multi Functional Milling

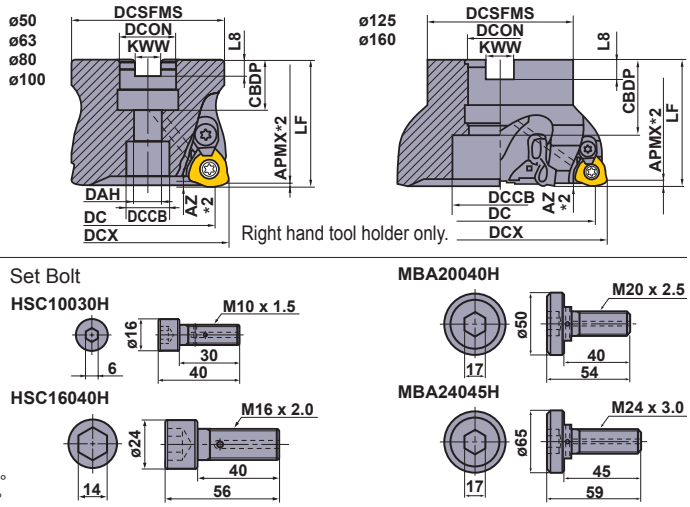
Product Information

Work Material

P M K S H

SYMBOL DESCRIPTIONS >> 1350
TECHNICAL DATA >> 1987
ISO13399 Property >> 1966

- 13° and 15° positive inserts.
- High rigidity double clamp structure.
- Suitable for high feed machining.
- With through coolant holes.
- Special insert design with 3 cutting edges.



ARBOR TYPE

AJX09	AJX12	AJX14
GAMP :+8°	GAMP :+8°	GAMP :+8°
GAMF :-6°	GAMF :-5°—-4°	GAMF :-3°

Type	Order Number	Stock R	Number of Teeth	Dimensions(mm) DCX	DC	LF	DCON	CBDP	DAH	DCSFMS	KWW	L8	DCCB	*3 WT (kg)	*1 Clamp Screw	Clamp Bridge	*1 Clamp Bridge Screw	Spring	① ② Wrench	Set Bolt	Insert
Coarse Pitch	AJX12-050A03R	●	3	50	38.3	50	22	20	11	47	10.4	6.3	17	0.4	TS43	AMS4	AJS40 12T15	ASS2	①TKY15T	HSC100 30H	JDM□ 1204□□ ZD□R-□□
	AJX12R05003B	●	3	50	38.3	50	22.225	19	11	47	8.4	5	17	0.4							
	AJX14-063A03R	●	3	63	51.1	50	22	20	11	60	10.4	6.3	17	0.7	TS54	AMS5	AJS50 14T25	ASS3	①TKY25T	HSC100 30H	JDM□ 1405□□ ZD□R-□□
	AJX14R06303B	●	3	63	51.1	50	22.225	19	11	60	8.4	5	17	0.7							
	AJX14R08004D	●	4	80	68.1	63	31.75	32	17	76	12.7	8	26	1.3						HSC160 40H	
	AJX14R10005D	●	5	100	88.1	63	31.75	32	17	96	12.7	8	26	2.4							
	AJX14R12505E	●	5	125	113.2	63	38.1	40	—	100	15.9	10	56	3.3						MBA200 40H	
	AJX14R16006F	●	6	160	148.2	63	50.8	43	—	100	19.1	11	72	5.0						MBA240 45H	
Fine Pitch	AJX12-050A04R	●	4	50	38.3	50	22	20	11	47	10.4	6.3	17	0.4	TS43	AMS4	AJS40 12T15	ASS2	①TKY15T	HSC100 30H	JDM□ 1204□□ ZD□R-□□
	AJX12R05004B	●	4	50	38.3	50	22.225	19	11	47	8.4	5	17	0.4							
	AJX14-063A04R	●	4	63	51.1	50	22	20	11	60	10.4	6.3	17	0.7	TS54	AMS5	AJS50 14T25	ASS3	①TKY25T	HSC100 30H	JDM□ 1405□□ ZD□R-□□
	AJX14R06304B	●	4	63	51.1	50	22.225	19	11	60	8.4	5	17	0.7							
	AJX14R08005D	●	5	80	68.1	63	31.75	32	17	76	12.7	8	26	1.3						HSC160 40H	
	AJX14R10006D	●	6	100	88.1	63	31.75	32	17	96	12.7	8	26	2.4							
	AJX14R12507E	●	7	125	113.2	63	38.1	40	—	100	15.9	10	56	3.3						MBA200 40H	
	AJX14R16008F	●	8	160	148.2	63	50.8	43	—	100	19.1	11	72	5.0						MBA240 45H	
Extra Fine Pitch	AJX09-050A05R	●	5	50	40	50	22	20	11	47	10.4	6.3	17	0.5	TS351	AMS3	AJS30 10T10	ASS2	②TKY10D	HSC100 30H	JDM□ 09T3□□ ZD□R-□□
	AJX09R05005B	●	5	50	40	50	22.225	19	11	47	8.4	5	17	0.5							
	AJX12-063A05R	●	5	63	51.3	50	22	20	11	60	10.4	6.3	17	0.9	TS43	AMS4	AJS40 12T15	ASS2	①TKY15T	HSC100 30H	JDM□ 1204□□ ZD□R-□□
	AJX12R06305B	●	5	63	51.3	50	22.225	19	11	60	8.4	5	17	0.9							
	AJX12R08006D	●	6	80	68.3	63	31.75	32	17	76	12.7	8	26	1.7						HSC160 40H	
	AJX12R10007D	●	7	100	88.3	63	31.75	32	17	96	12.7	8	26	2.9							

*1 Clamp Torque (N • m) : TS351=2.5, TS43=6.0, TS54=7.5, AJS3010T10=2.5, AJS4012T15=3.5, AJS5014T25=7.5
*2 Refer to recommended cutting conditions for the max. depth of cut APMX and maximum drilling depth AZ.
*3 WT : Tool Weight

● : Inventory maintained in Japan.

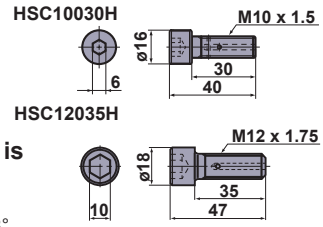
AJX

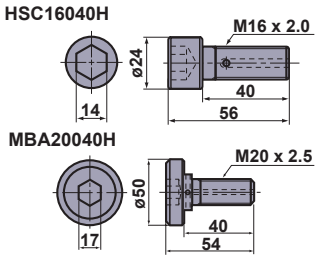
For metric arbor

The cutter bore diameter DCON is indicated in millimetre.

AJX09	AJX12	AJX14
GAMP :+8°	GAMP :+8°	GAMP :+8°
GAMF :-6°	GAMF :-5°—-4°	GAMF :-3°

Set Bolt



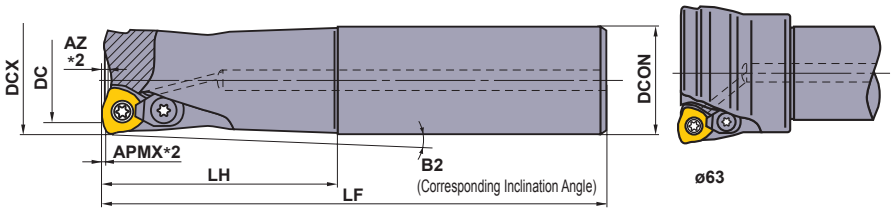


ARBOR TYPE

Type	Order Number	Stock R	Number of Teeth	DCX	DC	LF	DCON	CBDP	DAH	DCSFMS	KWW	L8	DCCB	*3 WT (kg)	*1 Clamp Screw	Clamp Bridge	*1 Clamp Bridge Screw	Spring	①② Wrench	Set Bolt	Insert
Coarse Pitch	AJX12-050A03R	●	3	50	38.3	50	22	20	11	47	10.4	6.3	17	0.4	TS43	AMS4	AJS40 12T15	ASS2	①TKY15T	HSC100 30H	JDM□ 1204□□ ZD□R-□□
Coarse Pitch	AJX14-063A03R	●	3	63	51.1	50	22	20	11	60	10.4	6.3	17	0.7	TS54	AMS5	AJS50 14T25	ASS3	①TKY25T	HSC100 30H	JDM□ 1405□□ ZD□R-□□
Coarse Pitch	AJX14-080A04R	●	4	80	68.1	50	27	23	13	76	12.4	7.0	19	1.2						HSC120 35H	
Coarse Pitch	AJX14-100A05R	●	5	100	88.1	63	32	26	17	96	14.4	8.0	26	2.4						HSC160 40H	
Coarse Pitch	AJX14-125B05R	●	5	125	113.2	63	40	40	—	100	16.4	9.0	56	3.3						MBA200 40H	
Coarse Pitch	AJX14-160B06R	●	6	160	148.2	63	40	40	—	100	16.4	9.0	56	5.0							
Fine Pitch	AJX12-050A04R	●	4	50	38.3	50	22	20	11	47	10.4	6.3	17	0.4	TS43	AMS4	AJS40 12T15	ASS2	①TKY15T	HSC100 30H	JDM□ 1204□□ ZD□R-□□
Fine Pitch	AJX12-080A06R	●	6	80	68.3	50	27	23	13	76	12.4	7.0	19	1.2						HSC120 35H	
Fine Pitch	AJX12-100A07R	●	7	100	88.3	63	32	26	17	96	14.4	8.0	26	2.6						HSC160 40H	
Fine Pitch	AJX14-063A04R	●	4	63	51.1	50	22	20	11	60	10.4	6.3	17	0.7	TS54	AMS5	AJS50 14T25	ASS3	①TKY25T	HSC100 30H	JDM□ 1405□□ ZD□R-□□
Fine Pitch	AJX14-080A05R	●	5	80	68.1	50	27	23	13	76	12.4	7.0	19	1.2						HSC120 35H	
Fine Pitch	AJX14-100A06R	●	6	100	88.1	63	32	26	17	96	14.4	8.0	26	2.4						HSC160 40H	
Fine Pitch	AJX14-125B07R	●	7	125	113.2	63	40	40	—	100	16.4	9.0	56	3.3						MBA200 40H	
Fine Pitch	AJX14-160B08R	●	8	160	148.2	63	40	40	—	100	16.4	9.0	56	5.0							
Extra Fine Pitch	AJX09-050A05R	●	5	50	40	50	22	20	11	47	10.4	6.3	17	0.4	TS351	AMS3	AJS30 10T10	ASS2	②TKY10D	HSC100 30H	JDM□ 09T3□□ ZD□R-□□
Extra Fine Pitch	AJX12-063A05R	●	5	63	51.3	50	22	20	11	60	10.4	6.3	17	0.7	TS43	AMS4	AJS40 12T15	ASS2	①TKY15T	HSC100 30H	JDM□ 1204□□ ZD□R-□□

*1 Clamp Torque (N • m) : TS351=2.5, TS43=6.0, TS54=7.5, AJS3010T10=2.5, AJS4012T15=3.5, AJS5014T25=7.5
*2 Refer to recommended cutting conditions for the max. depth of cut APMX and maximum drilling depth AZ.
*3 WT : Tool Weight

AJX



SHANK TYPE

Right hand tool holder only.

Type	Order Number	Stock R	Number of Teeth	Dimensions(mm) DCX	DCON	DC	LF	LH	B2	*1 Clamp Screw	Clamp Bridge	*1 Clamp Bridge Screw	Spring	①② Wrench	Insert
Short	AJX06R162SA16SS	●	2	16	16	8.9	70	20	3°30′	TS25	–	–	–	①TKY08F	JOM◌06T215 ZZ◌R-◌◌
Short	AJX06R172SA16SS	●	2	17	16	9.9	70	20	–	TS25	–	–	–	①TKY08F	
Standard	AJX06R162SA16S	●	2	16	16	8.9	110	30	2°15′	TS25	–	–	–	①TKY08F	JOM◌ 06T215 ZZ◌R-◌◌
Standard	AJX06R172SA16S	●	2	17	16	9.9	110	20	–	TS25	–	–	–	①TKY08F	
Standard	AJX06R203SA20S	●	3	20	20	12.9	130	50	1°18′	TS25	–	–	–	①TKY08F	
Standard	AJX06R223SA20S	●	3	22	20	14.9	130	30	–	TS25	–	–	–	①TKY08F	
Standard	AJX08R202SA20S	●	2	20	20	11.4	130	50	1°20′	TS33	–	–	–	②TKY08D	JOM◌ 080320 ZZ◌R-◌◌
Standard	AJX08R222SA20S	●	2	22	20	13.4	130	30	–	TS33	–	–	–	②TKY08D	
Standard	AJX08R253SA25S	●	3	25	25	16.4	140	60	1°06′	TS33	–	–	–	②TKY08D	
Standard	AJX08R283SA25S	●	3	28	25	19.4	140	40	–	TS33	–	–	–	②TKY08D	
Standard	AJX09R252SA25S	●	2	25	25	14.9	140	60	1°06′	TS351	AMS3	AJS3010T10	ASS2	②TKY10D	JDM◌ 09T3◌◌ ZD◌R-◌◌
Standard	AJX09R282SA25S	●	2	28	25	17.9	140	40	–	TS351	AMS3	AJS3010T10	ASS2	②TKY10D	
Standard	AJX09R303SA32S	●	3	30	32	20.0	150	70	1°48′	TS351	AMS3	AJS3010T10	ASS2	②TKY10D	
Standard	AJX09R323SA32S	●	3	32	32	21.9	150	70	0°56′	TS351	AMS3	AJS3010T10	ASS2	②TKY10D	
Standard	AJX09R353SA32S	●	3	35	32	24.9	150	50	–	TS351	AMS3	AJS3010T10	ASS2	②TKY10D	
Standard	AJX09R404SA32S	●	4	40	32	29.9	150	50	–	TS351	AMS3	AJS3010T10	ASS2	②TKY10D	
Standard	AJX09R404SA42S	●	4	40	42	29.9	150	70	1°48′	TS351	AMS3	AJS3010T10	ASS2	②TKY10D	
Standard	AJX12R302SA32S	●	2	30	32	18.3	150	70	1°48′	TS407	AMS4	AJS4012T15	ASS2	②TKY15D	JDM◌ 1204◌◌ ZD◌R-◌◌
Standard	AJX12R322SA32S	●	2	32	32	20.3	150	70	0°58′	TS43	AMS4	AJS4012T15	ASS2	②TKY15D	
Standard	AJX12R352SA32S	●	2	35	32	23.3	150	50	–	TS43	AMS4	AJS4012T15	ASS2	②TKY15D	
Standard	AJX12R403SA32S	●	3	40	32	28.3	150	50	–	TS43	AMS4	AJS4012T15	ASS2	②TKY15D	
Standard	AJX12R403SA42S	●	3	40	42	28.3	150	70	1°48′	TS43	AMS4	AJS4012T15	ASS2	②TKY15D	
Standard	AJX14R503SA42S	●	3	50	42	38.2	150	50	–	TS54	AMS5	AJS5014T25	ASS3	②TKY25D	JDM◌1405◌◌ ZD◌R-◌◌
Standard	AJX14R634SA42S	●	4	63	42	51.1	150	50	–	TS54	AMS5	AJS5014T25	ASS3	②TKY25D	

*1 Clamp Torque (N • m) : TS25=1.0, TS33=1.5, TS351=2.5, TS407=3.5, TS43=6.0, TS54=7.5, AJS3010T10=2.5, AJS4012T15=3.5, AJS5014T25=7.5

*2 Refer to recommended cutting conditions for the max. depth of cut APMX and maximum drilling depth AZ.

● : **Inventory maintained in Japan.**

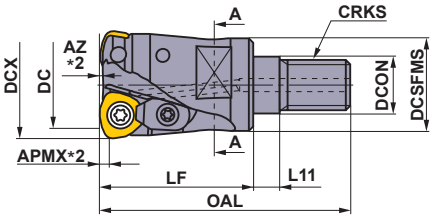
AJX

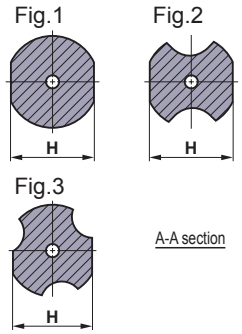
Type	Order Number	Stock R	Number of Teeth	Dimensions(mm) DCX	DCON	DC	LF	LH	B2	Clamp Screw *1	Clamp Bridge	Clamp Bridge Screw *1	Spring	Wrench	Insert
Long	AJX06R162SA16L	●	2	16	16	8.9	150	70	0°56′	TS25	—	—	—	①TKY08F	JOM◌ 06T215 ZZ◌R-◌◌
	AJX06R172SA16L	●	2	17	16	9.9	150	20	—	TS25	—	—	—	①TKY08F	
	AJX06R203SA20L	●	3	20	20	12.9	180	100	0°38′	TS25	—	—	—	①TKY08F	
	AJX06R223SA20L	●	3	22	20	14.9	180	30	—	TS25	—	—	—	①TKY08F	
	AJX08R202SA20L	●	2	20	20	11.4	180	100	0°39′	TS33	—	—	—	②TKY08D	JOM◌ 080320 ZZ◌R-◌◌
	AJX08R222SA20L	●	2	22	20	13.4	180	30	—	TS33	—	—	—	②TKY08D	
	AJX08R253SA25L	●	3	25	25	16.4	200	120	0°32′	TS33	—	—	—	②TKY08D	
	AJX08R283SA25L	●	3	28	25	19.4	200	40	—	TS33	—	—	—	②TKY08D	
	AJX09R252SA25L	●	2	25	25	14.9	200	120	0°32′	TS351	AMS3	AJS3010T10	ASS2	②TKY10D	JDM◌ 09T3◌◌ ZD◌R-◌◌
	AJX09R282SA25L	●	2	28	25	17.9	200	40	—	TS351	AMS3	AJS3010T10	ASS2	②TKY10D	
	AJX09R303SA32L	●	3	30	32	20.0	200	120	1°02′	TS351	AMS3	AJS3010T10	ASS2	②TKY10D	
	AJX09R323SA32L	●	3	32	32	21.9	200	120	0°32′	TS351	AMS3	AJS3010T10	ASS2	②TKY10D	
	AJX09R353SA32L	●	3	35	32	24.9	200	50	—	TS351	AMS3	AJS3010T10	ASS2	②TKY10D	
	AJX09R404SA32L	●	4	40	32	29.9	250	50	—	TS351	AMS3	AJS3010T10	ASS2	②TKY10D	
	AJX09R404SA42L	●	4	40	42	29.9	250	70	1°48′	TS351	AMS3	AJS3010T10	ASS2	②TKY10D	
	AJX12R302SA32L	●	2	30	32	18.3	200	120	1°02′	TS407	AMS4	AJS4012T15	ASS2	②TKY15D	JDM◌ 1204◌◌ ZD◌R-◌◌
	AJX12R322SA32L	●	2	32	32	20.3	200	120	0°33′	TS43	AMS4	AJS4012T15	ASS2	②TKY15D	
	AJX12R352SA32L	●	2	35	32	23.3	200	50	—	TS43	AMS4	AJS4012T15	ASS2	②TKY15D	
	AJX12R403SA32L	●	3	40	32	28.3	250	50	—	TS43	AMS4	AJS4012T15	ASS2	②TKY15D	
	AJX12R403SA42L	●	3	40	42	28.3	250	70	1°48′	TS43	AMS4	AJS4012T15	ASS2	②TKY25D	
	AJX14R503SA42L	●	3	50	42	38.1	250	50	—	TS54	AMS5	AJS5014T25	ASS3	②TKY25D	JDM◌1405◌◌ ZD◌R-◌◌
	AJX14R634SA42L	●	4	63	42	51.1	250	50	—	TS54	AMS5	AJS5014T25	ASS3	②TKY25D	
Extra Long	AJX06R162SA16EL	●	2	16	16	8.9	200	100	0°38′	TS25	—	—	—	①TKY08F	JOM◌06T215 ZZ◌R-◌◌
	AJX06R172SA16EL	●	2	17	16	9.9	200	20	—	TS25	—	—	—	①TKY08F	
	AJX08R202SA20EL	●	2	20	20	11.4	250	130	0°30′	TS33	—	—	—	②TKY08D	JOM◌080320 ZZ◌R-◌◌
	AJX08R222SA20EL	●	2	22	20	13.4	250	30	—	TS33	—	—	—	②TKY10D	
	AJX09R252SA25EL	●	2	25	25	14.9	300	180	0°22′	TS351	AMS3	AJS3010T10	ASS2	②TKY10D	JDM◌09T3◌◌ ZD◌R-◌◌
	AJX09R282SA25EL	●	2	28	25	17.9	300	40	—	TS351	AMS3	AJS3010T10	ASS2	②TKY10D	
	AJX12R302SA32EL	●	2	30	32	18.3	300	180	0°42′	TS407	AMS4	AJS4012T15	ASS2	②TKY15D	JDM◌ 1204◌◌ ZD◌R-◌◌
	AJX12R322SA32EL	●	2	32	32	20.3	300	180	0°22′	TS43	AMS4	AJS4012T15	ASS2	②TKY15D	
	AJX12R352SA32EL	●	2	35	32	23.3	300	50	—	TS43	AMS4	AJS4012T15	ASS2	②TKY15D	
	AJX12R402SA32EL	●	2	40	32	28.3	350	50	—	TS43	AMS4	AJS4012T15	ASS2	②TKY15D	
	AJX12R402SA42EL	●	2	40	42	28.3	350	70	1°48′	TS43	AMS4	AJS4012T15	ASS2	②TKY15D	

*1 Clamp Torque (N • m) : TS25=1.0, TS33=1.5, TS351=2.5, TS407=3.5, TS43=6.0, TS54=7.5, AJS3010T10=2.5, AJS4012T15=3.5, AJS5014T25=7.5

*2 Refer to recommended cutting conditions for the max. depth of cut APMX and maximum drilling depth AZ.

AJX





SCREW-IN TYPE

Right hand tool holder only.

Order Number	Stock R	Coolant Hole	Number of Teeth	Dimensions(mm) DCX	DCON	DCSFMS	DC	OAL	LF	L11	H	CRKS	*3 WT (kg)	Type (Fig.)	*1 Clamp Screw	Clamp Bridge	*1 Clamp Bridge Screw	Spring	① ② Wrench	Insert
AJX06R162AM0830	●	○	2	16	8.5	13	8.9	48	30	6	10	M8	0.1	1	TS25	—	—	—	①TKY08F	JOM□ 06T215 ZZ□R-□□
AJX06R172AM0830	●	○	2	17	8.5	13	9.9	48	30	6	10	M8	0.1	1	TS25	—	—	—	①TKY08F	
AJX06R203AM1030	●	○	3	20	10.5	18	12.9	49	30	6	14	M10	0.1	3	TS25	—	—	—	①TKY08F	
AJX06R223AM1030	●	○	3	22	10.5	18	14.9	49	30	6	14	M10	0.1	3	TS25	—	—	—	①TKY08F	
AJX08R202AM1030	●	○	2	20	10.5	18	11.4	49	30	6	14	M10	0.1	2	TS33	—	—	—	①TKY08D	JOM□ 080320 ZZ□R-□□
AJX08R222AM1030	●	○	2	22	10.5	18	13.4	49	30	6	14	M10	0.1	2	TS33	—	—	—	①TKY08D	
AJX08R253AM1235	●	○	3	25	12.5	21	16.4	57	35	6	19	M12	0.1	1	TS33	—	—	—	①TKY08D	
AJX08R283AM1235	●	○	3	28	12.5	21	19.4	57	35	6	19	M12	0.1	1	TS33	—	—	—	①TKY08D	
AJX09R252AM1235	●	○	2	25	12.5	21	14.9	57	35	6	19	M12	0.2	2	TS351	AMS3	AJS3010T10	ASS2	②TKY10D	JDM□ 09T3□□ ZD□R-□□
AJX09R282AM1235	●	○	2	28	12.5	21	17.9	57	35	6	19	M12	0.2	2	TS351	AMS3	AJS3010T10	ASS2	②TKY10D	
AJX09R303AM1645	●	○	3	30	17	29	20.0	68	45	6	24	M16	0.2	1	TS351	AMS3	AJS3010T10	ASS2	②TKY10D	
AJX09R323AM1645	●	○	3	32	17	29	21.9	68	45	6	24	M16	0.2	1	TS351	AMS3	AJS3010T10	ASS2	②TKY10D	
AJX09R353AM1645	●	○	3	35	17	29	24.9	68	45	6	24	M16	0.2	1	TS351	AMS3	AJS3010T10	ASS2	②TKY10D	
AJX09R404AM1645	●	○	4	40	17	29	29.9	68	45	6	24	M16	0.2	1	TS351	AMS3	AJS3010T10	ASS2	②TKY10D	
AJX12R302AM1645	●	○	2	30	17	29	18.3	68	45	6	24	M16	0.3	2	TS407	AMS4	AJS4012T15	ASS2	②TKY15D	JDM□ 1204□□ ZD□R-□□
AJX12R322AM1645	●	○	2	32	17	29	20.3	68	45	6	24	M16	0.3	2	TS43	AMS4	AJS4012T15	ASS2	②TKY15D	
AJX12R352AM1645	●	○	2	35	17	29	23.3	68	45	6	24	M16	0.3	2	TS43	AMS4	AJS4012T15	ASS2	②TKY15D	
AJX12R403AM1645	●	○	3	40	17	29	28.3	68	45	6	24	M16	0.3	2	TS43	AMS4	AJS4012T15	ASS2	②TKY15D	

*1 Clamp Torque (N • m) : TS25=1.0, TS33=1.5, TS351=2.5, TS407=3.5, TS43=6.0, AJS3010T10=2.5, AJS4012T15=3.5
*2 Max. depth of cut APMX(max), Maximum drilling depth AZ.
*3 WT : Tool Weight

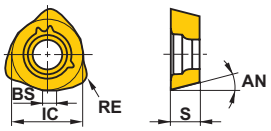
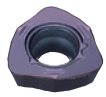
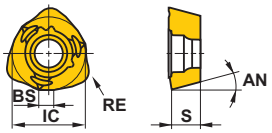
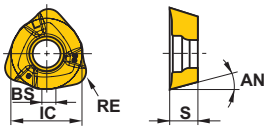
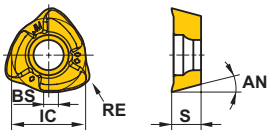
● : **Inventory maintained in Japan.**

AJX

INSERTS

Work Material		FH7020	MP6120	MP6130	MP7130	MP7140	MP9120	MP9130	VP15TF	VP30RT
P	Steel	●	◐	✠					◐	✠
M	Stainless Steel				◔	✠			◔	✠
K	Cast Iron	●							✠	
S	Heat-resistant Alloy, Titanium Alloy						◐	✠	◐	
H	Hardened Materials								◔	

Cutting Conditions :
● : Stable Cutting ◐ : General Cutting ✠ : Unstable Cutting

Shape	Order Number	Class	FH7020	MP6120	MP6130	MP7130	MP7140	MP9120	MP9130	VP15TF	VP30RT	AN	IC	S	BS	RE	Geometry
			Coated									Dimensions (inch)					
	JOMW06T215ZZSR-FT	M	●	●	●	●	●	●	●	●	●	13°	6.35	2.78	1.2	1.5	
	JOMW080320ZZSR-FT	M	●	●	●	●	●	●	●	●	●	13°	8	3.18	1.4	2	
	JDMW09T320ZDSR-FT	M	●	●	●	●	●	●	●	●	●	15°	9.525	3.97	1.8	2	
	JDMW120420ZDSR-FT	M	●	●	●	●	●	●	●	●	●	15°	12	4.76	2.5	2	
	JDMW140520ZDSR-FT	M	●	●	●	●	●	●	●	●	●	15°	14	5.56	2.8	2	
	JDMT120420ZDSR-ST	M	●	●	●	●	●			●	●	15°	12	4.76	2.5	2	
	JDMT140520ZDSR-ST	M	●	●	●	●	●			●	●	15°	14	5.56	2.8	2	
	JOMT06T216ZZER-JL	M				●	●	●	●			13°	6.35	2.78	1.2	1.6	
	JOMT080322ZZER-JL	M				●	●	●	●			13°	8	3.18	1.4	2.2	
	JDMT09T323ZDER-JL	M				●	●	●	●			15°	9.525	3.97	1.8	2.3	
	JDMT120423ZDER-JL	M				●	●	●	●			15°	12	4.76	2.5	2.3	
	JDMT140523ZDER-JL	M				●	●	●	●			15°	14	5.56	2.8	2.3	
	JOMT06T215ZZSR-JM	M	●	●	●	●	●	●	●	●	●	13°	6.35	2.78	1.2	1.5	
	JOMT080320ZZSR-JM	M	●	●	●	●	●	●	●	●	●	13°	8	3.18	1.4	2	
	JDMT09T320ZDSR-JM	M	●	●	●	●	●	●	●	●	●	15°	9.525	3.97	1.8	2	
	JDMT120420ZDSR-JM	M	●	●	●	●	●	●	●	●	●	15°	12	4.76	2.5	2	
	JDMT140520ZDSR-JM	M	●	●	●	●	●	●	●	●	●	15°	14	5.56	2.8	2	

(Note) Setting height for ST chipbreaker is slightly different from that for other chipbreakers.
If you use ST chipbreaker, check the setting height.

■ = MIRACLE SIGMA

● : **Inventory maintained in Japan. (10 inserts in one case)**

AJX

RECOMMENDED CUTTING CONDITIONS

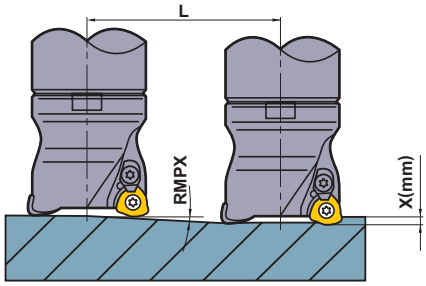
CUTTING SPEED

Work Material		Hardness	Cutting speed (m/min) for different grades			
P			FH7020	MP6120	MP6130	VP30RT
	Mild Steel	≤180HB	170 (120—220)	150 (100—200)	130 (80—180)	110 (60—160)
	Carbon Steel Alloy Steel	180—280HB	150 (100—200)	130 (80—180)	110 (60—160)	90 (40—140)
	Carbon Steel Alloy Steel	280—350HB	130 (80—180)	100 (50—150)	80 (30—130)	60 (20—110)
	Alloy Tool Steel	≤350HB	130 (80—180)	100 (50—150)	80 (30—120)	60 (20—90)
	Pre-hardened Steel	35—45HRC	—	100 (70—130)	80 (50—110)	80 (30—90)
M			MP7130	MP7140	—	—
	Stainless Steel	≤270HB	140 (100—180)	120 (80—160)		
K			FH7020	VP15TF	—	—
	Gray Cast Iron	≤350MPa	150 (100—200)	—		
	Ductile Cast Iron	≤800MPa	—	120 (80—160)	—	—
S			MP9120	MP9130	—	—
	Heat Resistant Alloy	≤350HB	30 (20—40)	25 (20—35)		
	Titanium Alloy	—	50 (40—60)	45 (30—55)		
H			VP15TF	—	—	—
	Hardened Steel	40—55HRC	70 (50—90)			

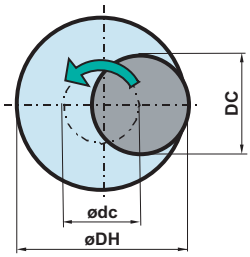
AJX

MAXIMUM CAPACITIES BY MODE

RAMPING



HELICAL DRILLING



- How to derive a locus of the center of the tool.

ødc = øDH - DC

Locus of the center of the tool — Desired hole diameter — Tool Diameter

- The depth of cut per pass must not exceed the max. depth of cut APMX.
- Set the machine spindle revolution so that the tool is rotating and cutting in a down cut direction.

- When ramping and helical cutting, please apply a lower feed (60% of the calculated feed rate or less).
- When drilling, please set the feed in the axial direction at 0.2mm/rev or less.
- The long chips generated can disperse, ensure that adequate safety precautions are taken.

Type	Order Number	DCX (mm)	DC (mm)	APMX (mm)		Ramping					Helical Drilling		AZ (mm)
				FT/JM/ST Breaker	JL Breaker	RMPX	L (mm) Required distance for X mm depth				DH (mm)		
							X=1	X=1.2	X=1.5	X=2	Min	Max	
Shank type/Screw-in type	AJX06R162	16	8	1	0.6	3°	19.1	—	—	—	23	29	0.3
	AJX06R172	17	9	1	0.6	2° 30′	22.9	—	—	—	25	31	0.3
	AJX06R203	20	12	1	0.6	1° 30′	38.2	—	—	—	31	37	0.3
	AJX06R223	22	14	1	0.6	1°	57.3	—	—	—	35	41	0.3
	AJX08R202	20	11	1.5	0.9	3° 30′	16.3	19.6	24.5	—	27	36	0.5
	AJX08R222	22	13	1.5	0.9	3°	19.1	22.9	28.6	—	31	40	0.5
	AJX08R253	25	16	1.5	0.9	2°	28.6	34.4	43	—	37	46	0.5
	AJX08R283	28	19	1.5	0.9	1° 42′	33.7	40.4	50.5	—	43	52	0.5
	AJX09R252	25	14	2	1.2	4°	14.3	17.2	21.5	28.6	33	46	1
	AJX09R282	28	17	2	1.2	3°	19.1	22.9	28.6	38.1	39	52	1
	AJX09R303	30	19	2	1.2	2° 42′	21.2	25.4	31.8	42.4	43	56	1
	AJX09R323	32	21	2	1.2	2° 30′	22.9	27.5	34.4	45.8	47	60	1
	AJX09R353	35	24	2	1.2	2°	28.6	34.4	43	57.3	53	66	1
	AJX09R404	40	29	2	1.2	1° 30′	38.2	45.8	57.3	76.4	63	76	1
	AJX12R302	30	18	2	1.2	4° 30′	12.7	15.2	19	25.4	39	56	1.5
	AJX12R322	32	20	2	1.2	4°	14.3	17.2	21.4	28.6	41	60	1.5
	AJX12R352	35	23	2	1.2	3° 30′	16.3	19.6	24.5	32.7	47	66	1.5
	AJX12R402	40	28	2	1.2	3°	19.1	22.9	28.6	38.2	57	76	1.5
	AJX12R403	40	28	2	1.2	3°	19.1	22.9	28.6	38.2	57	76	1.5
	AJX14R503	50	38	2	1.2	4° 12′	13.6	16.3	20.4	27.2	72	96	2
	AJX14R634	63	51	2	1.2	2° 48′	20.4	24.5	30.7	40.9	98	122	2
Arbor type	AJX09-050	50	40	2	1.2	1° 06′	52.1	62.5	78.1	104.2	83	96	1
	AJX09R05005B	50	40	2	1.2	1° 06′	52.1	62.5	78.1	104.2	83	96	1
	AJX12-050	50	38	2	1.2	2°	28.6	34.4	43	57.3	77	96	1.5
	AJXR050	50	38	2	1.2	2°	28.6	34.4	43	57.3	77	96	1.5
	AJX12-063	63	51	2	1.2	1° 30′	38.2	45.8	57.3	76.4	103	122	1.5
	AJXR063	63	51	2	1.2	1° 30′	38.2	45.8	57.3	76.4	103	122	1.5
	AJXR080	80	68	2	1.2	1° 06′	52.1	62.5	78.1	104.2	137	156	1.5
	AJXR100	100	88	2	1.2	0° 48′	71.6	85.9	107.4	143.2	177	196	1.5
	AJX14-063	63	51	2	1.2	2° 48′	20.4	24.5	30.7	40.9	98	122	2
	AJXR063	63	51	2	1.2	2° 48′	20.4	24.5	30.7	40.9	98	122	2
	AJXR080	80	68	2	1.2	1° 48′	31.8	38.2	47.7	63.6	132	156	2
	AJXR100	100	88	2	1.2	1° 12′	47.7	57.3	71.6	95.5	172	196	2
	AJXR125	125	113	2	1.2	0° 48′	71.6	85.9	107.4	143.2	222	246	2
	AJXR160	160	148	2	1.2	0° 30′	114.6	137.5	171.9	229.2	292	316	2

DCX = Maximum hole diameter **DC** = Cutting diameter **DH** = Desired hole diameter
APMX = Max. depth of cut **RMPX** = Ramping angle **AZ** = Plunge depth maximum

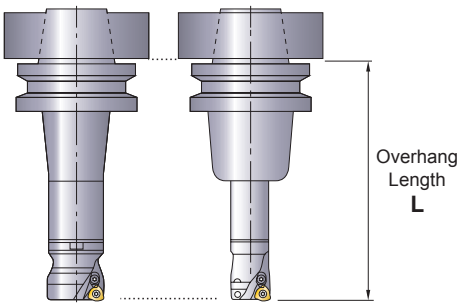
AJX

RECOMMENDED CUTTING CONDITIONS

DEPTH OF CUT / FEED

	Work Material	Hardness	Shank Type / Screw-in Type								
			ø16, ø17			ø20, ø22			ø25, ø28		
			L (mm)	ap (mm)	fz (mm/t)	L (mm)	ap (mm)	fz (mm/t)	L (mm)	ap (mm)	fz (mm/t)
P	Mild Steel	≤180HB	140	0.8	0.8	160	1.0	1.0	170	1.0	1.2
			180	0.6	0.6	210	0.8	0.8	230	0.8	1.0
			210	0.4	0.4	240	0.6	0.6	290	0.6	0.8
	Carbon Steel Alloy Steel	180—280HB	140	0.8	0.8	160	1.0	1.0	170	1.0	1.2
			180	0.6	0.6	210	0.8	0.8	230	0.8	1.0
			210	0.4	0.4	240	0.6	0.6	290	0.6	0.8
	Carbon Steel Alloy Steel	280—350HB	140	0.7	0.8	160	0.8	1.0	170	0.8	1.2
			180	0.5	0.6	210	0.6	0.8	230	0.6	1.0
			210	0.3	0.4	240	0.4	0.6	290	0.4	0.8
	Alloy Tool Steel	≤350HB	140	0.7	0.8	160	0.8	1.0	170	0.8	1.2
			180	0.5	0.6	210	0.6	0.8	230	0.6	1.0
			210	0.3	0.4	240	0.4	0.6	290	0.4	0.8
	Pre-hardened Steel	35—45HRC	140	0.7	0.7	160	0.8	0.8	170	0.8	1.0
			180	0.5	0.5	210	0.6	0.6	230	0.6	0.8
			210	0.3	0.3	240	0.4	0.4	290	0.4	0.6
M	Stainless Steel	≤270HB	140	0.8	0.7	160	1.0	0.8	170	1.0	1.0
			180	0.6	0.5	210	0.8	0.6	230	0.8	0.8
			210	0.4	0.3	240	0.6	0.4	290	0.6	0.6
K	Gray Cast Iron	Tensile Strength ≤350MPa	140	0.8	1.0	160	1.0	1.2	170	1.0	1.4
			180	0.6	0.8	210	0.8	1.0	230	0.8	1.2
			210	0.4	0.6	240	0.6	0.8	290	0.6	1.0
	Ductile Cast Iron	Tensile Strength ≤800MPa	140	0.7	0.8	160	0.8	1.0	170	0.8	1.2
			180	0.5	0.6	210	0.6	0.8	230	0.6	1.0
			210	0.3	0.4	240	0.4	0.6	290	0.4	0.8
S	Heat Resistant Alloy	≤350HB	140	0.6	0.6	160	0.8	0.6	170	1.0	0.6
			180	0.4	0.4	210	0.6	0.4	230	0.8	0.4
	Titanium Alloy	—	210	0.3	0.3	240	0.4	0.3	290	0.6	0.3
H	Hardened Steel	40—55HRC	140	0.5	0.5	160	0.5	0.6	170	0.5	0.8
			180	0.4	0.3	210	0.4	0.4	230	0.4	0.6
			210	0.3	0.2	240	0.3	0.2	290	0.3	0.4

① Overhang Length **L**



② Main Spindle Revolution
n(min^{-1})=(Recommended Cutting Speed x 1000)÷(Outer Tool Diameter x 3.14)

③ Table Feed Rate
vf(mm/min)=n x Feed per Tooth x Number of Teeth

④ Recommended width of cut (ae) is more than 60% of the cutting edge diameter.

⑤ The above cutting conditions are guides to cutting on a #50 BT machine. In case of #40 BT and #63 HSK machines, a cutting edge diameter of under 35mm is recommended. In this case, reduce the depth of cut and table feed rate.

⑥ Use of ST chipbreaker with tougher cutting edges is recommended for machining parts that require interrupted cutting. First recommended insert grade for non-standard 06/08/09 ST chipbreakers is VP30RT irrespective of the workpiece material.

⑦ Cutter body with coarse pitch is recommended for the unstable cutting caused by the long tool overhang.

⑧ Use the "sharp" JM chipbreaker to lower cutting forces or when long tool overhangs are used.

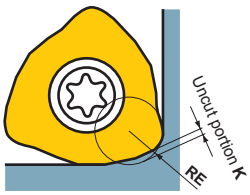
⑨ Heavy chips are generated when machining with the AJX. To avoid chip jamming-related problems, use air blow while machining to discharging chips effectively.

⑩ The JL breaker depth of cut ap differs depending on the insert.
06 size is up to 0.6mm, 08 size is up to 0.9mm, and 09,12,14 size is up to 1.2mm.

AJX

Shank Type / Screw-in Type												Arbor Type					
ø30, ø32, ø35			ø40 (ø32 Shank)			ø40 (ø42 Shank)			ø50, ø63			ø50, ø63			ø80, ø100, ø125, ø160		
L (mm)	ap (mm)	fz (mm/t)	L (mm)	ap (mm)	fz (mm/t)	L (mm)	ap (mm)	fz (mm/t)	L (mm)	ap (mm)	fz (mm/t)	L (mm)	ap (mm)	fz (mm/t)	L (mm)	ap (mm)	fz (mm/t)
180	1.2	1.4	180	1.2	1.4	180	1.2	1.5	180	1.4	1.5	150	1.5	1.5	170	1.5	1.5
230	1.0	1.2	240	1.0	1.2	240	1.0	1.3	240	1.2	1.3	250	1.3	1.3	300	1.3	1.3
290	0.8	1.0	300	0.8	1.0	300	0.8	1.1	–	–	–	350	1.1	1.1	450	1.0	1.0
180	1.2	1.4	180	1.2	1.4	180	1.2	1.5	180	1.4	1.5	150	1.5	1.5	170	1.5	1.5
230	1.0	1.2	240	1.0	1.2	240	1.0	1.3	240	1.2	1.3	250	1.3	1.3	300	1.3	1.3
290	0.8	1.0	300	0.8	1.0	300	0.8	1.1	–	–	–	350	1.1	1.1	450	1.0	1.0
180	1.0	1.4	180	1.0	1.4	180	1.0	1.5	180	1.2	1.5	150	1.3	1.5	170	1.3	1.5
230	0.8	1.2	240	0.8	1.2	240	0.8	1.3	240	1.0	1.3	250	1.1	1.3	300	1.1	1.3
290	0.6	1.0	300	0.6	1.0	300	0.6	1.1	–	–	–	350	0.9	1.1	450	0.8	1.0
180	1.0	1.4	180	1.0	1.4	180	1.0	1.5	180	1.2	1.5	150	1.3	1.5	170	1.3	1.5
230	0.8	1.2	240	0.8	1.2	240	0.8	1.3	240	1.0	1.3	250	1.1	1.3	300	1.1	1.3
290	0.6	1.0	300	0.6	1.0	300	0.6	1.1	–	–	–	350	0.9	1.1	450	0.8	1.0
180	1.0	1.2	180	1.0	1.2	180	1.0	1.3	180	1.2	1.3	150	1.3	1.3	170	1.3	1.3
230	0.8	1.0	240	0.8	1.0	240	0.8	1.1	240	1.0	1.1	250	1.1	1.1	300	1.1	1.1
290	0.6	0.8	300	0.6	0.8	300	0.6	0.9	–	–	–	350	0.9	0.9	450	0.8	0.8
180	1.2	1.2	180	1.2	1.2	180	1.2	1.3	180	*1.4	1.3	150	*1.5	1.3	170	*1.5	1.3
230	1.0	1.0	240	1.0	1.0	240	1.0	1.1	240	1.2	1.1	250	*1.3	1.1	300	*1.3	1.1
290	0.8	0.8	300	0.8	0.8	300	0.8	0.9	–	–	–	350	1.1	0.9	450	1.0	0.8
180	1.2	1.6	180	1.2	1.6	180	1.2	1.7	180	1.4	1.7	150	1.5	1.7	170	1.5	1.7
230	1.0	1.4	240	1.0	1.4	240	1.0	1.5	240	1.2	1.5	250	1.3	1.5	300	1.3	1.5
290	0.8	1.2	300	0.8	1.2	300	0.8	1.3	–	–	–	350	1.1	1.3	450	1.0	1.2
180	1.0	1.4	180	1.0	1.4	180	1.0	1.5	180	1.2	1.5	150	1.3	1.5	170	1.3	1.5
230	0.8	1.2	240	0.8	1.2	240	0.8	1.3	240	1.0	1.3	250	1.1	1.3	300	1.1	1.3
290	0.6	1.0	300	0.6	1.0	300	0.6	1.1	–	–	–	350	0.9	1.1	450	0.8	1.0
180	1.2	0.6	180	1.2	0.6	180	1.2	0.6	180	1.2	0.6	150	1.2	0.6	170	1.2	0.6
230	1.0	0.4	240	1.0	0.4	240	1.0	0.4	240	1.0	0.4	250	1.0	0.4	300	1.0	0.4
290	0.8	0.3	300	0.8	0.3	300	0.8	0.3	–	–	–	350	0.8	0.3	450	0.8	0.3
180	0.6	1.0	180	0.6	1.0	180	0.6	1.1	180	0.8	1.1	150	0.9	1.1	170	0.9	1.1
230	0.5	0.8	240	0.5	0.8	240	0.5	0.9	240	0.6	0.9	250	0.7	0.9	300	0.7	0.9
290	0.4	0.6	300	0.4	0.6	300	0.4	0.7	–	–	–	–	–	–	–	–	–

NOTE FOR PROGRAMMING



When using the AJX, please programme as an R3 radius cutter. The approximate uncut portions for the programme are as follows.

Insert size	Breaker	Approx. RE(mm)	Uncut portion K(mm)
06	FT / JM	2.0	0.33
	JL	2.5	0.32
08	FT / JM	2.5	0.46
	JL	2.0	0.40
09	FT / JM	3.0	0.47
	JL	3.0	0.46
12	FT / JM / ST	3.0	0.63
	JL	3.0	0.53
14	FT / JM / ST	3.0	0.64
	JL	3.0	0.55

(Note.) The uncut portion may change slightly depending on cutting conditions.

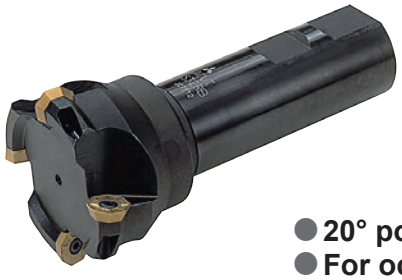
OCTACUT

Multi Functional Milling

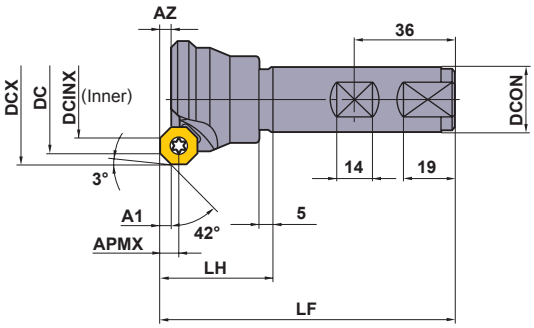
Product Information

Work Material

SYMBOL DESCRIPTIONS >> 1350
TECHNICAL DATA >> 1987
ISO13399 Property >> 1966



- 20° positive insert.
- For octagonal and round type inserts.
- Multi-functional machining.



SHANK TYPE

KAPR :42°

Right hand tool holder only.

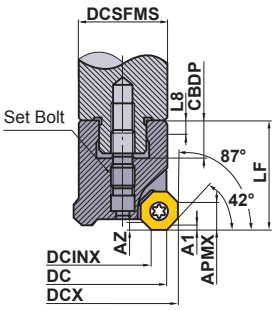
Order Number	Stock	Number of Teeth	Dimensions (mm)									*	① ②	① ②
	R		DCX	DC	DCINX	LF	DCON	LH	A1	APMX	AZ	Clamp Screw	Wrench	Insert
OCTACUT322S32RB	●	2	32	23.6	13.1	125	32	45	2.5	7	3	CS350990T	①TKY10F	①OEMX12T3○○○○ ②REMX12T3○○○○
OCTACUT403S32RB	●	3	40	31.7	21.2	125	32	45	2.5	7	3	CS350990T	①TKY10F	
OCTACUT504S32RB	●	4	50	41.9	31.4	125	32	45	2.5	7	3	CS350990T	①TKY10F	
OCTACUT634S32RB	●	4	63	54.9	44.5	125	32	45	2.5	7	3	CS350990T	①TKY10F	
OCTACUT503S32R	●	3	50	38.3	24.5	125	32	45	3	9	4	CS501290T	②TKY25T	①OEMX1705○○○○ ②REMX1705○○○○
OCTACUT634S32R	●	4	63	51.4	37.6	125	32	45	3	9	4	CS501290T	②TKY25T	

* Clamp Torque (N • m) : CS350990T=2.5, CS501290T=7.5

● : **Inventory maintained in Japan.**

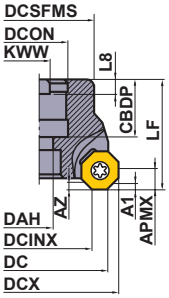
OCTACUT

Fig.1



Small Insert Type
ø40
Standard Insert Type
ø50

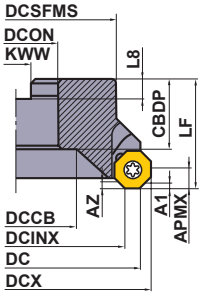
Fig.2



Small Insert Type
ø50
ø63
ø80

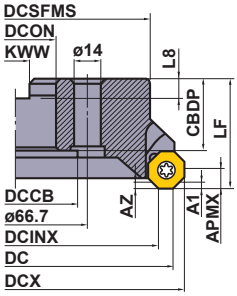
Standard Insert Type
ø63
ø80
ø100

Fig.3



Standard Insert Type
ø125

Fig.4



Standard Insert Type
ø160

KAPR :42°
GAMP :+13°
GAMF :-4°

ARBOR TYPE

Right hand tool holder only.

Order Number	Stock	Number of Teeth	Dimensions (mm)											WT* (kg)	Max. Depth of Cut			Type (Fig.)
	R		DCX	DC	DCINX	LF	DCON	CBDP	DAH	DCCB	KWW	DCSFMS	L8		A1	APMX	AZ	
OCTACUT0403ARB	●	3	40	31.7	21.2	40	16	18	—	—	8.4	33	5.6	0.4	2.5	7	3	1
OCTACUT0504ARB	●	4	50	41.9	31.4	50	22	20	11	—	10.4	42.5	6.3	0.5	2.5	7	3	2
OCTACUT0634ARB	●	4	63	54.9	44.5	50	22	20	11	—	10.4	44	6.3	0.7	2.5	7	3	2
OCTACUT0805CRB	●	5	80	71.9	61.5	50	25.4	26	13	—	9.5	53	6	1.2	2.5	7	3	2
OCTACUT0503AR	●	3	50	38.3	24.5	50	22	20	—	—	10.4	41	6.3	0.5	3	9	4	1
OCTACUT0634AR	●	4	63	51.4	37.6	50	22	20	11	—	10.4	44	6.3	0.7	3	9	4	2
OCTACUT0805CR	●	5	80	68.4	54.7	50	25.4	26	13	—	9.5	53	6	1.2	3	9	4	2
OCTACUT1006DR	●	6	100	88.5	74.7	63	31.75	32	17	—	12.7	70	8	1.6	3	9	4	2
OCTACUT1257ER	●	7	125	113.5	99.8	63	38.1	35	—	60	15.9	80	10	1.8	3	9	4	3
OCTACUT1608FR	●	8	160	148.5	134.8	63	50.8	38	—	80.9	19.1	120	11	3.6	3	9	4	4

* WT : Tool Weight

SPARE PARTS

Tool Holder Number	* Clamp Screw	Wrench	Wrench	Set Bolt	Set Bolt	① ② Insert
OCTACUT0403ARB	CS350990T	TKY10F	—	HDS08030	—	①OEMX12T3□□□□ ②REMX12T3□□□□
OCTACUT0504ARB				—	BOES101	
OCTACUT0634ARB					—	
OCTACUT0805CRB						
OCTACUT0503AR	CS501290T	—	TKY25T	HDS10031	—	①OEMX1705□□□□ ②REMX1705□□□□
OCTACUT0634AR				—	BOES101	
OCTACUT0805CR					—	
OCTACUT1006DR					HSC16035	
OCTACUT1257ER					—	
OCTACUT1608FR						

* Clamp Torque (N • m) : CS350990T=2.5, CS501290T=7.5

OCTACUT

Fig.1

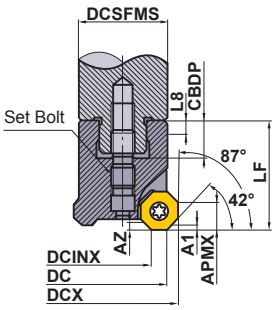


Fig.2

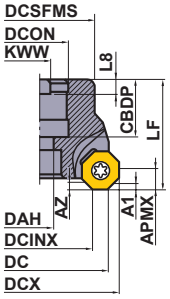


Fig.3

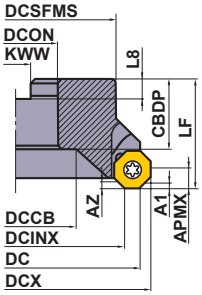
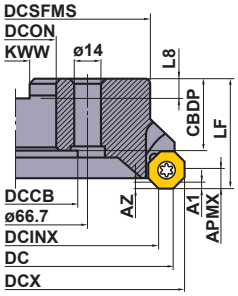


Fig.4



For metric arbor

The cutter bore diameter DCON is indicated in millimetre.

ARBOR TYPE

KAPR :42°
GAMP :+13°
GAMF :-4°

Right hand tool holder only.

Order Number	Stock R	Number of Teeth	Dimensions (mm) DCX	DC	DCINX	LF	DCON	CBDP	DAH	DCCB	KWW	DCSFMS	L8	WT* (kg)	Max. Depth of Cut A1	APMX	AZ	Type (Fig.)
OCTACUT0403ARB	●	3	40	31.7	21.2	40	16	18	—	—	8.4	33	5.6	0.4	2.5	7	3	1
OCTACUT0504ARB	●	4	50	41.9	31.4	50	22	20	11	—	10.4	42.5	6.3	0.5	2.5	7	3	2
OCTACUT0634ARB	●	4	63	54.9	44.5	50	22	20	11	—	10.4	44	6.3	0.7	2.5	7	3	2
OCTACUT0805ARB	●	5	80	71.9	61.5	50	27	23	13	—	12.4	53	7	1.2	2.5	7	3	2
OCTACUT0503AR	●	3	50	38.3	24.5	50	22	20	—	—	10.4	41	6.3	0.5	3	9	4	1
OCTACUT0634AR	●	4	63	51.4	37.6	50	22	20	11	—	10.4	44	6.3	0.7	3	9	4	2
OCTACUT0805AR	●	5	80	68.4	54.7	50	27	23	13	—	12.4	53	7	1.2	3	9	4	2
OCTACUT1006AR	●	6	100	88.5	74.7	50	32	32	45	—	14.4	70	8	1.6	3	9	4	2
OCTACUT1257BR	●	7	125	113.5	99.8	50	40	32	—	56	16.4	80	9	1.8	3	9	4	3
OCTACUT1608CR	●	8	160	148.5	134.8	50	40	29	—	88.7	16.4	120	9	3.6	3	9	4	4

* WT : Tool Weight

● : **Inventory maintained in Japan.**

SPARE PARTS

Tool Holder Number	Clamp Screw *	Wrench	Wrench	Set Bolt	Set Bolt	Insert
OCTACUT0403ARB	CS350990T	TKY10F	—	HDS08030	—	①OEMX12T3□□□□ ②REMX12T3□□□□
OCTACUT0504ARB				—	BOES101	
OCTACUT0634ARB OCTACUT0805ARB					—	
OCTACUT0503AR	CS501290T	—	TKY25T	HDS10031	—	①OEMX1705□□□□ ②REMX1705□□□□
OCTACUT0634AR				—	BOES101	
OCTACUT0805AR OCTACUT1608CR					—	

* Clamp Torque (N • m) : CS350990T=2.5, CS501290T=7.5

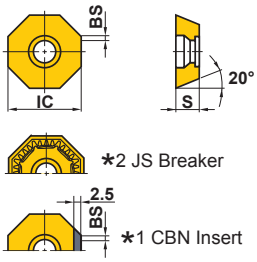
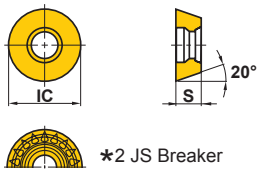
OCTACUT

INSERTS

Work Material			F7030	VP15TF		NX2525	NX4545		MB730		
	P	Steel	◐	◐		●	◐				
	M	Stainless Steel	◔	◔		○	◔				
	K	Cast Iron		✱		●			◐		
	H	Hardened Steel							◔		

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✱ : Unstable Cutting

Honing :
E : Round **S :** Chamfer + Hone **T :** Chamfer

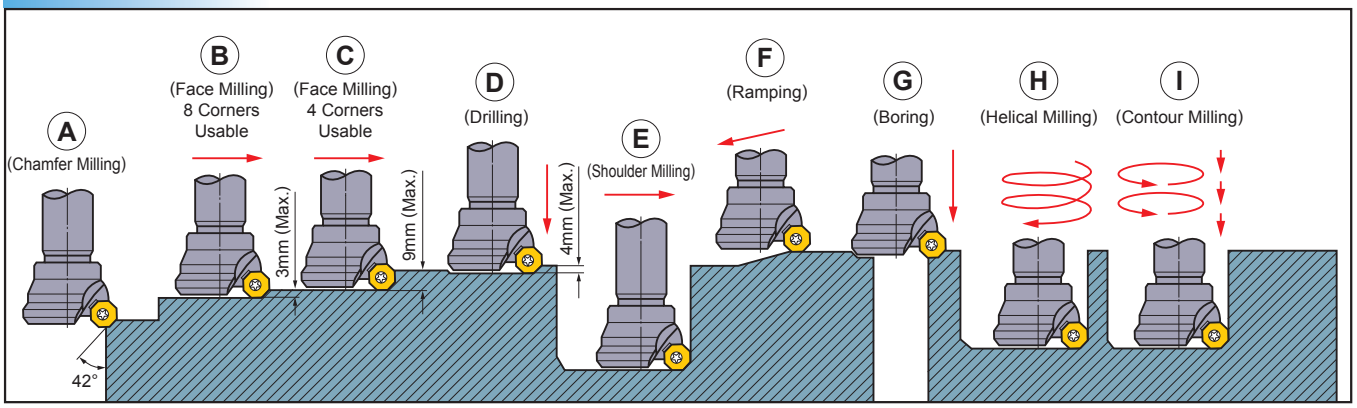
Shape	Order Number	Class	Honing	Coated F7030	Coated VP15TF		Cermet NX2525	Cermet NX4545		CBN *1 MB730			Dimensions (mm) IC	S	BS	Geometry
*2 JS Breaker	OEMX12T3ETR1	M	T					●		●			12.7	3.97	1.0	
	OEMX12T3ESR1	M	S	●									12.7	3.97	1.0	
	*2 OEMX12T3EER1-JS	M	E	●									12.7	3.97	1.0	
	OEMX1705ETR1	M	T		●			●					17.0	5.0	1.4	
	OEMX1705ESR1	M	S	●									17.0	5.0	1.4	
	*2 OEMX1705EER1-JS	M	E	●									17.0	5.0	1.4	
	*2 OEMX1705ETR1-JS	M	T		●								17.0	5.0	1.4	
*2 JS Breaker	*2 REMX12T3EN-JS	M	E	●									12.95	4.17	—	
	REMX1705SN	M	S	●									17.25	5.2	—	
	*2 REMX1705EN-JS	M	E	●									17.25	5.2	—	

*2 Insert with breaker.

● : **Inventory maintained in Japan. (10 inserts in one case) (CBN inserts are available in 1 piece in one case.)**

OCTACUT

RECOMMENDED CUTTING CONDITIONS



This list of recommended cutting conditions is for cutters with diameter≤ϕ80. For cutters with diameter>ϕ80 increase cutting speed by 10%.
Above sizes are for OEMX1705□□□□.

	Work Material	Hardness	Grade	Cutting Speed (m/min)	Cutting Mode	Feed per Tooth (mm/t.)
P	Mild Steel	≤180HB	**F7030**	240 (180—300)	A	0.2 (0.15—0.25)
					B	0.2 (0.15—0.25)
			VP15TF	180 (100—250)	C,E,F	0.2 (0.15—0.25)
					D,G,H,I	0.075 (0.05—0.1)
	Carbon Steel Alloy Steel	180—280HB	**F7030**	200 (140—240)	A	0.2 (0.15—0.25)
					B	0.2 (0.15—0.25)
			VP15TF	180 (100—250)	C,E,F	0.2 (0.15—0.25)
					D,G,H,I	0.075 (0.05—0.1)
		280—380HB	**F7030**	150 (100—170)	A	0.2 (0.15—0.25)
					B	0.2 (0.15—0.25)
			VP15TF	120 (80—160)	C,E,F	0.2 (0.15—0.25)
					D,G,H,I	0.075 (0.05—0.1)
	Pre-Hardened Steel	35—45HRC	**F7030**	130 (90—160)	A	0.15 (0.1—0.2)
					B	0.15 (0.1—0.2)
			VP15TF	120 (80—160)	C,E,F	0.1 (0.05—0.15)
					D,G,H,I	0.05 (0.025—0.075)
	High Alloy Steel	≤300HB	**F7030**	150 (100—170)	A	0.15 (0.1—0.2)
					B	0.15 (0.1—0.2)
			VP15TF	120 (80—160)	C,E,F	0.1 (0.05—0.15)
					D,G,H,I	0.05 (0.025—0.075)
M	Stainless Steel	≤270HB	**F7030**	200 (140—240)	A	0.15 (0.1—0.2)
					B	0.15 (0.1—0.2)
			VP15TF	150 (100—200)	C,E,F	0.1 (0.05—0.15)
					D,G,H,I	0.075 (0.05—0.1)

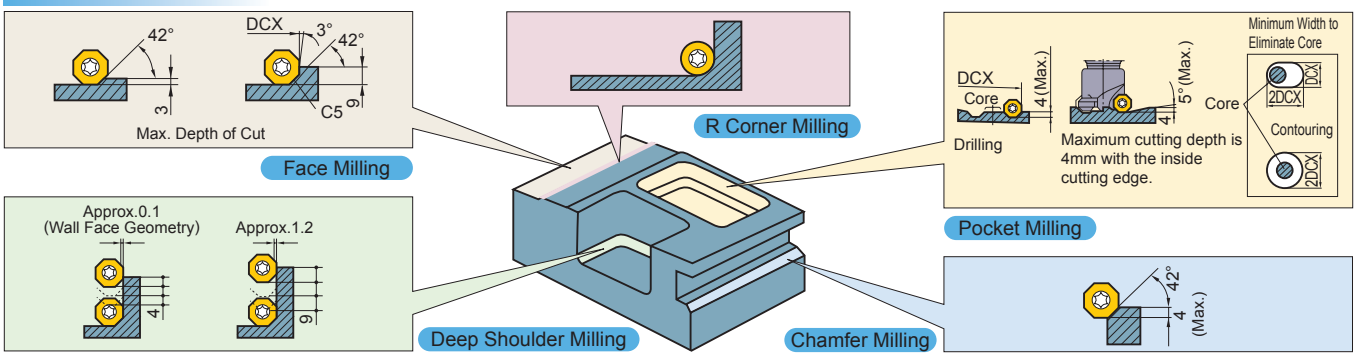
●Revolution (min^{-1})=(1000 x Cutting Speed)÷(3.14 x DC)
●Table Feed (mm/min)=Feed per Tooth x Number of Teeth x Cutter Revolution
(Note 1) This list of recommended cutting conditions is for flank wear of 0.3mm in 30 min. cutting time.
(Note 2) More than 50mm shank length should be clamped in the milling chuck.
(Note 3) Use step cutting when driling (0.5 mm steps are recommended).
(Note 4) When chattering occurs, reduce cutting speed by 20—30 %.
(Note 5) When using round inserts, make sure that the flat portion of the flank surface is secure against the insert seat wall.

OCTACUT

	Work Material	Hardness	Grade	Cutting Speed (m/min)	Cutting Mode	Feed per Tooth (mm/t.)
K	Gray Cast Iron	Tensile Strength ≤350MPa	**VP15TF**	160 (100—220)	A	0.3 (0.25—0.35)
					B	0.25 (0.2—0.3)
					C,E,F	0.15 (0.1—0.2)
					D,G,H,I	0.075 (0.05—0.1)
			MB730	1500 (1000—3000)	B (D.O.C 0.1—0.5mm)	0.15 (0.1—0.2)
	Ductile Cast Iron	Tensile Strength 360—500MPa	**VP15TF**	160 (100—220)	A	0.25 (0.2—0.3)
					B	0.2 (0.15—0.25)
					C,E,F	0.1 (0.05—0.15)
					D,G,H,I	0.05 (0.025—0.075)
	Ductile Cast Iron	Tensile Strength 500—800MPa	**VP15TF**	140 (90—190)	A	0.25 (0.2—0.3)
					B	0.2 (0.15—0.25)
					C,E,F	0.1 (0.05—0.15)
					D,G,H,I	0.05 (0.025—0.075)
H	Hardened Steel	45—60HRC	**VP15TF**	80 (50—100)	A	0.15 (0.1—0.2)
					B	0.15 (0.1—0.2)
					C,E,F	0.1 (0.05—0.12)
					D,G,H,I	0.05 (0.025—0.06)
			MB730	150 (100—200)	B (D.O.C 0.1—0.3mm)	0.15 (0.1—0.2)

●Revolution (min^{-1})=(1000 x Cutting Speed)÷(3.14 x DC)
●Table Feed (mm/min)=Feed per Tooth x Number of Teeth x Cutter Revolution
(Note 1) This list of recommended cutting conditions is for flank wear of 0.3mm in 30 min. cutting time.
(Note 2) More than 50mm shank length should be clamped in the milling chuck.
(Note 3) Use step cutting when driling (0.5 mm steps are recommended).
(Note 4) When chattering occurs, reduce cutting speed by 20—30 %.
(Note 5) When using round inserts, make sure that the flat portion of the flank surface is secure against the insert seat wall.

APPLICATION



Above sizes are for OEMX1705□□□□.

ARP

Multi Functional Milling

Product Information

R KAPR

Work Material

M S R

SYMBOL DESCRIPTIONS >> 1350
TECHNICAL DATA >> 1987
ISO13399 Property >> 1966

Fig.1

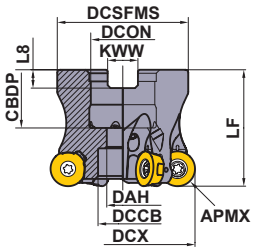
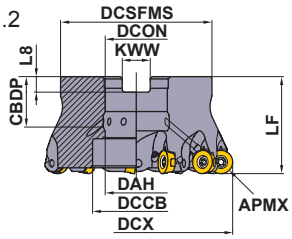
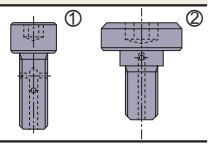


Fig.2



- **Run out does not occur easily when changing sections.**
- **Solid clamping system.**
- **Standardized stock of extra fine pitch.**

Cutter Diameter DC	Set Bolt	Geometry
ϕ80	HSC08025H	①
–	–	
ϕ100	MBA16033H	②
–	–	



ARBOR TYPE

GAMP:+4°
GAMF:-6°

Type	Cutting Edge R (APMX)	Order Number	Stock R	Coolant Hole	Number of Teeth	Dimensions (mm) DCX	DCSFMS	LF	DCON	CBDP	DAH	DCCB	KWW	L8	WT* (kg)	Max. Depth of Cut (mm) APMX	A1	AZ	RMPX	Fig.
Fine Pitch	6	ARP6PR08008CA	●	○	8	80	56	50	25.4	26	13	20	9.5	6	0.89	6.0	2.5	2.5	2.3°	1
		ARP6PR10009DA	●	○	9	100	70	50	31.75	32	31.75	45	12.7	8	1.38	6.0	2.5	2.5	1.7°	2
Extra Fine Pitch	6	ARP6PR08009CA	●	○	9	80	56	50	25.4	26	13	20	9.5	6	0.89	6.0	2.5	2.5	2.3°	1
		ARP6PR10011DA	●	○	11	100	70	50	31.75	32	31.75	45	12.7	8	1.36	6.0	2.5	2.5	1.7°	2

* WT : Tool Weight

● : **Inventory maintained in Japan.**

SPARE PARTS

Tool Holder Number	*1 Insert Screw	Wrench	Anti-seize Lubricant	Insert
ARP5	TPS351B	TIP10D	MK1KS	RP○T1040M0E4-○
ARP6	TPS4	TIP15D	MK1KS	RP○T1248M0E4-○

*1 Clamp Torque (N • m) : TPS351B=2.5,TPS4=4.0

*2 Coolant nozzles are available with varying diameters for adjusting coolant pressure. Select nozzles as required by the specification.

	≤1Mpa (≤20 l/min.)	←Standard→	≥5Mpa (≥30 l/min.)	≥7Mpa (≥50 l/min.)
Nozzle Dia.	ø0.6mm	ø0.8mm	ø1.2mm	ø1.6mm
Order Number	HSD04004H06	HSD04004H08	HSD04004H12	HSD04004H16

* Clamp Torque (N • m) : HSD0400H○○=1.5

*3 The part number for a blank screw without a through nozzle is HSS04004.

ARP

Fig.1

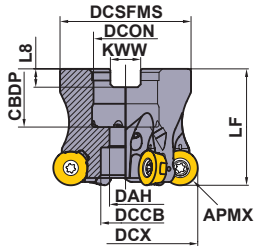
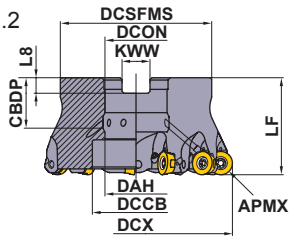


Fig.2

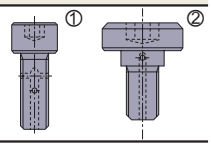


For metric arbors

The cutter bore diameter DCON is indicated in millimetres.

Right hand (R) only for the standard.

Cutter Diameter DC	Set Bolt	Geometry
ϕ40	HSC08025H	①
ϕ50, ϕ63	HSC10030H	①
ϕ80	HSC12035H	①
ϕ100	MBA16033H	②

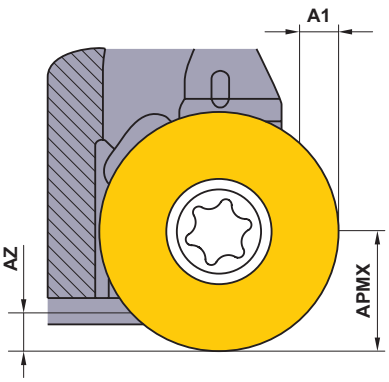


ARBOR TYPE

GAMP:+4°
GAMF:-6°

Type	Cutting Edge R (APMX)	Order Number	Stock R	Coolant Hole	Number of Teeth	Dimensions (mm) DCX	DCSFMS	LF	DCON	CBDP	DAH	DCCB	KWW	L8	WT* (kg)	Max. Depth of Cut (mm) APMX	A1	AZ	RMPX	Fig.
Fine Pitch	5	ARP5P-040A05AR	●	○	5	40	34	40	16	18	9	14	8.4	5.6	0.15	5.0	2.0	1.30	2.8°	1
		ARP5P-050A06AR	●	○	6	50	45	40	22	20	11	17	10.4	6.3	0.27	5.0	2.0	1.85	2.9°	1
		ARP5P-063A07AR	●	○	7	63	50	40	22	20	11	17	10.4	6.3	0.46	5.0	2.5	2.50	3.0°	1
Extra Fine Pitch	5	ARP5P-050A07AR	●	○	7	50	45	40	22	20	11	17	10.4	6.3	0.27	5.0	2.0	1.85	2.9°	1
		ARP5P-063A08AR	●	○	8	63	50	40	22	20	11	17	10.4	6.3	0.46	5.0	2.5	2.50	3.0°	1
Fine Pitch	6	ARP6P-040A04AR	●	○	4	40	34	40	16	18	9	13.4	8.4	5.6	0.15	6.0	2.0	1.15	2.7°	1
		ARP6P-050A05AR	●	○	5	50	45	40	22	20	11	17	10.4	6.3	0.26	6.0	2.0	1.70	2.9°	1
		ARP6P-063A06AR	●	○	6	63	50	40	22	20	11	17	10.4	6.3	0.44	6.0	2.5	2.50	3.1°	1
		ARP6P-080A08AR	●	○	8	80	56	50	27	23	13	20	12.4	7	0.88	6.0	2.5	2.50	2.3°	1
		ARP6P-100B09AR	●	○	9	100	78	50	32	26	32	45	14.4	8	1.47	6.0	2.5	2.50	1.7°	2
Extra Fine Pitch	6	ARP6P-050A06AR	●	○	6	50	45	40	22	20	11	17	10.4	6.3	0.25	6.0	2.0	1.70	2.9°	1
		ARP6P-063A07AR	●	○	7	63	50	40	22	20	11	17	10.4	6.3	0.44	6.0	2.5	2.50	3.1°	1
		ARP6P-080A09AR	●	○	9	80	56	50	27	23	13	20	12.4	7	0.88	6.0	2.5	2.50	2.3°	1
		ARP6P-100B11AR	●	○	11	100	78	50	32	26	32	45	14.4	8	1.45	6.0	2.5	2.50	1.7°	2

* WT : Tool Weight



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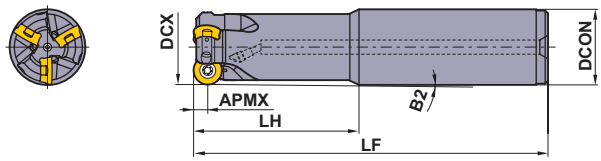


Fig.1

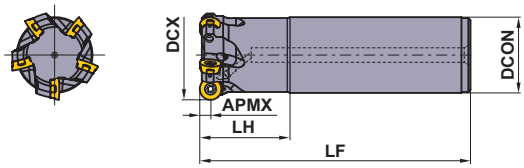


Fig.2

SHANK TYPE

GAMP:+4°
GAMF:-6°—-7°

Type	Cutting Edge R (APMX)	Order Number	Stock R	Coolant Hole	Number of Teeth	Dimensions (mm) DCX	DCON	LF	LH	B2	WT* (kg)	Max. Depth of Cut (mm) APMX	A1	AZ	RMPX	Fig.
Standard	5	ARP5PR2503SA25M	●	○	3	25	25	140	60	1.10°	0.42	5.0	1.0	0.40	1.8°	1
		ARP5PR3204SA32M	●	○	4	32	32	150	70	0.92°	0.77	5.0	1.0	0.65	1.9°	1
Long	5	ARP5PR2502SA25L	●	○	2	25	25	180	80	0.80°	0.56	5.0	1.0	0.40	1.8°	1
		ARP5PR3203SA32L	●	○	3	32	32	200	120	0.51°	1.01	5.0	1.0	0.65	1.9°	1
Standard	6	ARP6PR3203SA32M	●	○	3	32	32	150	70	0.94°	0.76	6.0	1.0	0.60	2.0°	1
		ARP6PR4004SA32M	●	○	4	40	32	150	50	–	0.85	6.0	2.5	1.15	2.7°	2
		ARP6PR5005SA42M	●	○	5	50	42	150	50	–	1.47	6.0	2.5	1.70	2.9°	2
Long	6	ARP6PR3202SA32L	●	○	2	32	32	200	120	0.52°	1.00	6.0	1.0	0.60	2.0°	1
		ARP6PR4003SA32L	●	○	3	40	32	250	50	–	1.48	6.0	2.5	1.15	2.7°	2
		ARP6PR5004SA42L	●	○	4	50	42	250	50	–	2.53	6.0	2.5	1.70	2.9°	2

* WT : Tool Weight

● : **Inventory maintained in Japan.**

SPARE PARTS

Tool Holder Number	*1 Insert Screw	Wrench	Anti-seize Lubricant	Insert
ARP5	TPS351B	TIP10D	MK1KS	RP○T1040M0E4-○
ARP6	TPS4	TIP15D	MK1KS	RP○T1248M0E4-○

*1 Clamp Torque (N • m) : TPS351B=2.5,TPS4=4.0

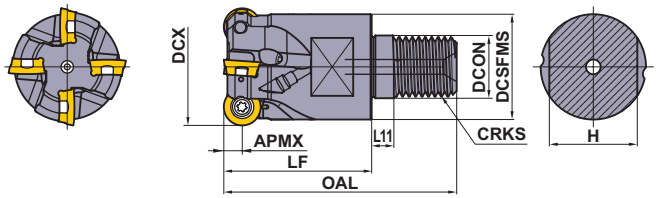
*2 Coolant nozzles are available with varying diameters for adjusting coolant pressure. Select nozzles as required by the specification.

	≤1Mpa (≤20 l/min.)	←Standard→	≥5Mpa (≥30 l/min.)	≥7Mpa (≥50 l/min.)
Nozzle Dia.	ø0.6mm	ø0.8mm	ø1.2mm	ø1.6mm
Order Number	**HSD04004H06**	**HSD04004H08**	**HSD04004H12**	**HSD04004H16**

* Clamp Torque (N • m) : HSD0400H○○=1.5

*3 The part number for a blank screw without a through nozzle is HSS04004.

ARP



SCREW-IN TYPE

GAMP:+4°
GAMF:-6°—-7°

Type	Cutting Edge R (APMX)	Order Number	Stock R	Coolant Hole	Number of Teeth	Dimensions (mm) DCX	DCON	DCSFMS	OAL	LF	L11	H	CRKS	* WT (kg)	Max. Depth of Cut (mm) APMX	A1	AZ	RMPX
Standard	5	ARP5PR2502AM1235	●	○	2	25	12.5	23.5	57	35	6	19	M12	0.10	5.0	–	0.40	1.8°
		ARP5PR3203AM1640	●	○	3	32	17.0	28.5	63	40	6	24	M16	0.16	5.0	1.0	0.65	1.9°
Fine Pitch	5	ARP5PR2503AM1235	●	○	3	25	12.5	23.5	57	35	6	19	M12	0.09	5.0	–	0.40	1.8°
		ARP5PR3204AM1640	●	○	4	32	17.0	28.5	63	40	6	24	M16	0.15	5.0	1.0	0.65	1.9°
Standard	6	ARP6PR3202AM1640	●	○	2	32	17.0	28.5	63	40	6	24	M16	0.18	6.0	1.0	0.60	2.0°
		ARP6PR4003AM1640	●	○	3	40	17.0	28.5	63	40	6	24	M16	0.20	6.0	2.5	1.15	2.7°
Fine Pitch	6	ARP6PR3203AM1640	●	○	3	32	17.0	28.5	63	40	6	24	M16	0.17	6.0	1.0	0.60	2.0°
		ARP6PR4004AM1640	●	○	4	40	17.0	28.5	63	40	6	24	M16	0.20	6.0	2.5	1.15	2.7°

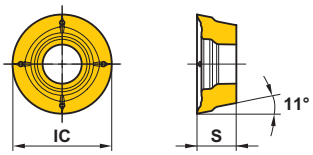
* WT : Tool Weight

INSERTS

Work Material			MC7020	MP7130	MP9130
	P	Steel		◐	
	M	Stainless Steel	◐	◐	
	K	Cast Iron			
	N	Non-ferrous Metal			
	S	Heat-resistant Alloy, Titanium Alloy			✣
	H	Hardened Steel			

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✣ : Unstable Cutting

Honing :
E : Round

Shape		Order Number	Class	Honing	Coated MC7020	MP7130	MP9130	Cermet		Carbide		Dimensions (mm) IC	S	Geometry
	Ground	RPHT1040M0E4-L	H	E	●	●	●					10	3.97	
		RPHT1040M0E4-M	H	E	●	●	●					10	3.97	
		RPHT1040M0E4-R	H	E	●	●	●					10	3.97	
		RPHT1248M0E4-L	H	E	●	●	●					12	4.76	
		RPHT1248M0E4-M	H	E	●	●	●					12	4.76	
		RPHT1248M0E4-R	H	E	●	●	●					12	4.76	
	Sintered	RPMT1040M0E4-L	M	E	●	●	●					10	3.97	
		RPMT1040M0E4-M	M	E	●	●	●					10	3.97	
		RPMT1040M0E4-R	M	E	●	●	●					10	3.97	
		RPMT1248M0E4-L	M	E	●	●	●					12	4.76	
		RPMT1248M0E4-M	M	E	●	●	●					12	4.76	
		RPMT1248M0E4-R	M	E	●	●	●					12	4.76	

● : Inventory maintained in Japan. (10 inserts in one case)

■ = MIRACLE SIGMA

ARP

RECOMMENDED CUTTING CONDITIONS

Dry cutting

	Work Material	Hardness	Grade	vc (m/min)	fz (mm/t.)
M	Austenitic Stainless Steel	≤200HB	**MC7020**	220 (170–270)	0.2 (0.1–0.35)
			MP7130	200 (150–250)	0.2 (0.1–0.35)
	Austenitic Stainless Steel	>200HB	**MC7020**	190 (140–240)	0.2 (0.1–0.35)
			MP7130	170 (120–220)	0.2 (0.1–0.35)
	Two-phase Stainless Steel	≤280HB	**MC7020**	180 (130–230)	0.2 (0.1–0.35)
			MP7130	160 (110–210)	0.2 (0.1–0.35)
	Ferritic and Martensitic Stainless Steel	≤200MPa	**MC7020**	240 (190–290)	0.2 (0.1–0.35)
			MP7130	200 (150–250)	0.2 (0.1–0.35)
	Ferritic and Martensitic Stainless Steel	>200HB	**MC7020**	240 (190–290)	0.2 (0.1–0.35)
			MP7130	200 (150–250)	0.2 (0.1–0.35)
	Hardened Stainless Steel	<450HB	**MC7020**	170 (120–220)	0.2 (0.1–0.35)
			MP7130	150 (100–200)	0.2 (0.1–0.35)

Wet cutting

	Work Material	Hardness	Grade	vc (m/min)	fz (mm/t.)
M	Austenitic Stainless Steel	≤200HB	**MC7020**	150 (100–200)	0.2 (0.1–0.35)
			MP7130	130 (80–180)	0.2 (0.1–0.35)
	Austenitic Stainless Steel	>200HB	**MC7020**	120 (70–170)	0.2 (0.1–0.35)
			MP7130	100 (80–150)	0.2 (0.1–0.35)
	Two-phase Stainless Steel	≤280HB	**MC7020**	120 (70–170)	0.2 (0.1–0.35)
			MP7130	100 (80–150)	0.2 (0.1–0.35)
	Ferritic and Martensitic Stainless Steel	≤200MPa	**MC7020**	170 (120–220)	0.2 (0.1–0.35)
			MP7130	130 (80–180)	0.2 (0.1–0.35)
	Ferritic and Martensitic Stainless Steel	>200HB	**MC7020**	170 (120–220)	0.2 (0.1–0.35)
			MP7130	130 (80–180)	0.2 (0.1–0.35)
	Hardened Stainless Steel	<450HB	**MC7020**	110 (60–160)	0.2 (0.1–0.35)
			MP7130	90 (50–140)	0.2 (0.1–0.35)
S	Titanium Alloy	–	**MP9130**	45 (30–55)	0.1 (0.05–0.15)
	Heat Resistant Alloy	–	**MP9130**	35 (15–45)	0.1 (0.05–0.15)

* Actual cutting conditions are estimated to avoid chatter vibration with high rigidity of a machine or workpiece.
  Make appropriate adjustments when chatter and/or insert chipping occurs during cutting.
  Use with lowered conditions when there is a big overhang and/or when pocket-cutting.
* The setting level for feeding 1 blade is ap = 2.5mm with ARP5 axial cutting. With ARP6, use ap = 3mm.
  Use while matching the ap fluctuation and correction value F of the respective table.
  Ex. Feed for the recommended 1 blade when ARP5,SUS304, MP7130,ap=1: 0.2 mm/t.×1.5 (correction value F)=0.3 mm/t.
* For grooving, use feed at the recommended 70% level. For ramping, drilling, and plunging, use 50% level.
* Internal coolant is recommended in titanium alloy and heat resistant alloy cutting.
  When the coolant nozzle of separately sold is used, it is more effective.

ARP

MAXIMUM CAPACITIES BY EACH CUTTING

Cutting Edge	Maximum hole diameter	Order Number	Install	Type	Recommendation (mm)		Ramping	Helical Drilling		Drilling Depth	Plunging
APMX	DCX				ap	ae	RMPX(deg)	Smallest hole DH min.(mm)	Largest hole DH max.(mm)	Maximum AZ(mm)	AE1(mm)
5	25	ARP5PR2502AM1235	Screw-in	Standard	≤2.5	≤1.00DCX	1.8°	40	48	0.40	—
		ARP5PR2503AM1235	Screw-in	Fine Pitch	≤1.5	≤1.00DCX	1.8°	40	48	0.40	—
		ARP5PR2503SA25M	Shank	Standard	≤1.5	≤1.00DCX	1.8°	40	48	0.40	1.0
		ARP5PR2502SA25L	Shank	Long	≤1.5	≤1.00DCX	1.8°	40	48	0.40	1.0
	32	ARP5PR3203AM1640	Screw-in	Standard	≤2.5	≤1.00DCX	1.9°	54	62	0.65	1.0
		ARP5PR3204AM1640	Screw-in	Fine Pitch	≤2.5	≤1.00DCX	1.9°	54	62	0.65	1.0
		ARP5PR3204SA32M	Shank	Standard	≤2.5	≤1.00DCX	1.9°	54	62	0.65	1.0
		ARP5PR3203SA32L	Shank	Long	≤2.5	≤1.00DCX	1.9°	54	62	0.65	1.0
	40	ARP5P-040A05AR	Arbor	Fine Pitch	≤2.5	≤1.00DCX	2.8°	70	78	1.30	2.0
	50	ARP5P-050A06AR	Arbor	Fine Pitch	≤2.5	≤1.00DCX	2.9°	90	98	1.85	2.0
		ARP5P-050A07AR	Arbor	Extra Fine Pitch	≤1.5	≤1.00DCX	2.9°	90	98	1.85	2.0
	63	ARP5P-063A07AR	Arbor	Fine Pitch	≤2.5	≤0.75DCX	3.0°	116	124	2.50	2.5
		ARP5P-063A08AR	Arbor	Extra Fine Pitch	≤1.5	≤0.75DCX	3.0°	116	124	2.50	2.5
6	32	ARP6PR3202AM1640	Screw-in	Standard	≤3.5	≤1.00DCX	2.0°	52	62	0.60	1.0
		ARP6PR3203AM1640	Screw-in	Fine Pitch	≤3.5	≤1.00DCX	2.0°	52	62	0.60	1.0
		ARP6PR3203SA32M	Shank	Standard	≤3.5	≤1.00DCX	2.0°	52	62	0.60	1.0
		ARP6PR3202SA32L	Shank	Long	≤3.5	≤1.00DCX	2.0°	52	62	0.60	1.0
	40	ARP6PR4003AM1640	Screw-in	Standard	≤3.5	≤1.00DCX	2.7°	68	78	1.15	2.5
		ARP6PR4004AM1640	Screw-in	Fine Pitch	≤3.5	≤1.00DCX	2.7°	68	78	1.15	2.5
		ARP6PR4004SA32M	Shank	Standard	≤3.5	≤1.00DCX	2.7°	68	78	1.15	2.5
		ARP6PR4003SA32L	Shank	Long	≤3.5	≤1.00DCX	2.7°	68	78	1.15	2.5
		ARP6P-040A04AR	Arbor	Fine Pitch	≤3.5	≤1.00DCX	2.7°	68	78	1.15	2.0
	50	ARP6PR5005SA42M	Shank	Standard	≤3.5	≤1.00DCX	2.9°	88	98	1.70	2.5
		ARP6PR5004SA42L	Shank	Long	≤3.5	≤1.00DCX	2.9°	88	98	1.70	2.5
		ARP6P-050A05AR	Arbor	Fine Pitch	≤3.5	≤1.00DCX	2.9°	88	98	1.70	2.0
		ARP6P-050A06AR	Arbor	Extra Fine Pitch	≤2.5	≤1.00DCX	2.9°	88	98	1.70	2.0
	63	ARP6P-063A06AR	Arbor	Fine Pitch	≤3.5	≤0.75DCX	3.1°	114	124	2.50	2.5
		ARP6P-063A07AR	Arbor	Extra Fine Pitch	≤2.5	≤0.75DCX	3.1°	114	124	2.50	2.5
	80	ARP6PR08008CA	Arbor	Fine Pitch	≤3.5	≤0.60DCX	2.3°	148	158	2.50	2.5
		ARP6PR08009CA	Arbor	Extra Fine Pitch	≤2.5	≤0.60DCX	2.3°	148	158	2.50	2.5
	100	ARP6PR10009DA	Arbor	Fine Pitch	≤3.5	≤0.50DCX	1.7°	188	198	2.50	2.5
		ARP6PR10011DA	Arbor	Extra Fine Pitch	≤2.5	≤0.50DCX	1.7°	188	198	2.50	2.5

* When drilling, be careful of long scattered cutting chips
* When cutting helical holes, do not exceed the largest APMX cutting depth per one rotation.
* Calculate using the following formula for center tool tracks and ϕdc when cutting helical holes: Center tool tracks ϕdc=desired hole diameter ϕDH tool diameter ϕDCX
* For preventing trouble with cutting chip biting, especially when grooving, ramping, helical cutting, and drilling, thoroughly eliminate cutting chips with an air blower or the like.
* Cutting chip pockets are small for extra-multiple cutting and small diameter cutters.
  Use with caution the ae and ap feed due to the possibility of cutting blockage.
* When cutting large ae with large diameter cutter, blockage from long cuttings is possible.
  Regulate ap and feed.

Correction level F feed amount for 1 blade, based on axial cutting ap fluctuation

Holder	ap=0.5mm	ap=1mm	ap=1.5mm	ap=2mm	ap=2.5mm	ap=3mm	ap=3.5mm	ap=4mm	ap=5mm	ap=6mm
ARP5	2.3	1.5	1.2	1.1	1.0	0.9	0.8	0.8	0.8	–
ARP6	2.5	1.7	1.3	1.1	1.0	1.0	0.9	0.9	0.8	0.8

* Tool body durability may weaken, when the amount of axial cutting exceeds ARP5=5mm and ARP6=6mm.

ARX

Multi Functional Milling

Product Information

R KAPR

Work Material

P M K H R

SYMBOL DESCRIPTIONS >> 1350
TECHNICAL DATA >> 1987
ISO13399 Property >> 1966

- 15° positive, high tolerance M-class insert.
- Effective for various machining applications.
- With through air & coolant holes.

Fig.1

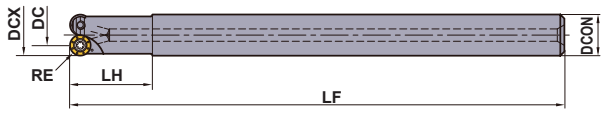


Fig.2 (Center Cutting Edge Type)

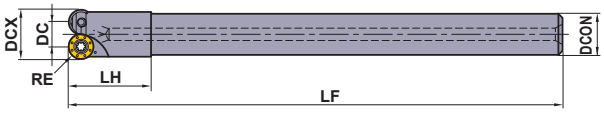
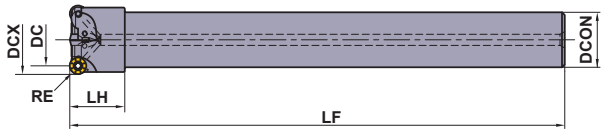


Fig.3 (Non-center Cutting Edge Type (Multi-tooth))



STEEL SHANK TYPE

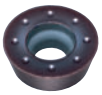
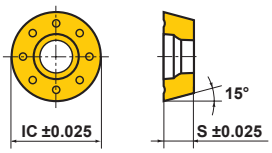
Right hand tool holder only.

Type	Order Number	Stock R	Coolant Hole	Number of Teeth	Dimensions (mm) RE	DCX	DCON	DC	LF	LH	Type (Fig.)	* Clamp Screw	Wrench	Insert
Center Cutting	ARX25R102SA10S	●	○	2	2.5	10	10	5	120	20	1	TPS20	TIP06F	RDMW0517M0E
	ARX30R122SA10S	●	○	2	3.0	12	10	6	120	20	2	TPS22S	TIP07FS	RDMW0620M0E
	ARX35R142SA12S	●	○	2	3.5	14	12	7	140	20	2	TPS22	TIP07FS	RDMW0724M0E
Non-center Cutting (Multi-tooth)	ARX25R122SA10S	●	○	2	2.5	12	10	7	120	20	3	TPS20	TIP06F	RDMW0517M0E
	ARX25R163SA16S	●	○	3	2.5	16	16	11	180	20	1	TPS20	TIP06F	RDMW0517M0E
	ARX30R163SA16S	●	○	3	3.0	16	16	10	180	20	1	TPS22	TIP07FS	RDMW0620M0E
	ARX25R173SA16S	●	○	3	2.5	17	16	12	180	20	1	TPS20	TIP06F	RDMW0517M0E
	ARX30R173SA16S	●	○	3	3.0	17	16	11	180	20	1	TPS22	TIP07FS	RDMW0620M0E
	ARX25R204SA20S	●	○	4	2.5	20	20	15	180	20	1	TPS20	TIP06F	RDMW0517M0E
	ARX30R203SA20S	●	○	3	3.0	20	20	14	180	20	1	TPS22	TIP07FS	RDMW0620M0E
	ARX25R224SA20S	●	○	4	2.5	22	20	17	180	20	3	TPS20	TIP06F	RDMW0517M0E
	ARX30R224SA20S	●	○	4	3.0	22	20	16	180	20	3	TPS22	TIP07FS	RDMW0620M0E
	ARX25R255SA20S	●	○	5	2.5	25	20	20	180	20	3	TPS20	TIP06F	RDMW0517M0E
	ARX30R254SA20S	●	○	4	3.0	25	20	19	180	20	3	TPS22	TIP07FS	RDMW0620M0E

* Clamp Torque (N • m) : TPS20=0.5, TPS22S=0.5, TPS22=0.5

● : Inventory maintained in Japan.

INSERTS

Shape	Order Number	Coated MP8010	Coated VP15TF	Dimensions (mm) IC	S	Geometry
	RDMW0517M0E	●	●	5.0	1.70	
	RDMW0620M0E	●	●	6.0	1.99	
	RDMW0724M0E	●	●	7.0	2.38	

● : Inventory maintained in Japan. (10 inserts in one case)

ARX

Fig.1

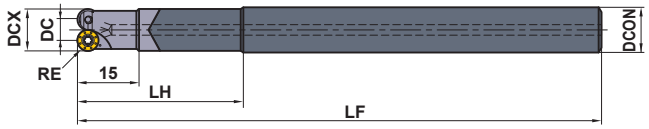


Fig.2

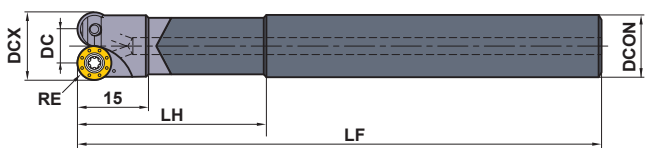
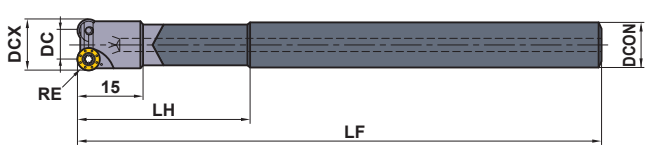


Fig.3

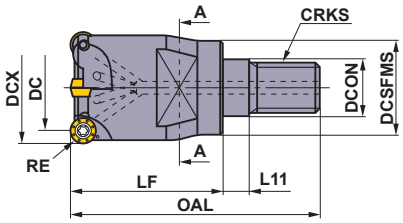


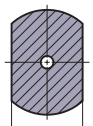
CARBIDE SHANK TYPE

Right hand tool holder only.

Type	Order Number	Stock	Coolant Hole	Number of Teeth	Dimensions (mm)						Type (Fig.)	* Clamp Screw	Wrench	Insert
		R			RE	DCX	DCON	DC	LF	LH				
Center Cutting	ARX25R102SA10LW	●	○	2	2.5	10	10	5	150	40	1	TPS20	TIP06F	RDMW0517M0E
	ARX30R122SA10LW	●	○	2	3.0	12	10	6	150	40	2	TPS22S	TIP07FS	RDMW0620M0E
	ARX35R142SA12LW	●	○	2	3.5	14	12	7	170	40	2	TPS22	TIP07FS	RDMW0724M0E
Non-center Cutting (Multi-tooth)	ARX25R122SA10LW	●	○	2	2.5	12	10	7	150	40	3	TPS20	TIP06F	RDMW0517M0E

* Clamp Torque (N • m) : TPS20=0.5, TPS22S=0.5, TPS22=0.5





A-A section

SCREW-IN TYPE

Right hand tool holder only.

Order Number	Stock	Coolant Hole	Number of Teeth	Dimensions (mm)										*2 WT (kg)	*1 Clamp Screw	Wrench	Insert
	R			RE	DCX	DCON	DC	DCSFMS	OAL	LF	L11	H	CRKS				
ARX25R163M08A30	●	○	3	2.5	16	8.5	11	14.7	48	30	6	10	M8	0.1	TPS20	TIP06F	RDMW0517M0E
ARX25R173M08A30	●	○	3	2.5	17	8.5	12	14.5	48	30	6	10	M8	0.1	TPS20	TIP06F	RDMW0517M0E
ARX25R204M10A30	●	○	4	2.5	20	10.5	15	18.6	49	30	6	14	M10	0.2	TPS20	TIP06F	RDMW0517M0E
ARX25R224M10A30	●	○	4	2.5	22	10.5	17	18.5	49	30	6	14	M10	0.2	TPS20	TIP06F	RDMW0517M0E
ARX25R255M12A35	●	○	5	2.5	25	12.5	20	23.6	57	35	6	19	M12	0.2	TPS20	TIP06F	RDMW0517M0E
ARX30R163M08A30	●	○	3	3.0	16	8.5	11	14.6	48	30	6	10	M8	0.1	TPS22	TIP07FS	RDMW0620M0E
ARX30R173M08A30	●	○	3	3.0	17	8.5	12	14.5	48	30	6	10	M8	0.1	TPS22	TIP07FS	RDMW0620M0E
ARX30R203M10A30	●	○	3	3.0	20	10.5	15	18.5	49	30	6	14	M10	0.2	TPS22	TIP07FS	RDMW0620M0E
ARX30R224M10A30	●	○	4	3.0	22	10.5	17	18.5	49	30	6	14	M10	0.2	TPS22	TIP07FS	RDMW0620M0E
ARX30R254M12A35	●	○	4	3.0	25	12.5	20	23.4	57	35	6	19	M12	0.2	TPS22	TIP07FS	RDMW0620M0E

*1 Clamp Torque (N • m) : TPS20=0.5, TPS22=0.5
*2 WT : Tool Weight

ARX

RECOMMENDED CUTTING CONDITIONS

* The cutting conditions below are a guide only.Please make adjustments according to the machining conditions.
* Please note the follows when machining the hardened steel by using MP8010.
  - Please shorten the overhang length as much as possible.
  - Use with carbide shank recommended.
  - Please note the setting of the depth of cut especially to prevent the fracture.
  - The first recommended grade when machining hardened steel of less than 50HRC is VP15TF.

SHOULDER MILLING • POCKET MILLING • RAMPING • COPYING

	Work Material	Hardness	Grade	Cutting Speed vc (m/min)	ARX25R SA S ARX25R M A		ARX30R SA S ARX30R M A		ARX35R SA S	
					Depth of Cut ap (mm)	Feed per Tooth fz (mm/t.)	Depth of Cut ap (mm)	Feed per Tooth fz (mm/t.)	Depth of Cut ap (mm)	Feed per Tooth fz (mm/t.)
P	Mild Steel	≤180HB	VP15TF	180 (150—220)	≤1.0	≤0.5	≤1.2	≤0.5	≤1.5	≤0.5
P	Carbon Steel • Alloy Steel	180—350HB	VP15TF	160 (120—200)	≤0.7	≤0.3	≤0.9	≤0.3	≤1.2	≤0.3
M	Stainless Steel	≤270HB	VP15TF	150 (120—180)	≤0.7	≤0.3	≤0.9	≤0.3	≤1.2	≤0.3
K	Gray Cast Iron	Tensile Strength≤350MPa	VP15TF	180 (150—220)	≤1.0	≤0.5	≤1.2	≤0.5	≤1.5	≤0.5
K	Ductile Cast Iron	Tensile Strength≤800MPa	VP15TF	120 (80—160)	≤1.0	≤0.5	≤1.2	≤0.5	≤1.5	≤0.5
H	Hardened Steel	<50HRC	VP15TF	80 (50—120)	≤0.5	≤0.2	≤0.7	≤0.2	≤1.0	≤0.2
H	Hardened Steel	≥50HRC	MP8010	80 (50—120)	≤0.3	≤0.2	≤0.4	≤0.2	≤0.5	≤0.2

(Note) For ramping process, refer to cutting criteria by type.

SLOT MILLING

	Work Material	Hardness	Grade	Cutting Speed vc (m/min)	ARX25R SA S ARX25R M A		ARX30R SA S ARX30R M A		ARX35R SA S	
					Depth of Cut ap (mm)	Feed per Tooth fz (mm/t.)	Depth of Cut ap (mm)	Feed per Tooth fz (mm/t.)	Depth of Cut ap (mm)	Feed per Tooth fz (mm/t.)
P	Mild Steel	≤180HB	VP15TF	180 (150—220)	≤1.0	≤0.4	≤1.2	≤0.4	≤1.5	≤0.4
P	Carbon Steel • Alloy Steel	180—350HB	VP15TF	160 (120—200)	≤0.7	≤0.2	≤0.9	≤0.2	≤1.2	≤0.2
M	Stainless Steel	≤270HB	VP15TF	150 (120—180)	≤0.7	≤0.2	≤0.9	≤0.2	≤1.2	≤0.2
K	Gray Cast Iron	Tensile Strength≤350MPa	VP15TF	180 (150—220)	≤1.0	≤0.4	≤1.2	≤0.4	≤1.5	≤0.4
K	Ductile Cast Iron	Tensile Strength≤800MPa	VP15TF	120 (80—160)	≤1.0	≤0.4	≤1.2	≤0.4	≤1.5	≤0.4
H	Hardened Steel	<50HRC	VP15TF	80 (50—120)	≤0.5	≤0.1	≤0.7	≤0.1	≤1.0	≤0.1
H	Hardened Steel	≥50HRC	MP8010	80 (50—120)	≤0.3	≤0.1	≤0.4	≤0.1	≤0.5	≤0.1

PLUNGING

	Work Material	Hardness	Grade	Cutting Speed vc (m/min)	ARX25R SA S ARX25R M A		ARX30R SA S ARX30R M A		ARX35R SA S	
					Cutting Width ae (mm)	Feed per Tooth fz (mm/t.)	Cutting Width ae (mm)	Feed per Tooth fz (mm/t.)	Cutting Width ae (mm)	Feed per Tooth fz (mm/t.)
P	Mild Steel	≤180HB	VP15TF	180 (150—220)	≤2.5	≤0.3	≤3.0	≤0.3	≤3.5	≤0.3
P	Carbon Steel • Alloy Steel	180—350HB	VP15TF	160 (120—200)	≤2.5	≤0.2	≤3.0	≤0.2	≤3.5	≤0.2
M	Stainless Steel	≤270HB	VP15TF	150 (120—180)	≤2.5	≤0.2	≤3.0	≤0.2	≤3.5	≤0.2
K	Gray Cast Iron	Tensile Strength≤350MPa	VP15TF	180 (150—220)	≤2.5	≤0.3	≤3.0	≤0.3	≤3.5	≤0.3
K	Ductile Cast Iron	Tensile Strength≤800MPa	VP15TF	120 (80—160)	≤2.5	≤0.3	≤3.0	≤0.3	≤3.5	≤0.3
H	Hardened Steel	<50HRC	VP15TF	80 (50—120)	≤2.5	≤0.1	≤3.0	≤0.1	≤3.5	≤0.1
H	Hardened Steel	≥50HRC	MP8010	80 (50—120)	≤2.5	≤0.1	≤3.0	≤0.1	≤3.5	≤0.1

HELICAL DRILLING

	Work Material	Hardness	Grade	Cutting Speed vc (m/min)	ARX25R SA S ARX25R M A		ARX30R SA S ARX30R M A		ARX35R SA S	
					DOC/pass ap (mm/pass)	Feed per Tooth fz (mm/t.)	DOC/pass ap (mm/pass)	Feed per Tooth fz (mm/t.)	DOC/pass ap (mm/pass)	Feed per Tooth fz (mm/t.)
P	Mild Steel	≤180HB	VP15TF	180 (150—220)	≤1.0	≤0.3	≤1.0	≤0.3	≤1.0	≤0.3
P	Carbon Steel • Alloy Steel	180—350HB	VP15TF	160 (120—200)	≤0.7	≤0.2	≤0.9	≤0.2	≤1.0	≤0.2
M	Stainless Steel	≤270HB	VP15TF	150 (120—180)	≤0.7	≤0.2	≤0.9	≤0.2	≤1.0	≤0.2
K	Gray Cast Iron	Tensile Strength≤350MPa	VP15TF	180 (150—220)	≤1.0	≤0.3	≤1.0	≤0.3	≤1.0	≤0.3
K	Ductile Cast Iron	Tensile Strength≤800MPa	VP15TF	120 (80—160)	≤1.0	≤0.3	≤1.0	≤0.3	≤1.0	≤0.3
H	Hardened Steel	<50HRC	VP15TF	80 (50—120)	≤0.5	≤0.1	≤0.7	≤0.1	≤1.0	≤0.1
H	Hardened Steel	≥50HRC	MP8010	80 (50—120)	≤0.3	≤0.1	≤0.4	≤0.1	≤0.5	≤0.1

(Note) For helical drilling, refer to cutting criteria by type.

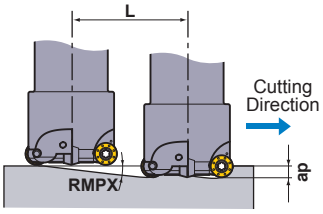
ARX

CUTTING MODE MAXIMUM CAPACITIES

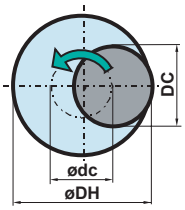
RAMPING

Finding a cutters' distance moved **"L"** when depth of cut reaches **"ap"** at a ramping angle of **"α°"**.

L=ap/tan α (mm)



HELICAL DRILLING



- How to derive a locus of the center of the tool.

ødc = øDH - DC

Locus of the center of the tool — Desired hole diameter — Cutting edge diameter

- For the depth of cut per cycle, refer to the cutting conditions for helical drilling.
- Set the machine spindle revolution so that the tool is rotating and cutting in a down cut direction.

Type	Order Number	Tool Diameter DC (mm)	Corner RE (mm)	Number of Teeth	Ramping RMPX *1	Ramping APMX (mm) *2	Ramping Distance L at Depth of Cut of ap L (mm)	Helical Drilling Min. Hole Diameter DH min. (mm)	Helical Drilling Max. Hole Diameter DH max. (mm)
Center Cutting	ARX25R102SA10S	10	2.5	2	90°	2.5	0	15	19
	ARX25R102SA10LW	10	2.5	2	90°	2.5	0	15	19
	ARX30R122SA10S	12	3.0	2	90°	3.0	0	18	23
	ARX30R122SA10LW	12	3.0	2	90°	3.0	0	18	23
	ARX35R142SA12S	14	3.5	2	90°	3.5	0	21	27
	ARX35R142SA12LW	14	3.5	2	90°	3.5	0	21	27
Non-center Cutting (Multi-tooth)	ARX25R122SA10S	12	2.5	2	27.17°	2.5	4.87	19	23
	ARX25R122SA10LW	12	2.5	2	27.17°	2.5	4.87	19	23
	ARX25R163M08A30	16	2.5	3	13.70°	2.5	10.76	27	31
	ARX25R163SA16S	16	2.5	3	13.70°	2.5	10.26	27	31
	ARX30R163M08A30	16	3.0	3	21.25	3.0	7.71	26	31
	ARX30R163SA16S	16	3.0	3	21.25°	3.0	7.71	26	31
	ARX25R173M08A30	17	2.5	3	12.22°	2.5	11.54	29	33
	ARX25R173SA16S	17	2.5	3	12.22°	2.5	11.54	29	33
	ARX30R173M08A30	17	3.0	3	18.42°	3.0	9.01	28	33
	ARX30R173SA16S	17	3.0	3	18.42°	3.0	9.01	28	33
	ARX30R203M10A30	20	3.0	3	13.21°	3.0	12.78	34	39
	ARX30R203SA20S	20	3.0	3	13.21°	3.0	12.78	34	39
	ARX25R204M10A30	20	2.5	4	9.23°	2.5	15.38	35	39
	ARX25R204SA20S	20	2.5	4	9.23°	2.5	15.38	35	39
	ARX25R224M10A30	22	2.5	4	7.94°	2.5	17.92	39	43
	ARX25R224SA20S	22	2.5	4	7.94°	2.5	17.92	39	43
	ARX30R224M10A30	22	3.0	4	11.13°	3.0	15.25	38	43
	ARX30R224SA20S	22	3.0	4	11.13°	3.0	15.25	38	43
	ARX30R254M12A35	25	3.0	4	9.01°	3.0	18.92	44	49
	ARX30R254SA20S	25	3.0	4	9.01°	3.0	18.92	44	49
	ARX25R255M12A35	25	2.5	5	6.57°	2.5	21.71	45	49
	ARX25R255SA20S	25	2.5	5	6.57°	2.5	21.71	45	49

*1 RMPX : Max.Ramping Angle
*2 APMX : Max. Depth of Cut

BRP

Multi Functional Milling

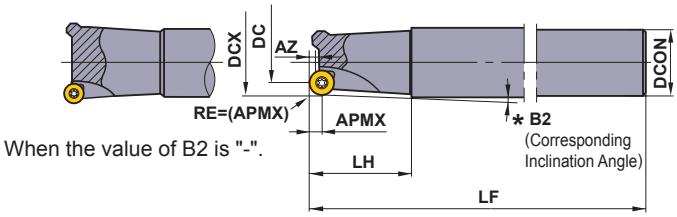
Product Information

R KAPR

Work Material

P M K S H R

SYMBOL DESCRIPTIONS >> 1350
TECHNICAL DATA >> 1987
ISO13399 Property >> 1966



When the value of B2 is "-".

*Please allow for an inclination angle of B2+1°

- **11°positive insert.**
- **Round shape insert with a strong cutting edge.**
- **Wide range of tools available.**
- **Suitable for mould machining.**

SHANK TYPE

Right hand tool holder only.

Cutting Edge R (APMX)	Type	Order Number	Stock R	Number of Teeth	Dimensions (mm) DCX	DC	LF	DCON	LH	AZ	B2	APMX	* Clamp Screw	Wrench	① ② Insert
4	R	BRP4NR121S12	●	1	12	3.8	85	12	25	0.2	3°00′	4	CS250560T	TKY08F	①RPMW08T2M0◌ ②RPMT08T2M0E-JS
		BRP4NR161S16	●	1	16	7.8	85	16	25	1.0	3°00′	4	CS250560T	TKY08F	
		BRP4NR202S20	●	2	20	11.8	100	20	30	2.0	2°25′	4	CS250560T	TKY08F	
		BRP4NR253S25	●	3	25	16.8	115	25	35	2.0	2°02′	4	CS250560T	TKY08F	
	L	BRP4NR121LS12	●	1	12	3.8	150	12	70	0.2	0°57′	4	CS250560T	TKY08F	
		BRP4NR161LS16	●	1	16	7.8	150	16	70	1.0	0°57′	4	CS250560T	TKY08F	
		BRP4NR202LS20	●	2	20	11.8	180	20	100	2.0	0°39′	4	CS250560T	TKY08F	
		BRP4NR253LS25	●	3	25	16.8	180	25	100	2.0	0°39′	4	CS250560T	TKY08F	
	EL	BRP4NR202ELS20	●	2	20	11.8	250	20	130	2.0	0°30′	4	CS250560T	TKY08F	
		BRP4NR253ELS25	●	3	25	16.8	250	25	130	2.0	0°30′	4	CS250560T	TKY08F	
5	R	BRP5NR161S16	●	1	16	5.8	85	16	25	0.3	3°09′	5	CS350760T	TKY15F	①RPMW10T3M0◌ ②RPMT10T3M0E-JS
		BRP5NR201S20	●	1	20	9.8	100	20	30	1.2	2°31′	5	CS350760T	TKY15F	
		BRP5NR252S25	●	2	25	14.8	115	25	35	2.5	2°06′	5	CS350860T	TKY15F	
		BRP5NR323S32	●	3	32	21.8	125	32	45	2.5	1°34′	5	CS350860T	TKY15F	
	L	BRP5NR161LS16	●	1	16	5.8	150	16	70	0.3	0°58′	5	CS350760T	TKY15F	
		BRP5NR201LS20	●	1	20	9.8	180	20	100	1.2	0°40′	5	CS350760T	TKY15F	
		BRP5NR252LS25	●	2	25	14.8	180	25	100	2.5	0°40′	5	CS350860T	TKY15F	
		BRP5NR323LS32	●	3	32	21.8	200	32	120	2.5	0°33′	5	CS350860T	TKY15F	
	EL	BRP5NR252ELS25	●	2	25	14.8	250	25	130	2.5	0°30′	5	CS350860T	TKY15F	
		BRP5NR323ELS32	●	3	32	21.8	300	32	180	2.5	0°22′	5	CS350860T	TKY15F	

(Note) **R :** regular type **L :** long type **EL :** extra long type
* Clamp Torque (N • m) : CS250560T=1.0, CS350760T=3.5, CS350860T=3.5

● : **Inventory maintained in Japan.**

BRP

Cutting Edge R (APMX)	Type	Order Number	Stock R	Number of Teeth	Dimensions (mm) DCX	DC	LF	DCON	LH	AZ	B2	APMX	* Clamp Screw	Wrench	① ② Insert
6	R	**BRP6PR322S32**	●	2	32	19.8	125	32	45	4	1°37′	6	TS43	TKY15D	①RPMW1204M0□ ②RPMT1204M0E-JS
		BRP6PR403S32	●	3	40	27.9	125	32	45	4	—	6	TS43	TKY15D	
		BRP6PR504S32	●	4	50	37.8	150	32	50	4	—	6	TS43	TKY15D	
		BRP6PR504S42	●	4	50	37.8	150	42	50	4	—	6	TS43	TKY15D	
	L	**BRP6PR322LS32**	●	2	32	19.8	200	32	120	4	0°33′	6	TS43	TKY15D	
		BRP6PR403LS32	●	3	40	27.9	200	32	120	4	—	6	TS43	TKY15D	
		BRP6PR504LS32	●	4	50	37.8	250	32	150	4	—	6	TS43	TKY15D	
		BRP6PR504LS42	●	4	50	37.8	250	42	150	4	—	6	TS43	TKY15D	
	EL	**BRP6PR322ELS32**	●	2	32	19.8	300	32	50	4	1°26′	6	TS43	TKY15D	
		BRP6PR403ELS32	●	3	40	27.9	300	32	50	4	—	6	TS43	TKY15D	
		BRP6PR403ELS42	●	3	40	27.9	300	42	50	4	2°44′	6	TS43	TKY15D	
		BRP6PR504ELS42	●	4	50	37.8	300	42	50	4	—	6	TS43	TKY15D	
8	R	**BRP8PR402S32**	●	2	40	23.8	125	32	45	5.5	—	8	TS54	TKY25D	①RPMW1606M0□ ②RPMT1606M0E-JS
		BRP8PR503S32	●	3	50	33.8	150	32	50	5.5	—	8	TS54	TKY25D	
		BRP8PR503S42	●	3	50	33.8	150	42	50	5.5	—	8	TS54	TKY25D	
		BRP8PR634S32	●	4	63	46.8	150	32	50	5.5	—	8	TS54	TKY25D	
		BRP8PR634S42	●	4	63	46.8	150	42	50	5.5	—	8	TS54	TKY25D	
	L	**BRP8PR402LS32**	●	2	40	23.8	200	32	120	5.5	—	8	TS54	TKY25D	
		BRP8PR503LS32	●	3	50	33.8	250	32	150	5.5	—	8	TS54	TKY25D	
		BRP8PR503LS42	●	3	50	33.8	250	42	150	5.5	—	8	TS54	TKY25D	
		BRP8PR634LS32	●	4	63	46.8	250	32	150	5.5	—	8	TS54	TKY25D	
		BRP8PR634LS42	●	4	63	46.8	250	42	150	5.5	—	8	TS54	TKY25D	
	EL	**BRP8PR402ELS32**	●	2	40	23.8	300	32	50	5.5	—	8	TS54	TKY25D	
		BRP8PR402ELS42	●	2	40	23.8	300	42	50	5.5	2°52′	8	TS54	TKY25D	
		BRP8PR503ELS42	●	3	50	33.8	300	42	50	5.5	—	8	TS54	TKY25D	
		BRP8PR634ELS42	●	4	63	46.8	300	42	50	5.5	—	8	TS54	TKY25D	

(Note) **R :** regular type **L :** long type **EL :** extra long type
* Clamp Torque (N • m) : TS43=6.0, TS54=7.5

BRP

Fig.1
ø40

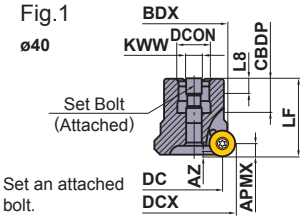
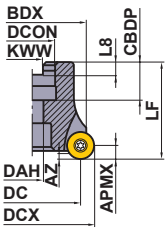
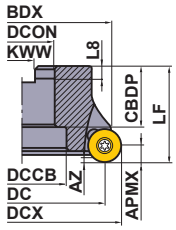


Fig.2
ø50
ø63
ø80



Right hand tool holder only.

Fig.3
ø100



ARBOR TYPE

GAMP:-7°—+5°
GAMF:-15°—0°

Cutting Edge R (APMX)	Order Number	Stock R	Number of Teeth	Dimensions (mm) DCX	DC	BDX	LF	DCON	CBDP	DAH	DCCB	KWW	L8	WT* (kg)	Max. Depth of Cut (mm) APMX	AZ	Type (Fig.)
6	**BRP6P-040A03R**	●	3	40	27.9	33.3	40	16	18	—	—	8.4	5.6	0.4	6	4	1
	BRP6P-050A04R	●	4	50	37.8	43.1	50	22	20	11	—	10.4	6.3	0.5	6	4	2
	BRP6PR05004B	●	4	50	37.8	43.1	63	22.225	29	11	—	8.4	5	0.5	6	4	2
	BRP6P-063A05R	●	5	63	50.8	56.1	50	22	20	11	—	10.4	6.3	0.7	6	4	2
	BRP6PR06305B	●	5	63	50.8	56.1	63	22.225	29	11	—	8.4	5	0.7	6	4	2
	BRP6PR08006C	●	6	80	67.8	72.8	50	25.4	26	13	—	9.5	6	1.2	6	4	2
8	**BRP8P-063A04R**	●	4	63	46.8	54.5	50	22	20	11	—	10.4	6.3	0.7	8	5.5	2
	BRP8PR06304B	●	4	63	46.8	54.5	63	22.225	29	11	—	8.4	5	0.7	8	5.5	2
	BRP8PR08005C	●	5	80	63.8	70.9	50	25.4	26	13	—	9.5	6	1.2	8	5.5	2
	BRP8PR10006D	●	6	100	83.8	90.6	50	31.75	32	—	45	12.7	8	1.6	8	5.5	3

* WT : Tool Weight

● : **Inventory maintained in Japan.**

SPARE PARTS

Tool Holder Number	Clamp Screw *	Wrench	Set Bolt	Insert
BRP6P-040A03R	TS43	TKY15D	HDS08030	①RPMW1204M0◌ ②RPMT1204M0E-JS
BRP6P-050A04R ~ **BRP6P-R08006C**	TS43	TKY15D	—	
BRP8P	TS54	TKY25D	—	①RPMW1606M0◌ ②RPMT1606M0E-JS

* Clamp Torque (N • m) : TS43=6.0, TS54=7.5

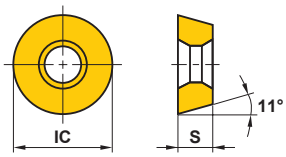
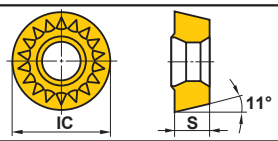
BRP

INSERTS

Work Material		F7030	VP15TF			NX4545		UTi20T	
P	Steel	◐	◐			◐		◐	
M	Stainless Steel	◔	◔			◔		◔	
K	Cast Iron		✠					✠	
S	Heat-resistant Alloy, Titanium Alloy		◐						
H	Hardened Steel		◔						

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✠ : Unstable Cutting

Honing :
E : Round **T :** Chamfer

Shape	Order Number	Class	Honing	Coated F7030	Coated VP15TF			Cermet NX4545		Carbide UTi20T		Dimensions (mm) IC	Dimensions (mm) S	Geometry
	RPMW08T2M0T	M	T		●							8	2.78	
	RPMW10T3M0E	M	E	●				●				10	3.97	
	RPMW10T3M0T	M	T		●							10	3.97	
	RPMW1204M0E	M	E	●				●		●		12	4.76	
	RPMW1204M0T	M	T		●							12	4.76	
	RPMW1606M0E	M	E	●						●		16	6.35	
	RPMW1606M0T	M	T		●							16	6.35	
	RPMT08T2M0E-JS	M	E	●	●							8	2.78	
	RPMT10T3M0E-JS	M	E	●	●							10	3.97	
	RPMT1204M0E-JS	M	E	●	●					●		12	4.76	
	RPMT1606M0E-JS	M	E	●	●							16	6.35	

● : Inventory maintained in Japan. (10 inserts in one case)

BRP

RECOMMENDED CUTTING CONDITIONS

CUTTING SPEED (m/min)

	Work Material	Hardness	Coated		Carbide
			F7030	VP15TF	UTi20T
P	Mild Steel	≤180HB	**250 (200—300)**	250 (200—300)	150 (100—200)
	Carbon Steel Alloy Steel	180—280HB	**180 (130—220)**	180 (130—220)	140 (100—170)
		280—380HB	**160 (110—190)**	160 (110—190)	100 (70—120)
	Pre-Hardened Steel	35—45HRC	**120 (80—140)**	120 (80—140)	90 (60—100)
	High Alloy Steel	300HB	**130 (90—160)**	130 (90—160)	100 (70—120)
M	Stainless Steel	≤260HB	**180 (130—220)**	180 (130—220)	140 (100—170)
K	Gray Cast Iron	Tensile Strength ≤350MPa	—	**170 (130—220)**	140 (100—170)
	Ductile Cast Iron	Tensile Strength 360—500MPa	—	**140 (100—180)**	120 (80—140)
		Tensile Strength 500—800MPa	—	**110 (80—140)**	90 (70—110)
H	Hardened Steel	45—60HRC	—	**60 (50—100)**	60 (40—70)

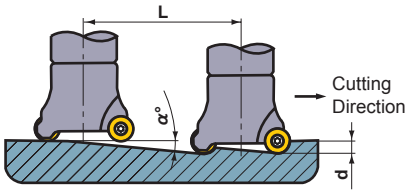
(Note) Cutting speeds shown in bold type are for the recommended first choice grades.

FEED PER TOOTH (mm/t.)

Type	Depth of Cut (mm)							
	1	2	3	4	5	6	7	8
BRP4	0.40	0.30	0.20	0.10	—	—	—	—
BRP5	0.40	0.35	0.30	0.20	0.10	—	—	—
BRP6	0.50	0.40	0.30	0.25	0.23	0.20	—	—
BRP8	0.60	0.50	0.45	0.40	0.33	0.30	0.25	0.20

RAMPING

RAMPING ANGLE AND MACHINING LENGTH



Formula to find cutting length "L" at maximum ramping angle.

$$L = \frac{d}{\tan \alpha} \text{ (mm)}$$

Type	Cutting Edge Diameter (ϕ)	Max. Ramping Angle RMPX	tan α	Cutting Length L at Max. Ramping Angle L(mm)*				
				d=2mm	d=4mm	d=5mm	d=6mm (max.)	d=8mm (max.)
BRP4	12	5.02°	0.088	22	45	—	—	—
	16	12.2°	0.216	9	18	—	—	—
	20	14.52°	0.259	7	15	—	—	—
	25	8.8°	0.155	12	25	—	—	—
BRP5	16	4.52°	0.079	25	50	63	—	—
	20	11.4°	0.202	9	19	24	—	—
	25	14.4°	0.257	7	15	19	—	—
	32	8.37°	0.147	13	27	33	—	—
BRP6	32	15.91°	0.285	7	14	17	21	—
	40	10.29°	0.181	11	22	27	33	—
	50	7.12°	0.125	16	32	40	48	—
	63	5.08°	0.089	22	44	56	67	—
	80	3.69°	0.064	31	62	77	93	—
BRP8	40	18.86°	0.342	5	11	14	17	23
	50	11.91°	0.211	9	18	23	28	37
	63	8.01°	0.141	14	28	35	42	56
	80	5.60°	0.098	20	40	50	61	81
	100	4.13°	0.072	27	55	69	83	110

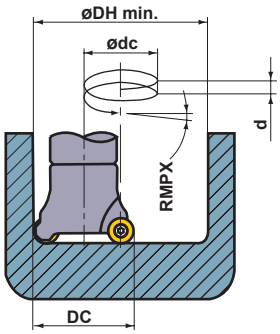
* "L" value is approximate rounded value.

BRP

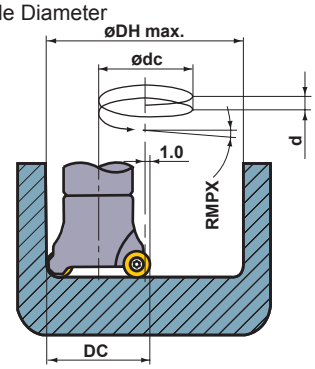
HELICAL DRILLING

RELATIONSHIP BETWEEN HOLE DIAMETER AND DEPTH OF CUT

Minimum Hole Diameter



Maximum Hole Diameter



Type	Cutting Edge Diameter DC (mm)	*1 øDH min.	*2 ødc	Ramping Angle RMPX d=2mm	d=4mm	d=5mm	d=6mm	d=8mm	*1 øDH max.	*2 ødc	Ramping Angle RMPX d=2mm	d=4mm	d=5mm	d=6mm	d=8mm
BRP4	12	16	4	d=1mm,RMPX=4.55°					22	10	3.64°	—	—	—	—
	16	24	8	4.55°	9.10°	—	—	—	30	14	2.60°	5.20°	—	—	—
	20	32	12	3.04°	6.08°	—	—	—	38	18	2.03°	4.05°	—	—	—
	25	42	17	2.15°	4.29°	—	—	—	48	23	1.59°	3.17°	—	—	—
BRP5	16	22	6	d=1mm,RMPX=3.04°					30	14	2.60°	5.20°	6.50°	—	—
	20	30	10	3.64°	7.26°	9.10°	—	—	38	18	2.03°	4.05°	5.08°	—	—
	25	40	15	2.43°	4.85°	6.08°	—	—	48	23	1.59°	3.17°	3.98°	—	—
	32	54	22	1.66°	3.31°	4.15°	—	—	62	30	1.22°	2.43°	3.04°	—	—
BRP6	32	52	20	1.82°	3.64°	4.55°	5.45°	—	62	30	1.22°	2.43°	3.04°	3.64°	—
	40	68	28	1.30°	2.60°	3.25°	3.90°	—	78	38	0.96°	1.92°	2.40°	2.88°	—
	50	88	38	0.96°	1.92°	2.40°	2.88°	—	98	48	0.78°	1.52°	1.90°	2.28°	—
	63	114	51	0.72°	1.43°	1.79°	2.14°	—	124	61	0.60°	1.20°	1.49°	1.79°	—
	80	148	68	0.54°	1.07°	1.34°	1.61°	—	158	78	0.47°	0.94°	1.17°	1.40°	—
BRP8	40	64	24	1.52°	3.04°	3.79°	4.55°	6.06°	78	38	0.96°	1.92°	2.40°	2.88°	3.38°
	50	84	34	1.07°	2.14°	2.68°	3.22°	4.28°	98	48	0.76°	1.52°	1.90°	2.28°	3.04°
	63	110	47	0.78°	1.55°	1.94°	2.33°	3.10°	124	61	0.60°	1.20°	1.49°	1.79°	2.39°
	80	144	64	0.57°	1.14°	1.42°	1.71°	2.28°	158	78	0.47°	0.94°	1.17°	1.40°	1.87°
	100	184	84	0.43°	0.87°	1.09°	1.30°	1.74°	198	98	0.37°	0.74°	0.93°	1.12°	1.49°

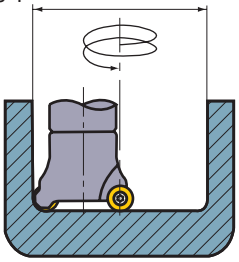
*1 DH=Hole Diameter : ϕ(mm) *2 dc=Tool Pass : ϕ(mm)

BRP4	DH min. (Minimum Hole Diameter)=(DC - 4)×2,	DH max. (Maximum Hole Diameter)=(DC - 1)×2,	d max. (Maximum Depth of Cut)=4(mm)
BRP5	DH min. (Minimum Hole Diameter)=(DC - 5)×2,	DH max. (Maximum Hole Diameter)=(DC - 1)×2,	d max. (Maximum Depth of Cut)=5(mm)
BRP6	DH min. (Minimum Hole Diameter)=(DC - 6)×2,	DH max. (Maximum Hole Diameter)=(DC - 1)×2,	d max. (Maximum Depth of Cut)=6(mm)
BRP8	DH min. (Minimum Hole Diameter)=(DC - 8)×2,	DH max. (Maximum Hole Diameter)=(DC - 1)×2,	d max. (Maximum Depth of Cut)=8(mm)

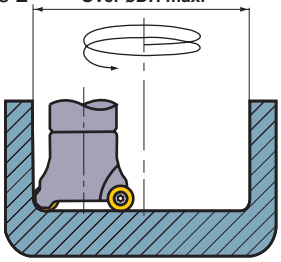
dc=(Tool Pass)**=DH-D**

◀Note▶ When machining a hole larger than DH max., first machine a pilot hole smaller than DH max. before enlarging to the required size as shown above.

Process 1 **øDH min.–DH max.**



Process 2 **Over øDH max.**



APX4000

LONG CUTTING EDGE

DEEP SHOULDER MILLING

Product Information

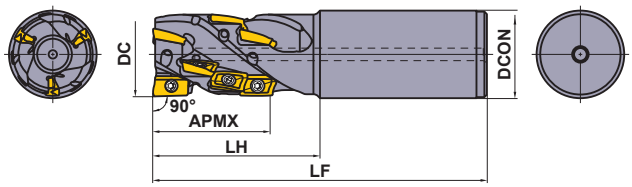
90° KAPR

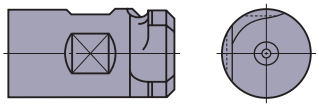
Work Material

P M K S F R

SYMBOL DESCRIPTIONS >> 1350
TECHNICAL DATA >> 1987
ISO13399 Property >> 1966

- High accuracy, high quality vertical wall.
- Low cutting force insert.
- With through air & coolant holes.





*1 Combination Shank

LONG CUTTING EDGE

SHANK TYPE

KAPR :90°

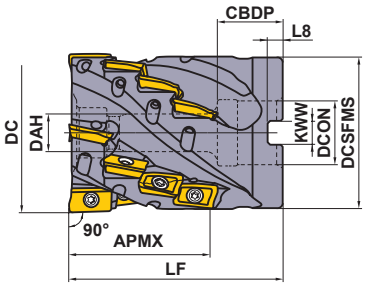
Right hand tool holder only.

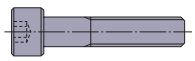
Order Number	Stock	Number of Flutes	Total	Dimensions(mm)					*2		
	R			DC	DCON	LF	LH	APMX	Clamp Screw	Wrench	Insert
APX4KR4008SA42S056A	●	2	8	40	42	160	80	56	TPS43	TIP15W	AOMT1848◌◌PEER-◌
APX4KR4012SA42S056A	●	3	12	40	42	160	80	56	TPS43	TIP15W	
*1 APX4KR5012WA508S056A	●	3	12	50	50.8	160	80	56	TPS43	TIP15W	
*1 APX4KR5018WA508M084A	●	3	18	50	50.8	190	110	84	TPS43	TIP15W	

(Note 1) Additional machining is needed for this unit when using an end cutting edge corner insert of R3.2 or greater.
(Note 2) Only corner radius RE 0.4mm and 0.8mm can be used for the peripheral cutting edges expect the bottom cutting edge (the end cuttting edge).
(Note 3) When using the tool at high spindle speeds, ensure that the tool and arbor are correctly balanced.
*2 Clamp Torque (N • m) : TPS43=4.0

● : Inventory maintained in Japan.

APX4000



Cutter Diameter DC	Set Bolt	Geometry
ϕ50	HSC10050	
ϕ63	HSC12070	

SHELL TYPE

KAPR :90°

Right hand tool holder only.

Order Number	Stock R	Number of Flutes	Total	DC	LF	DCON	CBDP	DAH	DCSFMS	KWW	L8	APMX	Clamp Screw *	Wrench	Anti-seize Lubricant	Insert
APX4K-050A09A042RA	●	3	9	50	65	22	22	11	48	10.4	6.3	42	TPS43	TIP15W	MK1KS	AOMT1848 PEER-
APX4KR06316CA056A	●	4	16	63	85	25.4	26	13	60.7	9.5	6	56	TPS43	TIP15W	MK1KS	

∗ Clamp Torque (N • m) : TPS43=4.0

For metric arbor

The cutter bore diameter DCON is indicated in millimetre.

Order Number	Stock R	Number of Flutes	Total	DC	LF	DCON	CBDP	DAH	DCSFMS	KWW	L8	APMX	Clamp Screw *	Wrench	Anti-seize Lubricant	Insert
APX4K-050A09A042RA	●	3	9	50	65	22	22	11	48	10.4	6.3	42	TPS43	TIP15W	MK1KS	AOMT1848 PEER-
APX4K-063A16A056RA	●	4	16	63	85	27	28	13	60.7	12.4	7	56	TPS43	TIP15W	MK1KS	

(Note 1) Additional machining is needed for this unit when using an end cutting edge corner insert of R3.2 or greater.
(Note 2) Only corner radius RE 0.4mm and 0.8mm can be used for the peripheral cutting edges expect the bottom cutting edge (the end cuttting edge).
(Note 3) When using the tool at high spindle speeds, ensure that the tool and arbor are correctly balanced.
(Note 4) In case of internal coolant supply, please use a face mill arbor with through coolant channels. Regular center-thru or side-thru arbors can't be used.
∗ Clamp Torque (N • m) : TPS43=4.0

● : Inventory maintained in Japan.

APX4000

RECOMMENDED CUTTING CONDITIONS

CUTTING SPEED

	Work Material	Hardness	Insert Grade 1st Recommenedation	Insert Grade 2nd Recommenedation	Breaker		Cutting Width **ae** (mm) ≤0.15DC	0.15—0.3DC	DC (Slot)
							Cutting Speed **vc** (m/min)		
P	Mild Steel	≤180HB	MP6120	VP15TF	M	H	200(160—250)	160(120—200)	140(120—160)
			MP6130	VP20RT	M	H	170(130—220)	130(90—170)	110(90—130)
	Carbon Steel Alloy Steel	180—350HB	MP6120	VP15TF	M	H	160(120—200)	120(100—140)	100(80—120)
			MP6130	VP20RT	M	H	130(90—170)	90(70—110)	70(50—90)
M	Stainless Steel	≤270HB	MP7130	VP15TF	M	H	160(120—200)	120(100—140)	100(80—120)
K	Gray Cast Iron	≤350MPa	MC5020	VP15TF	H		230(180—280)	190(140—240)	190(140—240)
	Ductile, Cast Iron	≤800MPa	MC5020	VP15TF	H		190(140—220)	170(120—220)	170(120—220)
S	Titanium Alloy	≤350HB	MP9120	VP15TF	H	M	50(40—70)		50(40—70)
			MP9130	VP20RT	H	M	40(30—60)		40(30—60)
	Heat-resistant Alloy	—	MP9120	VP15TF	H	M	40(30—60)		40(30—60)
			MP9130	VP20RT	H	M	30(20—40)		30(20—40)

APX4000

DEPTH OF CUT AND FEED

	Work Material	Hardness	Cutting Width **ae** (mm)	Depth of Cut **ap** (mm)	Feed per Tooth **fz** (mm/t.) Cutter Diameter (mm) ø40 Length of cut 56mm ø50 Length of cut 42mm	ø50 Length of cut 56mm ø63 Length of cut 56mm	ø50 Length of cut 84mm
P	Mild Steel	≤180HB	≤0.3DC	≤20	0.25	0.25	0.20
				20—50	0.20	0.20	0.15
				50—80			0.10
			DC (Slot)	≤20	0.20	0.20	0.15
				20—50	0.15	0.15	
	Carbon Steel Alloy Steel	180—350HB	≤0.3DC	≤20	0.25	0.25	0.20
				20—50	0.20	0.20	0.15
				50—80			0.10
			DC (Slot)	≤20	0.15	0.15	0.10
				20—50	0.10	0.10	
M	Stainless Steel	≤270HB	≤0.3DC	≤20	0.25	0.25	0.20
				20—50	0.20	0.20	0.15
				50—80			0.10
			DC (Slot)	≤10	0.10	0.10	0.07
K	Gray Cast Iron	Tensile Strength ≤350MPa	≤0.15DC	≤10	0.30	0.30	0.25
				10—50	0.25	0.25	0.20
				50—80			0.15
			0.15—0.3DC	≤10	0.25	0.25	0.20
				10—50	0.20	0.20	0.15
				50—80			0.10
			DC (Slot)	≤10	0.25	0.25	0.20
				10—50	0.20	0.20	0.15
	Ductile, Cast Iron	Tensile Strength ≤800MPa	≤0.15DC	≤20	0.25	0.25	0.20
				20—50	0.20	0.20	0.15
				50—80			0.10
			0.15—0.3DC	≤20	0.20	0.20	0.15
				20—50	0.15	0.15	0.10
				50—80			0.07
			DC (Slot)	≤10	0.15	0.15	0.10
				10—50	0.10	0.10	
S	Titanium Alloy	≤350HB	≤0.15DC	≤20	0.10	0.10	
				20—50	0.10	0.10	
			DC (Slot)	≤50	0.08	0.08	
	Heat-resistant Alloy	—	≤0.15DC	≤10	0.07	0.07	
			DC (Slot)	≤20	0.05	0.05	

(Note) The above cutting conditons are determined based on high rigidity machine and workpiece, where no vibration occurred. Please adjust processing conditions if the vibration is generated.

BAP300

LONG CUTTING EDGE

DEEP SHOULDER MILLING

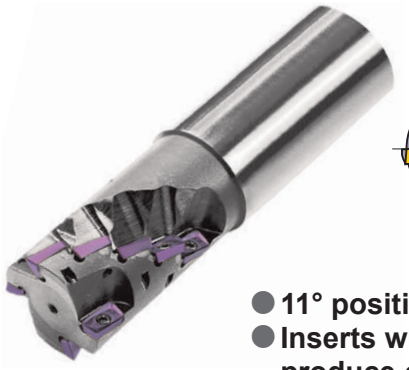
Product Information

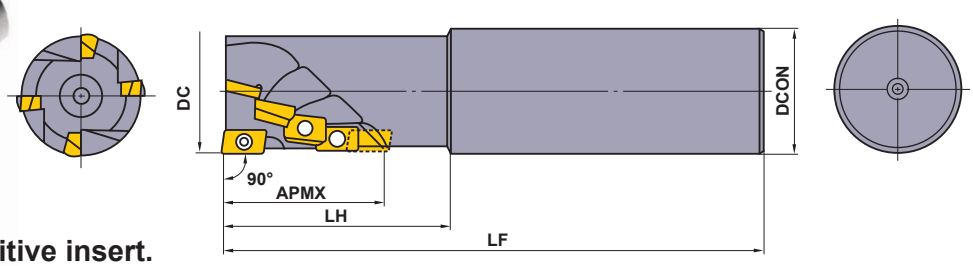
90° KAPR

Work Material

P M K N S H R

SYMBOL DESCRIPTIONS >> 1350
TECHNICAL DATA >> 1987
ISO13399 Property >> 1966





- 11° positive insert.
- Inserts with wiper edges produce optimal finished surface.
- Multi insert design for high feed machining.

LONG CUTTING EDGE

SHANK TYPE

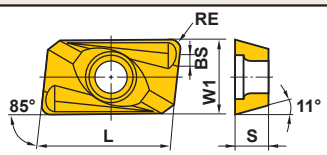
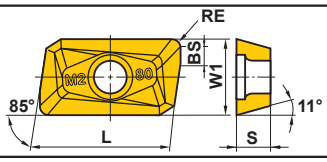
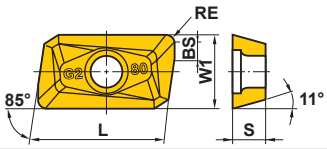
KAPR :90°

Right hand tool holder only.

Order Number	Stock R	Number of Flutes	Total	Dimensions(mm) DC	LF	DCON	LH	APMX	* Clamp Screw	Wrench	Insert
BAP300R2004ES20	●	1	4	20	120	20	40	25	TS25	TKY08F	APG/MT1135 PD◌R-M0/◌1/◌2
BAP300R2508ES25	●	2	8	25	130	25	50	34	TS25	TKY08F	
BAP300R3212ES32	●	2	12	32	140	32	60	43	TS25	TKY08F	
BAP300R4014ES42	●	2	14	40	150	42	70	51	TS25	TKY08F	

* Clamp Torque (N • m) : TS25=1.0

INSERTS

Shape	Order Number	Class	Honing	Coated F7030	VP15TF			Cermet NX2525	NX4545	Carbide HTi10		Dimensions(mm) L	W1	S	BS	RE	Geometry
	APMT1135PDER-H1	M	E	●	●			●	●	●		11	6.35	3.5	1.5	0.4	
	APMT1135PDER-H2	M	E	●	●			●	●	●		11	6.35	3.5	1.2	0.8	
	APMT1135PDER-M0	M	E	●								11	6.35	3.5	1.8	0.2	
	APMT1135PDER-M1	M	E	●								11	6.35	3.5	1.5	0.4	
	APMT1135PDER-M2	M	E	●	●				●			11	6.35	3.5	1.2	0.8	
	APGT1135PDFR-G2	G	F							●		11	6.35	3.5	1.2	0.8	

● : Inventory maintained in Japan. (10 inserts in one case)

BAP300

RECOMMENDED CUTTING CONDITIONS

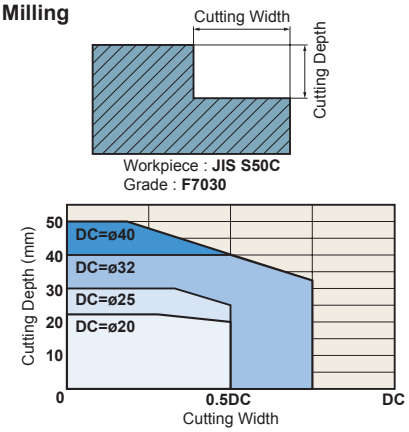
	Work Material	Hardness	Grade	Breaker	Cutting Mode	Cutting Speed (m/min)	Feed per Tooth (mm/t.)
P	Mild Steel	≤180HB	**F7030**	**M**	General Cutting	180 (150—200)	0.15 (0.08—0.2)
	Carbon Steel Alloy Steel	180—280HB	**F7030**	**M**	General Cutting	150 (120—280)	0.15 (0.08—0.2)
			F7030	**H**	Unstable Cutting	120 (100—160)	0.2 (0.1—0.25)
		280—350HB	**F7030**	**M**	General Cutting	140 (120—160)	0.1 (0.05—0.15)
			F7030	**H**	Unstable Cutting	100 (80—120)	0.15 (0.08—0.2)
M	Stainless Steel	≤200HB	**F7030**	**M**	General Cutting	140 (120—160)	0.1 (0.08—0.15)
			F7030	**H**	Unstable Cutting	120 (80—140)	0.15 (0.08—0.2)
K	Gray Cast Iron	Tensile Strength ≤350MPa	**VP15TF**	**M**	General Cutting	140 (120—160)	0.15 (0.08—0.2)
			HTi10	**H**	General Cutting	120 (100—140)	0.1 (0.05—0.15)
	Ductile Cast Iron	Tensile Strength ≤450MPa	**VP15TF**	**M**	General Cutting	120 (100—140)	0.1 (0.05—0.15)
			UTi20T	**H**	General Cutting	100 (80—120)	0.15 (0.08—0.2)
	Ductile Cast Iron	Tensile Strength 500—800MPa	**VP15TF**	**M**	General Cutting	100 (80—120)	0.08 (0.05—0.1)
			HTi10	**H**	General Cutting	80 (60—100)	0.1 (0.05—0.15)
N	Aluminium Alloy	—	**HTi10**	**G**	General Cutting	500 (200—1000)	0.15 (0.05—0.25)
S	Ti Alloy	≥350HB	**HTi10**	**G**	General Cutting	40 (30—60)	0.15 (0.05—0.25)
	Heat Resistant Alloy	—	**F7030**	**M**	General Cutting	30 (20—40)	0.1 (0.05—0.15)
H	Hardened Steel	≥40HRC	**VP15TF**	**M**	General Cutting	70 (50—100)	0.08 (0.05—0.1)

- Revolution (min^{-1})=(1000 x Cutting Speed)÷(3.14 x DC)
- Table Feed (mm/min)=Feed per Tooth x Number of Teeth x Cutter Revolution

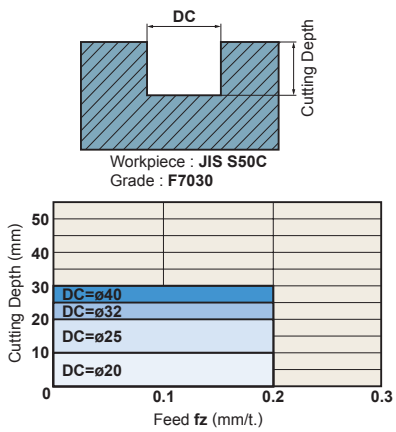
CUTTING PERFORMANCE

Cemented carbide/Coated carbide

Shoulder Milling



Slot Milling



(Note 1) In each of the adove graphs cutting performance is shown for carbon steel (JIS S50C).
In case of alloy steels, reduce the conditions by 20—30%.
(Note 2) In the case of deep slot milling, air blow should be used.
(Note 3) The diameter "DC" is taken from the tools peripheral cutting edge.

DCCC

DEEP SHOULDER MILLING

Product Information

90° KAPR

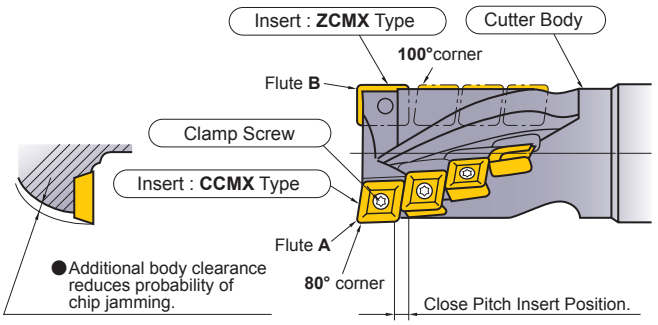
SYMBOL DESCRIPTIONS >> 1350
TECHNICAL DATA >> 1987
ISO13399 Property >> 1966

Work Material

P M K R

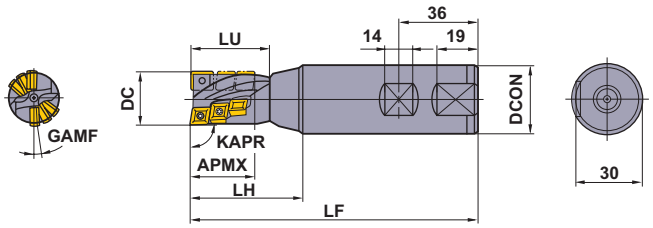
- Different helical flute angles prevents chattering.
- Suitable for heavy cutting due to holder rigidity.

DESIGN FEATURES OF DCCC TYPE END MILL

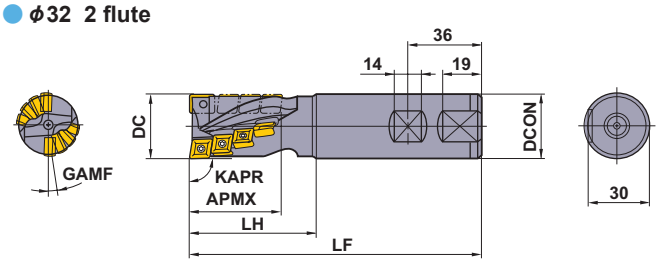


●All 4 cutting edges of CCMX insert are utilized, 80° corners in flute "A" and 100° corners on flute "B".

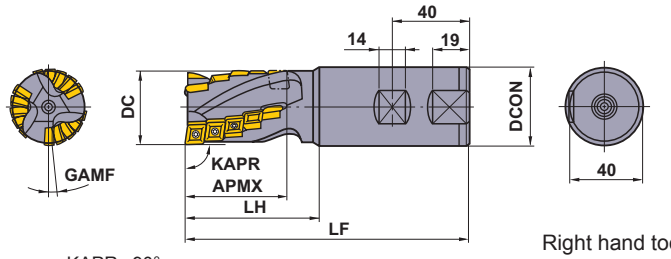
ϕ25 2 flute



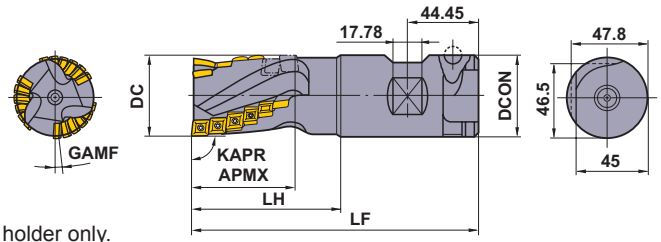
ϕ32 2 flute



ϕ40 3 flute



ϕ50 (Combination Shank) 3 flute



KAPR : 90°

Right hand tool holder only.

(mm)

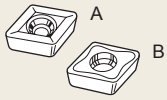
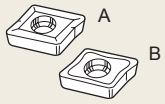
DC	Order Number	Stock	LF	DCON	LH	LU	APMX	GAMF	WT *1	No. of Teeth Bottom	No. of Teeth Total	Peripheral and Bottom Type	Peripheral and Bottom *2 Number of Teeth	Bottom insert only Type	Bottom insert only *2 Number of Teeth
25	**DCCCR2506S32**	●	130	32	50	36	27	8°	0.6	2	6	CCMX08	5	ZCMX08	1
25	**DCCCR2510S32**	●	150	32	70	56	44	8°	0.7	2	10	CCMX08	9	ZCMX08	1
32	**DCCCR3208S32**	●	140	32	60	–	43	8°36′	0.8	2	8	CCMX09	7	ZCMX09	1
32	**DCCCR3212S32**	●	160	32	80	–	63	8°36′	0.8	2	12	CCMX09	11	ZCMX09	1
40	**DCCCR4015S42**	●	150	42	70	–	53	5°31′	1.3	3	15	CCMX09	14	ZCMX09	1
40	**DCCCR4024S42**	●	180	42	100	–	83	5°31′	1.4	3	24	CCMX09	23	ZCMX09	1
50	**DCCCR5018S508**	●	175	50.8	90	–	63	5°51′	2.3	3	18	CCMX09	17	ZCMX09	1
50	**DCCCR5027S508**	●	205	50.8	120	–	93	5°51′	2.6	3	27	CCMX09	26	ZCMX09	1

* WT : Tools Weight (Kg)

● : **Inventory maintained in Japan.**

DCCC

SPARE PARTS

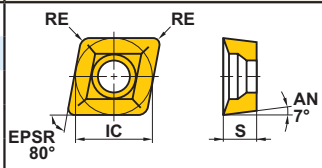
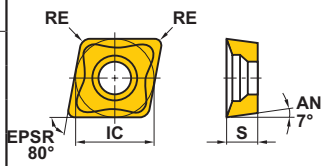
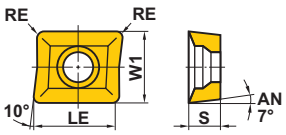
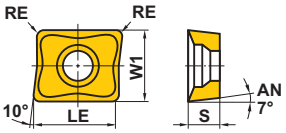
Tool Holder Number	*				
	Clamp Screw	Wrench	Wrench	Insert	
				Peripheral and Bottom Insert	Bottom Insert (One Pocket Only)
DCCCR25	CS300890T	TKY08F	TKY08DS	CCMX083508EN-A	ZCMX083508ER-A
DCCCR32 **DCCCR40** **DCCCR50**	CS350990T	TKY10F	TKY10DS	CCMX09T308EN-A or B	ZCMX09T308ER-A or B

* Clamp Torque (N • m) : CS300890T=1.0, CS350990T=2.5

INSERTS

Work Material			F7030	VP15TF	UP20M		UTi20T	
	P	Steel	◐	◐	◐		◐	
	M	Stainless Steel	◔	◔	◔		◔	
	K	Cast Iron		✠			✠	

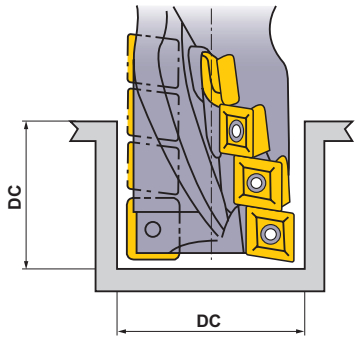
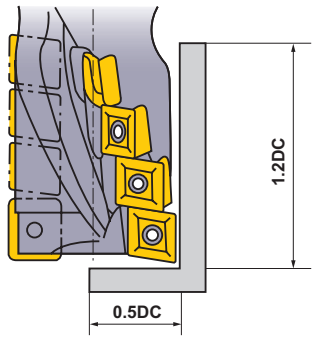
Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✠ : Unstable Cutting
Honing : E : Round

Shape	Order Number	Class	Honing	Coated F7030	Coated VP15TF	Coated UP20M		Carbide UTi20T		Dimensions (mm) LE	W1	IC	S	RE	Geometry
	CCMX083508EN-A	M	E	●		●		●		–	–	7.94	3.5	0.8	
	CCMX09T308EN-A	M	E	●	●	●		●		–	–	9.525	3.97	0.8	
Strong Cutting Edge Type	**CCMX09T308EN-B**	M	E	●				●		–	–	9.525	3.97	0.8	
	ZCMX083508ER-A	M	E	●				●		10.4	7.94	–	3.5	0.8	
	ZCMX09T308ER-A	M	E	●	●	●		●		12	9.525	–	3.97	0.8	
Strong Cutting Edge Type	**ZCMX09T308ER-B**	M	E	●		●		●		12	9.525	–	3.97	0.8	

● : **Inventory maintained in Japan. (10 inserts in one case)**

DCCC

RECOMMENDED CUTTING CONDITIONS

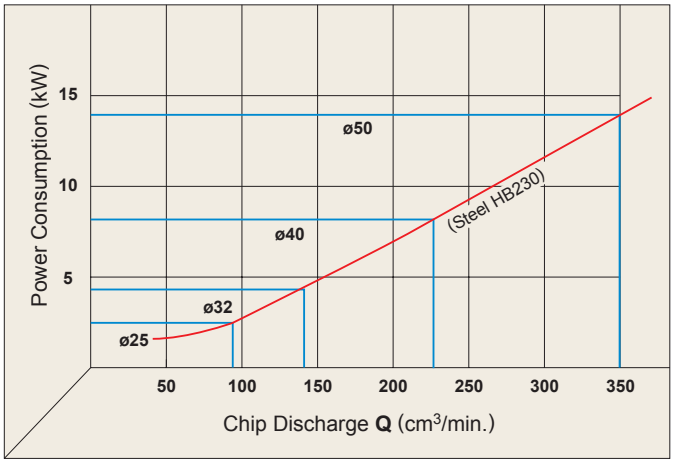
Cutting Mode	A : Slot Milling (APMX Short Type)	B : Shoulder Milling (APMX Short Type)
		

	Work Material	Hardness	Grade	Cutting Mode	Cutting Speed (m/min)	Table Feed (mm/min)			
						ϕ25	ϕ32	ϕ40	ϕ50
P	Mild Steel	≤180HB	F7030	A	200 (160—240)	120 (100—140)	120 (100—140)	120 (100—140)	120 (100—140)
			F7030	B	200 (160—240)	200 (180—220)	200 (180—220)	230 (200—250)	230 (200—250)
	Carbon Steel Alloy Steel	180—280HB	F7030	A	160 (130—180)	120 (100—140)	120 (100—140)	140 (120—150)	140 (120—150)
			F7030	B	160 (130—180)	150 (120—180)	150 (120—180)	180 (150—200)	180 (150—200)
		280—350HB	F7030	A	160 (130—180)	100 (80—120)	100 (80—120)	130 (100—150)	130 (100—150)
			F7030	B	160 (130—180)	120 (100—140)	120 (100—140)	150 (120—180)	150 (120—180)
M	Stainless Steel	≤200HB	F7030	A	80 (60—100)	70 (50—90)	70 (50—90)	70 (50—90)	70 (50—90)
			F7030	B	130 (100—160)	100 (80—120)	100 (80—120)	120 (100—140)	120 (100—140)
K	Cast Iron	Tensile Strength ≤450MPa	UTI20T	A	120 (100—140)	200 (180—220)	200 (180—220)	230 (200—250)	230 (200—250)
			UTI20T	B	120 (100—140)	230 (200—250)	230 (200—250)	260 (240—280)	260 (240—280)

- Revolution (min^{-1})=(1000 x Cutting Speed)÷(3.14 x DC)
- Table Feed (mm/min)=Feed per Tooth x Number of Teeth x Cutter Revolution

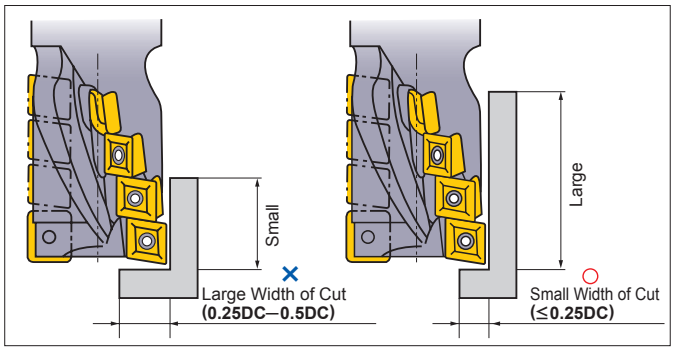
POWER CONSUMPTION

- Please use the chart below for reference, please select the conditions that suits the machines power.
- Chip Discharge Q (cm^3/min.)=Table Feed x Depth of Cut x Cutting Width÷1000



FOR USE OF APMX LONG TYPE

- Since the overhang from the milling chuck is long, a large width of cut will cause chattering and tool breakage.
- Keep the width of cut small and the depth of cut in axial direction large. (See the following illustration.)
- For slot milling, keep the table feed at not more than half the value listed in the above table. (Use the APMX Short type as much as possible.)



SPX

DEEP SHOULDER MILLING

Product Information

90° KAPR

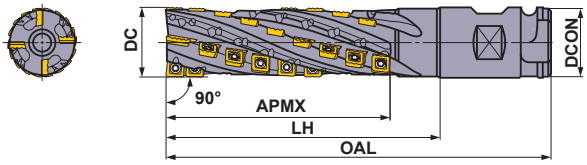
Work Material

P M K S R

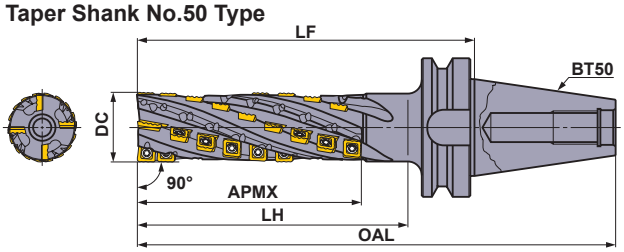
SYMBOL DESCRIPTIONS >> 1350
TECHNICAL DATA >> 1987
ISO13399 Property >> 1966

- Low cutting resistance due to the use of wavy inserts.
- Suitable for heavy cutting due to holder rigidity.

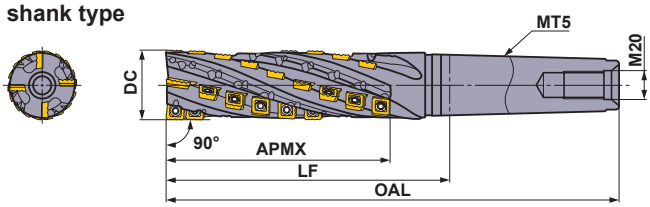
● Straight Shank Type (Combination Shank)



● 7/24 Taper Shank No.50 Type



● MT5 shank type



SHANK TYPE

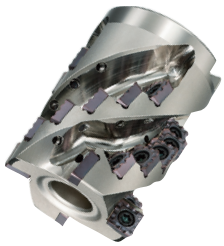
KAPR :90°

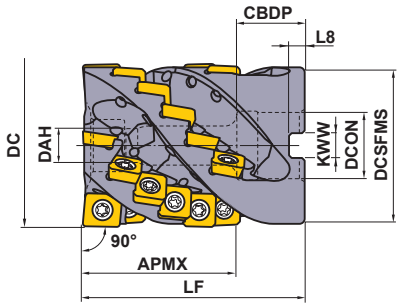
Right hand tool holder only.

Type		Order Number	Stock R	Number of Teeth Flutes	Number of Teeth Total	Dimensions (mm) DC	OAL	DCON	LH	LF	APMX	Number of Insert: Bottom On-edge A JPMX 190412-○○	Bottom On-edge B MPMX 120412-○○	Peripheral SPMX 120408-○○
Straight Shank (Combination Shank)	Short Edge Type	SPX4R05016WNES	●	4	16	50	180	50.8	100	—	72	2	2	12
Straight Shank (Combination Shank)	Coarse Pitch	SPX4R05024WNS	●	4	24	50	220	50.8	140	—	110	2	2	20
Straight Shank (Combination Shank)	Coarse Pitch	SPX4R05034WNM	●	4	34	50	270	50.8	190	—	157	2	2	30
Straight Shank (Combination Shank)	Coarse Pitch	SPX4R05044WNL	●	4	44	50	320	50.8	240	—	205	2	2	40
7/24 Taper Shank (No. 50)	Short Edge Type	SPX4R05016BT50NES	●	4	16	50	249.8	—	100	148	72	2	2	12
7/24 Taper Shank (No. 50)	Coarse Pitch	SPX4R05024BT50NS	●	4	24	50	289.8	—	140	188	110	2	2	20
7/24 Taper Shank (No. 50)	Coarse Pitch	SPX4R05034BT50NM	●	4	34	50	339.8	—	190	238	157	2	2	30
7/24 Taper Shank (No. 50)	Coarse Pitch	SPX4R05044BT50NL	●	4	44	50	389.8	—	240	288	205	2	2	40
7/24 Taper Shank (No. 50)	Coarse Pitch	SPX4R06324BT50NS	●	4	24	63	289.8	—	140	188	110	2	2	20
7/24 Taper Shank (No. 50)	Coarse Pitch	SPX4R06334BT50NM	●	4	34	63	339.8	—	190	238	157	2	2	30
7/24 Taper Shank (No. 50)	Coarse Pitch	SPX4R06344BT50NL	●	4	44	63	389.8	—	240	288	205	2	2	40
7/24 Taper Shank (No. 50)	Coarse Pitch	SPX4R06356BT50NX	●	4	56	63	439.8	—	290	338	261	2	2	52
MT5 shank type		SPX4R05024MT5NS	●	4	24	50	279.5	—	—	150	110	2	2	20
MT5 shank type		SPX4R05034MT5NM	●	4	34	50	329.5	—	—	200	157	2	2	30
MT5 shank type		SPX4R05044MT5NL	●	4	44	50	379.5	—	—	250	205	2	2	40

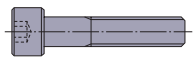
● : Inventory maintained in Japan.

SPX





Right hand tool holder only.

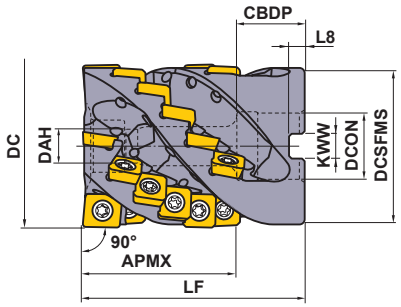
Cutter Diameter DC	Set Bolt (included)	Geometry
ϕ63	HSC12070	
ϕ80	16065	

SHELL TYPE

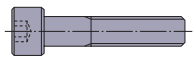
KAPR :90°

Order Number	Stock	Number of Teeth		Dimensions (mm)									Number of Insert		
													Bottom On-edge **A**	Bottom On-edge **B**	Peripheral
	R	Flutes	Total	DC	LF	DCON	CBDP	DAH	DCSFMS	KWW	L8	APMX	JPMX 140412-○○	MPMX 120412-○○	SPMX 120408-○○
SPX4R06324CA058A	●	4	24	63	85	25.4	26	13	60	9.5	6	58	2	2	20
SPX4R08024DA058A	●	4	24	80	85	31.75	38	17	76.8	12.7	8	58	2	2	20

(Note) In case of internal coolant supply, please use a face mill arbor with through coolant channels. Regular center-thru or side-thru arbors can't be used.



Right hand tool holder only.

Cutter Diameter DC	Set Bolt (included)	Geometry
ϕ63	HSC12070	
ϕ80	16065	

For metric arbor

The cutter bore diameter DCON is indicated in millimetre.

SHELL TYPE

KAPR :90°

Order Number	Stock	Number of Teeth		Dimensions (mm)									Number of Insert		
													Bottom On-edge **A**	Bottom On-edge **B**	Peripheral
	R	Flutes	Total	DC	LF	DCON	CBDP	DAH	DCSFMS	KWW	L8	APMX	JPMX 140412-○○	MPMX 120412-○○	SPMX 120408-○○
SPX4-063A24A058RA	●	4	24	63	85	27	28	13	60	12.4	7	58	2	2	20
SPX4-080A24A058RA	●	4	24	80	85	32	40	17	76.8	14.4	8	58	2	2	20

(Note) In case of internal coolant supply, please use a face mill arbor with through coolant channels. Regular center-thru or side-thru arbors can't be used.

● : **Inventory maintained in Japan.**

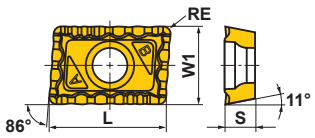
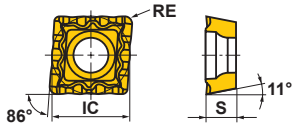
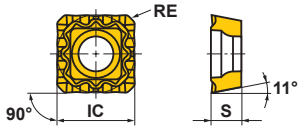
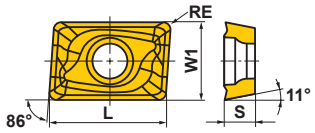
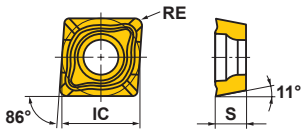
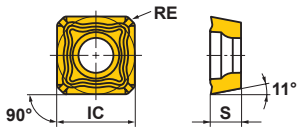
SPARE PARTS

Tool Holder Number	*					
	Clamp Screw	Wrench	Anti-seize Lubricant	Insert		
				Bottom On-edge **A**	Bottom On-edge **B**	Peripheral
SPX	TS55	TKY25D	MK1KS	JPMX140412-WH	MPMX120412-WH	SPMX120408-WH
				JPMX140412-JM	MPMX120412-JM	SPMX120408-JM

* Clamp Torque (N • m) : TS55=7.5

SPX

INSERTS

Type		Shape	Order Number	Class	Coated VP15TF	Coated VP20RT			Dimensions(mm) L	W1	IC	S	RE	Geometry
Wavy cutting edge type (WH Breaker)	Bottom On-edge A		**JPMX190412-WH**	M	●	●			19.05	12.7	—	4.76	1.2	
			*** JPMX140412-WH**	M	●	●			14.3	12.7	—	4.76	1.2	
	Bottom On-edge B		**MPMX120412-WH**	M	●	●			—	—	12.7	4.76	1.2	
	Peripheral		**SPMX120408-WH**	M	●	●			—	—	12.7	4.76	0.8	
Straight cutting edge type (JM Breaker)	Bottom On-edge A		**JPMX190412-JM**	M	●	●			19.05	12.7	—	4.83	1.2	
			*** JPMX140412-JM**	M	●	●			14.3	12.7	—	4.79	1.2	
	Bottom On-edge B		**MPMX120412-JM**	M	●	●			—	—	12.7	4.79	1.2	
	Peripheral		**SPMX120408-JM**	M	●	●			—	—	12.7	4.80	0.8	

* Only for use with a shell type holder.

● : **Inventory maintained in Japan. (10 inserts in one case)**

SPX

RECOMMENDED CUTTING CONDITIONS (SHANK TYPE)

CUTTING CONDITIONS FOR SHOULDER MILLING

	Work Material	Hardness	Grade	Breaker	Cutting Speed vc (m/min)	Cutting Width : ae (mm) Feed per Tooth : fz (mm/t.)						
						ϕ50 (the last letter of order number for cutter body)			ϕ63 (the last letter of order number for cutter body)			
						S (APMX≤110)	M (APMX=157)	L (APMX=205)	S (APMX=110)	M (APMX=157)	L (APMX=205)	X (APMX=261)
P	Mild Steel	≤180HB	VP15TF	WH	120 (100−140)	≤10.0 0.15−0.25	≤5.0 0.15−0.25	≤2.5 0.10−0.20	≤12.5 0.15−0.25	≤10.0 0.15−0.25	≤5.0 0.15−0.25	≤2.5 0.10−0.20
				JM	120 (100−140)	≤7.5 0.10−0.20	≤5.0 0.10−0.20	≤2.5 0.05−0.15	≤10.0 0.10−0.20	≤7.5 0.10−0.20	≤5.0 0.10−0.20	≤2.5 0.05−0.15
	Carbon Steel Alloy Steel	180−350HB		WH	80 (70−120)	≤10.0 0.15−0.25	≤5.0 0.15−0.25	≤2.5 0.10−0.20	≤12.5 0.15−0.25	≤10.0 0.15−0.25	≤5.0 0.15−0.25	≤2.5 0.10−0.20
				JM	80 (70−120)	≤7.5 0.10−0.20	≤5.0 0.10−0.20	≤2.5 0.05−0.15	≤10.0 0.10−0.20	≤7.5 0.10−0.20	≤5.0 0.10−0.20	≤2.5 0.05−0.15
	Alloy Tool Steel	≤300HB		WH	80 (60−100)	≤10.0 0.10−0.20	≤5.0 0.10−0.20	≤2.5 0.05−0.15	≤12.5 0.10−0.20	≤10.0 0.10−0.20	≤5.0 0.10−0.20	≤2.5 0.05−0.15
				JM	80 (60−100)	≤7.5 0.10−0.15	≤5.0 0.10−0.15	≤2.5 0.05−0.10	≤10.0 0.10−0.15	≤7.5 0.10−0.15	≤5.0 0.10−0.15	≤2.5 0.05−0.10
M	Stainless Steel	≤200HB	VP20RT	WH	80 (60−100)	≤7.5 0.08−0.15	≤5.0 0.08−0.15	≤2.5 0.05−0.10	≤10.0 0.08−0.15	≤7.5 0.08−0.15	≤5.0 0.08−0.15	≤2.5 0.05−0.10
				JM	80 (60−100)	≤5.0 0.08−0.15	≤3.5 0.08−0.15	≤2.0 0.05−0.10	≤7.5 0.08−0.15	≤5.0 0.08−0.15	≤3.5 0.08−0.15	≤2.0 0.05−0.10
K	Gray Cast Iron	Tensile Strength ≤350MPa	VP15TF	WH	100 (80−120)	≤10.0 0.15−0.40	≤5.0 0.15−0.35	≤2.5 0.10−0.30	≤12.5 0.15−0.40	≤10.0 0.15−0.40	≤5.0 0.15−0.35	≤2.5 0.10−0.30
				JM	100 (80−120)	≤7.5 0.10−0.25	≤5.0 0.10−0.25	≤2.5 0.05−0.20	≤10.0 0.10−0.25	≤7.5 0.10−0.25	≤5.0 0.10−0.25	≤2.5 0.05−0.20
	Ductile Cast Iron	Tensile Strength ≤800MPa		WH	80 (60−100)	≤10.0 0.15−0.35	≤5.0 0.15−0.30	≤2.5 0.10−0.25	≤12.5 0.15−0.35	≤10.0 0.15−0.35	≤5.0 0.15−0.30	≤2.5 0.10−0.25
				JM	80 (60−100)	≤7.5 0.10−0.20	≤5.0 0.10−0.20	≤2.5 0.05−0.15	≤10.0 0.10−0.20	≤7.5 0.10−0.20	≤5.0 0.10−0.20	≤2.5 0.05−0.15
S	Ti Alloy	≤350HB	VP20RT	WH	40 (35−50)	≤5.0 0.05−0.10	≤3.5 0.05−0.10	≤2.0 0.05−0.10	≤7.5 0.05−0.10	≤5.0 0.05−0.10	≤3.5 0.05−0.10	≤2.0 0.05−0.10
				JM	40 (35−50)	≤3.5 0.05−0.10	≤2.5 0.05−0.10	≤1.5 0.05−0.10	≤5.0 0.05−0.10	≤3.5 0.05−0.10	≤2.5 0.05−0.10	≤1.5 0.05−0.10

(Note 1) The above cutting conditons are determined based on high rigidity machine and workpiece, where no vibration occurred. Please adjust processing conditions if the vibration is generated.

(Note 2) If the cutting angle between the tool and workpiece exceeds 90º when machining corners ,Reduce the cutting speed and table feed by 10-20% and ae by 50%. Also if possible, set a radius cutting path for corners.

SLOT MILLING

	Work Material	Hardness	Grade	Breaker	Cutting Speed vc (m/min)	Depth of Cut : ap : (mm) Feed per Tooth : fz (mm/t.)						
						ϕ50 (the last letter of order number for cutter body)			ϕ63 (the last letter of order number for cutter body)			
						S (APMX≤110)	M (APMX=157)	L (APMX=205)	S (APMX=110)	M (APMX=157)	L (APMX=205)	X (APMX=261)
P	Mild Steel	≤180HB	VP15TF	WH	60 (50−120)	≤10.0 0.10−0.25	≤5.0 0.10−0.20	≤2.5 0.10−0.15	≤12.5 0.10−0.25	≤10.0 0.10−0.25	≤5.0 0.10−0.20	≤2.5 0.10−0.15
				JM	60 (50−120)	≤7.5 0.10−0.15	≤5.0 0.10−0.15	≤2.5 0.10−0.15	≤10.0 0.10−0.15	≤7.5 0.10−0.15	≤5.0 0.10−0.15	≤2.5 0.10−0.15
	Carbon Steel Alloy Steel	180−350HB		WH	60 (50−100)	≤10.0 0.10−0.25	≤5.0 0.10−0.20	≤2.5 0.10−0.15	≤12.5 0.10−0.25	≤10.0 0.10−0.25	≤5.0 0.10−0.20	≤2.5 0.10−0.15
				JM	60 (50−100)	≤7.5 0.10−0.15	≤5.0 0.10−0.15	≤2.5 0.10−0.15	≤10.0 0.10−0.15	≤7.5 0.10−0.15	≤5.0 0.10−0.15	≤2.5 0.10−0.15
	Alloy Tool Steel	≤300HB		WH	50 (40−80)	≤10.0 0.10−0.25	≤5.0 0.10−0.20	≤2.5 0.10−0.15	≤12.5 0.10−0.25	≤10.0 0.10−0.25	≤5.0 0.10−0.20	≤2.5 0.10−0.15
				JM	50 (40−80)	≤7.5 0.10−0.15	≤5.0 0.10−0.15	≤2.5 0.10−0.15	≤10.0 0.10−0.15	≤7.5 0.10−0.15	≤5.0 0.10−0.15	≤2.5 0.10−0.15
M	Stainless Steel	≤200HB	VP20RT	WH	40 (35−80)	≤10.0 0.08−0.15	≤5.0 0.08−0.15	≤2.5 0.05−0.10	≤12.5 0.08−0.15	≤10.0 0.08−0.15	≤5.0 0.08−0.15	≤2.5 0.05−0.10
				JM	40 (35−80)	≤7.5 0.08−0.15	≤5.0 0.08−0.15	≤2.5 0.05−0.10	≤10.0 0.08−0.15	≤7.5 0.08−0.15	≤5.0 0.08−0.15	≤2.5 0.05−0.10
K	Gray Cast Iron	Tensile Strength ≤350MPa	VP15TF	WH	50 (40−80)	≤10.0 0.15−0.25	≤5.0 0.10−0.25	≤2.5 0.10−0.20	≤12.5 0.15−0.25	≤10.0 0.15−0.25	≤5.0 0.10−0.25	≤2.5 0.10−0.20
				JM	50 (40−80)	≤7.5 0.10−0.20	≤5.0 0.10−0.20	≤2.5 0.10−0.20	≤10.0 0.10−0.20	≤7.5 0.10−0.20	≤5.0 0.10−0.20	≤2.5 0.10−0.20
	Ductile Cast Iron	Tensile Strength ≤800MPa		WH	40 (35−80)	≤10.0 0.15−0.25	≤5.0 0.10−0.25	≤2.5 0.10−0.20	≤12.5 0.15−0.25	≤10.0 0.15−0.25	≤5.0 0.10−0.25	≤2.5 0.10−0.20
				JM	40 (35−80)	≤7.5 0.10−0.20	≤5.0 0.10−0.20	≤2.5 0.10−0.20	≤10.0 0.10−0.20	≤7.5 0.10−0.20	≤5.0 0.10−0.20	≤2.5 0.10−0.20
S	Ti Alloy	≤350HB	VP20RT	WH	35 (30−50)	≤5.0 0.05−0.10	≤3.5 0.05−0.10	≤2.0 0.05−0.10	≤7.5 0.05−0.10	≤5.0 0.05−0.10	≤3.5 0.05−0.10	≤2.0 0.05−0.10
				JM	35 (30−50)	≤5.0 0.05−0.10	≤3.5 0.05−0.10	≤2.0 0.05−0.10	≤7.5 0.05−0.10	≤5.0 0.05−0.10	≤3.5 0.05−0.10	≤2.0 0.05−0.10

(Note 1) The above cutting conditons are determined based on high rigidity machine and workpiece, where no vibration occurred. Please adjust processing conditions if the vibration is generated.

(Note 2) For slotting, please use high rigidity tools such as SPX4R05016WNES/BT50NES.

SPX

RECOMMENDED CUTTING CONDITIONS (SHELL TYPE)

CUTTING CONDITIONS FOR SHOULDER MILLING

	Work Material	Hardness	Grade Breaker	Cutting Speed **vc** (m/min)	Depth of Cut **ap** (mm)	Cutting Width **ae** (mm)	Feed per Tooth **fz** (mm/t.)
P	Mild Steel	≤180HB	**VP15TF JM**	120 (100−140)	−0.5DC	−10	0.15−0.30
				120 (100−140)	0.5DC−	−10	0.15−0.25
	Carbon Steel Alloy Steel	180−350HB	**VP15TF JM**	120 (80−130)	−0.5DC	−10	0.15−0.30
				100 (80−120)	0.5DC−	−10	0.15−0.25
	Alloy Tool Steel	≤300HB	**VP15TF JM**	100 (60−110)	−0.5DC	−10	0.10−0.20
				80 (60−100)	0.5DC−	−10	0.10−0.15
M	Stainless Steel	≤200HB	**VP20RT JM**	140 (100−150)	−0.5DC	−10	0.10−0.25
				120 (100−140)	0.5DC−	−10	0.10−0.20
K	Gray Cast Iron	Tensile Strength ≤350MPa	**VP15TF WH**	120 (80−130)	−0.5DC	−10	0.25−0.40
				100 (80−120)	0.5DC−	−10	0.25−0.40
			VP15TF JM	120 (80−130)	−0.5DC	−10	0.15−0.30
				100 (80−120)	0.5DC−	−10	0.15−0.25
	Ductile Cast Iron	Tensile Strength ≤800MPa	**VP15TF WH**	100 (60−110)	−0.5DC	−10	0.20−0.35
				80 (60−110)	0.5DC−	−10	0.20−0.35
			VP15TF JM	100 (60−120)	−0.5DC	−10	0.15−0.30
				80 (60−120)	0.5DC−	−10	0.15−0.30
S	Ti Alloy	≤350HB	**VP20RT JM**	45 (35−50)	−0.5DC	−10	0.08−0.10
				40 (35−50)	0.5DC−	−10	0.08−0.10

(Note 1) The above cutting conditons are determined based on high rigidity machine and workpiece, where no vibration occurred. Please adjust processing conditions if the vibration is generated.

SLOT MILLING

	Work Material	Hardness	Grade Breaker	Cutting Speed **vc** (m/min)	Depth of Cut **ap** (mm)	Cutting Width **ae** (mm)	Feed per Tooth **fz** (mm/t.)
P	Mild Steel	≤180HB	**VP15TF JM**	120 (100−140)	−10	DC	0.15−0.25
	Carbon Steel Alloy Steel	180−350HB	**VP15TF JM**	100 (80−120)	−0.25DC	DC	0.15−0.25
	Alloy Tool Steel	≤300HB	**VP15TF JM**	80 (60−100)	−10	DC	0.10−0.20
M	Stainless Steel	≤200HB	**VP20RT JM**	100 (80−140)	−10	DC	0.10−0.15
K	Gray Cast Iron	Tensile Strength ≤350MPa	**VP15TF WH**	80 (60−100)	−0.25DC	DC	0.10−0.25
				60 (50−100)	−0.6DC	DC	0.10−0.20
			VP15TF JM	80 (60−100)	−0.25DC	DC	0.10−0.20
				60 (50−100)	−0.6DC	DC	0.10−0.15
	Ductile Cast Iron	Tensile Strength ≤800MPa	**VP15TF WH**	80 (60−100)	−0.25DC	DC	0.10−0.25
				60 (50−100)	−0.5DC	DC	0.10−0.20
			VP15TF JM	80 (60−100)	−0.25DC	DC	0.10−0.20
				60 (50−100)	−0.5DC	DC	0.10−0.15
S	Ti Alloy	≤350HB	**VP20RT JM**	40 (35−50)	−0.25DC	DC	0.06−0.10

(Note 1) The above cutting conditons are determined based on high rigidity machine and workpiece, where no vibration occurred. Please adjust processing conditions if the vibration is generated.

VFX5

DEEP SHOULDER MILLING

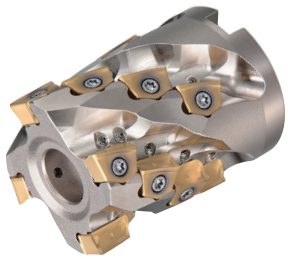
Product Information

90° KAPR

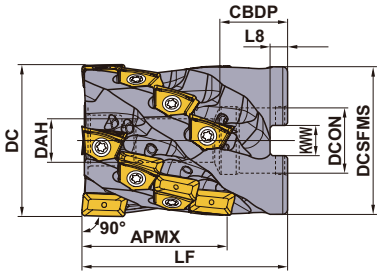
Work Material

S R

SYMBOL DESCRIPTIONS >> 1350
TECHNICAL DATA >> 1987
ISO13399 Property >> 1966



- Vertical inserts with high strength cutting edge.
- Screw-on type clamping.
- High efficiency milling of titanium alloys.



Right hand tool holder only.

SHELL TYPE

KAPR :90°

(mm)

Order Number	Stock R	Number of Flutes	Total	DC	LF	DCON	CBDP	DAH	DCSFMS	KWW	L8	APMX	WT(kg)
VFX5-040A03A026R	●	3	6	40	50	16	21	8.5	38.2	8.4	5.6	26	0.3
VFX5-040A03A038R	●	3	9	40	60	16	21	8.5	38.2	8.4	5.6	38	0.4
VFX5-050X03A026R	●	3	6	50	50	27	23	12.5	48.2	12.4	7.0	26	0.4
VFX5-050X03A038R	●	3	9	50	60	27	23	12.5	48.2	12.4	7.0	38	0.5
VFX5-050A04A026R	●	4	8	50	50	22	21	10.5	48.2	10.4	6.3	26	0.5
VFX5-050A04A038R	●	4	12	50	60	22	21	10.5	48.2	10.4	6.3	38	0.6
VFX5-050X04A038R	●	4	12	50	60	27	23	12.5	48.2	12.4	7.0	38	0.5
VFX5-050A04A050R	●	4	16	50	70	22	21	10.5	48.2	10.4	6.3	50	0.7
VFX5-063A05A026R	●	5	10	63	60	27	28	12.5	61	12.4	7.0	26	1.0
VFX5-063A05A063R	●	5	25	63	85	27	28	12.5	61	12.4	7.0	63	1.4
VFX5-080A06A075R	●	6	36	80	100	32	28	16.5	77.3	14.4	8.0	75	2.8

● : Inventory maintained in Japan.

VFX5

SPARE PARTS

Order Number	*2				*3				Number of Insert	
									End Cutting Edge	Peripheral *1 Cutting Edge
	Clamp Screw	Number	Seal Washer	Wrench	Coolant Nozzle	Number	Anti-seize Lubricant	Set Bolt	XNMU1607 ○○R-○○	XNMU1607 08R-○○
VFX5-040A03A026R	TS352	6	W8-S1	TKY10D	HSD04004H08	9	MK1KS	HSC08040	3	3
VFX5-040A03A038R	TS352	9	W8-S1	TKY10D	HSD04004H08	12	MK1KS	HSC08050	3	6
VFX5-050X03A026R	TS352	6	W12-S1	TKY10D	HSD04004H08	9	MK1KS	HSC12035	3	3
VFX5-050X03A038R	TS352	9	W12-S1	TKY10D	HSD04004H08	12	MK1KS	HSC12045	3	6
VFX5-050A04A026R	TS352	8	W10-S1	TKY10D	HSD04004H08	12	MK1KS	HSC10035	4	4
VFX5-050A04A038R	TS352	12	W10-S1	TKY10D	HSD04004H08	16	MK1KS	HSC10045	4	8
VFX5-050X04A038R	TS352	12	W12-S1	TKY10D	HSD04004H08	16	MK1KS	HSC12045	4	8
VFX5-050A04A050R	TS352	16	W10-S1	TKY10D	HSD04004H08	20	MK1KS	HSC10055	4	12
VFX5-063A05A026R	TS352	10	W12-S1	TKY10D	HSD04004H08	15	MK1KS	HSC12045	5	5
VFX5-063A05A063R	TS352	25	W12-S1	TKY10D	HSD04004H08	30	MK1KS	HSC12070	5	20
VFX5-080A06A075R	TS352	36	W16-S1	TKY10D	HSD04004H08	42	MK1KS	HSC16080	6	30

*1 Only corner radius R0.8 can be used for the peripheral cutting edges except the end cutting edge.
*2 Clamp Torque (N • m) : TS352=2.5
*3 Coolant nozzles are available with varying diameters for adjusting coolant pressure. Select nozzles as required by the specification.

	≤1Mpa (≤20 l/min.)	←Standard→	≥5Mpa (≥30 l/min.)	≥7Mpa (≥50 l/min.)
Nozzle Dia.	ø0.6mm	ø0.8mm	ø1.2mm	ø1.6mm
Order Number	**HSD04004H06**	**HSD04004H08**	**HSD04004H12**	**HSD04004H16**

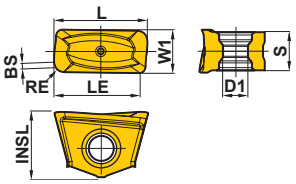
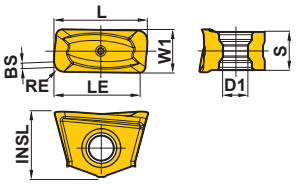
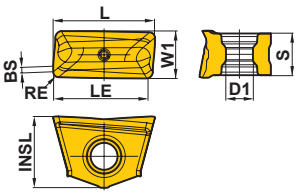
* Clamp Torque (N • m) : HSD0400H○○=1.5

*4 The part number for a blank screw without a through nozzle is HSS04004.
*5 Note for insert with a corner radius of 3.2 and above, as corner radius increases the LF dimension increases.
Corner radius 3.2: LF+0.7mm Corner radius 4.0: LF+1.5mm

VFX5

INSERTS

(mm)

Shape	Order Number	Stock Coated MP9030	Stock Coated MP9130			L	LE	W1	INSL	S	BS	RE	D1	Geometry
	XNMU160708R-MS	●	●			16.0	13.4	7.0	11.1	6.5	1.0	0.8	4.2	
	XNMU160712R-MS	●	●			16.0	13.8	7.0	11.1	6.5	1.0	1.2	4.2	
	XNMU160716R-MS	●	●			16.0	13.8	7.0	11.1	6.5	1.0	1.6	4.2	
	XNMU160724R-MS	●	●			16.0	13.8	7.0	11.1	6.5	1.0	2.4	4.2	
	*1 XNMU160732R-MS	●	●			17.3	14.4	7.0	11.1	6.5	—	3.2	4.2	
	*1 XNMU160740R-MS	●	●			18.9	15.2	7.0	11.1	6.5	—	4.0	4.2	
	XNMU160708R-HS	●	●			16.0	13.4	7.0	11.1	6.5	1.0	0.8	4.2	
	XNMU160708R-LS		●			16.0	13.4	7.0	11.1	6.5	1.0	0.8	4.2	

*1 Note for insert with a corner radius of 3.2 and above, as corner radius increases the LF dimension increases.
Corner radius 3.2: LF+0.7mm Corner radius 4.0: LF+1.5mm

■ = MIRACLE SIGMA

● : **Inventory maintained in Japan. (10 inserts in one case)**

VFX5

RECOMMENDED CUTTING CONDITIONS

VFX5

(mm)

	Work Material	Cutting Edge Diameter	Number of Flutes	Recommended Insert	Cutting Speed vc (m/min)	Revolution n (min^{-1})	Depth of Cut apmax (mm)	Cutting Width ae (mm)	Feed per Tooth fz (mm/t.)	Table Feed vf (mm/min)	Chip Removal Rate Q (cm^3/min)	Estimated cutting power (kW)	Expected Torque (Nm)	Tool life ratio (%)
S	Titanium Alloy (Ti-Al-4V)	ϕ40	3	LS	40	318	38	40	0.10	95	145	6.5	194	40
			3	MS	50	398	38	24	0.10	119	109	4.5	109	60
			3	MS	60	477	38	16	0.10	143	87	3.5	69	80
			3	HS	60	477	38	8	0.12	172	52	2.3	45	100
		ϕ50	3	LS	40	255	38	50	0.10	76	145	6.5	242	40
			4	MS	50	318	50	30	0.10	127	191	7.9	237	60
			4	MS	60	382	50	20	0.10	153	153	6.0	151	80
			4	HS	60	382	50	10	0.12	183	92	3.9	98	100
		ϕ63	5	LS	40	202	60	63	0.10	101	382	16.8	793	40
			5	MS	50	253	60	38	0.10	126	286	11.8	447	60
			5	MS	60	303	60	25	0.10	152	229	9.0	285	80
			5	HS	60	303	60	13	0.12	182	138	5.9	185	100
		ϕ80	6	LS	40	159	75	80	0.10	95	573	25.0	1500	40
			6	MS	50	199	75	48	0.10	119	430	17.6	846	60
			6	MS	60	239	75	32	0.10	143	344	13.5	539	80
			6	HS	60	239	75	16	0.12	172	206	8.7	350	100
	Titanium Alloy (Ti-5553)	ϕ40	3	LS	25	199	38	40	0.08	48	73	3.4	161	30
			3	MS	25	199	38	24	0.08	48	44	1.9	92	50
			3	MS	30	239	38	16	0.10	72	44	1.8	74	70
			3	HS	30	239	38	8	0.10	72	22	1.0	41	90
		ϕ50	4	LS	25	159	50	50	0.08	51	127	5.8	350	30
			4	MS	25	159	50	30	0.08	51	76	3.4	201	50
			4	MS	30	191	50	20	0.10	76	76	3.2	160	70
			4	HS	30	191	50	10	0.10	76	38	1.8	89	90
		ϕ63	5	LS	25	126	60	63	0.08	51	191	8.7	658	30
			5	MS	25	126	60	38	0.08	51	115	5.0	378	50
			5	MS	30	152	60	25	0.10	76	115	4.8	301	70
			5	HS	30	152	60	13	0.10	76	57	2.6	167	90
		ϕ80	6	LS	25	99	75	80	0.08	48	286	13.0	1246	30
			6	MS	25	99	75	48	0.08	48	172	7.5	716	50
			6	MS	30	119	75	32	0.10	72	172	7.1	570	70
			6	HS	30	119	75	16	0.10	72	86	3.9	316	90

*1 Please note that machining performance varies depending to the conditions such as machine rigidity, work clamping rigidity, coolant supply system, pressure and flow volume etc.

*2 Internal coolant is recommended. Please use an FMH type arbor for through coolant. Using external coolant in combination with through coolant is even more effective.

*3 The tool life ratio shows the standard when ae = tool diameter × 20% is assumed to be 100 when shoulder cutting.

*4 The maximum depth of cut (apmax) varies according to the machine rigidity and power.

VFX6

DEEP SHOULDER MILLING

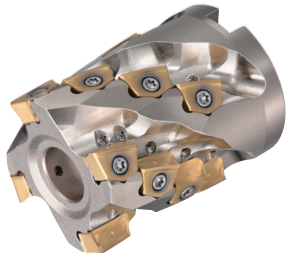
Product Information

90° KAPR

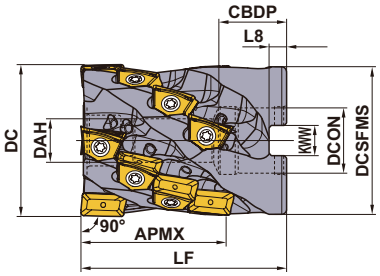
Work Material

S R

SYMBOL DESCRIPTIONS >> 1350
TECHNICAL DATA >> 1987
ISO13399 Property >> 1966



- Vertical inserts with high strength cutting edge.
- Screw-on type clamping.
- High efficiency milling of titanium alloys.



Right hand tool holder only.

SHELL TYPE

KAPR :90°

(mm)

Order Number	Stock R	Number of Flutes	Total	DC	LF	DCON	CBDP	DAH	DCSFMS	KWW	L8	APMX	WT(kg)
VFX6-063A04A031R	●	4	8	63	60	27	28	12.5	61	12.4	7	31	0.9
VFX6-063A04A060R	●	4	16	63	85	27	28	12.5	61	12.4	7	60	1.3
VFX6-080A05A031R	●	5	10	80	60	32	28	16.5	77.3	14.4	8	31	1.5
VFX6-080A05A075R	●	5	25	80	100	32	28	16.5	77.3	14.4	8	75	2.6
VFX6-100A06A031R	●	6	12	100	65	40	30	20.5	96.6	16.4	9	31	2.7
VFX6-100A06A090R	●	6	36	100	115	40	30	20.5	96.6	16.4	9	90	4.8

● : Inventory maintained in Japan.

VFX6

SPARE PARTS

Order Number	*2				*3				Number of Insert	
									End Cutting Edge	Peripheral Cutting Edge *1
	Clamp Screw	Number	Seal Washer	Wrench	Coolant Nozzle	Number	Anti-seize Lubricant	Set Bolt	XNMU1909 ○○R-○○	XNMU1909 12R-○○
VFX6-063A04A031R	TS450	8	W12-S1	TKY20T	HSD04004H08	12	MK1KS	HSC12045	4	4
VFX6-063A04A060R	TS450	16	W12-S1	TKY20T	HSD04004H08	20	MK1KS	HSC12070	4	12
VFX6-080A05A031R	TS450	10	W16-S1	TKY20T	HSD04004H08	15	MK1KS	HSC16040	5	5
VFX6-080A05A075R	TS450	25	W16-S1	TKY20T	HSD04004H08	30	MK1KS	HSC16080	5	20
VFX6-100A06A031R	TS450	12	W20-S1	TKY20T	HSD04004H08	18	MK1KS	HSC20040	6	6
VFX6-100A06A090R	TS450	36	W20-S1	TKY20T	HSD04004H08	42	MK1KS	HSC20090	6	30

*1 Only corner radius R1.2 can be used for the peripheral cutting edges except the end cutting edge.
*2 Clamp Torque (N • m) : TS450=5.0
*3 Coolant nozzles are available with varying diameters for adjusting coolant pressure. Select nozzles as required by the specification.

	≤1Mpa (≤20 l/min.)	←Standard→	≥5Mpa (≥30 l/min.)	≥7Mpa (≥50 l/min.)
Nozzle Dia.	ø0.6mm	ø0.8mm	ø1.2mm	ø1.6mm
Order Number	**HSD04004H06**	**HSD04004H08**	**HSD04004H12**	**HSD04004H16**

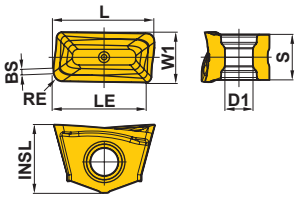
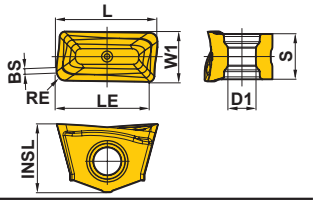
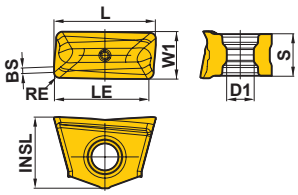
* Clamp Torque (N • m) : HSD0400H○○=1.5

*4 The part number for a blank screw without a through nozzle is HSS04004.
*5 Note for insert with a corner radius of 3.2 and above, as corner radius increases the LF dimension increases.
Corner radius 3.2: LF+0.7mm Corner radius 4.0: LF+1.5mm Corner radius 5.0: LF+1.5mm

VFX6

INSERTS

(mm)

Shape	Order Number	Stock Coated MP9030	Stock Coated MP9130			L	LE	W1	INSL	S	BS	RE	D1	Geometry
	XNMU190912R-MS	●	●			19.1	16.5	9.5	12.7	8.5	1.0	1.2	5.2	
	XNMU190916R-MS	●	●			19.1	16.5	9.5	12.7	8.5	1.0	1.6	5.2	
	XNMU190924R-MS	●	●			19.1	16.6	9.5	12.7	8.5	1.0	2.4	5.2	
	*1 XNMU190932R-MS	●	●			20.2	17.1	9.5	12.7	8.5	—	3.2	5.2	
	*1 XNMU190940R-MS	●	●			21.8	17.8	9.5	12.7	8.5	—	4.0	5.2	
	*1 XNMU190950R-MS	●	●			21.8	17.8	9.5	12.7	8.5	—	5.0	5.2	
	XNMU190912R-HS	●	●			19.1	16.5	9.5	12.7	8.5	1.0	1.2	5.2	
	XNMU190912R-LS		●			19.1	16.5	9.5	12.7	8.5	1.0	1.2	5.2	

*1 Note for insert with a corner radius of 3.2 and above, as corner radius increases the LF dimension increases.
Corner radius 3.2: LF+0.7mm Corner radius 4.0: LF+1.5mm Corner radius 5.0: LF+1.5mm

■ = MIRACLE SIGMA

● : **Inventory maintained in Japan. (10 inserts in one case)**

VFX6

RECOMMENDED CUTTING CONDITIONS

VFX6

(mm)

	Work Material	Cutting Edge Diameter (mm)	Number of Flutes	Recommended Insert	Cutting Speed vc (m/min)	Revolution n (min^{-1})	Depth of Cut apmax (mm)	Cutting Width ae (mm)	Feed per Tooth fz (mm/t.)	Table Feed vf (mm/min)	Chip Removal Rate Q (cm^3/min)	Estimated cutting power (kW)	Expected Torque (Nm)	Tool life ratio (%)
S	Titanium Alloy (Ti-Al-4V)	ϕ63	4	LS	40	202	60	63	0.10	81	306	13.4	634	40
			4	MS	50	253	60	38	0.10	101	229	9.5	357	60
			4	MS	60	303	60	25	0.10	121	183	7.2	228	80
			4	HS	60	303	60	13	0.12	146	110	4.7	148	100
		ϕ80	5	LS	40	159	75	80	0.10	80	477	20.8	1250	40
			5	MS	50	199	75	48	0.10	99	358	14.7	705	60
			5	MS	60	239	75	32	0.10	119	286	11.2	449	80
			5	HS	60	239	75	16	0.12	143	172	7.3	291	100
		ϕ100	6	LS	40	127	90	100	0.10	76	688	29.6	2218	40
			6	MS	50	159	90	60	0.10	95	516	20.9	1252	60
			6	MS	60	191	90	40	0.10	115	413	16.0	798	80
			6	HS	60	191	90	20	0.12	138	248	10.3	517	100
	Titanium Alloy (Ti-5553)	ϕ63	4	LS	25	126	60	63	0.08	40	153	7.0	527	30
			4	MS	25	126	60	38	0.08	40	92	4.0	303	50
			4	MS	30	152	60	25	0.10	61	92	3.8	241	70
			4	HS	30	152	60	13	0.10	61	46	2.1	133	80
		ϕ80	5	LS	25	99	75	80	0.08	40	239	10.8	1038	30
			5	MS	25	99	75	48	0.08	40	143	6.2	597	50
			5	MS	30	119	75	32	0.10	60	143	5.9	475	70
			5	HS	30	119	75	16	0.10	60	72	3.3	263	80
		ϕ100	6	LS	25	80	90	100	0.08	38	344	15.3	1841	30
			6	MS	25	80	90	60	0.08	38	206	8.8	1059	50
			6	MS	30	95	90	40	0.10	57	206	8.4	844	70
			6	HS	30	95	90	20	0.10	57	103	4.7	466	80

*1 Please note that machining performance varies depending to the conditions such as machine rigidity, work clamping rigidity, coolant supply system, pressure and flow volume etc.

*2 Internal coolant is recommended. Please use an FMH type arbor for through coolant. Using external coolant in combination with through coolant is even more effective.

*3 The tool life ratio shows the standard when ae = tool diameter × 20% is assumed to be 100 when shoulder cutting.

*4 The maximum depth of cut (apmax) varies according to the machine rigidity and power.

SRF/SRB

BALL NOSE END MILL

Product Information

R KAPR

SYMBOL DESCRIPTIONS >> 1350
TECHNICAL DATA >> 1987
ISO13399 Property >> 1966

Work Material

P K N H F

Fig.1

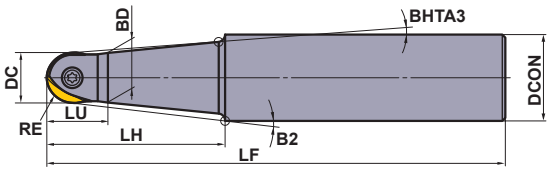


Fig.2

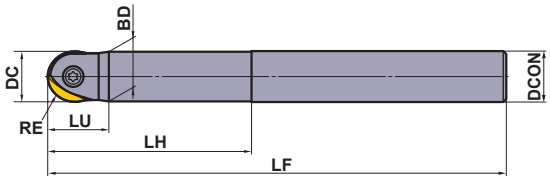
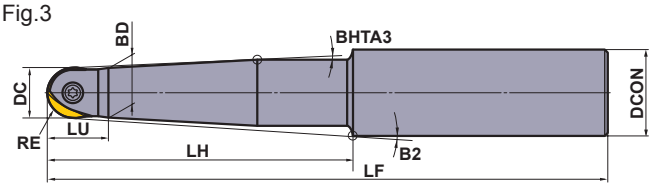


Fig.3



- **S-shaped cutting edge provides sharpness similar to that of solid ball nose end mills.**
- **Highly accurate corner radius tolerance allows for high precision finishing.**
- **Carbide shank type available.**

STEEL SHANK TYPE

Right hand tool holder only.

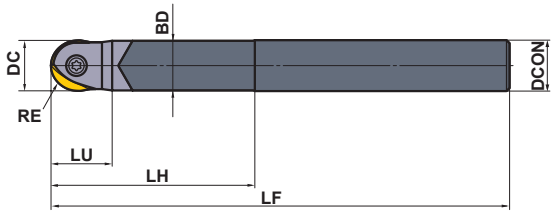
Type	Order Number	Stock R	Number of Teeth	Dimensions (mm) RE	DC	DCON	LF	BD	LH	LU	B2	BHTA3	Type (Fig.)	Clamp Screw *	Wrench ①②	Insert
Standard	SRFH10S12M	●	1	5	10	12	110	9.5	40	13	1°38′	1°30′	1	RS3008T	①TKY08D	SRFT10 SRBT10
	SRFH12S16M	●	1	6	12	16	120	11.5	50	15	2°36′	1°30′	1	RS3510T	①TKY10D	SRFT12 SRBT12
	SRFH16S20M	●	1	8	16	20	130	15.5	50	20	2°44′	1°30′	1	RS4015T	②TKY15T	SRFT16 SRBT16
	SRFH20S25M	●	1	10	20	25	150	19.5	70	24	2°23′	1°30′	1	RS5020T	②TKY20T	SRFT20 SRBT20
	SRFH25S32M	●	1	12.5	25	32	180	24.5	80	30	2°58′	1°30′	1	RS6025T	②TKY25T	SRFT25 SRBT25
	SRFH30S32M	●	1	15	30	32	200	29.5	100	35	—	—	2	RS8030T	②TKY30T	SRFT30 SRBT30
	SRFH32S32M	●	1	16	32	32	200	31.5	100	35	—	—	2	RS8030T	②TKY30T	SRFT32 SRBT32
Semi-long	SRFH10S12L	●	1	5	10	12	150	9.5	60	13	1°30′	1°30′	1	RS3008T	①TKY08D	SRFT10 SRBT10
	SRFH12S16L	●	1	6	12	16	160	11.5	70	15	1°47′	1°30′	1	RS3510T	①TKY10D	SRFT12 SRBT12
	SRFH16S20L	●	1	8	16	20	160	15.5	70	20	1°51′	1°30′	1	RS4015T	②TKY15T	SRFT16 SRBT16
	SRFH20S25L	●	1	10	20	25	180	19.5	80	24	2°03′	1°30′	1	RS5020T	②TKY20T	SRFT20 SRBT20
	SRFH20S20L80	●	1	10	20	20	180	19.5	80	24	—	—	2	RS5020T	②TKY20T	SRFT20 SRBT20
	SRFH25S32L	●	1	12.5	25	32	200	24.5	100	30	2°17′	1°30′	1	RS6025T	②TKY25T	SRFT25 SRBT25
	SRFH25S25L100	●	1	12.5	25	25	200	24.5	100	30	—	—	2	RS6025T	②TKY25T	SRFT25 SRBT25
	SRFH30S32L	●	1	15	30	32	230	29.5	130	35	—	—	2	RS8030T	②TKY30T	SRFT30 SRBT30
Long	SRFH20S25E	●	1	10	20	25	220	19.5	120	24	1°30′	1°30′	3	RS5020T	②TKY20T	SRFT20 SRBT20
	SRFH20S20E120	●	1	10	20	20	220	19.5	120	24	—	—	2	RS5020T	②TKY20T	SRFT20 SRBT20
	SRFH25S32E	●	1	12.5	25	32	250	24.5	150	30	1°30′	1°30′	3	RS6025T	②TKY25T	SRFT25 SRBT25
	SRFH25S25E150	●	1	12.5	25	25	250	24.5	150	30	—	—	2	RS6025T	②TKY25T	SRFT25 SRBT25
	SRFH30S32E	●	1	15	30	32	300	29.5	200	35	—	—	2	RS8030T	②TKY30T	SRFT30 SRBT30

* Clamp Torque (N • m) : RS3008T=1.5, RS3510T=2.5, RS4015T=3.3, RS5020T=5.0, RS6025T=7.5, RS8030T=10.0

● : **Inventory maintained in Japan.**

SRF/SRB

Fig.1



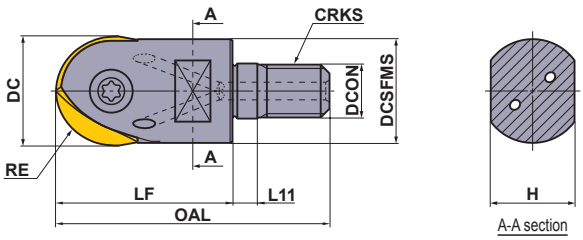
Right hand tool holder only.

CARBIDE SHANK TYPE

Type	Order Number	Stock R	Number of Teeth	RE	DC	DCON	LF	BD	LH	LU	Type (Fig.)	Clamp Screw *	Wrench ①②	Insert
Standard	SRFH10S10MW	●	1	5	10	10	110	9.5	40	13	1	RS3008T	①TKY08D	SRFT10 SRBT10
	SRFH12S12MW	●	1	6	12	12	120	11.5	50	15	1	RS3510T	①TKY10D	SRFT12 SRBT12
	SRFH16S16MW	●	1	8	16	16	130	15.5	50	20	1	RS4015T	②TKY15T	SRFT16 SRBT16
	SRFH20S20MW	●	1	10	20	20	180	19.5	80	24	1	RS5020T	②TKY20T	SRFT20 SRBT20
	SRFH25S25MW	●	1	12.5	25	25	200	24.5	100	30	1	RS6025T	②TKY25T	SRFT25 SRBT25
	SRFH30S32MW	●	1	15	30	32	230	29.5	130	35	1	RS8030T	②TKY30T	SRFT30 SRBT30
				16	32	32	231	29.5	131	36				SRFT32 SRBT32
Long	SRFH10S10LW	●	1	5	10	10	150	9.5	60	13	1	RS3008T	①TKY08D	SRFT10 SRBT10
	SRFH12S12LW	●	1	6	12	12	160	11.5	70	15	1	RS3510T	①TKY10D	SRFT12 SRBT12
	SRFH16S16LW	●	1	8	16	16	160	15.5	70	20	1	RS4015T	②TKY15T	SRFT16 SRBT16
	SRFH16S16EW	●	1	8	16	16	200	15.5	110	20	1	RS4015T	②TKY15T	SRFT16 SRBT16
	SRFH20S20LW	●	1	10	20	20	250	19.5	150	24	1	RS5020T	②TKY20T	SRFT20 SRBT20
	SRFH25S25LW	●	1	12.5	25	25	300	24.5	200	30	1	RS6025T	②TKY25T	SRFT25 SRBT25
	SRFH30S32LW	●	1	15	30	32	350	29.5	250	35	1	RS8030T	②TKY30T	SRFT30 SRBT30
				16	32	32	351	29.5	251	36				SRFT32 SRBT32

(Note 1) SRFH30S32MW and SRFH30S32LW tool body can use both inserts SRFT30 and SRFT32.
However, the overall length size LF is different respectively.

∗ Clamp Torque (N • m) : RS3008T=1.5, RS3510T=2.5, RS4015T=3.3, RS5020T=5.0, RS6025T=7.5, RS8030T=10.0



SCREW-IN TYPE

Right hand tool holder only.

Order Number	Stock R	Coolant Hole	Number of Teeth	RE	DC	DCON	DCSFMS	OAL	LF	L11	H	CRKS	∗2 WT (kg)	Clamp Screw ∗1	Wrench	Insert
SRFH16AM0830	●	○	1	8	16	8.5	14.9	48	30	6	10	8	0.1	RS4015T	TKY15T	SRFT16 SRBT16
SRFH20AM1035	●	○	1	10	20	10.5	18.4	54	35	6	14	10	0.1	RS5020T	TKY20T	SRFT20 SRBT20
SRFH25AM1240	●	○	1	12.5	25	12.5	23.5	62	40	6	19	12	0.1	RS6025T	TKY25T	SRFT25 SRBT25
SRFH30AM1645	●	○	1	15	30	17	28.1	68	45	6	24	16	0.2	RS8030T	TKY30T	SRFT30 SRBT30
				16	32	17	28.1	69	46	6	24	16	0.2			SRFT32 SRBT32

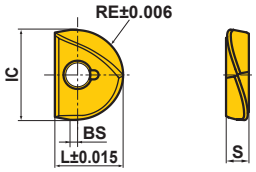
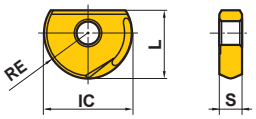
(Note 1) SRFH30AM1645 tool body can use both inserts SRFT30 and SRFT32. However, the overall length size OAL is different respectively.

∗1 Clamp Torque (N • m) : RS4015T=3.3, RS5020T=5.0, RS6025T=7.5, RS8030T=10.0

∗2 WT : Tool Weight

SRF/SRB

INSERTS

Shape	Order Number	Coated				Dimensions (mm)					Geometry
		EP6120	VP15TF	MP8010		DC	RE	L	BS	S	
	SRFT10	●	●	●		10	5	8.5	0.5	2.6	
	SRFT12	●	●	●		12	6	10	0.5	3	
	SRFT16	●	●	●		16	8	12	1	4	
	SRFT20	●	●	●		20	10	15	1	5	
	SRFT25	●	●	●		25	12.5	18.5	1	6	
	SRFT30	●	●	●		30	15	22.5	1	7	
	SRFT32	●	●	●		32	16	23.5	1	7	
	SRBT10		●			10	5	8.5	—	2.6	
	SRBT12		●			12	6	10	—	3	
	SRBT16		●			16	8	12	—	4	
	SRBT20		●			20	10	15	—	5	
	SRBT25		●			25	12.5	18.5	—	6	
	SRBT30		●			30	15	22.5	—	7	
	SRBT32		●			32	16	23.5	—	7	

● : Inventory maintained in Japan. (2 inserts in one case)

■ = MIRACLE SIGMA

FITTING INSERTS ON HOLDERS

1. Clean the insert seat

Clean the insert seat in the holder body by blowing air or using a brush.

2. Fit the insert

Place the concave mark of the insert into the clamp-screw-fastening part of the holder(only SRF type inserts). Fasten the clamp screw while firmly pressing the insert against the insert seat wall. You are recommended to use the special lubricant for preventing screw seizing, MK1KS, and to fasten with recommended torque.

SRF/SRB

RECOMMENDED CUTTING CONDITIONS

	Work Material	Hardness	Grade	Cutting Speed **vc** (m/min)	Feed per Tooth **fz** (mm/t.)	Depth of Cut **ap** (mm)
P	Mild Steel (ASTM A36, AISI 1010)	≤180HB	**EP6120**	200 (80—300)	0.2 (0.1—0.3)	≤0.05DC
	Carbon Steel, Alloy Steel (AISI 1045, AISI 4140)	180—280HB	**EP6120**	200 (80—300)	0.2 (0.1—0.3)	≤0.05DC
			VP15TF	200 (80—300)	0.2 (0.1—0.3)	≤0.05DC
	Carbon Steel, Alloy Steel (AISI 4340)	280—350HB	**EP6120**	200 (80—300)	0.2 (0.1—0.3)	≤0.05DC
	Pre-Hardened Steel (AISI P21, AISI P20 etc)	35—45HRC	**EP6120**	150 (80—200)	0.2 (0.1—0.3)	≤0.05DC
			VP15TF	150 (80—200)	0.2 (0.1—0.3)	≤0.05DC
	Alloy Tool Steel	≤350HB	**EP6120**	150 (80—200)	0.2 (0.1—0.3)	≤0.05DC
			VP15TF	150 (80—200)	0.2 (0.1—0.3)	≤0.05DC
K	Gray Cast Iron (FC300)	Tensile Strength ≤350MPa	**MP8010**	250 (80—450)	0.2 (0.1—0.3)	≤0.05DC
	Ductile Cast Iron (FCD450)	Tensile Strength ≤450MPa	**MP8010**	200 (80—300)	0.2 (0.1—0.3)	≤0.05DC
	Ductile Cast Iron	Tensile Strength ≤800MPa	**MP8010**	200 (80—300)	0.2 (0.1—0.3)	≤0.05DC
N	Copper, Copper alloys		**EP6120**	200 (80—300)	0.2 (0.1—0.3)	≤0.05DC
H	Hardened Steel	45—55HRC	**MP8010**	100 (60—120)	0.2 (0.1—0.3)	≤0.05DC
	Hardened Steel	55—65HRC	**MP8010**	80 (60—120)	0.2 (0.1—0.3)	≤0.01DC

(Note 1) The above values are average condition values at actual cutting speeds. The values change slightly according to the state of a machine to be used and method of workholding. Adjust the values depending on an actual machine condition, referring to the above values.
(Note 2) For end mills with a carbide shank, you will be able to set about 20 percent higher cutting conditions.
(Note 3) Please note the following when machining hardened steel with MP8010.
- Please shorten the overhang length as much as possible.
- Use with carbide shank recommended.
- Please note the setting of the depth of cut especially to prevent the fracture.

CUTTING SPEED FORMULAE

1. Employing $\theta°$ ➡ Calculate cutting speed at point P.
(Cutting speed at the cutting depth border for oblique machining)

Formula : Cutting Speed = $\dfrac{\pi \cdot DC \cdot \sin\theta \cdot n}{1000}$ (m/min)

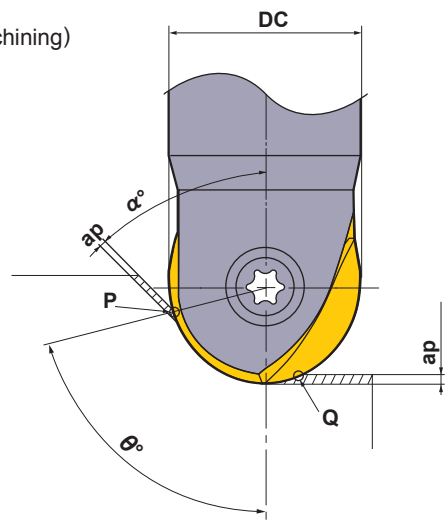
$$\theta° = \cos^{-1}\left(\frac{DC-2ap}{DC}\right)+90-\alpha$$

n : Spindle Speed (min^{-1})

2. Employing ap ➡ Calculate cutting speed at point Q.
(Cutting speed at the cutting depth border)

Formula : Cutting Speed = $\dfrac{2\pi n\sqrt{ap\,(DC-ap)}}{1000}$ (m/min)

n : Spindle Speed (min^{-1})
DC : Cutting Edge Diameter (mm)
ap : Depth of Cut (mm)



SUF

Corner radius end mill, short cut length, 4-6 flute

Product Information

R KAPR

Work Material

P M K H F

SYMBOL DESCRIPTIONS >> 1350
TECHNICAL DATA >> 1987
ISO13399 Property >> 1966

- **Highly accurate corner radius tolerance allows for high precision finishing.**
- **Seamless gash.**

Fig.1

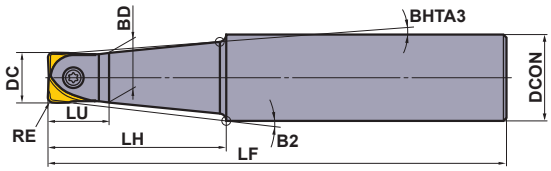


Fig.2

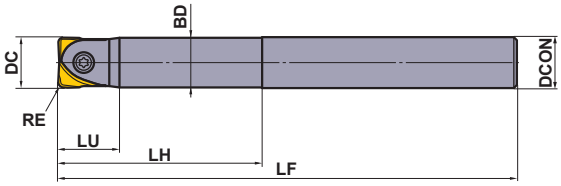
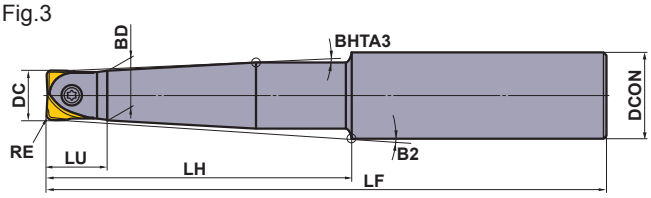


Fig.3



STEEL SHANK TYPE

Right hand tool holder only.

Type	Order Number	Stock R	Number of Teeth	Dimensions (mm) DC	DCON	LF	BD	LH	LU	B2	BHTA3	Type (Fig.)	* Clamp Screw	①② Wrench	Insert
Standard	SRFH10S12M	●	1	10	12	110	9.5	40	13	1°38′	—	1	RS3008T	①TKY08D	SUFT10R○○
	SRFH12S16M	●	1	12	16	120	11.5	50	15	2°36′	—	1	RS3510T	①TKY10D	SUFT12R○○
	SRFH16S20M	●	1	16	20	130	15.5	50	20	2°44′	—	1	RS4015T	②TKY15T	SUFT16R○○
	SRFH20S25M	●	1	20	25	150	19.5	70	24	2°23′	1°30′	1	RS5020T	②TKY20T	SUFT20R○○
	SRFH25S32M	●	1	25	32	180	24.5	80	30	2°58′	1°30′	1	RS6025T	②TKY25T	SUFT25R○○
	SRFH30S32M	●	1	30	32	200	29.5	100	35	—	—	2	RS8030T	②TKY30T	SUFT30R○○
	SRFH32S32M	●	1	32	32	200	31.5	100	35	—	—	2	RS8030T	②TKY30T	SUFT32R○○
Semi-long	SRFH10S12L	●	1	10	12	150	9.5	60	13	1°30′	—	1	RS3008T	①TKY08D	SUFT10R○○
	SRFH12S16L	●	1	12	16	160	11.5	70	15	1°47′	—	1	RS3510T	①TKY10D	SUFT12R○○
	SRFH16S20L	●	1	16	20	160	15.5	70	20	1°51′	—	1	RS4015T	②TKY15T	SUFT16R○○
	SRFH20S25L	●	1	20	25	180	19.5	80	24	2°03′	1°30′	1	RS5020T	②TKY20T	SUFT20R○○
	SRFH20S20L80	●	1	20	20	180	19.5	80	24	—	—	2	RS5020T	②TKY20T	SUFT20R○○
	SRFH25S32L	●	1	25	32	200	24.5	100	30	2°17′	1°30′	1	RS6025T	②TKY25T	SUFT25R○○
	SRFH25S25L100	●	1	25	25	200	24.5	100	30	—	—	2	RS6025T	②TKY25T	SUFT25R○○
	SRFH30S32L	●	1	30	32	230	29.5	130	35	—	—	2	RS8030T	②TKY30T	SUFT30R○○
Long	SRFH20S25E	●	1	20	25	220	19.5	120	24	1°30′	1°30′	3	RS5020T	②TKY20T	SUFT20R○○
	SRFH20S20E120	●	1	20	20	220	19.5	120	24	—	—	2	RS5020T	②TKY20T	SUFT20R○○
	SRFH25S32E	●	1	25	32	250	24.5	150	30	1°30′	1°30′	3	RS6025T	②TKY25T	SUFT25R○○
	SRFH25S25E150	●	1	25	25	250	24.5	150	30	—	—	2	RS6025T	②TKY25T	SUFT25R○○
	SRFH30S32E	●	1	30	32	300	29.5	200	35	—	—	2	RS8030T	②TKY30T	SUFT30R○○

* Clamp Torque (N • m) : RS3008T=1.5, RS3510T=2.5, RS4015T=3.3, RS5020T=5.0, RS6025T=7.5, RS8030T=10.0

● : **Inventory maintained in Japan.**

SUF

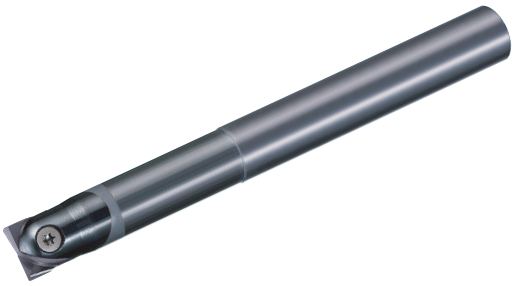
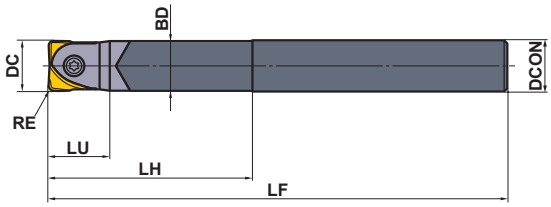


Fig.1



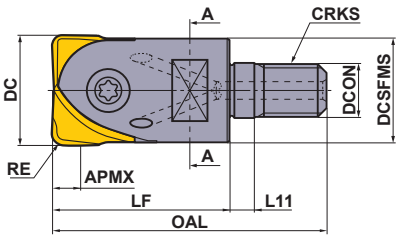
CARBIDE SHANK TYPE

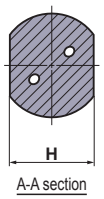
Right hand tool holder only.

Type	Order Number	Stock R	Number of Teeth	Dimensions (mm) DC	DCON	LF	BD	LH	LU	Type (Fig.)	Clamp Screw *	Wrench ①②	Insert
Standard	SRFH10S10MW	●	1	10	10	110	9.5	40	13	1	RS3008T	①TKY08D	SUFT10R○○
	SRFH12S12MW	●	1	12	12	120	11.5	50	15	1	RS3510T	①TKY10D	SUFT12R○○
	SRFH16S16MW	●	1	16	16	130	15.5	50	20	1	RS4015T	②TKY15T	SUFT16R○○
	SRFH20S20MW	●	1	20	20	180	19.5	80	24	1	RS5020T	②TKY20T	SUFT20R○○
	SRFH25S25MW	●	1	25	25	200	24.5	100	30	1	RS6025T	②TKY25T	SUFT25R○○
	SRFH30S32MW	●	1	30	32	230	29.5	130	35	1	RS8030T	②TKY30T	SUFT30R○○
				32	32	231	29.5	131	36				SUFT32R○○
Long	SRFH10S10LW	●	1	10	10	150	9.5	60	13	1	RS3008T	①TKY08D	SUFT10R○○
	SRFH12S12LW	●	1	12	12	160	11.5	70	15	1	RS3510T	①TKY10D	SUFT12R○○
	SRFH16S16LW	●	1	16	16	160	15.5	70	20	1	RS4015T	②TKY15T	SUFT16R○○
	SRFH20S20LW	●	1	20	20	250	19.5	150	24	1	RS5020T	②TKY20T	SUFT20R○○
	SRFH25S25LW	●	1	25	25	300	24.5	200	30	1	RS6025T	②TKY25T	SUFT25R○○
	SRFH30S32LW	●	1	30	32	350	29.5	250	35	1	RS8030T	②TKY30T	SUFT30R○○
				32	32	351	29.5	251	36				SUFT32R○○

(Note 1) SRFH30S32MW and SRFH30S32LW tool body can use both inserts SUFT30R○○ and SUFT32R○○.
However, the overall length size LF is different respectively.

∗ Clamp Torque (N • m) : RS3008T=1.5, RS3510T=2.5, RS4015T=3.3, RS5020T=5.0, RS6025T=7.5, RS8030T=10.0





SCREW-IN TYPE

Right hand tool holder only.

Order Number	Stock R	Coolant Hole	Number of Teeth	Dimensions (mm) DC	DCON	DCSFMS	OAL	LF	L11	H	CRKS	WT*2 (kg)	Clamp Screw *1	Wrench	Insert
SRFH16AM0830	●	○	1	16	8.5	14.9	48	30	6	10	8	0.1	RS4015T	TKY15T	SUFT16R○○
SRFH20AM1035	●	○	1	20	10.5	18.4	54	35	6	14	10	0.1	RS5020T	TKY20T	SUFT20R○○
SRFH25AM1240	●	○	1	25	12.5	23.5	62	40	6	19	12	0.1	RS6025T	TKY25T	SUFT25R○○
SRFH30AM1645	●	○	1	30	17	28.1	68	45	6	24	16	0.2	RS8030T	TKY30T	SUFT30R○○
				32	17	28.1	69	46	6	24	16				SUFT32R○○

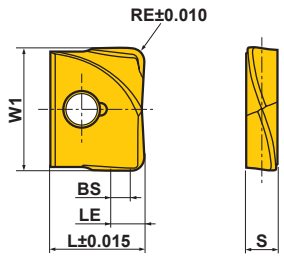
(Note 1) SRFH30AM1645 tool body can use both inserts SUFT30R○○ and SUFT32R○○.
However, the overall length size OAL is different respectively.

∗1 Clamp Torque (N • m) : RS4015T=3.3, RS5020T=5.0, RS6025T=7.5, RS8030T=10.0

∗2 WT : Tool Weight

SUF

INSERTS

Shape	Order Number	Coated				Dimensions (mm)						Geometry
		MP8010	VP15TF			W1	RE	BS	LE	L	S	
	SUFT10R05	●	●			10	0.5	1	1.5	8.5	2.6	
	SUFT10R10	●	●			10	1	1	2	8.5	2.6	
	SUFT10R20	●	●			10	2	1	3	8.5	2.6	
	SUFT12R05	●	●			12	0.5	1.2	1.7	10	3	
	SUFT12R10	●	●			12	1	1.2	2.2	10	3	
	SUFT12R20	●	●			12	2	1.2	3.2	10	3	
	SUFT12R30	●	●			12	3	1.2	4.2	10	3	
	SUFT16R05	●	●			16	0.5	1.6	2.1	12	4	
	SUFT16R10	●	●			16	1	1.6	2.6	12	4	
	SUFT16R15	●	●			16	1.5	1.6	3.1	12	4	
	SUFT16R20	●	●			16	2	1.6	3.6	12	4	
	SUFT16R30	●	●			16	3	1.6	4.6	12	4	
	SUFT20R05	●	●			20	0.5	2	2.5	15	5	
	SUFT20R10	●	●			20	1	2	3	15	5	
	SUFT20R15	●	●			20	1.5	2	3.5	15	5	
	SUFT20R20	●	●			20	2	2	4	15	5	
	SUFT20R30	●	●			20	3	2	5	15	5	
	SUFT25R05	●	●			25	0.5	2.5	3	18.5	6	
	SUFT25R10	●	●			25	1	2.5	3.5	18.5	6	
	SUFT25R20	●	●			25	2	2.5	4.5	18.5	6	
	SUFT25R30	●	●			25	3	2.5	5.5	18.5	6	
	SUFT30R05	●	●			30	0.5	3	3.5	22.5	7	
	SUFT30R10	●	●			30	1	3	4	22.5	7	
	SUFT30R20	●	●			30	2	3	5	22.5	7	
	SUFT30R30	●	●			30	3	3	6	22.5	7	
	SUFT32R05	●	●			32	0.5	3.2	3.7	23.5	7	
	SUFT32R10	●	●			32	1	3.2	4.2	23.5	7	
	SUFT32R20	●	●			32	2	3.2	5.2	23.5	7	

● : Inventory maintained in Japan. (2 inserts in one case)

FITTING INSERTS ON HOLDERS

1. Clean the insert seat

Clean the insert seat in the holder body by blowing air or using a brush.

2. Fit the insert

Place the concave mark of the insert into the clamp-screw-fastening part of the holder(only SRF type inserts). Fasten the clamp screw while firmly pressing the insert against the insert seat wall. You are recommended to use the special lubricant for preventing screw seizing, MK1KS, and to fasten with recommended torque.

SUF

RECOMMENDED CUTTING CONDITIONS

SHOULDER MILLING(When small width of cut.*)

	Work Material	Hardness	Grade	Cutting Speed **vc** (m/min)	Depth of Cut **ap** (mm)	Cutting Width **ae** (mm)	Feed per Tooth **fz** (mm/t.)
P	Carbon Steel Alloy Steel	180—280HB	**VP15TF**	200 (80—300)	≤0.05DC	≤0.05DC	0.2 (≤0.4)
P	Pre-Hardened Steel	≤45HRC	**VP15TF**	150 (80—200)	≤0.05DC	≤0.05DC	0.15 (≤0.3)
P	Alloy Tool Steel	180—380HB	**VP15TF**	150 (80—200)	≤0.05DC	≤0.05DC	0.15 (≤0.3)
M	Stainless Steel	≤270HB	**VP15TF**	150 (100—200)	≤0.05DC	≤0.05DC	0.2 (≤0.4)
K	Gray Cast Iron	Tensile Strength ≤350MPa	**MP8010**	250 (180—450)	≤0.05DC	≤0.1DC	0.3 (≤0.4)
K	Ductile Cast Iron	Tensile Strength ≤800MPa	**MP8010**	200 (80—300)	≤0.05DC	≤0.1DC	0.3 (≤0.4)
H	Hardened Steel	45—55HRC	**MP8010**	100 (80—120)	≤0.05DC	≤0.02DC	0.1 (≤0.2)
H	Hardened Steel	55—65HRC	**MP8010**	80 (60—100)	≤0.05DC	≤0.02DC	0.1 (≤0.2)

* When the pick feed direction is along the axis of the tool such as finish machining at the wall part.

SLOTTING•SHOULDER MILLING(When large width of cut.*)

	Work Material	Hardness	Grade	Cutting Speed **vc** (m/min)	Depth of Cut **ap** (mm)	Cutting Width **ae** (mm)	Feed per Tooth **fz** (mm/t.)
P	Carbon Steel Alloy Steel	180—280HB	**VP15TF**	200 (80—300)	≤0.02DC	≤DC	0.2 (≤0.4)
P	Pre-Hardened Steel	≤45HRC	**VP15TF**	150 (80—200)	≤0.02DC	≤DC	0.15 (≤0.3)
P	Alloy Tool Steel	180—380HB	**VP15TF**	150 (80—200)	≤0.02DC	≤DC	0.15 (≤0.3)
M	Stainless Steel	≤270HB	**VP15TF**	150 (100—200)	≤0.02DC	≤DC	0.2 (≤0.4)
K	Gray Cast Iron	Tensile Strength ≤350MPa	**MP8010**	250 (180—450)	≤0.03DC	≤DC	0.3 (≤0.4)
K	Ductile Cast Iron	Tensile Strength ≤800MPa	**MP8010**	200 (80—300)	≤0.03DC	≤DC	0.3 (≤0.4)
H	Hardened Steel	45—55HRC	**MP8010**	100 (80—120)	≤0.01DC	≤DC	0.1 (≤0.2)
H	Hardened Steel	55—65HRC	**MP8010**	70 (60—80)	≤0.01DC	≤DC	0.1 (≤0.2)

* When the pick feed direction is along the axis of the tool such as finish machining at the wall part.

(Note 1) This cutting condition is the standard condition when using the steel standard shank type. If it is occurred vibration or chipping on the cutting edge, please decrease the cutting condition as width of cut, depth of cut and feed per tooth depending on the situation.

(Note 2) The value of cutting speed is stood at the peripheral diameter of the tool. Please calculate the spindle speed of tool in the following expressions.

Spindle speed of cutting tool n(min^{-1})=1000×Cutting speed vc ÷Diameter of cutting tool DC÷3.14

(Note 3) Please note the following when machining hardened steel with MP8010.

- Please shorten the overhang length as much as possible.
- Use with carbide shank recommended.
- Please note the setting of the depth of cut especially to prevent the fracture.

SRM2

BALL NOSE END MILL

Product Information

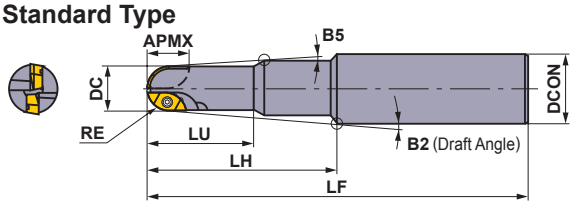
R KAPR

Work Material

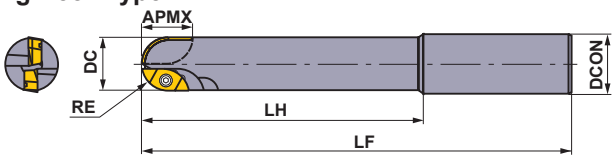
P M K H R

SYMBOL DESCRIPTIONS >> 1350
TECHNICAL DATA >> 1987
ISO13399 Property >> 1966

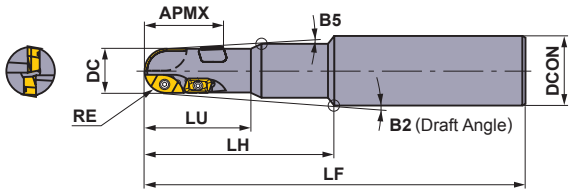
Standard Type



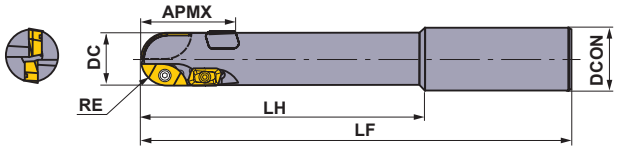
Long Neck Type



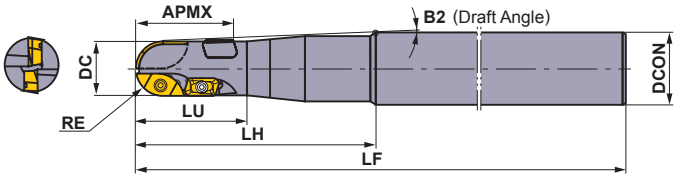
Long Cutting Edge Type



Long Neck Cutting Edge Type



Extra Long Cutting Edge Type



Right hand tool holder only.

Type	Order Number	Stock R	Coolant Hole	Number of Teeth	Dimensions (mm) RE	DC	DCON	LF	LH	LU	APMX	B2	B5	Clamp Screw Inner, Outer *	Clamp Screw Peripheral *	Wrench Inner, Outer ①	Wrench Peripheral ② ③	Insert Inner	Insert Outer	Insert Peripheral
Standard	SRM2160SNM	●	–	2	8	16	20	130	50	25	12	2°48′	1°30′	TS25H	–	①TKY08D	–	SRG16C SRM16C-M	SRG16E SRM16E-M	–
	SRM2160SAM	●	○	2	8	16	20	130	50	25	12	2°48′	1°30′	TS25H	–	①TKY08D	–	SRG16C SRM16C-M	SRG16E SRM16E-M	–
	SRM2200SNM	●	–	2	10	20	25	150	70	35	14	2°27′	1°30′	TS32	–	①TKY08D	–	SRG20C SRM20C-M	SRG20E SRM20E-M	–
	SRM2200SAM	●	○	2	10	20	25	150	70	35	14	2°27′	1°30′	TS32	–	①TKY08D	–	SRG20C SRM20C-M	SRG20E SRM20E-M	–
	SRM2250SNM	●	–	2	12.5	25	32	180	80	40	19	3°13′	1°30′	TS43	–	②TKY15T	–	SRG25C SRM25C-M	SRG25E SRM25E-M	–
	SRM2250SAM	●	○	2	12.5	25	32	180	80	40	19	3°13′	1°30′	TS43	–	②TKY15T	–	SRG25C SRM25C-M	SRG25E SRM25E-M	–
	SRM2300SNM	●	–	2	15	30	32	200	100	50	24	0°44′	0°30′	TS55	–	②TKY25T	–	SRG30C SRM30C-M	SRG30E SRM30E-M	–
	SRM2300SAM	●	○	2	15	30	32	200	100	50	24	0°44′	0°30′	TS55	–	②TKY25T	–	SRG30C SRM30C-M	SRG30E SRM30E-M	–
Long Cutting Edge	SRM2200SNL	●	–	4	10	20	25	150	70	35	30	2°27′	1°30′	TS32	TS25	①TKY08D	①TKY08D	SRG20C SRM20C-M	SRG20E SRM20E-M	APMT1135 PDER-○2
	SRM2200SAL	●	○	4	10	20	25	150	70	35	30	2°27′	1°30′	TS32	TS25	①TKY08D	①TKY08D	SRG20C SRM20C-M	SRG20E SRM20E-M	APMT1135 PDER-○2
	SRM2250SNL	●	–	4	12.5	25	32	180	80	40	37	3°13′	1°30′	TS43	TS25	②TKY15T	③TKY08F	SRG25C SRM25C-M	SRG25E SRM25E-M	APMT1135 PDER-○2
	SRM2250SAL	●	○	4	12.5	25	32	180	80	40	37	3°13′	1°30′	TS43	TS25	②TKY15T	③TKY08F	SRG25C SRM25C-M	SRG25E SRM25E-M	APMT1135 PDER-○2
	SRM2300SNL	●	–	4	15	30	32	200	100	50	44	0°44′	0°30′	TS55	TS43	②TKY25T	③TKY15F	SRG30C SRM30C-M	SRG30E SRM30E-M	APMT1604 PDER-○2
	SRM2300SAL	●	○	4	15	30	32	200	100	50	44	0°44′	0°30′	TS55	TS43	②TKY25T	③TKY15F	SRG30C SRM30C-M	SRG30E SRM30E-M	APMT1604 PDER-○2

* Clamp Torque (N • m) : TS25H=1.7, TS25=2.0, TS32=2.0, TS43=6.0, TS55=7.5

● : **Inventory maintained in Japan.**

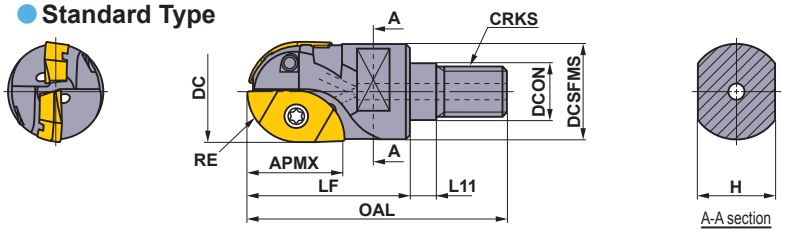
SRM2

Type	Order Number	Stock R	Coolant Hole	Number of Teeth	Dimensions (mm) RE	DC	DCON	LF	LH	LU	APMX	B2	B5	Clamp Screw Inner, Outer	Clamp Screw Peripheral	Wrench Inner, Outer	Wrench Peripheral	Insert Inner	Insert Outer	Insert Peripheral
Long Neck	**SRM2160SNF**	●	–	2	8	16	16	150	70	–	12	–	–	TS25H	–	①TKY08D	–	SRG16C SRM16C-M	SRG16E SRM16E-M	–
	SRM2160SAF	●	○	2	8	16	16	150	70	–	12	–	–	TS25H	–	①TKY08D	–	SRG16C SRM16C-M	SRG16E SRM16E-M	–
	SRM2200SNF	●	–	2	10	20	20	180	100	–	14	–	–	TS32	–	①TKY08D	–	SRG20C SRM20C-M	SRG20E SRM20E-M	–
	SRM2200SAF	●	○	2	10	20	20	180	100	–	14	–	–	TS32	–	①TKY08D	–	SRG20C SRM20C-M	SRG20E SRM20E-M	–
	SRM2250SNF	●	–	2	12.5	25	25	200	120	–	19	–	–	TS43	–	②TKY15T	–	SRG25C SRM25C-M	SRG25E SRM25E-M	–
	SRM2250SAF	●	○	2	12.5	25	25	200	120	–	19	–	–	TS43	–	②TKY15T	–	SRG25C SRM25C-M	SRG25E SRM25E-M	–
	SRM2300SNF	●	–	2	15	30	32	230	150	–	24	–	–	TS55	–	②TKY25T	–	SRG30C SRM30C-M	SRG30E SRM30E-M	–
	SRM2300SAF	●	○	2	15	30	32	230	150	–	24	–	–	TS55	–	②TKY25T	–	SRG30C SRM30C-M	SRG30E SRM30E-M	–
Long Neck Cutting Edge	**SRM2200SNLF**	●	–	4	10	20	20	180	100	–	30	–	–	TS32	TS25	①TKY08D	①TKY08D	SRG20C SRM20C-M	SRG20E SRM20E-M	APMT1135 PDER-○2
	SRM2200SALF	●	○	4	10	20	20	180	100	–	30	–	–	TS32	TS25	①TKY08D	①TKY08D	SRG20C SRM20C-M	SRG20E SRM20E-M	APMT1135 PDER-○2
	SRM2250SNLF	●	–	4	12.5	25	25	200	120	–	37	–	–	TS43	TS25	②TKY15T	③TKY08F	SRG25C SRM25C-M	SRG25E SRM25E-M	APMT1135 PDER-○2
	SRM2250SALF	●	○	4	12.5	25	25	200	120	–	37	–	–	TS43	TS25	②TKY15T	③TKY08F	SRG25C SRM25C-M	SRG25E SRM25E-M	APMT1135 PDER-○2
	SRM2300SNLF	●	–	4	15	30	32	230	150	–	44	–	–	TS55	TS43	②TKY25T	③TKY15F	SRG30C SRM30C-M	SRG30E SRM30E-M	APMT1604 PDER-○2
	SRM2300SALF	●	○	4	15	30	32	230	150	–	44	–	–	TS55	TS43	②TKY25T	③TKY15F	SRG30C SRM30C-M	SRG30E SRM30E-M	APMT1604 PDER-○2
Extra Long Cutting Edge	**SRM2200SNLL**	●	–	4	10	20	25	250	120	35	30	1°30′	–	TS32	TS25	①TKY08D	①TKY08D	SRG20C SRM20C-M	SRG20E SRM20E-M	APMT1135 PDER-○2
	SRM2200SALL	●	○	4	10	20	25	250	120	35	30	1°30′	–	TS32	TS25	①TKY08D	①TKY08D	SRG20C SRM20C-M	SRG20E SRM20E-M	APMT1135 PDER-○2
	SRM2250SNLL	●	–	4	12.5	25	32	300	170	37	37	1°30′	–	TS43	TS25	②TKY15T	③TKY08F	SRG25C SRM25C-M	SRG25E SRM25E-M	APMT1135 PDER-○2
	SRM2250SALL	●	○	4	12.5	25	32	300	170	37	37	1°30′	–	TS43	TS25	②TKY15T	③TKY08F	SRG25C SRM25C-M	SRG25E SRM25E-M	APMT1135 PDER-○2
	SRM2300SNLL	●	–	4	15	30	32	350	100	50	44	1°30′	–	TS55	TS43	③TKY25T	③TKY15F	SRG30C SRM30C-M	SRG30E SRM30E-M	APMT1604 PDER-○2
	SRM2300SALL	●	○	4	15	30	32	350	100	50	44	1°30′	–	TS55	TS43	③TKY25T	③TKY15F	SRG30C SRM30C-M	SRG30E SRM30E-M	APMT1604 PDER-○2

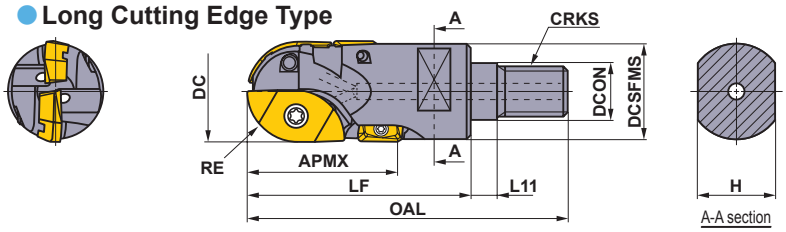
∗ Clamp Torque (N • m) : TS25H=1.7, TS25=2.0, TS32=2.0, TS43=6.0, TS55=7.5

SRM2

Standard Type



Long Cutting Edge Type



SCREW-IN TYPE

Right hand tool holder only.

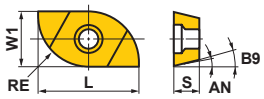
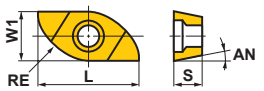
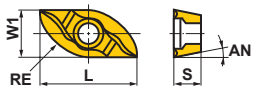
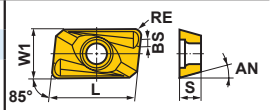
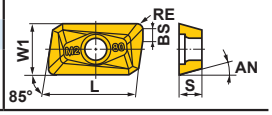
Type	Order Number	Stock R	Coolant Hole	RE	DC	DCON	DCSFMS	OAL	LF	L11	H	CRKS	APMX	*2 WT (kg)	*1 Inner, Outer Clamp Screw	*1 Peripheral Clamp Screw	Wrench	Inner Insert	Outer Insert	Peripheral Insert
Standard	SRM2160AM08S30	●	○	8	16	8.5	14.6	48	30	6	10	M8	12	0.1	TS25H	–	①TKY08D	SRG16C SRM16C-M	SRG16E SRM16E-M	–
Standard	SRM2200AM10S35	●	○	10	20	10.5	18.6	54	35	6	14	M10	14	0.1	TS32	–	①TKY08D	SRG20C SRM20C-M	SRG20E SRM20E-M	–
Standard	SRM2250AM12S40	●	○	12.5	25	12.5	23.5	62	40	6	19	M12	19	0.2	TS43	–	②TKY15T	SRG25C SRM25C-M	SRG25E SRM25E-M	–
Standard	SRM2300AM16S45	●	○	15	30	17	28.3	68	45	6	24	M16	24	0.2	TS55	–	②TKY25T	SRG30C SRM30C-M	SRG30E SRM30E-M	–
Standard	SRM2320AM16S45	●	○	16	32	17	30.0	68	45	6	24	M16	28	0.2	TS55	–	②TKY25T	SRG32C SRM32C-M	SRG32E SRM32E-M	–
Long Cutting Edge	SRM2200AM10L45	●	○	10	20	10.5	18.6	64	45	6	14	M10	30	0.2	TS32	TS25	①TKY08D	SRG20C SRM20C-M	SRG20E SRM20E-M	APMT1135 PDER-□2
Long Cutting Edge	SRM2250AM12L55	●	○	12.5	25	12.5	23.5	77	55	6	19	M12	37	0.3	TS43	TS25	②TKY15T ③TKY08F	SRG25C SRM25C-M	SRG25E SRM25E-M	APMT1135 PDER-□2
Long Cutting Edge	SRM2300AM16L60	●	○	15	30	17	28.3	83	60	6	24	M16	44	0.3	TS55	TS43	②TKY25T ③TKY15F	SRG30C SRM30C-M	SRG30E SRM30E-M	APMT1604 PDER-□2
Long Cutting Edge	SRM2320AM16L60	●	○	16	32	17	29.0	83	60	6	24	M16	44	0.3	TS55	TS43	②TKY25T ③TKY15F	SRG32C SRM32C-M	SRG32E SRM32E-M	APMT1604 PDER-□2

*1 Clamp Torque (N • m) : TS25H=1.7, TS25=2.0, TS32=2.0, TS43=6.0, TS55=7.5
*2 WT : Tool Weight

● : Inventory maintained in Japan.

SRM2

INSERTS

Type	Shape	Order Number	Class	Coated F7030	Coated MP6120	Coated MP9120	Coated VP15TF	Coated VP20RT	Coated VP30RT	Dimensions (mm) RE	L	W1	S	BS	AN	B9	Geometry
Inner	Strong Cutting Edge Type	SRG16C	G		●	●	●			8	16	8.2	3.5	—	11°	—	
		SRG20C	G		●	●	●			10	19	10.2	4.6	—	10°	18°	
		SRG25C	G		●	●	●			12.5	24	12.8	5.5	—	10°	18°	
		SRG30C	G		●	●	●			15	28	15.3	7	—	10°	18°	
		SRG32C	G		●	●	●			16	28	16.3	7	—	10°	18°	
Outer	Strong Cutting Edge Type	SRG16E	G		●	●	●			8	13.5	6.7	3.5	—	11°	—	
		SRG20E	G		●	●	●			10	15.5	8.5	4.6	—	9°	—	
		SRG25E	G		●	●	●			12.5	20.5	10.2	5.5	—	9°	—	
		SRG30E	G		●	●	●			15	25.2	12.2	7	—	9°	—	
		SRG32E	G		●	●	●			16	26.1	13.1	7	—	9°	—	
Inner	Low Resistance Type	SRM16C-M	M		●	●	●			8	16	8.2	3.5	—	11°	—	
		SRM20C-M	M		●	●	●			10	19	10.2	4.6	—	10°	18°	
		SRM25C-M	M		●	●	●			12.5	24	12.8	5.5	—	10°	18°	
		SRM30C-M	M		●	●	●			15	28	15.3	7	—	10°	18°	
		SRM32C-M	M		●	●	●			16	28	16.3	7	—	10°	18°	
Outer	Low Resistance Type	SRM16E-M	M		●	●	●			8	13.5	6.7	3.5	—	11°	—	
		SRM20E-M	M		●	●	●			10	15.5	8.5	4.6	—	9°	—	
		SRM25E-M	M		●	●	●			12.5	20.5	10.2	5.5	—	9°	—	
		SRM30E-M	M		●	●	●			15	25.2	12.2	7	—	9°	—	
		SRM32E-M	M		●	●	●			16	26.1	13.1	7	—	9°	—	
Peripheral *1	Strong Cutting Edge Type	APMT1135PDER-H2	M	●			●			0.8	11	6.35	3.5	1.2	11°	—	
		APMT1604PDER-H2	M	●			●			0.8	16.5	9.525	4.76	1.4	11°	—	
Peripheral	Low Resistance Type	APMT1135PDER-M2	M	●			●			0.8	11	6.35	3.5	1.2	11°	—	
		APMT1604PDER-M2	M	●			●			0.8	16.5	9.525	4.76	1.4	11°	—	

(Low-resistance inner or outer inserts are precision M class type.)

*1 Selection guide for peripheral cutting edges : The first recommendation is the super sharp M breaker (APMT....PDER-M2).
When cutting edge strength is particularly important, use the H breaker (APMT....PDER-H2).

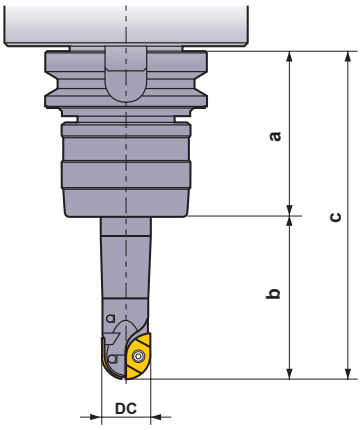
■ = MIRACLE SIGMA

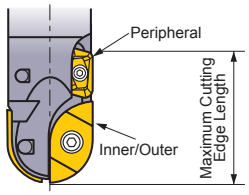
● : Inventory maintained in Japan. (10 inserts in one case)

SRM2

RECOMMENDED CUTTING CONDITIONS

SRM2 Ø16—Ø32





(Long Cutting Edge)

Tool Overhang

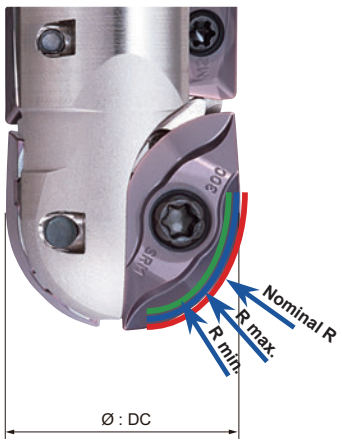
The recommended cutting conditions are chosen based on deflection, vibration and surface finish when using a BT50 arbor under the conditions below -**"a"**, a length from a gauge line to the arbor end face and **"b"**, neck length (tool overhang from the arbor).

Cutting Edge Diameter:DC	Type	a	b	c
16	Standard	105	50	155
	Long Neck		70	175
	Extra Long		—	—
20	Standard		70	175
	Long Neck		100	205
	Extra Long		150	255
25	Standard		80	185
	Long Neck		120	225
	Extra Long		200	305
30	Standard		100	205
	Long Neck		150	255
	Extra Long		250	355

Recommended Depth of Cut for Long Cutting Edge Type

The maximum cutting edge length of the long cutting edge type with a peripheral insert is 1.4-1.5DC. The peripheral insert's main purpose is to remove the small un-machined portions of the pre-machined surface above the main cutting edge. Recommended depth of cut: **Maximum ap** is 0.5DC or below.

Radius tolerance and other dimensions with an insert mounted in the body



Radial tolerance

	Nominal R	Tolerance	R min.	R max.
16	8	G	7.925	7.975
		M	7.910	7.970
20	10	G	9.925	9.975
		M	9.910	9.970
25	12.5	G	12.425	12.475
		M	12.410	12.470
30	15	G	14.925	14.975
		M	14.910	14.970

Dimensions with an insert mounted in the body

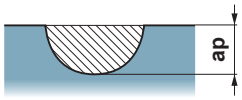
	Tolerance	DC min.	DC max.
16	G	15.800	16.000
	M	15.770	15.990
20	G	19.800	20.000
	M	19.770	19.990
25	G	24.800	25.000
	M	24.770	24.990
30	G	29.800	30.000
	M	29.770	29.990

*M : Precision M class

SRM2

SLOT MILLING

Cutting Mode



N : Revolution (min^{-1})
F : Table Feed (mm/min)

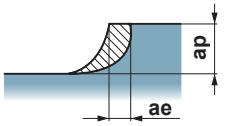
	Work Material	Hardness	Cutting Speed (m/min)	Insert Grade, Type	Holder Type	ϕ16			ϕ20			ϕ25			ϕ30		
						N	F	ap	N	F	ap	N	F	ap	N	F	ap
P	Carbon Steel Alloy Steel	180–280HB	160 (120–200)	**MP6120 VP15TF** Low Resistance Type	Standard	3183	382	6	2546	306	8	2037	489	12.5	1698	407	15
					Long Neck	3183	382	4	2546	306	4	2037	489	6	1698	407	7.5
					Extra Long	—	—	—	2546	306	2	2037	489	4	1698	407	3
		280–350HB	140 (120–160)	**MP6120 VP15TF** Low Resistance Type	Standard	2785	334	6	2228	267	8	1783	428	12.5	1485	357	15
					Long Neck	2785	334	4	2228	267	4	1783	428	6	1485	357	7.5
					Extra Long	—	—	—	2228	267	2	1783	428	4	1485	357	3
	Pre-Hardened Steel	35–45HRC	120 (100–160)	**MP6120 VP15TF** Low Resistance Type	Standard	2387	286	6	1910	229	8	1528	367	12.5	1273	306	15
					Long Neck	2387	286	4	1910	229	4	1528	367	6	1273	306	7.5
					Extra Long	—	—	—	1910	229	2	1528	367	4	1273	306	3
	Alloy Tool Steel	≤350HB	140 (120–160)	**MP6120 VP15TF** Low Resistance Type	Standard	2785	334	6	2228	267	8	1783	535	10	1485	594	12
					Long Neck	2785	334	4	2228	267	4	1783	535	5	1485	594	4.5
					Extra Long	—	—	—	2228	267	2	1783	535	2.5	1485	594	1.5
M	Stainless Steel	≤270HB	200 (100–250)	**VP15TF** Low Resistance Type	Standard	3979	477	4	3183	382	5	2546	764	6	2122	849	7.5
					Long Neck	3979	477	3	3183	382	3	2546	611	4	2122	637	4.5
					Extra Long	—	—	—	3183	382	1.5	2546	509	1.5	2122	509	1.5
K	Gray Cast Iron	≤350MPa	200 (150–300)	**VP15TF** Low Resistance Type	Standard	3979	796	6	3183	637	8	2546	1019	12.5	2122	849	15
					Long Neck	3979	796	4	3183	637	4	2546	1019	7.5	2122	849	4.5
					Extra Long	—	—	—	3183	637	2	2546	1019	4	2122	849	3
	Ductile Cast Iron	≤500MPa	180 (150–240)	**VP15TF** Low Resistance Type	Standard	3581	716	6	2865	573	8	2292	917	12.5	1910	764	15
					Long Neck	3581	716	4	2865	573	4	2292	917	7.5	1910	764	4.5
					Extra Long	—	—	—	2865	573	2	2292	917	4	1910	764	1.5
	Ductile Cast Iron	≤800MPa	160 (150–250)	**VP15TF** Low Resistance Type	Standard	3183	637	6	2546	509	8	2037	815	12.5	1698	679	15
					Long Neck	3183	637	4	2546	509	4	2037	815	7.5	1698	679	4.5
					Extra Long	—	—	—	2546	509	2	2037	815	4	1698	679	1.5
H	Hardened Steel	45–50HRC	100 (60–120)	**VP15TF** Strong Cutting Edge Type	Standard	1989	239	4	1591	191	4	1273	255	6	1061	212	7.5
					Long Neck	1989	239	2	1591	191	2	1273	255	4	1061	212	3
					Extra Long	—	—	—	1591	191	1	1273	255	2.5	1061	212	1.5
	Hardened Steel	50–60HRC	60 (40–100)	**VP15TF** Strong Cutting Edge Type	Standard	1194	143	4	955	115	4	764	153	6	637	127	7.5
					Long Neck	1194	143	2	955	115	2	764	153	4	637	127	3
					Extra Long	—	—	—	955	115	1	764	153	2.5	637	127	1.5
S	Titanium Alloy	≤350HB	50 (30-60)	**MP9120**	Standard	995	100	4	796	80	4	637	64	6	531	53	7.5
					Long Neck	995	100	2	796	80	2	637	64	4	531	53	3
					Extra Long	—	—	—	796	80	1	637	64	2.5	531	53	1.5
	Heat-resistant Alloy	—	50 (30-60)	**MP9120**	Standard	995	100	4	796	80	4	637	64	6	531	53	7.5
					Long Neck	995	100	2	796	80	2	637	64	4	531	53	3
					Extra Long	—	—	—	796	80	1	637	64	2.5	531	53	1.5

SRM2

RECOMMENDED CUTTING CONDITIONS

SHOULDER MILLING (Cutting Depth : Small)

Cutting Mode



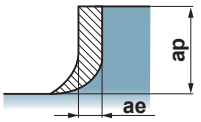
N : Revolution (min-1)
F : Table Feed (mm/min)

	Work Material	Hardness	Cutting Speed (m/min)	Insert Grade, Type	Holder Type	ϕ16				ϕ20				ϕ25				ϕ30			
						N	F	ap	ae	N	F	ap	ae	N	F	ap	ae	N	F	ap	ae
P	Carbon Steel Alloy Steel	180–280HB	200 (160–250)	**MP6120 VP15TF** Low Resistance Type	Standard	3979	796	4	6	3183	955	5	8	2546	1273	6	10	2122	1273	7.5	10
					Long Neck	3979	637	4	4	3183	637	5	6	2546	1273	6	7.5	2122	1273	7.5	7.5
					Extra Long	—	—	—	—	3183	382	5	4	2546	1019	6	5	2122	637	7.5	3
		280–350HB	160 (120–200)	**MP6120 VP15TF** Low Resistance Type	Standard	3183	509	4	6	2546	509	5	8	2037	815	6	10	1698	849	7.5	10
					Long Neck	3183	382	4	4	2546	407	5	6	2037	611	6	7.5	1698	509	7.5	7.5
					Extra Long	—	—	—	—	2546	306	5	4	2037	489	6	5	1698	407	7.5	3
	Pre-Hardened Steel	35–45HRC	160 (120–200)	**MP6120 VP15TF** Low Resistance Type	Standard	3183	509	4	6	2546	509	5	8	2037	815	6	10	1698	849	7.5	10
					Long Neck	3183	382	4	4	2546	407	5	6	2037	611	6	7.5	1698	679	7.5	7.5
					Extra Long	—	—	—	—	2546	306	5	4	2037	489	6	5	1698	509	7.5	3
	Alloy Tool Steel	≤350HB	160 (120–200)	**MP6120 VP15TF** Low Resistance Type	Standard	3183	509	4	6	2546	509	5	8	2037	815	6	10	1698	849	7.5	10
					Long Neck	3183	382	4	4	2546	407	5	6	2037	611	6	7.5	1698	509	7.5	7.5
					Extra Long	—	—	—	—	2546	306	5	4	2037	489	6	2.5	1698	407	7.5	1.5
M	Stainless Steel	≤270HB	200 (100–250)	**VP15TF** Low Resistance Type	Standard	3979	477	4	6	3183	509	5	8	2546	764	6	10	2122	849	7.5	10
					Long Neck	3979	477	4	4	3183	382	5	6	2546	611	6	7.5	2122	849	7.5	7.5
					Extra Long	—	—	—	—	3183	382	5	4	2546	509	6	5	2122	424	7.5	1.5
K	Gray Cast Iron	≤350MPa	200 (150–300)	**VP15TF** Low Resistance Type	Standard	3979	1592	4	8	3183	1592	5	10	2546	1528	6	10	2122	1485	7.5	10
					Long Neck	3979	1194	4	6	3183	1273	5	8	2546	1528	6	10	2122	1485	7.5	6
					Extra Long	—	—	—	—	3183	955	5	6	2546	1273	6	7.5	2122	1061	7.5	3
	Ductile Cast Iron	≤500MPa	200 (150–280)	**VP15TF** Low Resistance Type	Standard	3979	1592	4	8	3183	1592	5	10	2546	1528	6	10	2122	1273	7.5	10
					Long Neck	3979	1194	4	6	3183	1273	5	8	2546	1528	6	10	2122	1273	7.5	6
					Extra Long	—	—	—	—	3183	955	5	6	2546	1273	6	7.5	2122	1061	7.5	3
	Ductile Cast Iron	≤800MPa	180 (150–250)	**VP15TF** Low Resistance Type	Standard	3581	1432	4	8	2865	1433	5	10	2292	1375	6	10	1910	1146	7.5	10
					Long Neck	3581	1074	4	6	2865	1146	5	8	2292	1375	6	10	1910	1146	7.5	6
					Extra Long	—	—	—	—	2865	860	5	6	2292	1146	6	7.5	1910	955	7.5	3
H	Hardened Steel	45–50HRC	100 (60–120)	**VP15TF** Strong Cutting Edge Type	Standard	1989	239	4	4	1591	191	5	5	1273	255	6	7.5	1061	212	7.5	3
					Long Neck	1989	239	4	2	1591	191	5	3	1273	255	6	4	1061	212	7.5	1.5
					Extra Long	—	—	—	—	1591	191	5	2	1273	204	6	1.5	1061	170	7.5	1
	Hardened Steel	50–60HRC	60 (40–100)	**VP15TF** Strong Cutting Edge Type	Standard	1194	143	4	4	955	115	5	5	764	153	6	7.5	637	127	7.5	3
					Long Neck	1194	143	4	2	955	115	5	3	764	153	6	4	637	127	7.5	1.5
					Extra Long	—	—	—	—	955	115	5	2	764	122	6	1.5	637	102	7.5	1
S	Titanium Alloy	≤350HB	50 (30-60)	**MP9120**	Standard	995	299	4	4	796	239	4	5	637	191	6	7.5	531	159	7.5	3
					Long Neck	995	299	2	2	796	239	2	3	637	191	4	4	531	159	3	1.5
					Extra Long	—	—	—	—	796	239	1	2	637	191	2.5	1.5	531	159	1.5	1
	Heat-resistant Alloy	—	50 (30-60)	**MP9120**	Standard	995	299	4	4	796	239	4	5	637	191	6	7.5	531	159	7.5	3
					Long Neck	995	299	2	2	796	239	2	3	637	191	4	4	531	159	3	1.5
					Extra Long	—	—	—	—	796	239	1	2	637	191	2.5	1.5	531	159	1.5	1

SRM2

SHOULDER MILLING (Cutting Depth : Large)

Cutting Mode



N : Revolution (min^{-1})
F : Table Feed (mm/min)

(Note) Machining Stainless Steels

When up-cut milling stainless steels at large depths and widths of cut, the machined surface is liable to burrs and welding due to chip jamming. For stainless steels, down-cutting (climb milling) is recommended.

	Work Material	Hardness	Cutting Speed (m/min)	Insert Grade, Type	Holder Type	ϕ16				ϕ20				ϕ25				ϕ30			
						N	F	ap	ae	N	F	ap	ae	N	F	ap	ae	N	F	ap	ae
P	Carbon Steel Alloy Steel	180–280HB	200 (160–250)	MP6120 VP15TF Low Resistance Type	Standard	3979	637	8	4	3183	764	10	4	2546	1273	12.5	5	2122	1273	15	4.5
					Long Neck	3979	477	8	3	3183	509	10	3	2546	1019	12.5	4	2122	849	15	3
					Extra Long	—	—	—	—	3183	382	10	2	2546	764	12.5	2.5	2122	849	15	1.5
		280–350HB	160 (120–200)	MP6120 VP15TF Low Resistance Type	Standard	3183	382	8	4	2546	509	10	4	2037	815	12.5	5	1698	849	15	4.5
					Long Neck	3183	382	8	3	2546	306	10	3	2037	611	12.5	4	1698	509	15	3
					Extra Long	—	—	—	—	2546	306	10	2	2037	489	12.5	2.5	1698	407	15	1.5
	Pre-Hardened Steel	35–45HRC	160 (120–200)	MP6120 VP15TF Low Resistance Type	Standard	3183	382	8	4	2546	509	10	4	2037	815	12.5	5	1698	849	15	4.5
					Long Neck	3183	382	8	3	2546	306	10	3	2037	611	12.5	4	1698	509	15	3
					Extra Long	—	—	—	—	2546	306	10	2	2037	489	12.5	2.5	1698	407	15	1.5
	Alloy Tool Steel	≤350HB	160 (120–200)	MP6120 VP15TF Low Resistance Type	Standard	3183	382	8	4	2546	509	10	4	2037	815	12.5	5	1698	849	15	4.5
					Long Neck	3183	382	8	3	2546	306	10	3	2037	611	12.5	2.5	1698	509	15	3
					Extra Long	—	—	—	—	2546	306	10	2	2037	489	12.5	1.5	1698	407	15	1.5
M	Stainless Steel	≤270HB	200 (100–250)	VP15TF Low Resistance Type	Standard	3979	477	8	4	3183	509	10	4	2546	764	12.5	10	2122	849	15	10
					Long Neck	3979	477	8	3	3183	382	10	3	2546	611	12.5	4	2122	509	15	4.5
					Extra Long	—	—	—	—	3183	382	10	2	2546	489	12.5	1.5	2122	340	15	1.5
K	Gray Cast Iron	≤350MPa	200 (150–300)	VP15TF Low Resistance Type	Standard	3979	1194	8	8	3183	1273	10	8	2546	1273	12.5	10	2122	1485	15	10
					Long Neck	3979	955	8	5	3183	955	10	4	2546	1273	12.5	7.5	2122	1061	15	4.5
					Extra Long	—	—	—	—	3183	764	10	2	2546	1019	12.5	1.5	2122	849	15	3
	Ductile Cast Iron	≤500MPa	200 (150–280)	VP15TF Low Resistance Type	Standard	3979	1194	8	8	3183	1273	10	8	2546	1273	12.5	10	2122	1273	15	10
					Long Neck	3979	955	8	5	3183	955	10	4	2546	1273	12.5	7.5	2122	849	15	4.5
					Extra Long	—	—	—	—	3183	764	10	2	2546	1019	12.5	5	2122	849	15	1.5
	Ductile Cast Iron	≤800MPa	180 (150–250)	VP15TF Low Resistance Type	Standard	3581	1074	8	8	2865	1146	10	8	2292	1146	12.5	10	1910	1146	15	10
					Long Neck	3581	859	8	5	2865	860	10	4	2292	1146	12.5	7.5	1910	764	15	4.5
					Extra Long	—	—	—	—	2865	688	10	2	2292	917	12.5	5	1910	764	15	1.5
H	Hardened Steel	45–50HRC	100 (60–120)	VP15TF Strong Cutting Edge Type	Standard	1989	239	8	2	1591	191	10	3	1273	255	12.5	4	1061	212	15	3
					Long Neck	1989	239	8	1	1591	191	10	2	1273	204	12.5	1.5	1061	106	15	1.5
					Extra Long	—	—	—	—	1591	191	10	1	—	—	—	—	—	—	—	—
	Hardened Steel	50–60HRC	60 (40–100)	VP15TF Strong Cutting Edge Type	Standard	1194	143	8	2	955	115	10	3	764	153	12.5	4	637	127	15	3
					Long Neck	1194	143	8	1	955	115	10	2	764	122	12.5	1.5	637	64	15	1.5
					Extra Long	—	—	—	—	955	115	10	1	—	—	—	—	—	—	—	—
S	Titanium Alloy	≤350HB	50 (30-60)	MP9120	Standard	995	199	4	2	796	159	4	3	637	127	6	4	531	106	7.5	3
					Long Neck	995	199	2	1	796	159	2	2	637	127	4	1.5	531	106	3	1.5
					Extra Long	—	—	—	—	796	159	1	1	637	127	2.5	—	531	106	1.5	—
	Heat-resistant Alloy	—	50 (30-60)	MP9120	Standard	995	199	4	2	796	159	4	3	637	127	6	4	531	106	7.5	3
					Long Neck	995	199	2	1	796	159	2	2	637	127	4	1.5	531	106	3	1.5
					Extra Long	—	—	—	—	796	159	1	1	637	127	2.5	—	531	106	1.5	—

SRM2-40/50

BALL NOSE END MILL

Product Information

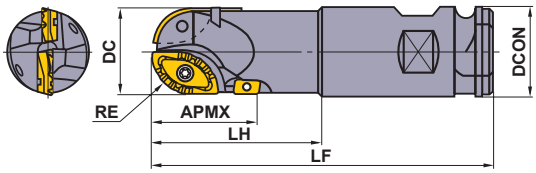
R KAPR

Work Material

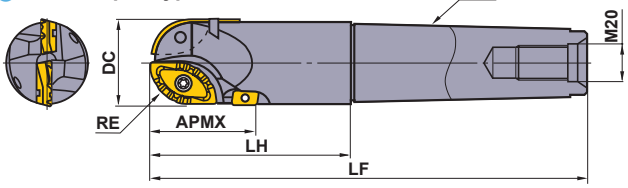
P K R

SYMBOL DESCRIPTIONS >> 1350
TECHNICAL DATA >> 1987
ISO13399 Property >> 1966

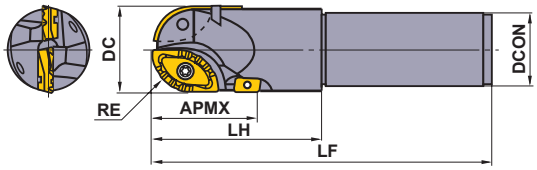
Combination Type



Morse Taper Type



Straight Type



Right hand tool holder only.

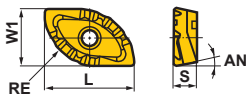
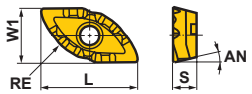
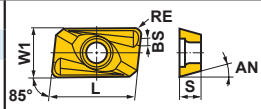
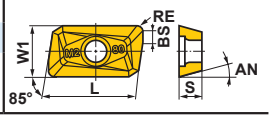
Type		Order Number	Stock R	Number of Flutes	Dimensions (mm) RE	DC	DCON	LF	LH	APMX	Clamp Screw Inner, Outer *	Clamp Screw Peripheral *	Wrench Inner, Outer	Wrench Peripheral	Insert Inner	Insert Outer	Insert Peripheral
Combination	Standard	SRM2400WNLS	●	2	20	40	50.8	200	120	54	TS6S	TS43	TKY30T	TKY15F	SRG40C	SRG40E	APMT1604 PDER-◌2
		SRM2500WNLS	●	2	25	50	50.8	200	120	63	TS6	TS43	TKY30T	TKY15F	SRG50C	SRG50E	APMT1604 PDER-◌2
	Long	SRM2400WNLM	●	2	20	40	50.8	250	170	54	TS6S	TS43	TKY30T	TKY15F	SRG40C	SRG40E	APMT1604 PDER-◌2
		SRM2500WNLM	●	2	25	50	50.8	250	170	63	TS6	TS43	TKY30T	TKY15F	SRG50C	SRG50E	APMT1604 PDER-◌2
	Extra Long	SRM2500WNLL	●	2	25	50	50.8	300	220	63	TS6	TS43	TKY30T	TKY15F	SRG50C	SRG50E	APMT1604 PDER-◌2
		SRM2500WNLX	●	2	25	50	50.8	350	270	63	TS6	TS43	TKY30T	TKY15F	SRG50C	SRG50E	APMT1604 PDER-◌2
Straight	Standard	SRM2400SNLS	●	2	20	40	42	200	100	54	TS6S	TS43	TKY30T	TKY15F	SRG40C	SRG40E	APMT1604 PDER-◌2
		SRM2500SNLS	●	2	25	50	42	200	100	63	TS6	TS43	TKY30T	TKY15F	SRG50C	SRG50E	APMT1604 PDER-◌2
	Long	SRM2400SNLM	●	2	20	40	42	250	150	54	TS6S	TS43	TKY30T	TKY15F	SRG40C	SRG40E	APMT1604 PDER-◌2
		SRM2500SNLM	●	2	25	50	42	250	100	63	TS6	TS43	TKY30T	TKY15F	SRG50C	SRG50E	APMT1604 PDER-◌2
Morse Taper	Standard	SRM2500MNLS	●	2	25	50	—	256	120	63	TS6	TS43	TKY30T	TKY15F	SRG50C	SRG50E	APMT1604 PDER-◌2
	Long	SRM2500MNLM	●	2	25	50	—	286	150	63	TS6	TS43	TKY30T	TKY15F	SRG50C	SRG50E	APMT1604 PDER-◌2

* Clamp Torque (N • m) : TS43=6.0, TS6=10.0, TS6S=8.5

● : **Inventory maintained in Japan.**

SRM2-40/50

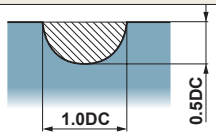
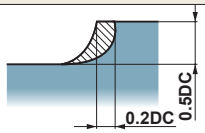
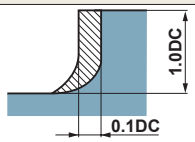
INSERTS

Type	Shape	Order Number	Class	Coated F7030	Coated MP6120	Coated MP9120	Coated VP15TF	Coated VP20RT	Coated VP30RT	Dimensions (mm) RE	L	W1	S	BS	AN	B9	Geometry
Inner		∗2 **SRG40C**	G				●	●	●	20	36	20.5	8.0	—	11°	—	
		∗2 **SRG50C**	G				●	●	●	25	40	26	8.5	—	11°	—	
Outer		∗2 **SRG40E**	G				●	●	●	20	32	16.6	8.0	—	11°	—	
		∗2 **SRG50E**	G				●	●	●	25	35.8	20	8.5	—	11°	—	
Peripheral ∗1	Strong Cutting Edge Type	**APMT1135PDER-H2**	M	●			●			0.8	11	6.35	3.5	1.2	11°	—	
		APMT1604PDER-H2	M	●			●			0.8	16.5	9.525	4.76	1.4	11°	—	
	Low Resistance Type	**APMT1135PDER-M2**	M	●			●			0.8	11	6.35	3.5	1.2	11°	—	
		APMT1604PDER-M2	M	●			●			0.8	16.5	9.525	4.76	1.4	11°	—	

(Low-resistance inner or outer inserts are precision M class type.)
∗1 Selection guide for peripheral cutting edges : The first recommendation is the super sharp M breaker (APMT....PDER-M2).
When cutting edge strength is particularly important, use the H breaker (APMT....PDER-H2).

● : Inventory maintained in Japan. (10 inserts in one case)(Inserts with asterisk (∗2) are available in 2 piece in one case)

RECOMMENDED CUTTING CONDITIONS

Cutting Mode	A : Slot Milling	B : Shoulder Milling (Standard Type)	C : Shoulder Milling (Long Cutting Edge Type)
			

	Work Material	Hardness	Grade	Cutting Speed (m/min)	Feed per Tooth (mm/t.)	Cutting Mode
P	Alloy Tool Steel	≤250HB	**VP20RT VP30RT**	160 (120—200)	0.12 (0.08—0.2)	A
					0.2 (0.1—0.4)	B
					0.15 (0.1—0.3)	C
	Alloy Tool Steel	≤250HB	**VP20RT VP30RT**	200 (160—250)	0.2 (0.1—0.3)	A
					0.3 (0.1—0.4)	B
					0.2 (0.1—0.4)	C
	Cast Tool Steel	≤235HB	**VP20RT**	200 (160—250)	0.2 (0.1—0.3)	A
					0.3 (0.1—0.4)	B
					0.2 (0.1—0.4)	C
	Cast Tool Steel	≤230HB	**VP15TF VP20RT**	200 (160—300)	0.2 (0.1—0.3)	A
					0.3 (0.1—0.45)	B
					0.2 (0.1—0.4)	C
K	Ductile Cast Iron	Tensile Strength ≤540MPa	**VP15TF VP20RT**	200 (160—300)	0.25 (0.1—0.4)	A
					0.35 (0.1—0.45)	B
					0.25 (0.1—0.45)	C
	Gray Cast Iron	Tensile Strength ≤350MPa	**VP15TF VP20RT**	200 (160—300)	0.25 (0.1—0.4)	A
					0.35 (0.1—0.45)	B
					0.25 (0.1—0.4)	C

CE/CF/CGSP

CHAMFER MILLING

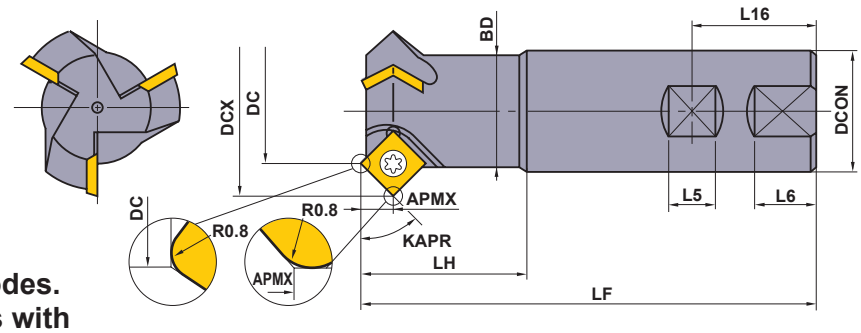
Product Information

45° KAPR

Work Material

P K R

SYMBOL DESCRIPTIONS >> 1350
TECHNICAL DATA >> 1987
ISO13399 Property >> 1966



- Covers 5 cutting modes.
- Excellent sharpness with 11° positive inserts.
- 30°, 45° and 60°chamfer series.

Right hand tool holder only.

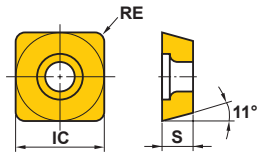
Order Number	Stock	Number of Teeth	Dimensions (mm)											*	① ②	
	R		KAPR	DC	DCX	LF	DCON	BD	LH	L16	L5	L6	APMX	Clamp Screw	Wrench	Insert
CESPR081S20	●	1	60°	8	19.6	110	20	19.5	40	25	11	—	10.2	TS52	①TKY25R	SPMW1203○○
CESPR161S20	●	1	60°	16	27.8	110	20	19.5	40	25	11	—	10.2	TS5	①TKY25R	SPMW1203○○
CESPR323S32	●	3	60°	32	43.8	125	32	31.5	45	36	14	19	10.2	TS5	①TKY25R	SPMW1203○○
CFSPR041S16S	●	1	45°	4	15.7	85	16	14.4	25	24	10	—	5.9	TS4	②TKY15F	SPMW0903○○
CFSPR041S16L	●	1	45°	4	15.7	110	16	14.4	50	24	10	—	5.9	TS4	②TKY15F	SPMW0903○○
CFSPR081S20	●	1	45°	8	24.6	110	20	19.5	40	25	11	—	8.3	TS5	①TKY25R	SPMW1203○○
CFSPR161S20	●	1	45°	16	32.6	110	20	19.5	40	25	11	—	8.3	TS5	①TKY25R	SPMW1203○○
CFSPR323S32	●	3	45°	32	48.6	125	32	31.5	45	36	14	19	8.3	TS5	①TKY25R	SPMW1203○○
CGSPR081S20	●	1	30°	8	28.4	110	20	19.5	40	25	11	—	5.9	TS5	①TKY25R	SPMW1203○○
CGSPR161S20	●	1	30°	16	36.4	110	20	19.5	40	25	11	—	5.9	TS5	①TKY25R	SPMW1203○○
CGSPR323S32	●	3	30°	32	52.4	125	32	31.5	45	36	14	19	5.9	TS5	①TKY25R	SPMW1203○○

* Clamp Torque (N • m) : TS4=3.5, TS5=7.5, TS52=7.5

● : Inventory maintained in Japan.

CE/CF/CGSP

INSERTS

Shape	Order Number	Class	Honing	Coated				Cermet		Carbide		Dimensions (mm)			Geometry
				VP15TF	UP20M			NX2525	NX4545	UTi20T	HTi10	IC	S	RE	
	SPMW090304	M	E*	●	●			●	●	●	●	9.525	3.18	0.4	
	SPMW090308	M	E*	●	●			●	●	●	●	9.525	3.18	0.8	
	SPMW120304	M	E*	●	●			●	●	●	●	12.7	3.18	0.4	
	SPMW120308	M	E*	●	●			●	●	●	●	12.7	3.18	0.8	

* NX2525 and NX4545 insert honing is "T" type.

● : **Inventory maintained in Japan. (10 inserts in one case)**

RECOMMENDED CUTTING CONDITIONS

	Work Material	Hardness	Grade	Cutting Speed (m/min)	Feed per Tooth (mm/t.) Chamfer Milling	Feed per Tooth (mm/t.) Face Milling
P	Carbon Steel Alloy Steel	180—280HB	**UTi20T**	80 (60—100)	0.4	0.15
			UP20M	130 (100—160)	0.4	0.2
			NX4545	130 (100—160)	0.4	0.2
		280—350HB	**UTi20T**	80 (60—100)	0.3	0.15
K	Cast Iron	Tensile Strength ≤450MPa	**UTi20T**	100 (85—120)	0.5	0.25
			HTi10	100 (85—120)	0.5	0.25

● Revolution (min^{-1})=(1000 x Cutting Speed)÷(3.14 x DC)
● Table Feed (mm/min)=Feed per Tooth x Number of Teeth x Cutter Revolution

TSMP

T-SLOT MILLING

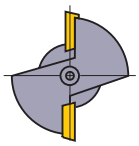
Product Information

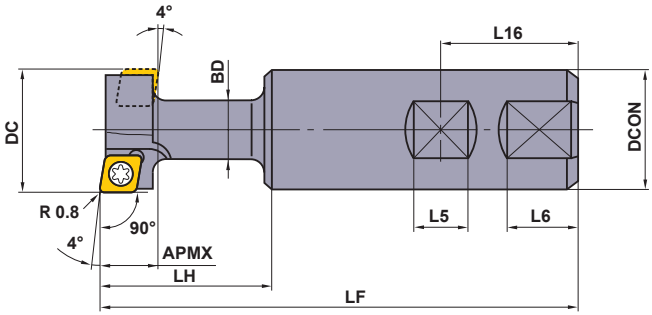
90° KAPR

Work Material

P K R

SYMBOL DESCRIPTIONS >> 1350
TECHNICAL DATA >> 1987
ISO13399 Property >> 1966





- **T-groove order number 14, 18 and 22 are available.**
- **86° rhombic shape 11° positive insert.**
- **Shoulder milling and inversed spot facing are also possible.**

KAPR :90°

Right hand tool holder only.

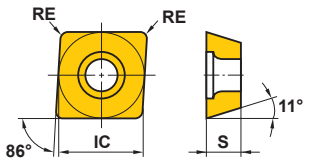
Order Number	T Slot Nomenclature	Stock	Number of Teeth	Dimensions (mm)									*		
		R		DC	LF	DCON	BD	LH	L16	L5	L6	APMX	Clamp Screw	Wrench	Insert
TSMPR252S25	14	●	2	25	112	25	12.5	33.2	32	12	17	11	TS3	①TKY08D	MPMW070308
TSMPR322S32	18	●	2	32	120	32	16	41.2	36	14	19	14	TS4	②TKY15R	MPMW090308
TSMPR402S32	22	●	2	40	130	32	20	51.2	36	14	19	18	TS5	②TKY25R	MPMW120408

* Clamp Torque (N • m) : TS3=1.0, TS4=3.5, TS5=7.5

● : **Inventory maintained in Japan.**

TSMP

INSERTS

Shape	Order Number	Class	Carbide UTi20T		Dimensions (mm) IC	S	RE	Geometry
	MPMW070308	M	●		7.94	3.18	0.8	
	MPMW090308	M	●		9.525	3.18	0.8	
	MPMW120408	M	●		12.7	4.76	0.8	

● : **Inventory maintained in Japan. (10 inserts in one case)**

RECOMMENDED CUTTING CONDITIONS

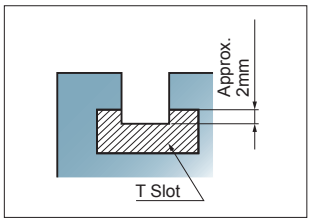
	Work Material	Hardness	Grade	Cutting Speed (m/min)	Feed per Tooth (mm/rev)
P	Carbon Steel Alloy Steel	180−280HB	**UTi20T**	130 (100−160)	0.15 (0.1−0.2)
		280−350HB	**UTi20T**	80 (60−100)	0.1 (0.05−0.15)
K	Cast Iron	Tensile Strength ≤450MPa	**UTi20T**	100 (80−120)	0.15 (0.1−0.2)

● Revolution (min^{-1})=(1000 x Cutting Speed)÷(3.14 x DC)

CAUTION FOR USE

● When T slot machining steel, the workpiece must be machined as shown in the drawing to ensure smooth chip evacuation.

● Slots to be machined must be free from chips for smooth machining.



CBJP/CBMP

Spot Milling

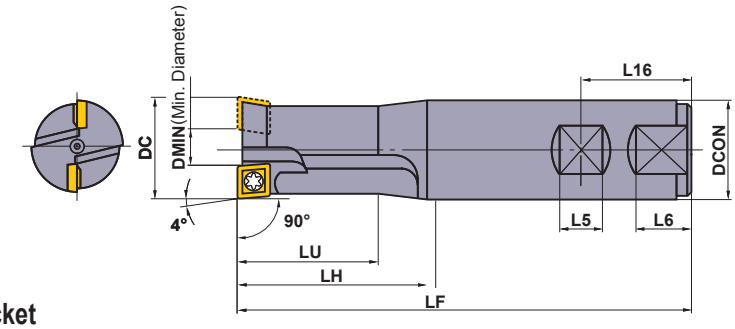
Product Information

90° KAPR

Work Material

P M K R

SYMBOL DESCRIPTIONS >> 1350
TECHNICAL DATA >> 1987
ISO13399 Property >> 1966



- Capable of spot facing machining, boring and interpolation.
- For seat machining of hexagon socket head bolt (M8-M30).
- 86°rhombic shape 11°positive insert.

KAPR :90°

Right hand tool holder only.

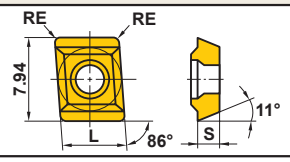
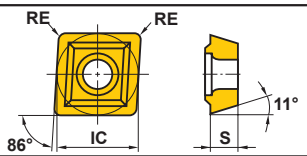
Order Number	For bolt size	Stock R	Number of Teeth	Dimensions (mm) DC	DMIN	LF	DCON	LH	LU	L16	L5	L6	* Clamp Screw	①② Wrench	Insert
CBJPR141S25	M8	●	1	14	3.1	108	25	28	21	32	12	17	TS3	①TKY08D	JPMT060204-E
CBJPR172S25	M10	●	2	17.5	5.3	115	25	35	26	32	12	17	TS3	①TKY08D	JPMT060204-E
CBJPR202S25	M12	●	2	20	7.8	120	25	40	30	32	12	17	TS3	①TKY08D	JPMT060204-E
CBJPR232S25	M14	●	2	23	10.8	126	25	46	34.5	32	12	17	TS3	①TKY08D	JPMT060204-E
CBMPR262S32	M16	●	2	26	8.5	132	32	52	39	36	14	19	TS4	②TKY15R	MPMT090308
CBMPR292S32	M18	●	2	29	11.5	138	32	58	43.5	36	14	19	TS4	②TKY15R	MPMT090308
CBMPR322S32	M20	●	2	32	14.5	144	32	64	59	36	14	19	TS4	②TKY15R	MPMT090308
CBMPR352S32	M22	●	2	35	17.5	150	32	70	70	36	14	19	TS4	②TKY15R	MPMT090308
CBMPR392S32	M24	●	2	39	21.5	158	32	78	78	36	14	19	TS4	②TKY15R	MPMT090308
CBMPR432S32	M27	●	2	43	25.5	166	32	86	86	36	14	19	TS4	②TKY15R	MPMT090308
CBMPR482S32	M30	●	2	48	30.5	176	32	96	96	36	14	19	TS4	②TKY15R	MPMT090308

* Clamp Torque (N • m) : TS3=1.0, TS4=3.5

● : **Inventory maintained in Japan.**

CBJP/CBMP

INSERTS

Cutter Type	Shape	Order Number	Class	Coated VP15TF	Coated UP20M	Coated	Coated	Carbide UTi20T	Carbide	Dimensions (mm) L	IC	S	RE	Geometry
CBJP		**JPMT060204-E**	M	●	●			●		6.5	—	2.38	0.4	
CBMP		**MPMT090308**	M	●	●			●		—	9.525	3.18	0.8	

● : **Inventory maintained in Japan. (10 inserts in one case)**

RECOMMENDED CUTTING CONDITIONS

	Work Material	Hardness	Grade	CBJP Cutting Speed (m/min)	CBJP Feed (mm/rev)	CBMP Cutting Speed (m/min)	CBMP Feed (mm/rev)
P	Mild Steel	≤180HB	**VP15TF**	180 (100—200)	0.16 (0.12—0.2)	180 (100—200)	0.225 (0.15—0.3)
P	Carbon Steel Alloy Steel	180—280HB	**VP15TF**	180 (100—200)	0.2 (0.15—0.25)	180 (100—200)	0.275 (0.2—0.35)
P	Carbon Steel Alloy Steel	280—350HB	**VP15TF**	120 (80—160)	0.16 (0.12—0.2)	120 (80—160)	0.225 (0.15—0.3)
M	Stainless Steel	≤200HB	**VP15TF**	150 (100—200)	0.16 (0.12—0.2)	150 (100—200)	0.225 (0.15—0.3)
K	Cast Iron	Tensile Strength ≤450MPa	**VP15TF**	160 (100—220)	0.3 (0.2—0.4)	160 (100—220)	0.35 (0.2—0.5)

●Revolution (min^{-1})=(1000 x Cutting Speed)÷(3.14 x DC) ●Spindle feed (mm/min) = Feed rate x Tool spindle speed
(Note) CBJPR141S25 use feed per revolution 50 % of this table, because only 1 insert on the body.

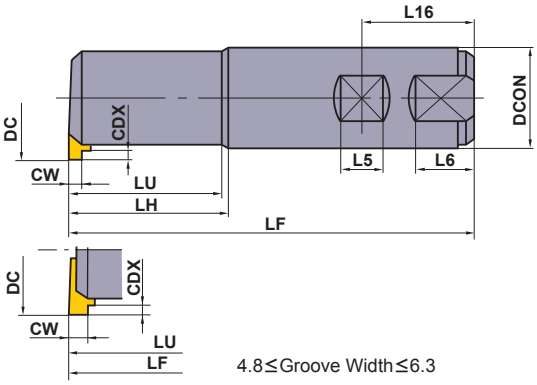
KSMG

SLOT MILLING

Product Information

Work Material

SYMBOL DESCRIPTIONS >> 1350
TECHNICAL DATA >> 1987
ISO13399 Property >> 1966



- **Side face grooving tool for machining centers.**
- **The minimum cutting diameter is ϕ25mm for internal grooving.**
- **For groove widths of 1.25mm−6.0mm.**

Right hand tool holder only.

Order Number	Stock R	Number of Teeth	LF	DCON	LH	LU	L16	L5	L6	CW	CDX	DC (mm)	Insert Number
			Dimensions (mm)							Geometry of Groove			
KSMGR25S25	●	1	115	25	40	36.5	32	12	17	1.25	1.2	25	MGTL33○○○
										1.45	1.5		
										1.5≤CW≤4.0	3.0		
KSMGR40S32	●	1	130	32	50	49	36	14	19	1.25	1.2	40	MGTL43○○○
										1.45	1.5		
										1.5≤CW≤2.3	3.0		
										2.5≤CW≤4.7	4.5		
			131.6	32	51.6	50.6	36	14	19	5.0≤CW≤6.0	4.5	40	MGTL44○○○
KSMGR40S32L	●	1	180	32	100	99	36	14	19	1.25	1.2	40	MGTL43○○
										1.45	1.5		
										1.5≤CW≤2.3	3.0		
										2.5≤CW≤4.7	4.5		
			181.6	32	101.6	100.6	36	14	19	5.0≤CW≤6.0	4.5	40	MGTL44○○○

● : Inventory maintained in Japan.

SPARE PARTS

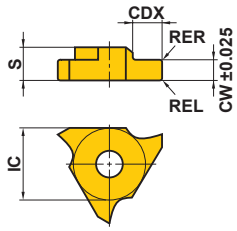
Tool Holder Number	Clamp Lever	Spring	Lever Pin	* Clamp Screw	Wrench
KSMGR25S25	LLCL13S	HLS2	—	LLCS105	①HKY20F
KSMGR40S32	LLCL24	—	LLP14	LLCS108	②HKY30R
KSMGR40S32L	LLCL24	—	LLP14	LLCS108	②HKY30R

* Clamp Torque (N • m) : LLCS105=1.5, LLCS108=3.3

KSMG

INSERTS

Order Number	Grooving Width	Stock: Coated VP20MF	Stock: Cermet NX2525	Stock: Carbide UTi20T	Dimensions (mm) IC	S	RE	CDX	Geometry
	CW	L	L	L					
MGTL33125	1.25	●		●	9.525	4.76	0.2	1.2	MGTL...
MGTL33145	1.45	●		●	9.525	4.76	0.2	1.5	
MGTL33150	1.5	●	●	●	9.525	4.76	0.2	3	
MGTL33175	1.75	●	●	●	9.525	4.76	0.2	3	
MGTL33200	2	●	●	●	9.525	4.76	0.2	3	
MGTL33230	2.3	●		●	9.525	4.76	0.2	3	
MGTL33250	2.5	●	●	●	9.525	4.76	0.3	3	
MGTL33270	2.7	●		●	9.525	4.76	0.3	3	
MGTL33280	2.8	●		●	9.525	4.76	0.3	3	
MGTL33300	3	●	●	●	9.525	4.76	0.3	3	
MGTL33320	3.2	●			9.525	4.76	0.3	3	
MGTL33330	3.3	●		●	9.525	4.76	0.3	3	
MGTL33350	3.5	●		●	9.525	4.76	0.3	3	
MGTL33400	4	●	●	●	9.525	4.76	0.3	3	
MGTL43125	1.25	●	●	●	12.7	4.76	0.2	1.2	
MGTL43145	1.45	●	●	●	12.7	4.76	0.2	1.5	
MGTL43150	1.5	●	●	●	12.7	4.76	0.2	3	
MGTL43175	1.75	●	●	●	12.7	4.76	0.2	3	
MGTL43200	2	●	●	●	12.7	4.76	0.2	3	
MGTL43230	2.3	●	●	●	12.7	4.76	0.2	3	
MGTL43250	2.5	●	●	●	12.7	4.76	0.3	4.5	
MGTL43260	2.6	●		●	12.7	4.76	0.3	4.5	
MGTL43270	2.7	●		●	12.7	4.76	0.3	4.5	
MGTL43280	2.8	●	●	●	12.7	4.76	0.3	4.5	
MGTL43300	3	●	●	●	12.7	4.76	0.3	4.5	
MGTL43320	3.2			●	12.7	4.76	0.3	4.5	
MGTL43330	3.3	●	●	●	12.7	4.76	0.3	4.5	
MGTL43350	3.5	●	●	●	12.7	4.76	0.3	4.5	
MGTL43400	4	●		●	12.7	4.76	0.3	4.5	
MGTL43420	4.2	●		●	12.7	4.76	0.4	4.5	
MGTL43430	4.3	●		●	12.7	4.76	0.4	4.5	
MGTL43450	4.5	●	●	●	12.7	4.76	0.4	4.5	
MGTL43470	4.7	●	●	●	12.7	4.76	0.4	4.5	
MGTL44500	5	●		●	12.7	6.35	0.4	4.5	
MGTL44600	6			●	12.7	6.35	0.4	4.5	



● : Inventory maintained in Japan. (10 inserts in one case)

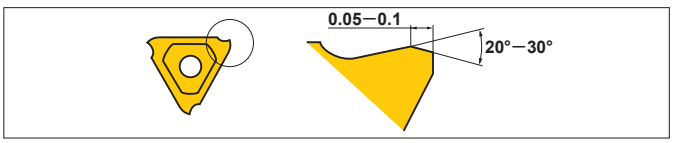
RECOMMENDED CUTTING CONDITIONS

	Work Material	Hardness	Grade	Cutting Speed (m/min)	Feed per Tooth (mm/t.)
P	Mild Steel	≤180HB	NX2525 UTi20T	130 (120—150)	0.225 (0.1—0.35)
			VP20MF	160 (120—200)	0.225 (0.1—0.35)
	Carbon Steel Alloy Steel	180—280HB	NX2525 UTi20T	110 (100—120)	0.2 (0.1—0.30)
			VP20MF	120 (100—140)	0.2 (0.1—0.30)
		280—350HB	UTi20T	110 (100—120)	0.175 (0.1—0.25)
K	Cast Iron	Tensile Strength ≤450MPa	UTi20T	100 (80—125)	0.225 (0.1—0.35)

● Revolution (min^{-1})=(1000 x Cutting Speed)÷(3.14 x DC)
● Table Feed (mm/min)=Feed per Tooth x Number of Teeth x Cutter Revolution

HONING OF CUTTING EDGE

Supplementary honing when steel cutting gives longer tool life.
Use a diamond file for best results.



PMC

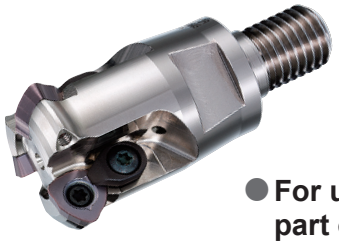
VERTICAL FEED MILLING

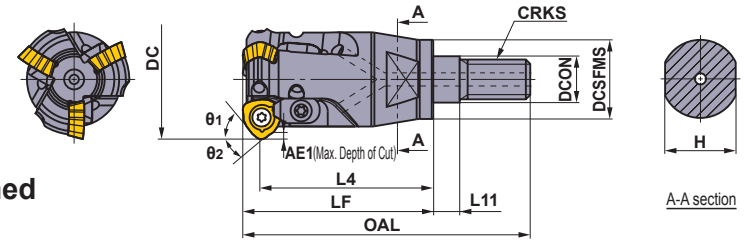
Product Information

Work Material

P K R

SYMBOL DESCRIPTIONS >> 1350
TECHNICAL DATA >> 1987
ISO13399 Property >> 1966





- **For under-cutting trimed part of press mould.**
- **2 directional cutting with large overhang.**

Right hand tool holder only.

Order Number	Stock	Coolant Hole	Number of Teeth	Dimensions (mm)												WT* (kg)	Insert	Shank Arbor
	R			DC	DCON	DCSFMS	OAL	LF	L4	L11	H	CRKS	AE1	θ1	θ2			
PMC08R252AM1035	●	○	2	25	10.5	18	58.7	39.7	35	6	14	M10	1.5	40.5°	35°	0.1	JOM◌080320 ZZSR-◌◌	SC20M10S ◌◌◌◌W
PMC09R323AM1245	●	○	3	32	12.5	21	72.5	50.5	45	6	19	M12	3	40.5°	35°	0.2	JDM◌09T320 ZDSR-◌◌	SC25M12S ◌◌◌◌W
PMC12R403AM1645	●	○	3	40	17	29	74.4	51.4	45	6	24	M16	3.5	42°	35°	0.3	JDM◌120420 ZDSR-◌◌	SC32M16S ◌◌◌◌W

* WT : Tool Weight

● : **Inventory maintained in Japan.**

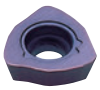
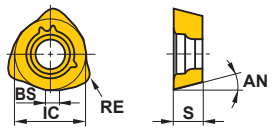
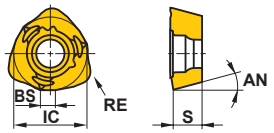
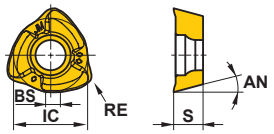
SPARE PARTS

Order Number	Clamp Screw *	Clamp Bridge	Clamp Bridge Screw *	Spring	Wrench	Anti-seize Lubricant
PMC08R252AM1035	TS33	AMS3	AJS3010T10	ASS2	②TKY08D ①TKY10R	MK1KS
PMC09R323AM1245	TS351	AMS3	AJS3010T10	ASS2	②TKY10D	MK1KS
PMC12R403AM1645	TS43	AMS4	AJS4012T15	ASS2	②TKY15D	MK1KS

* Clamp Torque (N • m) : TS33=1.5, TS351=2.5, TS43=6.0, AJS3010T10=2.5, AJS4012T15=3.5

PMC

INSERTS

Shape	Order Number	Class	Coated FH7020	Coated VP15TF	Coated VP30RT		Dimensions (mm) AN	IC	S	BS	RE	PMC holder	Geometry
Partial Profile FT Breaker 	JOMW080320ZZSR-FT	M	●	●	●		13°	8	3.18	1.4	2	PMC08R252AM1035	
	JDMW09T320ZDSR-FT	M	●	●	●		15°	9.525	3.97	1.8	2	PMC09R323AM1245	
	JDMW120420ZDSR-FT	M	●	●	●		15°	12	4.76	2.5	2	PMC12R403AM1645	
Strong Cutting Edge Type ST Breaker	JDMT120420ZDSR-ST	M	●	●	●		15°	12	4.76	2.5	2	PMC12R403AM1645	
JM Breaker	JOMT080320ZZSR-JM	M	●	●	●		13°	8	3.18	1.4	2	PMC08R252AM1035	
	JDMT09T320ZDSR-JM	M	●	●	●		15°	9.525	3.97	1.8	2	PMC09R323AM1245	
	JDMT120420ZDSR-JM	M	●	●	●		15°	12	4.76	2.5	2	PMC12R403AM1645	

● : Inventory maintained in Japan. (10 inserts in one case)

RECOMMENDED CUTTING CONDITIONS

	Work Material	Hardness	Grade	Breaker	Diameter (mm)	Number of Teeth	Cutting Speed (m/min)	Feed per Tooth (mm/t.)	Width of Cut (mm)	Pick Feed (mm)
P	Carbon Steel Alloy Steel	≤180HB	VP15TF	FT	ø40	3	250 (200—300)	—0.6	—1.5	—6
					ø32	3	200 (150—220)	—0.55	—1.2	—5
					ø25	2	200 (150—220)	—0.55	—1.0	—5
	Alloy Tool Steel Hardening Tool Steel for Cold Work Dies	≤300HB	VP15TF	FT	ø40	3	250 (200—300)	—0.55	—1.5	—5
					ø32	3	180 (150—200)	—0.5	—1.2	—3
					ø25	2	180 (150—200)	—0.5	—1.0	—3
	Alloy Tool Steel	≤300HB	VP15TF	FT	ø40	3	200 (100—300)	—0.55	—1.5	—5
					ø32	3	150 (80—200)	—0.5	—1.2	—3
					ø25	2	150 (80—200)	—0.5	—1.0	—3
K	Gray Cast Iron	Tensile Strength ≤350MPa	VP15TF	FT	ø40	3	250 (200—300)	—0.6	—1.5	—6
					ø32	3	200 (150—220)	—0.55	—1.2	—5
					ø25	2	200 (150—220)	—0.55	—1.0	—5
	Ductile Cast Iron	Tensile Strength ≤800MPa	VP15TF	FT	ø40	3	250 (200—300)	—0.6	—1.5	—6
					ø32	3	200 (150—220)	—0.55	—1.2	—5
					ø25	2	200 (150—220)	—0.55	—1.0	—5

● Revolution (min^{-1})=(1000 x Cutting Speed)÷(3.14 x DC)
● Table Feed (mm/min)=Feed per Tooth x Number of Teeth x Cutter Revolution

(Note 1) The above cutting conditions are general guide lines. Adjustments maybe necessary depending on machine rigidity, workpiece geometry and clamping.
(Note 2) A carbide shank extension is recommended to prevent vibrations.

PMF

VERTICAL FEED MILLING

Product Information

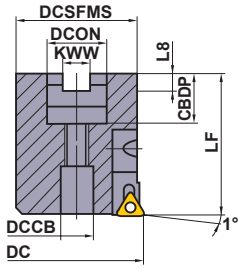
Work Material

P K F

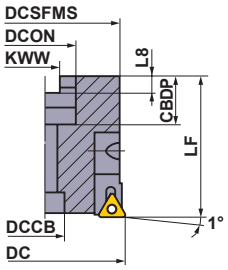
SYMBOL DESCRIPTIONS >> 1350
TECHNICAL DATA >> 1987
ISO13399 Property >> 1966

- 2 directional cutting with large overhang.
- Excellent straightness.
- Excellent wall accuracy.

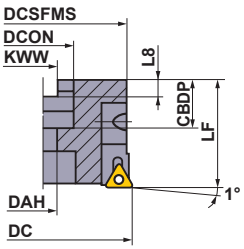
ø50



ø63



ø80



Right hand tool holder only.

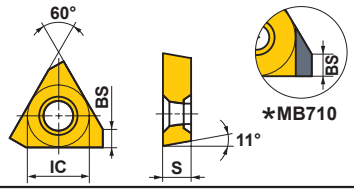
Order Number	Stock R	Number of Teeth	Dimensions (mm) DC	LF	DCON	CBDP	DAH	DCCB	KWW	L8	DCSFMS	Cartridge	Clamp Screw *	Radial Screw	Set Bolt (Cartridge) *	Wrench	Wrench	Set Bolt	Insert
PMF05004A22R	●	4	50	63	22	20	—	12	10.4	6.3	48	PMFA13R	TS254	TSS04005	HBH06012	TKY08F	HKY40R HKY50R	①HDS10031	TPEW 1303 ZP◌R2
PMF06306A22R	●	6	63	63	22	20	—	18	10.4	6.3	60	PMFA13R	TS254	TSS04005	HBH06012	TKY08F	HKY40R	②HSC10050	
PMF08008A27R	●	8	80	50	27	23	13.5	—	12.4	7	75	PMFA13R	TS254	TSS04005	HBH06012	TKY08F	HKY40R	②HSC12035	

* Clamp Torque (N • m) : TS254=1.0, HBH06012=8.5

● : Inventory maintained in Japan.

PMF

INSERTS

Shape	Order Number	Class	Coated VP15TF	Coated AP10H	Coated	Coated	CBN MB710	CBN	Dimensions (mm) IC	S	BS	Geometry
	TPEW1303ZPER2	E	●	●					7.94	3.18	2	
	* TPEW1303ZPTR2	E					●		7.94	3.18	2	

● : Inventory maintained in Japan.
(10 inserts in one case) (CBN inserts are available in 1 piece in one case.)

RECOMMENDED CUTTING CONDITIONS

	Work Material	Hardness	Grade	Cutting Speed (m/min)	Feed per Tooth (mm/t.)
P	Carbon Steel Alloy Steel	180—280HB	VP15TF	250 (150—350)	0.1 (0.05—0.15)
		280—380HB	VP15TF	200 (100—300)	
K	Gray Cast Iron	Tensile Strength ≤350MPa	AP10H	350 (200—500)	0.1 (0.05—0.15)
			MB710	1500 (1000—2000)	

	Work Material	Hardness	Grade	Cutting Speed (m/min)	Feed per Tooth (mm/t.)
K	Ductile Cast Iron	Tensile Strength 360—500MPa	AP10H	250 (150—350)	0.1 (0.05—0.15)
			MB710	1000 (800—1200)	
	Ductile Cast Iron	Tensile Strength 500—800MPa	AP10H	200 (100—300)	0.1 (0.05—0.15)
			MB710	1000 (800—1200)	

●Revolution (min^{-1})=(1000 x Cutting Speed)÷(3.14 x DC)
●Table Feed (mm/min)=Feed per Tooth x Number of Teeth x Cutter Revolution
(Note 1) Recommended radial depth of cut is 0.1mm.
(Note 2) 2 directional vertical cutting is recommended for efficiency.
(Note 3) For crossfeed cutting, the feed per tooth should be reduced to less than 0.05(mm/t.).

PMR

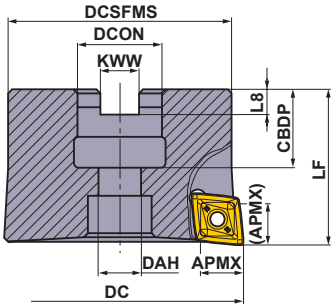
VERTICAL FEED MILLING

Product Information

Work Material

SYMBOL DESCRIPTIONS >> 1350
TECHNICAL DATA >> 1987
ISO13399 Property >> 1966

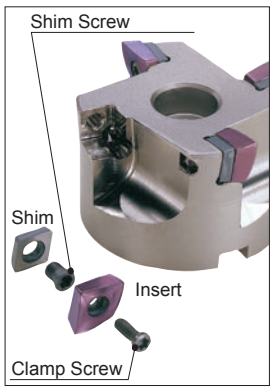
- 1 directional cutting with large overhang.
- Horizontal feed cutting and oblique cutting are also possible.
- Unique shape of curved edge gives high rigidity and low resistance.



Right hand tool holder only.

Type	Order Number	Stock R	Number of Teeth	DC	LF	DCON	CBDP	DAH	DCSFMS	KWW	L8	APMX	Insert
Metric	PMR405003A22R	●	3	50	40	22	20	11	45	10.4	6.3	11	CPMT1205ZPEN-M2/3
	PMR406304A22R	●	4	63	40	22	20	11	57	10.4	6.3	11	CPMT1205ZPEN-M2/3
	PMR408005A27R	●	5	80	50	27	23	13	73	12.4	7	11	CPMT1205ZPEN-M2/3
	PMR608004A27R	□	4	80	50	27	23	13	72	12.4	7	17	CPMT1906ZPEN-M2/3
Inch	PMR405003BR	●	3	50	40	22.225	19	11	45	8.4	5	11	CPMT1205ZPEN-M2/3
	PMR406304BR	●	4	63	40	22.225	19	11	57	8.4	5	11	CPMT1205ZPEN-M2/3
	PMR408005DR	●	5	80	63	31.75	32	17	73	12.7	8	11	CPMT1205ZPEN-M2/3
	PMR608004DR	□	4	80	63	31.75	32	17	72	12.7	8	17	CPMT1906ZPEN-M2/3

● : Inventory maintained in Japan.



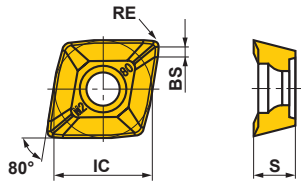
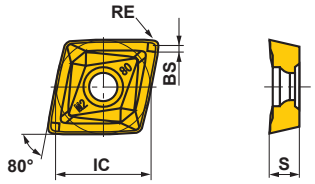
SPARE PARTS

Tool Holder Number	Shim	Shim Screw *	Clamp Screw *	Wrench (Insert)	Wrench (Shim)	Set Bolt
PMR405003A22R	STPMR4N	WCS503507H	①TPS35	①TIP15T	HKY35R	HSC10035
PMR406304A22R	STPMR4N	WCS503507H	①TPS35	①TIP15T	HKY35R	HSC10035
PMR408005A27R	STPMR4N	WCS503507H	①TPS35	①TIP15T	HKY35R	HSC12035
PMR405003BR	STPMR4N	WCS503507H	①TPS35	①TIP15T	HKY35R	HSC10035
PMR406304BR	STPMR4N	WCS503507H	①TPS35	①TIP15T	HKY35R	HSC10035
PMR408005DR	STPMR4N	WCS503507H	①TPS35	①TIP15T	HKY35R	HSC16040
PMR608004A27R	STPMR6N	WCS604010H	②CSF401260T	②TKY20D	HKY40R	HSC12035
PMR608004DR	STPMR6N	WCS604010H	②CSF401260T	②TKY20D	HKY40R	HSC16040

* Clamp Torque (N • m) : TPS35=3.5, CSF401260T=5.0, WCS503507H=5.0, WCS604010H=7.0

PMR

INSERTS

Shape	Order Number	Class	Coated			Dimensions (mm)				Geometry
			VP15TF			IC	S	BS	RE	
	CPMT1205ZPEN-M2	M	●			12.7	5.56	1.4	0.8	
	CPMT1205ZPEN-M3	M	●			12.7	5.56	1.4	1.2	
	CPMT1906ZPEN-M2	M	●			19.05	6.35	1.4	0.8	
	CPMT1906ZPEN-M3	M	●			19.05	6.35	1.4	1.2	

● : Inventory maintained in Japan. (10 inserts in one case)

RECOMMENDED CUTTING CONDITIONS

	Work Material	Hardness	Grade	Cutting Speed (m/min)	Feed per Tooth (mm/t.)	pf (mm)
P	Carbon Steel Alloy Steel	180−280HB	**VP15TF**	180 (150−200)	0.2 (0.1−0.3)	≤0.5DC
		280−380HB				
K	Gray Cast Iron	Tensile Strength ≤350MPa	**VP15TF**	180 (150−200)	0.2 (0.1−0.3)	≤0.5DC
	Ductile Cast Iron	Tensile Strength 360−500MPa	**VP15TF**	150 (120−170)	0.2 (0.1−0.3)	≤0.5DC
		Tensile Strength 500−800MPa	**VP15TF**	120 (100−150)	0.2 (0.1−0.3)	≤0.5DC

● Revolution (min^{-1})=(1000 x Cutting Speed)÷(3.14 x DC)
● Table Feed (mm/min)=Feed per Tooth x Number of Teeth x Cutter Revolution
(Note 1) The above conditions are suitable for general machining purposes, it is possible to use conditions that are different from the above.
(Note 2) For horizontal feed machining, please reduce the feed rate by 20−40%.
(Note 3) If vibration occurs when machining, please reduce the depth of cut, and reduce the cutting speed by 20−50%.

BMR

SYMBOL DESCRIPTIONS >> 1350
TECHNICAL DATA >> 1987
ISO13399 Property >> 1966

Body with Peripheral Cutting Edge Run-out Regulator

With peripheral cutting edge regulating function for possible use of economical M-class inserts.
* The bodies are only available by special order.

High Clamping Rigidity

High feed processing possible with improved fracture resistance.

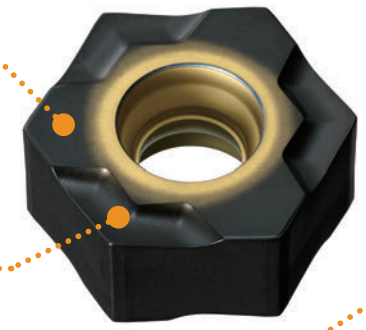
Double Positive Breaker

Reduced cutting resistance. Supports open deck work. Effective finished surface due to wiper edge.

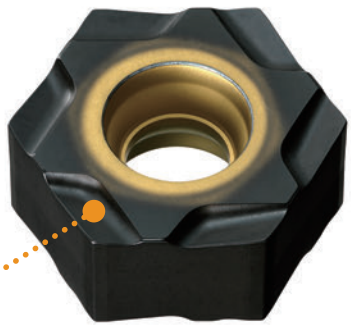
12-Corner Type with Right Hand

Economical 12-corner type that preserves comparable insert rigidity of the 6-corner type by securing the seating surface directly below where the cutting force is absorbed.

Double-sided 6-corner type (No hand)

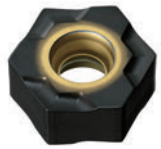
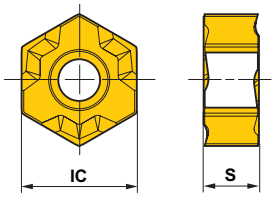
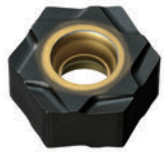
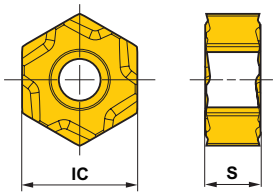


Double-sided 12-corner type (Right hand only)



BMR

INSERT

Shape	Order Number	Grade	Hand	Cutting edge	Stock	Dimensions (mm) IC	Dimensions (mm) S	Geometry
	**HNMX1206EN06-R**	**MC5015**	–	6	●	12.7	6.0	
	**HNMX1206ER12-R**	**MC5015**	R	12	●	12.7	6.0	

● : **Inventory maintained in Japan. (10 inserts in one case)**

RECOMMENDED CUTTING CONDITIONS

	Work Material	Tensile Strength	Grade	Cutting Speed **vc** (m/min)	Feed per Tooth **fz** (mm/t.)	Cutting depth **ae** (mm)
K	Gray Cast Iron	≤350MPa	**MC5015**	200 (150—250)	0.2 (0.1—0.25)	≤3.0

* With feed per cutter, settings are set small for finished surface roughness and large for ideal product life.

FP490

HIGH FEED CUTTING FOR CAST IRON

Product Information

90° KAPR

Work Material

K F

SYMBOL DESCRIPTIONS >> 1350
TECHNICAL DATA >> 1987
ISO13399 Property >> 1966

- **11°positive insert.**
- **Suitable for cast iron finishing.**
- **Multi insert design.**
- **For high feed cutting.**
- **Easy tool exchange.**

Fig.1
Q type (Small Diameter)
ø80
ø100
ø125
ø160

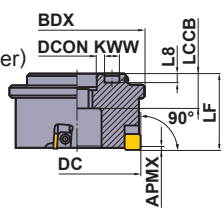


Fig.2
Q type (Large Diameter)
ø200
ø250
ø315
ø355
ø400
ø500

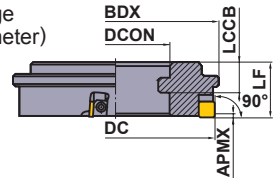
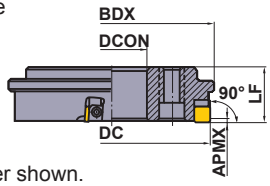


Fig.3
T type
ø250
ø315
ø355
ø400



KAPR :90°
GAMP:+5° T :+5°
GAMF:+0° I :0°

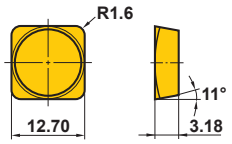
Right hand tool holder shown.

Type	Order Number	Number of Teeth	Dimensions (mm) DC	BDX	LF	DCON	LCCB	KWW	L8	WT* (kg)	APMX (mm)	Installation Detail Dimensions	Type (Fig.)
Quick Change Q Type	**FP490R/L0308Q**	8	80	85	50	25.4	26	10.8	7	1.5	0.5	Q Typeϕ80—ϕ160	1
	FP490R/L0410Q	10	100	105	63	31.75	29	12.8	7	2.8	0.5		1
	FP490R/L0514Q	14	125	130	63	38.1	29	15.8	7	4.2	0.5		1
	FP490R/L0618Q	18	160	165	63	50.8	29	18.8	7	6.7	0.5		1
	FP490R/L0822Q	22	200	205	45	125	25	—	—	5.5	0.5	Q Typeϕ200—ϕ500	2
	FP490R/L1028Q	28	250	255	45	175	25	—	—	8.0	0.5		2
	FP490R/L1236Q	36	315	320	45	240	25	—	—	10.7	0.5		2
	FP490R/L1440Q	40	355	360	45	280	25	—	—	12.2	0.5		2
	FP490R/L1646Q	46	400	405	45	325	25	—	—	13.8	0.5		2
	FP490R/L2056Q	56	500	505	45	425	25	—	—	17.8	0.5		2
Quick Change T Type	**FP490R/L1028T**	28	250	260	45	110	—	—	—	9.8	0.5	T Typeϕ250—ϕ400	3
	FP490R/L1236T	36	315	325	45	175	—	—	—	12.1	0.5		3
	FP490R/L1440T	40	355	365	45	215	—	—	—	14.1	0.5		3
	FP490R/L1646T	46	400	410	45	260	—	—	—	15.4	0.5		3

(Note) These are produced to order only.
* WT : Tool Weight

FP490

INSERTS

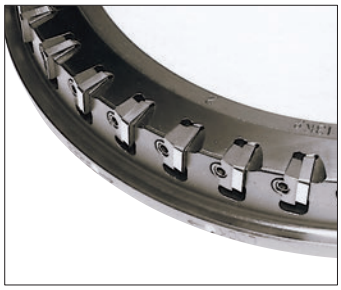
Order Number	Class	Carbide HTi10	Carbide HTi05T	Geometry
SPEN424A	E	●	●	

● : **Inventory maintained in Japan. (10 inserts in one case)**

RECOMMENDED CUTTING CONDITIONS

	Work Material	Tensile Strength	Grade	Cutting Speed (m/min)	Feed per Tooth (mm/t.)
K	Gray Cast Iron	≤350MPa	**HTi05T**	125 (100—150)	0.2 (0.1—0.3)

● Revolution (min^{-1})=(1000 x Cutting Speed)÷(3.14 x DC)
● Table Feed (mm/min)
=Feed per Tooth x Number of Teeth x Cutter Revolution



SPARE PARTS

Tool Holder Number	Wedge	* Clamp Screw	Wrench	Wrench (Sold Separately)	Hexagonal Head (Sold Separately)
FP490R/L0308Q - FP490R/L1646T	CWS42SPR/L	LS14	HKY40T	120QSPK×80 (KANONN-SEIKI CO.)	6.35□×4 (KYOKUTO MFG CO.)

* Clamp Torque (N • m) : LS14=7.8

FP590

HIGH FEED CUTTING FOR CAST IRON

Product Information

90° KAPR

Work Material

K F

SYMBOL DESCRIPTIONS >> 1350
TECHNICAL DATA >> 1987
ISO13399 Property >> 1966

- 11°positive insert.
- Suitable for cast iron finishing.
- Multi insert design.
- For high feed cutting.
- Easy tool exchange.

Fig.1
Q type (Small Diameter)
ø125
ø160

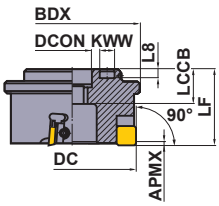


Fig.2
Q type (Large Diameter)
ø200
ø250
ø315
ø355
ø400
ø500

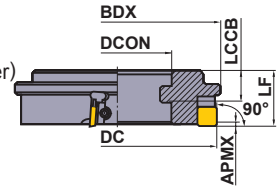
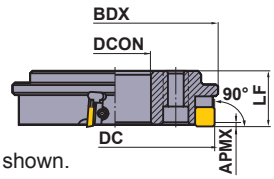


Fig.3
T type
ø250
ø315
ø355
ø400



Right hand tool holder shown.

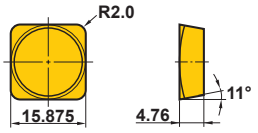
KAPR :90°
GAMP:+5° T :+5°
GAMF:+0° I :0°

Type	Order Number	Number of Teeth	Dimensions(mm) DC	BDX	LF	DCON	LCCB	KWW	L8	WT* (kg)	APMX (mm)	Installation Detail Dimensions	Type (Fig.)
Quick Change Q Type	FP590R/L0514Q	14	125	135	63	38.1	29	15.8	7	4.2	0.5	Q Typeϕ125—ϕ160	1
	FP590R/L0618Q	18	160	170	63	50.8	29	18.8	7	6.7	0.5		1
	FP590R/L0822Q	22	200	210	45	125	25	—	—	5.5	0.5	Q Typeϕ200—ϕ500	2
	FP590R/L1028Q	28	250	260	45	175	25	—	—	8.0	0.5		2
	FP590R/L1236Q	36	315	325	45	240	25	—	—	10.7	0.5		2
	FP590R/L1440Q	40	355	365	45	280	25	—	—	12.2	0.5		2
	FP590R/L1646Q	46	400	410	45	325	25	—	—	13.8	0.5		2
	FP590R/L2056Q	56	500	510	45	425	25	—	—	17.8	0.5		2
Quick Change T Type	FP590R/L1028T	28	250	260	45	110	—	—	—	9.8	0.5	T Typeϕ250—ϕ400	3
	FP590R/L1236T	36	315	325	45	175	—	—	—	12.1	0.5		3
	FP590R/L1440T	40	355	365	45	215	—	—	—	14.1	0.5		3
	FP590R/L1646T	46	400	410	45	260	—	—	—	15.4	0.5		3

(Note) These are produced to order only.
* WT : Tool Weight

FP590

INSERTS

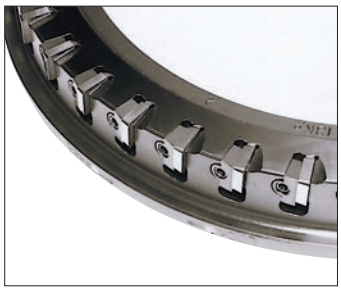
Order Number	Class	Carbide HTi05T		Geometry
SPEN535A	E	●		

● : Inventory maintained in Japan. (10 inserts in one case)

RECOMMENDED CUTTING CONDITIONS

	Work Material	Tensile Strength	Grade	Cutting Speed (m/min)	Feed per Tooth (mm/t.)
K	Gray Cast Iron	≤350MPa	HTi05T	125 (100—150)	0.2 (0.1—0.3)

● Revolution (min^{-1})=(1000 x Cutting Speed)÷(3.14 x DC)
● Table Feed (mm/min)
=Feed per Tooth x Number of Teeth x Cutter Revolution



SPARE PARTS

Tool Holder Number	Wedge	* Clamp Screw	Wrench	Wrench (Sold Separately)	Hexagonal Head (Sold Separately)
FP590R/L0514Q - FP590R/L1646T	CWS5	LS14	HKY40T	120QSPK×80 (KANONN-SEIKI CO.)	6.35□×4 (KYOKUTO MFG CO.)

* Clamp Torque (N • m) : LS14=7.8

FE404

FINISHING FOR ALUMINIUM ALLOY

Product Information

86° KAPR

Work Material

N F

SYMBOL DESCRIPTIONS >> 1350
TECHNICAL DATA >> 1987
ISO13399 Property >> 1966

- 21°positive insert.
- High rake and relief angle.
- Suitable for light alloy machining.
- Easy tool exchange.

Fig.1
Q type (Small Diameter)
ø100
ø125
ø160

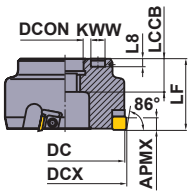


Fig.2
Q type (Large Diameter)
ø200
ø250
ø315
ø355
ø400
ø500

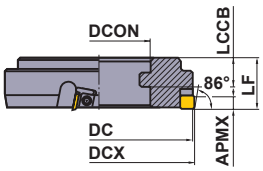
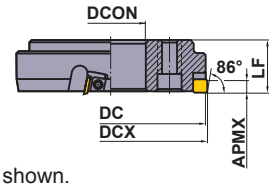


Fig.3
T type
ø250
ø315
ø355
ø400



KAPR :86°
GAMP:+11° T :+10°
GAMF:+9° I :+10°

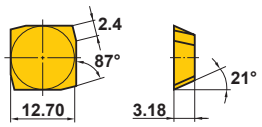
Right hand tool holder shown.

Type	Order Number	Number of Teeth	Dimensions(mm) DC	DCX	LF	DCON	LCCB	KWW	L8	WT* (kg)	APMX (mm)	Installation Detail Dimensions	Type (Fig.)
Quick Change Q Type	FE404R/L0408Q	8	100	102	63	31.75	29	12.8	7	3.2	9	Refer to page M014. (Q Typeϕ100—ϕ160)	1
	FE404R/L0510Q	10	125	127	63	38.1	29	15.8	7	4.7	9		1
	FE404R/L0612Q	12	160	162	63	50.8	29	18.8	7	7.6	9		1
	FE404R/L0816Q	16	200	202	45	125	25	—	—	6.1	9	Refer to page M015. (Q Typeϕ200—ϕ500)	2
	FE404R/L1020Q	20	250	252	45	175	25	—	—	7.8	9		2
	FE404R/L1224Q	24	315	317	45	240	25	—	—	10.2	9		2
	FE404R/L1428Q	28	355	357	45	280	25	—	—	11.8	9		2
	FE404R/L1632Q	32	400	402	45	325	25	—	—	13.3	9		2
	FE404R/L2040Q	40	500	502	45	425	25	—	—	16.2	9		2
Quick Change T Type	FE404R/L1020T	20	250	251	45	110	—	—	—	9.9	9	Refer to page M015. (T Typeϕ250—ϕ400)	3
	FE404R/L1224T	24	315	316	45	175	—	—	—	12.2	9		3
	FE404R/L1428T	28	335	356	45	215	—	—	—	13.7	9		3
	FE404R/L1632T	32	400	401	45	260	—	—	—	16.2	9		3

(Note) These are produced to order only.
* WT : Tool Weight

FE404

INSERTS

Order Number	Class	Carbide HTi10		Geometry
SEA42C10GR	A	▲		
SEA42C10GL	A	▲		

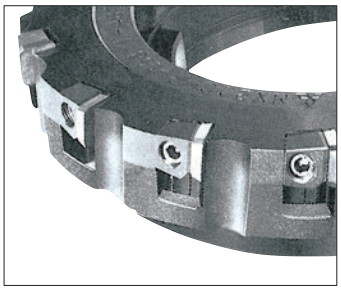
(Note) Use R at a right hand body and L at a left hand body.

▲ : Inventory maintained in Japan. To be replaced by new products.
(10 inserts in one case)

RECOMMENDED CUTTING CONDITIONS

	Work Material	Silicon (%)	Grade	Cutting Speed (m/min)	Feed per Tooth (mm/t.)
N	Aluminium Alloy	≤10	**HTi10**	700 (400—1000)	0.15 (0.05—0.25)
		≥10	**HTi10**	400 (200—600)	0.15 (0.05—0.25)

● Revolution (min^{-1})=(1000 x Cutting Speed)÷(3.14 x DC)
● Table Feed (mm/min)
=Feed per Tooth x Number of Teeth x Cutter Revolution



SPARE PARTS

Tool Holder Number	Wedge	Clamp Screw *	Wrench	Wrench (Sold Separately)	Hexagonal Head (Sold Separately)
FE404R/L0408Q - FE404R/L1632T	CWS42SER/L	LS10	HKY40T	120QSPK×80 (KANONN-SEIKI CO.)	6.35□×4 (KYOKUTO MFG CO.)

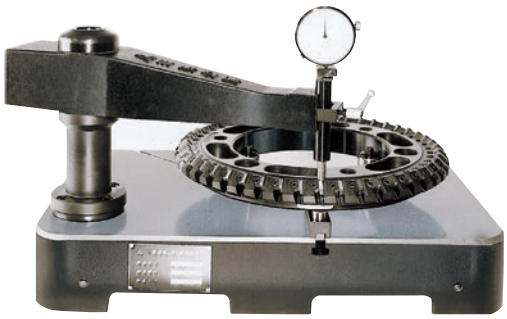
* Clamp Torque (N • m) : LS10=7.8

SEF SETTING FIXTURE

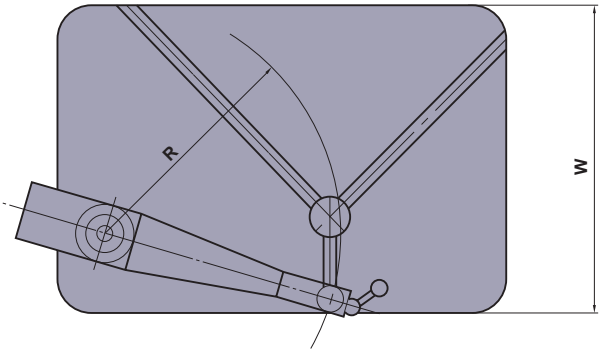
SYMBOL DESCRIPTIONS >> 1350
TECHNICAL DATA >> 1987
ISO13399 Property >> 1966

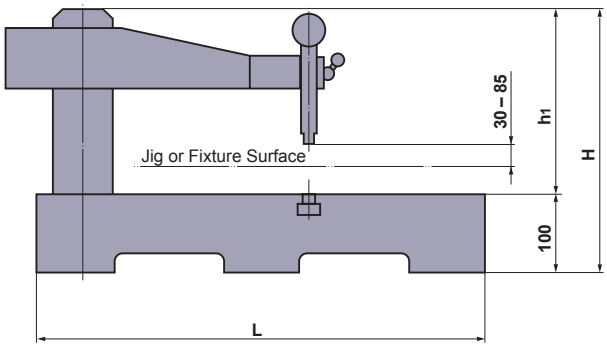
FEATURES OF SETTING FIXTURE

- **Compact design.**
- **Easy set up operation.**
- **Insert is adjusted from the cutting edge point therefore run-out accuracy is high.**



SETTING FIXTURE STANDARD

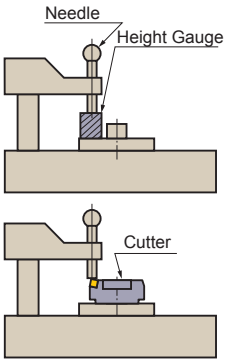




Order Number	R	L	W	H	h1	Cutter Diameter
SEF500	315	600	400	347	247	—ϕ500
SEF700	400	800	500	360	260	ϕ315—ϕ700

(Note 1) Please specify the order number when ordering.
(Note 2) Please contact us regarding special spare parts order.

Method of Insert Setting for One Piece Type.

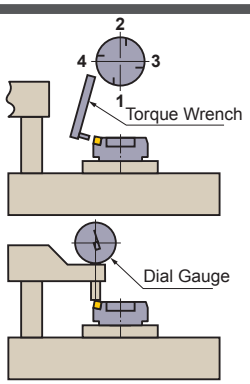


①Set the needle using a height gauge which is the same height as the cutter.

②Move the needle to an insert.

③Slide the insert to the point where it touches the needle Tighten all the inserts lightly. (Use torque wrench.) (1—2N • m)

*Screwing the inserts too tightly results in lower accuracy.



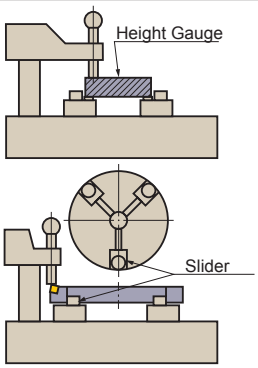
④After temporary tightening, use a torque wrench to tighten firmly. (Use torque wrench.) (8 N • m)

⑤Screw the inserts tightly according to the picture shown on the left.

⑥Check run-out of all the inserts with a dial gauge.

*For general milling, ≤10μm is the standard. For finishing,set the insert run out at≤5μm.

Method of Insert Setting for Two Piece Type.



①Set the height gauge at the same height as the cutter on the liners of slider, then set the needle.

②Put the cutter on the liners of the slider and move the rollers of the slider to the installation holes.

③Make sure that the three rollers are free, then fix the sliders.

*Process of tightening the inserts is the same as the one piece type.

●Note

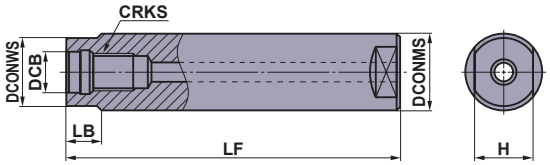
1. After machining, dust off chips on the cutter with air before loosening the wedge.
2. When loosening clamp screws, avoid using a damaged wrench.
3. Alien substances attached to inserts lowers run-out accuracy and damages the cutter body. Therefore, they need to be cleaned throughly.
4. After all the inserts are taken out, clean the cutter body with oil or strong air blow.
5. Use a torque wrench or special wrench for tightening the clamp screws.

SC-M

ARBORS FOR SCREW-IN TOOLS

SYMBOL DESCRIPTIONS >> 1350
TECHNICAL DATA >> 1987
ISO13399 Property >> 1966

STRAIGHT SHANK ARBOR



Type	Order Number	Stock	Dimensions (mm)						
			DCB	DCONMS	DCONWS	LF	LB	H	CRKS
STEEL SHANK TYPE	SC16M08S100S	●	8.5	16	14.5	100	10	10	M8
	SC16M08S200L	●	8.5	16	14.5	200	10	10	M8
	SC20M10S120S	●	10.5	20	18.5	120	10	14	M10
	SC20M10S220L	●	10.5	20	18.5	220	10	14	M10
	SC25M12S125S	●	12.5	25	23.5	125	10	19	M12
	SC25M12S245L	●	12.5	25	23.5	245	10	19	M12
	SC32M16S140S	●	17	32	28.5	140	15	24	M16
	SC32M16S280L	●	17	32	28.5	280	15	24	M16
CARBIDE SHANK TYPE	SC16M08S100SW	●	8.5	16	14.5	100	10	10	M8
	SC16M08S200LW	●	8.5	16	14.5	200	10	10	M8
	SC20M10S120SW	●	10.5	20	18.5	120	10	14	M10
	SC20M10S220LW	●	10.5	20	18.5	220	10	14	M10
	SC25M12S125SW	●	12.5	25	23.5	125	10	19	M12
	SC25M12S245LW	●	12.5	25	23.5	245	10	19	M12
	SC32M16S140SW	●	17	32	28.5	140	15	24	M16
	SC32M16S280LW	●	17	32	28.5	280	15	24	M16

● : Inventory maintained in Japan.

HOW TO INSTALL THE SCREW-IN HEAD

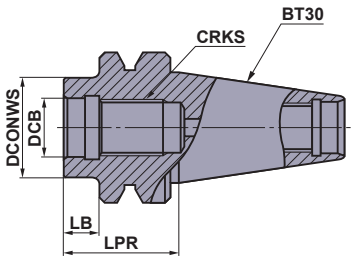
①Thoroughly clean the clamp section of the head and the arbor with an air blower or brush before installation.

②Tighten the head at the recommended torque and ensure that there is no gap between the head and arbor.

Screw Size	Recommended Torque (N • m)	Wrench Size (mm)
M8	23	10
M10	46	14
M12	80	19
M16	90	24

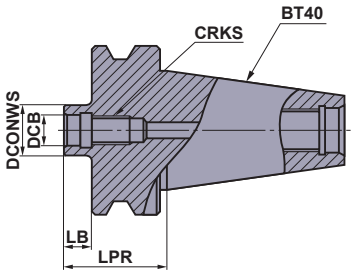
●Cutting tools become extremely hot during cutting. Never touch them with bare hands after operation as this mayproduce risk of injuries or burns.
●Do not handle the cutting tools with bare hands as this may cause injuries.

BT30 SHANK ARBOR



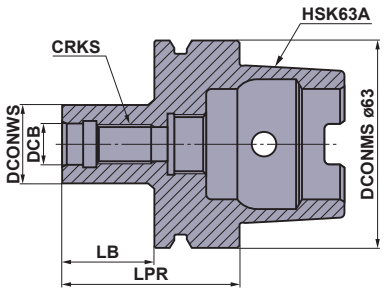
Order Number	Stock	Dimensions (mm)				
		DCB	DCONWS	LPR	LB	CRKS
SC16M08S10-BT30	●	8.5	14.5	32	10	M8
SC20M10S10-BT30	●	10.5	18.5	32	10	M10
SC25M12S10-BT30	●	12.5	23.5	32	10	M12
SC32M16S10-BT30	●	17.0	28.5	32	10	M16

BT40 SHANK ARBOR



Order Number	Stock	Dimensions (mm)				
		DCB	DCONWS	LPR	LB	CRKS
SC16M08S10-BT40	●	8.5	14.5	37	10	M8
SC20M10S10-BT40	●	10.5	18.5	37	10	M10
SC25M12S10-BT40	●	12.5	23.5	37	10	M12
SC32M16S10-BT40	●	17.0	28.5	37	10	M16

HSK63A SHANK ARBOR



Order Number	Stock	Dimensions (mm)				
		DCB	DCONWS	LPR	LB	CRKS
SC16M08S22-HSK63A	●	8.5	14.5	48	22	M8
SC20M10S24-HSK63A	●	10.5	18.5	50	24	M10
SC25M12S27-HSK63A	●	12.5	23.5	53	27	M12
SC32M16S28-HSK63A	●	17.0	28.5	54	28	M16

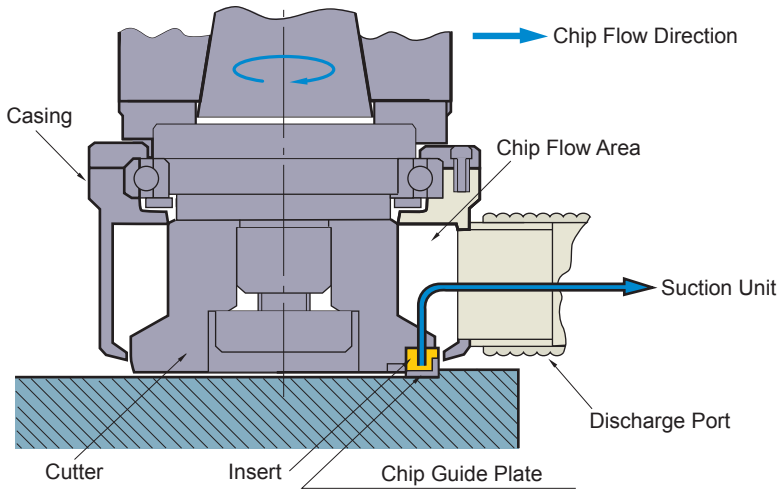
● : Inventory maintained in Japan.

Qing

SYMBOL DESCRIPTIONS >> 1350
TECHNICAL DATA >> 1987
ISO13399 Property >> 1966

STRUCTURE

- **Automatic continuous intake of chips while machining.**
- **Eliminates chip handing problems.**



1 Cutting is performed by a face mill.

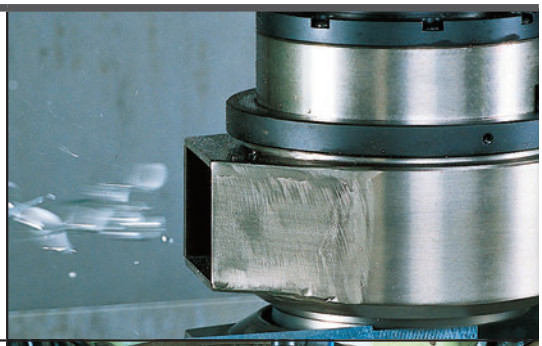
2 Chips are directed into the casing by way of the chip guide plate.

3 Chips are expelled via the discharge port.

CHIP COLLECTION METHOD

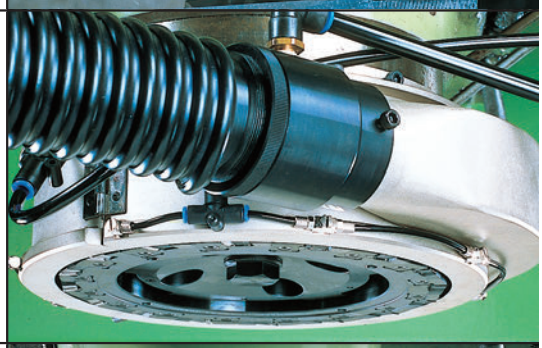
Self Expulsion Type QMC

①Chips are discharged towards the chip conveyor because of the centrifugal force created by the cutter.
②Installation with an ATC(auto tool changer) on machining centers is possible.
③Since there is no need for air or a dust collector, this method provides the lowest initial investment and running costs.
④Chips cannot be transported (carried) directly over long distances.
⑤High speed bearing required to suit high speed machining.



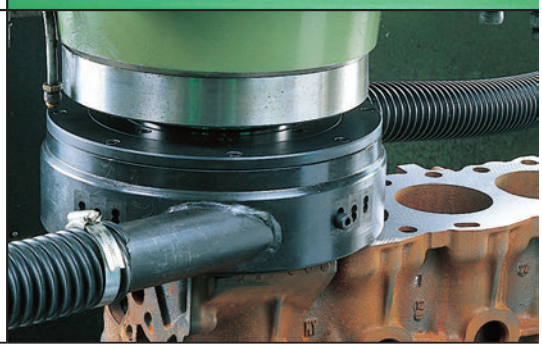
Double Air Type QWA

①Chip recovery using compressed air (factory air).
②Since air is also injected into the casing interior, wet cutting is also possible.
③Achieves the same suction capabilities as a dust collector, thereby enabling low equipment costs.
④Wet cutting is not recommended.



Vacuum Machine Type QSV

①Chip collection by use of a suction machine.
②Chip collection efficiency is high.
③Special equipment is required, such as a mist collector for wet cutting.

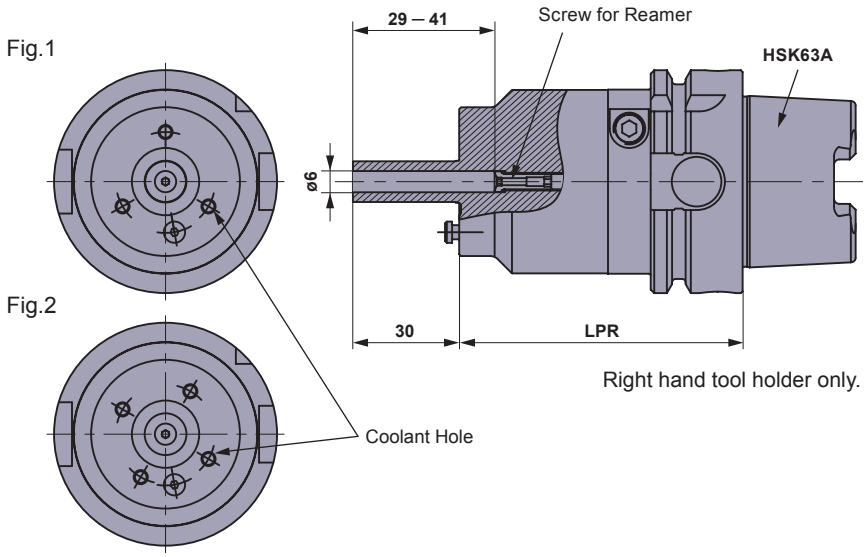


MILLING TOOLS

TOOLING SYSTEM

Valve Finisher 1592
CARTRIDGE 1596
BORING UNIT 1602
MI TYPE BORING BARS..... 1606
CLASSIFICATION OF QUICK CHANGE /
MODULAR TOOLING SYSTEM 1608
FACE MILL..... 1609
FACE MILLING ADAPTER 1610
SIDE CUTTER..... 1612
BORING TOOL..... 1613
ABS License KOMET 1614
HSK SYSTEM 1618

Valve Finisher



Right hand tool holder only.

* The Mitsubishi Materials tool holder (Patent held in Japan)(p) is manufactured under license by NT TOOL CORPORATION.

Tool Holder

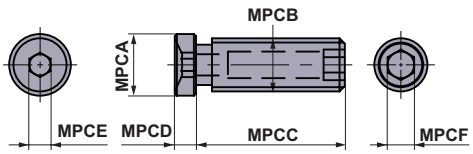
(mm)

Order Number	Stock	LPR	Coolant Hole (Hole)	WT (kg)	Installation	Balance Accuracy
HVF06-HSK63A110A3	●	80	Fig.1 (3 Hole)	1.5	HSK63A (With Coolant Pipe)	G2.5 (5000min^{-1})
HVF06-HSK63A110A4	●	80	Fig.2 (4 Hole)	1.5		
HVF06-HSK63A180A3	●	150	Fig.1 (3 Hole)	2.6		
HVF06-HSK63A180A4	●	150	Fig.2 (4 Hole)	2.6		

* A variety of other tool holders, such as BT shanks with their distinctive double face contact, can be mounted as well.

Spare Parts (Reamer Adjustment Screws)

(mm)

Geometry	Order Number	Stock	MPCA	MPCB	MPCC	MPCD	MPCE	MPCF
	**HSC05016HW**	●	5.8	M5×0.8	14	2	2	2.5

Reamer adjustment screws can be operated using a wrench from both the reamer insertion hole side and the mounting side.
The reamer adjustment screw is an accessory (1 piece), which can also be additionally purchased as a stand-alone item.
A hexagon socket set screw (M4) is included with the tool holder. It should be used as a stopper when discharging coolant with the use of an external oil supply.

● : **Inventory maintained in Japan.**

Valve Finisher

Produced-to-Order Products Please inquire with our Sales Department regarding production.

For Valve Guide Hole Reaming

Compatible Reamer Range : ≤ **ø6** (Guide Hole Diameter)

RT9005

Optimization and strengthening of the hard phase (WC) particle diameter and bonded phase (Co) have improved the wear resistance and fracture resistance, for the creation of a unique cemented carbide.

EF05

An ultra-high hardness, ultra micro-particle cemented carbide that contains specialized components. Just as with RT9005, its wear resistance and fracture resistance have been improved.

Coating (TiN)

The hard coating with smooth surface properties can maintain an excellent finished surface over extended periods of time.

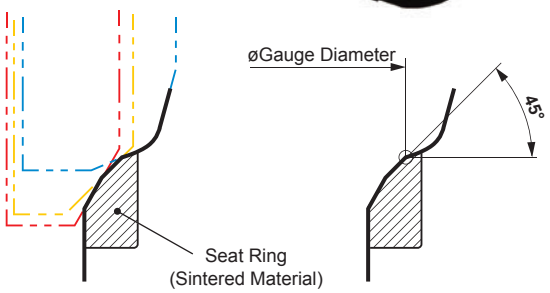
For Seat Surface Machining

Compatible Head Range : **ø20** ≤ Head Diameter < **ø35**
(Seat Hole : 45°-Surface Gauge Diameter)

Tool Bits : 3 types

MB4020

High edge toughness has been achieved with a newly-developed special binder. The even sharper cutting edge shape can suppress the creation of burrs and ensure high accuracy. CBN, which is included with a high chemical content, has outstanding welding resistance so that a constant dimensional accuracy can be maintained.



● The seat surface is composed of 3 faces at different angles (Cutting with 3 types of edges).

Relationship between number of head cutting edge grooves and tool holders

* HVF06-HSK63A110A◌ : Suitable for cases with no processing beyond the angle plate
* HVF06-HSK63A180A◌ : Suitable for cases with processing beyond the angle plate

Order Number	Coolant Hole (Hole)	Number of Cutting Edge Grooves on Head			
		1	2	3	4
HVF06-HSK63A110A3	**3**	○	×	○	×
HVF06-HSK63A180A3	**3**	○	×	○	×
HVF06-HSK63A110A4	**4**	○	○	×	○
HVF06-HSK63A180A4	**4**	○	○	×	○

○ = Suitable × = Unsuitable

* Hexagon socket set screws (M4) are included as separately-packaged accessories.

Important! Install screws in any unused coolant holes.

Valve Finisher

RECOMMENDED CUTTING CONDITIONS

Valve Guide Hole Reaming

Work Material	Reamer Material			Cutting Speed **vc** (m/min)	Feed per Tooth **fz** (mm/t.)
	Grade	Hardness (HRA)	Bending Strength (Gpa)		
Steel-based Sintered Alloy	**RT9005**	92.2	2.0	40 — 60	0.03 — 0.05
Cast Iron	**EF05**	94.0	2.5		

Seat Surface Machining

Work Material	Priority	CBN Material for Bits	Cutting Speed **vc** (m/min)	Feed per Tooth **fz** (mm/t.)
Sintered Alloy	1	**MB4020**	60 — 120	0.05 — 0.10
	2	**MB825**		
	2	**MB835**		

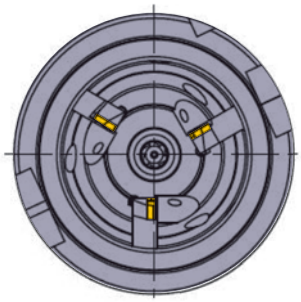
* Select materials in accordance with seat material characteristics.

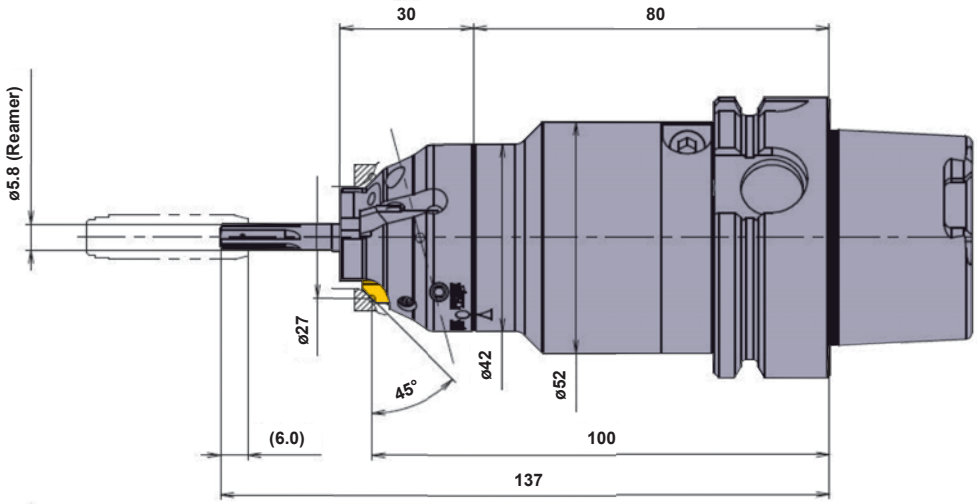
Setup Reference Diagram

(When Tool Holder : HVF06-HSK63A110A3 is suitable)

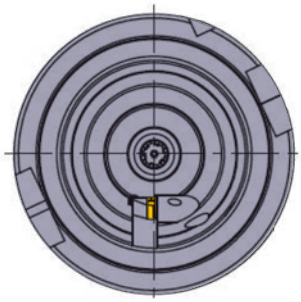
(mm)

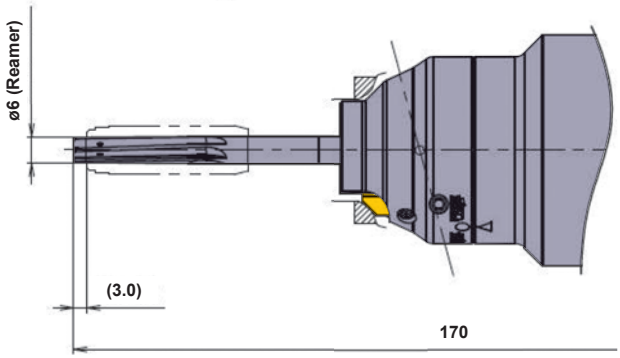
Rough Processing





Finish Processing





Valve Finisher

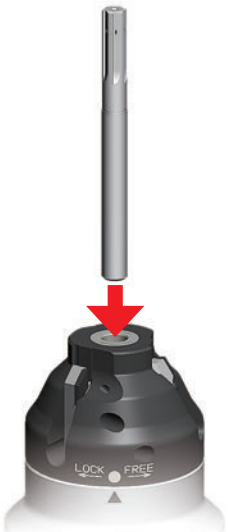
Procedure

STEP 1

Mount the head on the tool holder.

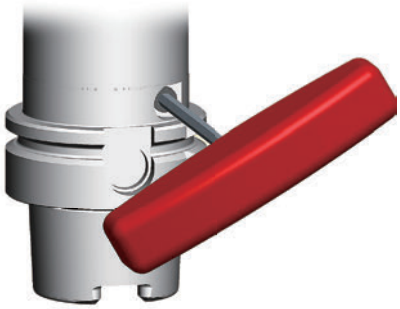
STEP 2

Attach the reamer.



STEP 3

Tightening and removing screws follow opposite procedures from the usual.



During use, line up the markings on the head and tool holder to secure them in place. When mounting and removing them, turn them to the side marked “FREE”.

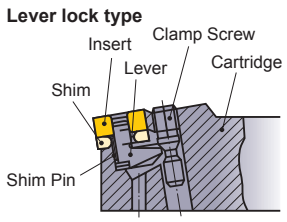
Secured Position

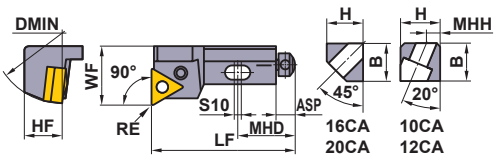
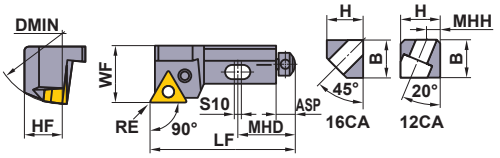
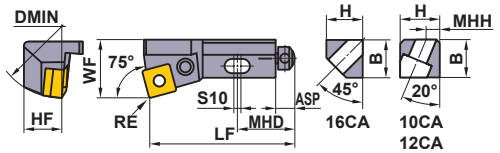
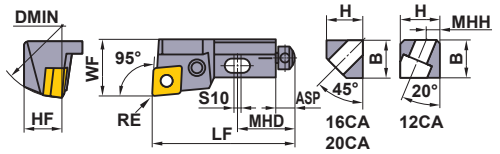
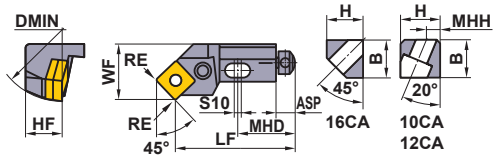
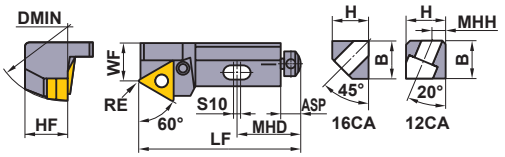
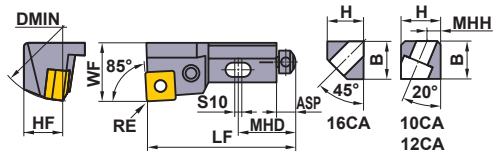
Mounting / Removal Position

CARTRIDGE

LL ISO type — Lever lock type

- Negative insert.
- Large breaker selection.
- Suitable for steel and cast iron.



Type	Order Number	Stock R	Stock L	Geometry	Insert Number	
PTFN	PTFNR/L10CA11	●	●	 Right hand tool holder shown.	TNMA TNMG TNMM TNGA TNGG	1103○○
	PTFNR/L12CA16	●	●			1604○○
	PTFNR/L16CA16	●	●			1604○○
	PTFNR/L20CA22	●				2204○○
PTGN	PTGNR/L12CA16	●	●	 Right hand tool holder shown.		1604○○
	PTGNR/L16CA16	●	●			1604○○
PSKN	PSKNR/L10CA09	●	●	 Right hand tool holder shown.	SNMA SNMG SNMM SNGA SNGG	0903○○
	PSKNR/L12CA12	●	●			1204○○
	PSKNR/L16CA12	●	●			1204○○
PCLN	PCLNR/L12CA12	●	●	 Right hand tool holder shown.	CNMA CNMG CNMM CNGG	1204○○
	PCLNR/L16CA12	●	●			1204○○
	PCLNR/L20CA12	●				1204○○
PSSN	PSSNR/L10CA09	●	●	 Right hand tool holder shown.	SNMA SNMG SNMM SNGA SNGG	0903○○
	PSSNR/L12CA12	●	●			1204○○
	PSSNR/L16CA12	●	●			1204○○
PTTN	PTTNR12CA16	●		 Right hand tool holder only.	TNMA TNMG TNMM TNGA TNGG	1604○○
	PTTNR16CA16	●				1604○○
PSYN	PSYNR10CA09	●		 Right hand tool holder only.	SNMA SNMG SNMM SNGA SNGG	0903○○
	PSYNR12CA12	●				1204○○
	PSYNR16CA12	●				1204○○

∗ Clamp Torque (N • m) : LLCS105=1.5, LLCS106=2.2, LLCS106S=2.2, LLCS108S=3.3

● : Inventory maintained in Japan.

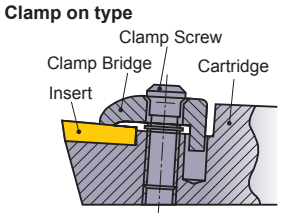
CARTRIDGE

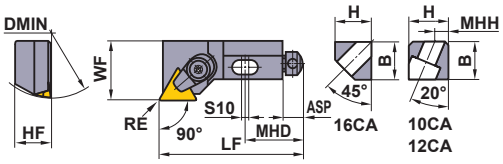
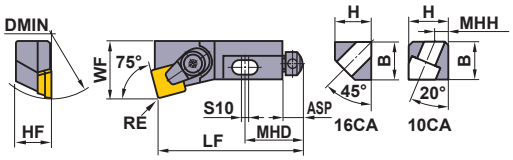
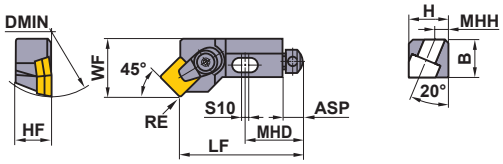
Dimensions(mm)											LLSCN LLSSN LLSTN				*			① ②	
H	B	LF	MHD	ASP	S10	MHH	HF	WF	RE	DMIN	Shim	Shim Pin	Clamp Lever	Lever Spring	Clamp Screw	Radial Screw	Axial Screw	Wrench	Set Bolt
12.5	11	50	20	8	2	5	10	14	0.4	**40**	—	—	LLCL12S	HLS1	LLCS105	LLR1	KS1	①HKY25R ②HKY20F	HSC06016
15.5	16	55	20	8	2	6	12	20	0.8	**50**	—	—	LLCL13S	HLS2	LLCS105	LLR1	KS1	①HKY25R ②HKY20F	HSC06020
16	17	63	25	8	2.5	—	16	25	0.8	**60**	LLSTN32	LLP13	LLCL13	—	LLCS106	LLR1	KS2	①HKY25R ②HKY20F	HBH08025
20	19	70	30	10	2.5	—	20	25	0.8	**70**	LLSTN42	LLP14	LLCL14	—	LLCS108S	LLR2	KS2	①HKY30R	HBH08030
15.5	16	55	20	8	2	6	12	20	0.8	**50**	—	—	LLCL13S	HLS2	LLCS105	LLR1	KS1	①HKY25R ②HKY20F	HSC06020
16	17	63	25	8	2.5	—	16	25	0.8	**60**	LLSTN32	LLP13	LLCL13	—	LLCS106	LLR1	KS2	①HKY25R ②HKY20F	HBH08025
12.5	11	50	20	8	2	5	10	14	0.8	**40**	—	—	LLCL13S	HLS2	LLCS105	LLR1	KS1	①HKY20R ①HKY25R	HSC06016
15.5	16	55	20	8	2	6	12	20	0.8	**50**	—	—	LLCL14S	HLS3	LLCS106S	LLR1	KS1	①HKY25R ②HKY20F	HSC06020
16	17	63	25	8	2.5	—	16	25	0.8	**60**	LLSSN42	LLP14	LLCL14	—	LLCS108S	LLR2	KS2	①HKY30R	HBH08025
15.5	16	55	20	8	2	6	12	20	0.8	**50**	—	—	LLCL14S	HLS3	LLCS106S	LLR1	KS1	①HKY25R ②HKY20F	HSC06020
16	17	63	25	8	2.5	—	16	25	0.8	**60**	LLSCN42	LLP14	LLCL14	—	LLCS108S	LLR2	KS2	①HKY30R	HBH08025
20	19	70	30	10	2.5	—	20	25	0.8	**70**	LLSCN42	LLP14	LLCL14	—	LLCS108S	LLR2	KS2	①HKY30R	HBH08030
12.5	11	44	20	8	2	5	10	14	0.8	**40**	—	—	LLCL13S	HLS2	LLCS105	LLR1	KS1	①HKY20R ①HKY25R	HSC06016
15.5	16	47	20	8	2	6	12	20	0.8	**50**	—	—	LLCL14S	HLS3	LLCS106S	LLR1	KS1	①HKY25R ②HKY20F	HSC06020
16	17	53	25	8	2.5	—	16	25	0.8	**60**	LLSSN42	LLP14	LLCL14	—	LLCS108S	LLR2	KS2	①HKY30R	HBH08025
15.5	16	55	20	8	2	6	12	13	0.8	**50**	—	—	LLCL13S	HLS2	LLCS105	LLR1	KS1	①HKY25R ②HKY20F	HSC06020
16	17	63	25	8	2.5	—	16	15	0.8	**60**	LLSTN32	LLP13	LLCL13	—	LLCS106	LLR1	KS2	①HKY25R ②HKY20F	HBH08025
12.5	11	50	20	8	2	5	10	14	0.8	**40**	—	—	LLCL13S	HLS2	LLCS105	LLR1	KS1	①HKY20R ①HKY25R	HSC06016
15.5	16	55	20	8	2	6	12	20	0.8	**50**	—	—	LLCL14S	HLS3	LLCS106S	LLR1	KS1	①HKY25R ②HKY20F	HSC06020
16	17	63	25	8	2.5	—	16	25	0.8	**60**	LLSSN42	LLP14	LLCL14	—	LLCS108S	LLR2	KS2	①HKY30R	HBH08025

CARTRIDGE

BC ISO type — Clamp on type

- 11°positive insert.
- Suitable for steel, cast iron, aluminium alloys and copper alloys.



Type	Order Number	Stock R	Stock L	Geometry	Insert Number	
CTGP	CTGPR10CA11	●		 Right hand tool holder only.	TPMN TPMR TPGN	1103○○
	CTGPR12CA16	●				1603○○
	CTGPR16CA16	●				1603○○
CSKP	CSKPR10CA09	●		 Right hand tool holder only.	SPMN SPMR SPGN	0903○○
	CSKPR16CA12	●				1203○○
CSSP	CSSPR10CA09	●		 Right hand tool holder only.		0903○○

∗ Clamp Torque (N • m) : BC4=2.5, BC4L=2.5, BC5=5.0, BC6=5.0

● : Inventory maintained in Japan.

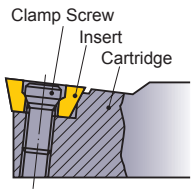
CARTRIDGE

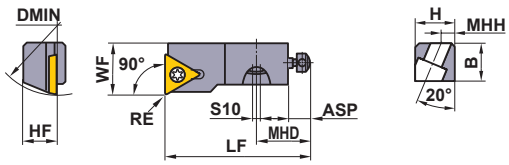
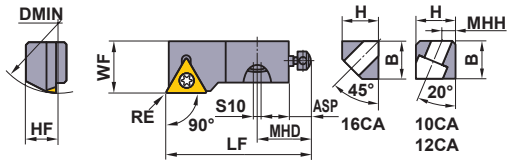
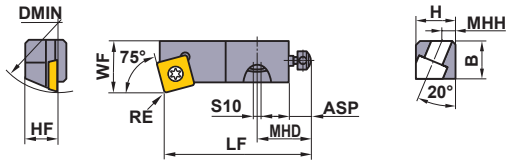
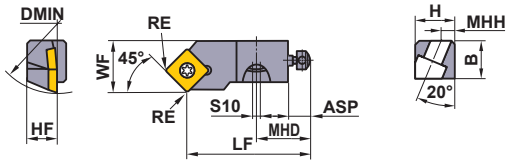
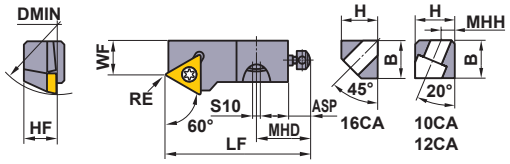
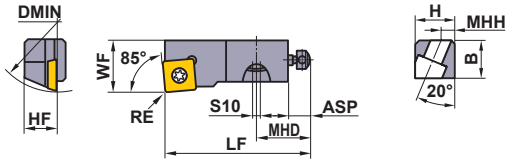
Dimensions(mm)											PS PT				*		
H	B	LF	MHD	ASP	S10	MHH	HF	WF	RE	DMIN	Shim	Shim Pin	Radial Screw	Axial Screw	Clamp Set	Wrench	Set Bolt
12.5	11	50	20	8	2	5	10	14	0.4	**38**	–	–	TSS05006	KS1	BC4	TKY10R	HSC06016
15.5	16	55	20	8	2	6	12	20	0.8	**50**	–	–	TSS06010	KS1	BC5	TKY20R	HSC06020
16	17	63	25	8	2	–	16	25	0.8	**55**	PT32	BCP201	TSS06010	KS2	BC6	TKY20R	HBH08025
12.5	11	50	20	8	2	5	10	14	0.8	**38**	–	–	TSS05006	KS1	BC4L	TKY10R	HSC06016
16	17	63	25	8	2	–	16	25	0.8	**55**	PS42	BCP251	TSS06010	KS2	BC6	TKY20R	HBH08025
12.5	11	44	20	8	2	5	10	14	0.8	**38**	–	–	TSS05006	KS1	BC4L	TKY10R	HSC06016

CARTRIDGE

SS ISO type — Screw on type

- 11°positive insert.
- Suitable for steel, cast iron, aluminium alloys and copper alloys.



Type	Order Number	Stock R	Stock L	Geometry	Insert Number	
STFP	STFPR/L10CA11	●	●	 Right hand tool holder shown.	TPMX TPGX	1103○○
	STFPR/L12CA16	●	●		TPMT TPGX	1603○○
STGP	STGPR10CA11	●		 Right hand tool holder only.	TPMX TPGX	1103○○
	STGPR12CA16	●			TPMT TPGX	1603○○
	STGPR16CA16	●				1603○○
SSKP	SSKPR10CA09	●		 Right hand tool holder only.	SPMT SPGX	0903○○
	SSKPR12CA12	●				1203○○
SSSP	SSSPR10CA09	●		 Right hand tool holder only.		0903○○
	SSSPR12CA12	●				1203○○
STTP	STTPR10CA11	●		 Right hand tool holder only.	TPMX TPGX	1103○○
	STTPR12CA16	●			TPMT TPGX	1603○○
	STTPR16CA16	●				1603○○
SSYP	SSYPR10CA09	●		 Right hand tool holder only.	SPMT SPGX	0903○○
	SSYPR12CA12	●				1203○○

* Clamp Torque (N • m) : CS300890T=1.0, TS4=3.5, TS5=7.5

● : Inventory maintained in Japan.

CARTRIDGE

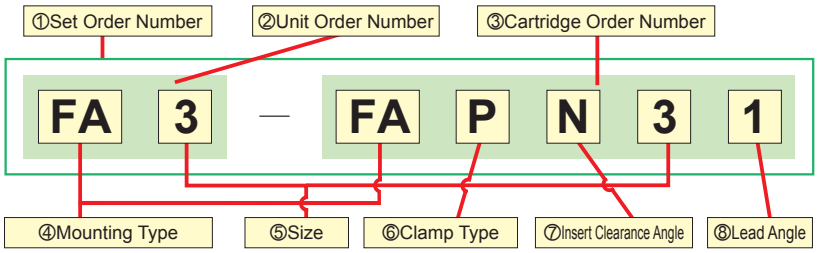
Dimensions(mm)											*				
H	B	LF	MHD	ASP	S10	MHH	HF	WF	RE	DMIN	Clamp Screw	Radial Screw	Axial Screw	Wrench	Set Bolt
12.5	11	50	20	8	2	5	10	14	0.4	**35**	CS300890T	TSS05006	KS1	TKY08F TKY10F	HSC06016
15.5	16	55	20	8	2	6	12	20	0.8	**50**	TS4	TSS06010	KS1	TKY15F TKY20F	HSC06020
12.5	11	50	20	8	2	5	10	14	0.4	**35**	CS300890T	TSS05006	KS1	TKY08F TKY10F	HSC06016
15.5	16	55	20	8	2	6	12	20	0.8	**50**	TS4	TSS06010	KS1	TKY15F TKY20F	HSC06020
16	17	63	25	8	2	—	16	25	0.8	**55**	TS4	TSS06012	KS2	TKY15F TKY20F	HBH08025
12.5	11	50	20	8	2	5	10	14	0.8	**35**	TS4	TSS05006	KS1	TKY10F TKY15F	HSC06016
15.5	16	55	20	8	2	6	12	20	0.8	**50**	TS5	TSS06010	KS1	TKY20F TKY25F	HSC06020
12.5	11	44	20	8	2	5	10	14	0.8	**35**	TS4	TSS05006	KS1	TKY10F TKY15F	HSC06016
15.5	16	47	20	8	2	6	12	20	0.8	**50**	TS5	TSS06010	KS1	TKY20F TKY25F	HSC06020
12.5	11	50	20	8	2	5	10	9	0.4	**35**	CS300890T	TSS05006	KS1	TKY08F TKY10F	HSC06016
15.5	16	55	20	8	2	6	12	13	0.8	**50**	TS4	TSS06010	KS1	TKY15F TKY20F	HSC06020
16	17	63	25	8	2	—	16	15	0.8	**55**	TS4	TSS06012	KS2	TKY15F TKY20F	HBH08025
12.5	11	50	20	8	2	5	10	14	0.8	**35**	TS4	TSS05006	KS1	TKY10F TKY15F	HSC06016
15.5	16	55	20	8	2	6	12	20	0.8	**50**	TS5	TSS06010	KS1	TKY20F TKY25F	HSC06020

BORING UNIT

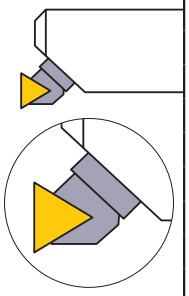
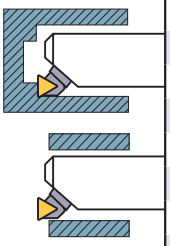
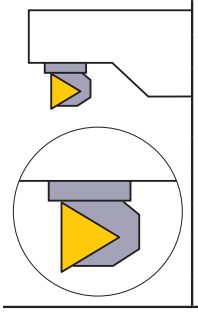
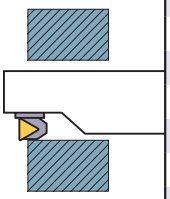
FA,FV

- Precision finish boring unit.
- Facilitates precision adjustment.
- High accuracy.

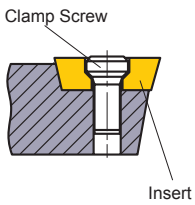
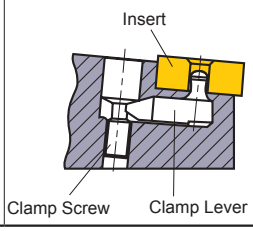
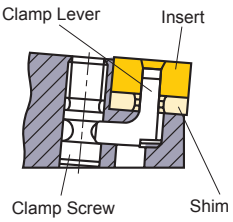
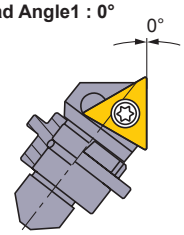
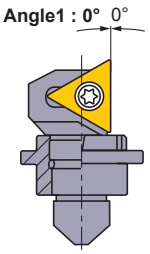
IDENTIFICATION



* Sets are delivered with unit and cartridge assembled.

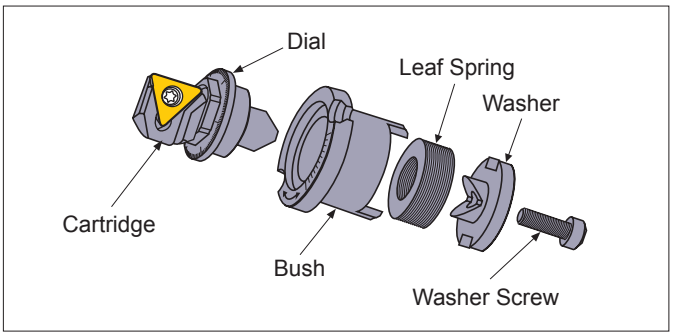
④Mounting Type	Cutting Mode	①Set Order Number *	Stock	②Unit Order Number	Stock	③Cartridge Order Number	Stock	⑤Size		⑥Clamp Type		⑦Insert Clearance Angle	
								Symbol	Min. Cutting Diameter (mm)	Symbol	Type	Symbol	Angle
FA Type (Angular Type) 		**FA0-FASC01**	●	**FA0**	●	**FASC01**	●	0	19	S	Screw On	C	7
		FA0-FASC01S	●	**FA0**	●	**FASC01S**	●	0	19	S	Screw On	C	7
		FA1-FASP11	●	**FA1**	●	**FASP11**	●	1	25	S	Screw On	P	11
		FA1-FASP11S	●	**FA1**	●	**FASP11S**	●	1	25	S	Screw On	P	11
		FA2-FASP21	●	**FA2**	●	**FASP21**	●	2	36	S	Screw On	P	11
		FA2-FASP21S	●	**FA2**	●	**FASP21S**	●	2	36	S	Screw On	P	11
		FA2-FAPN21	●	**FA2**	●	**FAPN21**	●	2	36	P	Lever Lock	N	0
		FA3-FASP31	●	**FA3**	●	**FASP31**	●	3	47	S	Screw On	P	11
		FA3-FASP31S	●	**FA3**	●	**FASP31S**	●	3	47	S	Screw On	P	11
		FA3-FAPN31	●	**FA3**	●	**FAPN31**	●	3	47	P	Lever Lock	N	0
		FA4-FAPN41	●	**FA4**	●	**FAPN41**	●	4	73	P	Lever Lock	N	0
FV Type (Vertical Type) 		**FV0-FVSC01**	●	**FV0**	●	**FVSC01**	●	0	19	S	Screw On	C	7
		FV0-FVSC01S	●	**FV0**	●	**FVSC01S**	●	0	19	S	Screw On	C	7
		FV1-FVSP11	●	**FV1**	●	**FVSP11**	●	1	25	S	Screw On	P	11
		FV1-FVSP11S	●	**FV1**	●	**FVSP11S**	●	1	25	S	Screw On	P	11
		FV2-FVSP21	●	**FV2**	●	**FVSP21**	●	2	36	S	Screw On	P	11
		FV2-FVSP21S	●	**FV2**	●	**FVSP21S**	●	2	36	S	Screw On	P	11
		FV2-FVPN21	●	**FV2**	●	**FVPN21**	●	2	36	P	Lever Lock	N	0
		FV3-FVSP31	●	**FV3**	●	**FVSP31**	●	3	47	S	Screw On	P	11
		FV3-FVSP31S	●	**FV3**	●	**FVSP31S**	●	3	47	S	Screw On	P	11
		FV3-FVPN31	●	**FV3**	●	**FVPN31**	●	3	47	P	Lever Lock	N	0
		FV4-FVPN41	●	**FV4**	●	**FVPN41**	●	4	73	P	Lever Lock	N	0

* "S" at the end of the order number indicates left hand tool.

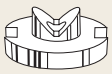
⑥Cartridge Clamp Structure			⑧Lead Angle	
S (Screw-on Type)	**P** (Lever Lock Type)	**P** (Lever Lock Type with Shim)	**FA**	**FV**
Applicable Size : 0,1,2,3 	**Applicable Size : 2,3** 	**Applicable Size : 4** 	**Lead Angle1 : 0°** 	**Lead Angle1 : 0°** 

● : Inventory maintained in Japan.

BORING UNIT



BORING UNIT SPARE PARTS

Unit Order Number	Washer Screw	Unit Screw	Wrench	Bush	 Washer	Leaf Spring
FA0	HSC02006	S1	HKY15R	The parts above are not sold separately as accuracy can only be guaranteed by having the complete set. Please contact us for questions about parts replacement.		
FV0	HSC02006	S1	HKY15R			
FA1	HSC02506	HY-A1	HKY20R			
FV1	HSC02506	HY-V1	HKY20R			
FA2	HSC03010	HY2	HKY20R,HKY25R			
FV2	HSC03010	HY2	HS-N2,HKY25R			
FA3	HSC04012	HY3	HKY20R,HKY30R			
FV3	HSC04012	HY3	HKY20R,HKY30R			
FA4	HSC05016	HY4	HKY30R,HKY40R			
FV4	HSC05016	HY4	HKY30R,HKY40R			

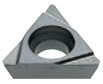
BORING UNIT

CARTRIDGE SPARE PARTS

Cartridge ∗1	Clamp Lever	Lever Spring	①② ∗3 Clamp Screw	Shim	Shim Pin	Spanner ∗2	①② Wrench	Applicable Insert	
FASC01(S)	—	—	① TS2	—	—	HR00	① TKY06F	TCGT..L-F TCGW	060102 060104
FVSC01(S)	—	—	① TS2	—	—	HR00	① TKY06F		
FASP11(S)	—	—	① CS250T	—	—	HR12	① TKY08F	TPGX TPGX..L/R TPMX..L/R	090204
FVSP11(S)	—	—	① CS250T	—	—	HR12	① TKY08F		
FASP21(S)	—	—	① CS300890T	—	—	HR12	① TKY08F		110304 110308
FVSP21(S)	—	—	① CS300890T	—	—	HR12	① TKY08F		
FAPN21	LLCL12S	HLS1	② LLCS103	—	—	HR12	② HKY20F	TNGA TNGG..L/R	110304 110308
FVPN21	LLCL12S	HLS1	② LLCS103	—	—	HR12	② HKY20F		
FASP31(S)	—	—	① CS300890T	—	—	HR34	① TKY08F	TPGX TPGX..L/R TPMX..L/R	110304 110308
FVSP31(S)	—	—	① CS300890T	—	—	HR34	① TKY08F		
FAPN31	LLCL12S	HLS1	② LLCS103	—	—	HR34	② HKY20F	TNGA TNGG..L/R	110304 110308
FVPN31	LLCL12S	HLS1	② LLCS103	—	—	HR34	② HKY20F		
FAPN41	LLCL13	—	② LLCS106	LLSTN32	LLP13	HR34	② HKY25F		160404 160408 160412
FVPN41	LLCL13	—	② LLCS106	LLSTN32	LLP13	HR34	② HKY25F		

(Note) Use left hand inserts in the cartridge for right hand cutting and right hand inserts in the cartridge for left hand cutting.
∗1 "S" at the end of the cartridge number indicates left hand.
∗2 Spanners and wrenches for adjustment will be included with orders made using the set code.
∗3 Clamp Torque (N • m) : TS2=0.6, CS250T=1.0, CS300890T=1.0, LLCS103=1.5, LLCS106=2.2

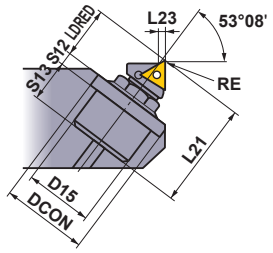
INSERTS

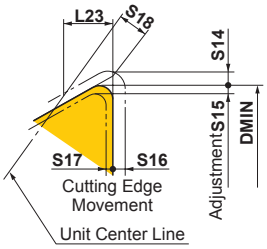
Finish Cutting			Medium Cutting	Flat Top	
TCGT..L/R-F	TPGX..L/R	TPMX..L	TNGG..L/R	TPGX	TNGA
(06)	(09,11)	 (09,11)	(11,16)	(09,11)	(11,16)

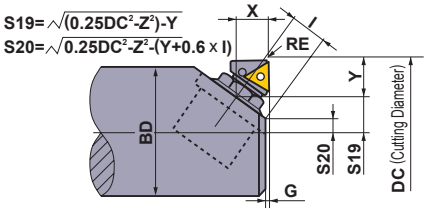
BORING UNIT

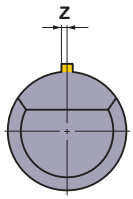
MAIN DIMENSIONS

●FA TYPE (ANGULAR TYPE)





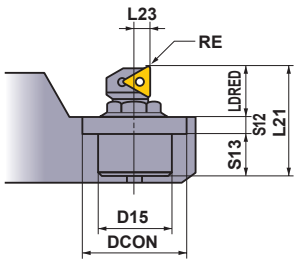


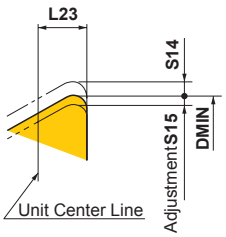


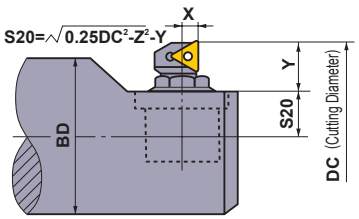
Clockwise (right hand) tool shown.
Minimum cutting diameters (DMIN) correspond to RE0.2 (0 type) and RE0.4 (1—4 type).
Unit : mm

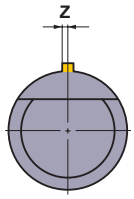
Set Order Number *	RE	DMIN	Adjustment S14	Adjustment S15	LDRED	L21	S16	S17	L23	D15	DCON	S12	S13	S18	Z	X	Y	G	I	BD Max.
FA0-FASC01(S)	0.2	19	0.32	0.16	9.0	19.9	0.30	0.12	1.5	11.11	15.06	2.7	8.2	1.11	1.2	6.4	6.5	1.0	6.8	DC-2
	0.4	19	0.32	0.16	8.8	19.7	0.30	0.12	1.6	11.11	15.06	2.7	8.2	1.11	1.2	6.4	6.4	1.0	6.8	DC-2
FA1-FASP11(S)	0.4	25	0.5	0.3	11.7	23.9	0.38	0.23	0.8	15.08	19.05	3.2	9.0	0.46	1.0	7.6	9.1	0.9	8.4	DC-2
FA2-FASP21(S)	0.4	36	0.7	0.4	14.9	33.4	0.53	0.30	1.1	19.05	24.58	4.0	14.5	0.7	1.2	9.7	11.5	0.8	11.1	DC-2
	0.8	36	0.7	0.4	14.5	33.0	0.53	0.30	1.3	19.05	24.58	4.0	14.5	0.7	1.2	9.7	11.2	0.8	11.1	DC-2
FA2-FAPN21	0.4	36	0.7	0.4	14.9	33.4	0.53	0.30	1.1	19.05	24.58	4.0	14.5	0.7	2.75	9.7	11.5	0.8	11.1	DC-2
	0.8	36	0.7	0.4	14.5	33.0	0.53	0.30	1.3	19.05	24.58	4.0	14.5	0.7	2.75	9.7	11.2	0.8	11.1	DC-2
FA3-FASP31(S)	0.4	47	1.0	0.6	18.35	42.85	0.75	0.45	0.9	22.225	31.75	4.8	19.7	0.54	1.9	11.7	14.4	1.2	13.1	DC-3
	0.8	47	1.0	0.6	17.95	42.45	0.75	0.45	1.1	22.225	31.75	4.8	19.7	0.54	1.9	11.7	14.1	1.2	13.1	DC-3
FA3-FAPN31	0.4	47	1.0	0.6	18.35	42.85	0.75	0.45	0.9	22.225	31.75	4.8	19.7	0.54	3.21	11.7	14.4	1.2	13.1	DC-3
	0.8	47	1.0	0.6	17.95	42.45	0.75	0.45	1.1	22.225	31.75	4.8	19.7	0.54	3.21	11.7	14.1	1.2	13.1	DC-3
FA4-FAPN41	0.4	73	1.5	0.7	28.0	65.4	1.13	0.53	1.3	31.75	46.02	6.4	31.0	0.86	5.2	17.7	21.9	1.3	20.5	DC-3
	0.8	73	1.5	0.7	27.6	65.0	1.13	0.53	1.5	31.75	46.02	6.4	31.0	0.86	5.2	17.7	21.6	1.3	20.5	DC-3
	1.2	73	1.5	0.7	27.2	64.6	1.13	0.53	1.7	31.75	46.02	6.4	31.0	0.86	5.2	17.7	21.3	1.3	20.5	DC-3

●FV TYPE (VERTICAL TYPE)









Clockwise (right hand) tool shown.
Minimum cutting diameters (DMIN) correspond to RE0.2 (0 type) and RE0.4 (1—4 type).
Unit : mm

Set Order Number *	RE	DMIN	Adjustment S14	Adjustment S15	LDRED	L21	L23	D15	DCON	S12	S13	Z	X	Y	BD Max.
FV0-FVSC01(S)	0.2	19	0.4	0.2	7.6	18.5	2.6	11.11	15.06	2.7	8.2	1.2	2.6	7.6	DC-2
	0.4	19	0.4	0.2	7.4	18.3	2.6	11.11	15.06	2.7	8.2	1.2	2.6	7.4	DC-2
FV1-FVSP11(S)	0.4	25	0.7	0.3	10.8	23.0	3.6	15.08	20.62	3.2	9.0	1.0	3.6	10.8	DC-2
FV2-FVSP21(S)	0.4	36	0.8	0.6	13.8	32.3	4.0	19.05	24.58	4.0	14.5	1.2	4.0	13.8	DC-2
	0.8	36	0.8	0.6	13.5	32.0	4.0	19.05	24.58	4.0	14.5	1.2	4.0	13.5	DC-2
FV2-FVPN21	0.4	36	0.8	0.6	13.8	32.3	4.0	19.05	24.58	4.0	14.5	2.1	4.0	13.8	DC-2
	0.8	36	0.8	0.6	13.5	32.0	4.0	19.05	24.58	4.0	14.5	2.1	4.0	13.5	DC-2
FV3-FVSP31(S)	0.4	47	1.3	0.7	16.7	41.2	4.8	22.225	31.75	4.8	19.7	1.9	4.8	16.7	DC-3
	0.8	47	1.3	0.7	16.4	40.9	4.8	22.225	31.75	4.8	19.7	1.9	4.8	16.4	DC-3
FV3-FVPN31	0.4	47	1.3	0.7	16.7	41.2	4.8	22.225	31.75	4.8	19.7	3.21	4.8	16.7	DC-3
	0.8	47	1.3	0.7	16.4	40.9	4.8	22.225	31.75	4.8	19.7	3.21	4.8	16.4	DC-3
FV4-FVPN41	0.4	73	1.8	1.0	25.0	62.4	7.1	31.75	46.02	6.4	31.0	5.2	7.1	25.0	DC-3
	0.8	73	1.8	1.0	24.7	62.1	7.1	31.75	46.02	6.4	31.0	5.2	7.1	24.7	DC-3
	1.2	73	1.8	1.0	24.4	61.8	7.1	31.75	46.02	6.4	31.0	5.2	7.1	24.4	DC-3

* "S" at the end of the order number indicates left hand tool.

MI TYPE BORING BARS

IDENTIFICATION

S B R 1 08

① ② ③ ④ ⑤

①Clamp Type	
S	Screw On Type

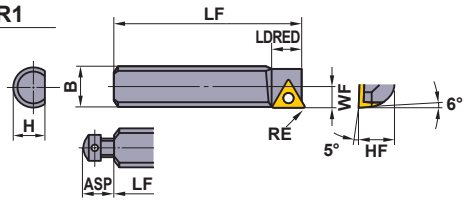
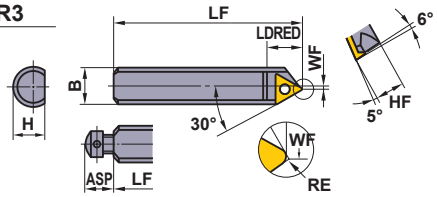
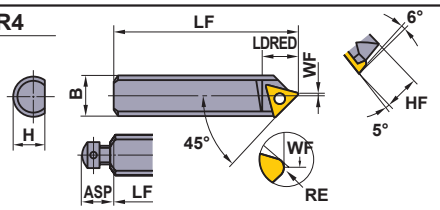
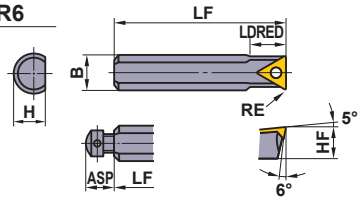
②Boring Bar Name

③Shank Shape	
R	Round Shank

④Lead Angle	
1	0°
3	30°
4	45°
6	90°

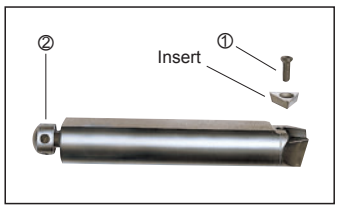
⑤Shank Size (mm)	
08	8
10	10
12	12
16	16

STANDARD HOLDER

Geometry	Order Number	Stock For Clockwise	* Insert Number		Dimensions (mm) H	B	LF	LDRED	ASP	HF	WF	RE
SBR1 	SBR108	●	TPGX TPGX...L TPMX...L	0802○○	7	8	35	9	—	7	3.5	0.4
	SBR110	●		0902○○	9	10	50	11	—	8	4.5	0.4
	SBR112	●		1103○○	10	12	60	12	7	10	5.0	0.4
SBR3 	SBR308	●	TPGX TPGX...L TPMX...L	0802○○	7	8	35	10	—	7	0.7	0.4
	SBR310	●		0902○○	9	10	50	12	—	8	1.0	0.4
	SBR312	●		1103○○	10	12	60	13	7	10	1.0	0.4
SBR4 	SBR408	●	TPGX TPGX...L TPMX...L	0802○○	7	8	35	10	—	7	0.5	0.4
	SBR410	●		0902○○	9	10	50	12	—	8	1.0	0.4
	SBR412	●		1103○○	10	12	60	13	7	10	1.0	0.4
	SBR416	●		1103○○	14	16	80	13	9	14	0	0.8
SBR6 	SBR608	●	TPGX TPGX...L TPMX...L	0802○○	7	8	35	8.5	—	7	—	0.4
	SBR610	●		0902○○	8	10	50	10	—	8	—	0.4
	SBR612	●		1103○○	10	12	60	11	7	10	—	0.4

(Note) When using an insert with a breaker, please use a left hand insert.

SPARE PARTS



Order Number		①Clamp Screw	②Pre-Set Screw	Wrench
SBR1 – SBR6	08	CS200T	—	TKY06F
	10	CS250T	—	TKY08F
	12	CS300890T	KS1S	TKY08F
	16	CS300890T	KS2S	TKY08F

* Clamp Torque (N • m) : CS200T=0.6, CS250T=1.0, CS300890T=1.0

● : Inventory maintained in Japan.

MI TYPE BORING BARS

Memo

CLASSIFICATION OF QUICK CHANGE / MODULAR TOOLING SYSTEM

Mitsubishi's quick change system is a must for improving efficiency in mass production lines.

- Shorten tool change times and increase machine efficiency.
- Reduce tool weight. Thus, tool change is safer and easier.
- Improve cutting edge accuracy.

QF1000 (Two Piece)

QF2000 (Small Diameter)

QF2000 (Large Diameter)

QC TYPE ADAPTER FOR PIN MILLING CUTTER

QS2000 (Arbor for Side Cutter)

Face Mill and Pin Milling Cutter

Boring Tool

QB2000 • QB3000

QB4000

MITSUBISHI's QUICK CHANGE SYSTEM

Connecting System

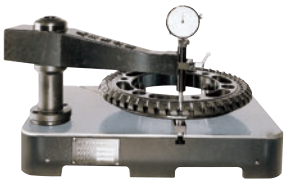
ABS License KOMET®

HSK

Special Tooling

SPQH (Spring)

SPQS (Spring+Oil pressure)



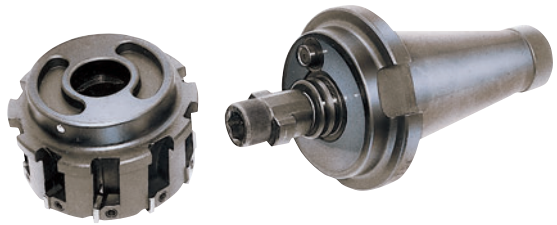
Setting Fixture

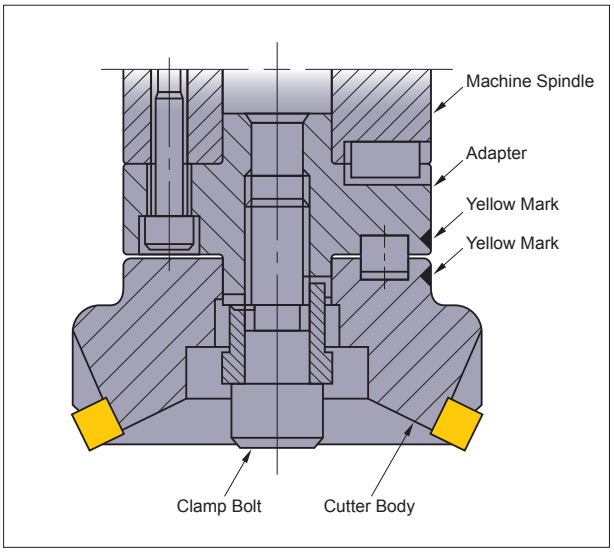
Setting Gauge

FACE MILL

QF2000 (SINGLE BOLT MOUNTING TYPE)

●One Piece Type (≤ϕ160)

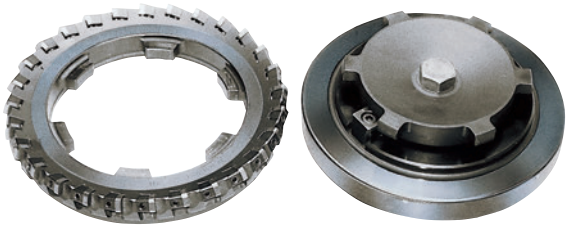


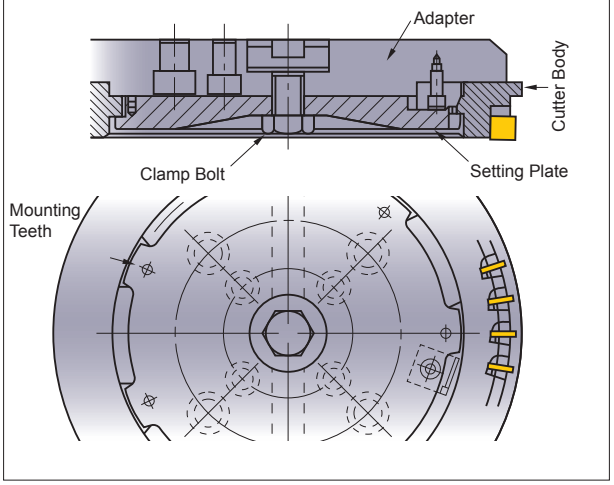


FEATURES

1. Simply turning a clamp bolt fixed to the adapter a few times enables cutter exchange.
2. The cutter needs to be turned 90° before removal. This prevents the cutter from falling free.
3. Applicable to both face milling and boring tools.
4. Cutter exchange time is less than 1 min.

●Two Piece Type (≥ϕ200)





FEATURES

1. Internal diameter of the cutter body has 4—6 mounting teeth. The adapter has the same mounting teeth and a single clamp bolt for installation.
2. The cutter needs to be turned 15° before removal. This prevents the cutter from falling free.
3. Cutter exchange time is less than 1 min.

QF1000 (GOURD SHAPED HOLE TYPE)

●One Piece Type (O Type ϕ200)

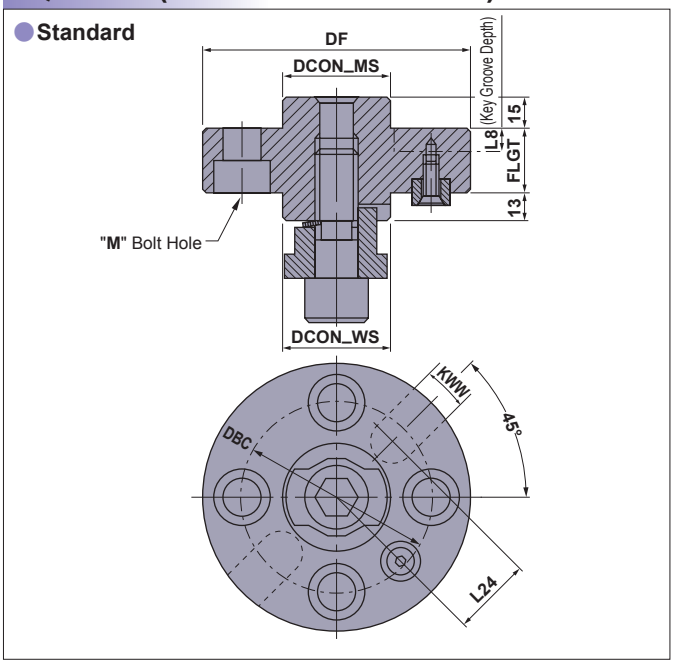
●Two Piece Type (T Type ≥ϕ250)

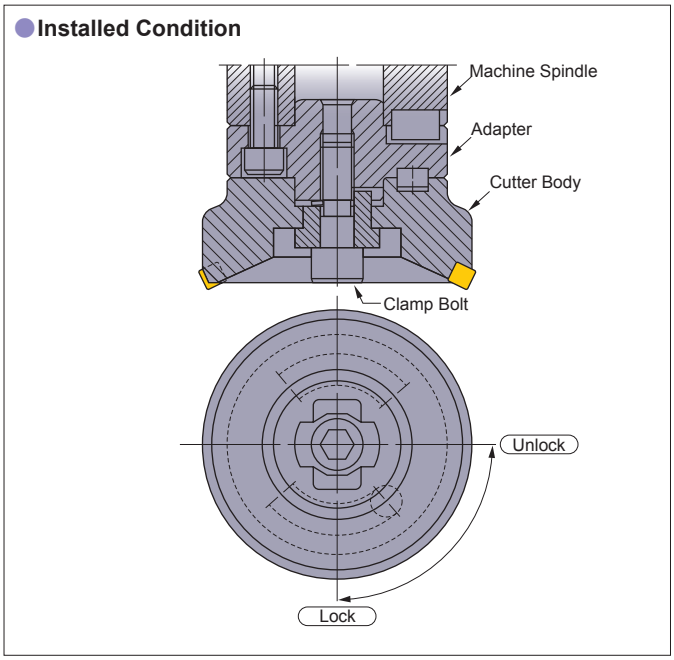
FEATURES

1. Gourd shaped hole type is employed. Turning 4—6 bolts enables cutter exchange.
2. The cutter needs to be turned 15° before removal. This prevents the cutter from falling free.
3. Cutters with ≥Ø250 are made up of 2 parts. Thus, weight at the time of installation is reduced and safety is improved.
4. Standard adapters facilitate installation of cutters with the same diameter and different insert shapes.
5. Cutter exchange time is less than 3—5 min.

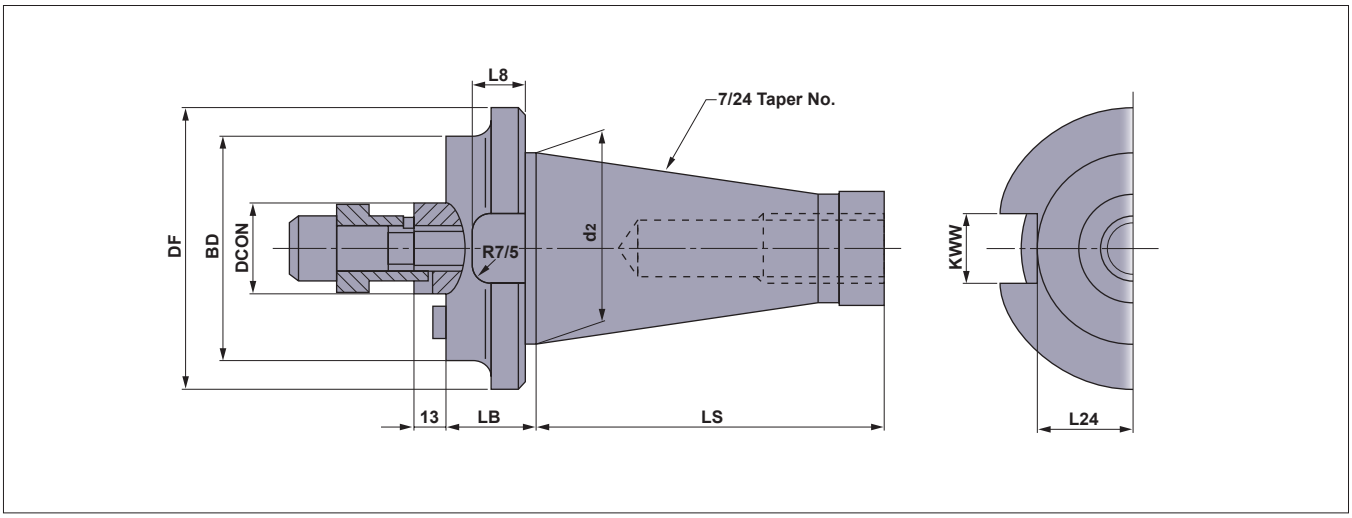
FACE MILLING ADAPTER

Q TYPE (SINGLE BOLT TYPE) φ80—φ160





Order Number	Cutter Diameter (DC)	Cutter Dimensions (mm)			Machine Dimensions (mm)						Tool Weight (kg)
		DF	DCON_WS	FLGT	DCON_MS	DBC	M	KWW	L8	L24	
QFA08025BCR/L	80	70	25.4	25	25.4	45	M12	9.5	7	18.4	0.8
QFA10025BDR/L	100	80	31.75	25	31.75	55	M16	12.7	8	23.2	1.2
QFA12530BER/L	125	100	38.1	30	38.1	70	M20	15.9	10	28	2.1
QFA16030BFR/L	160	125	50.8	30	50.8	85	M20	19	11	36	3.2

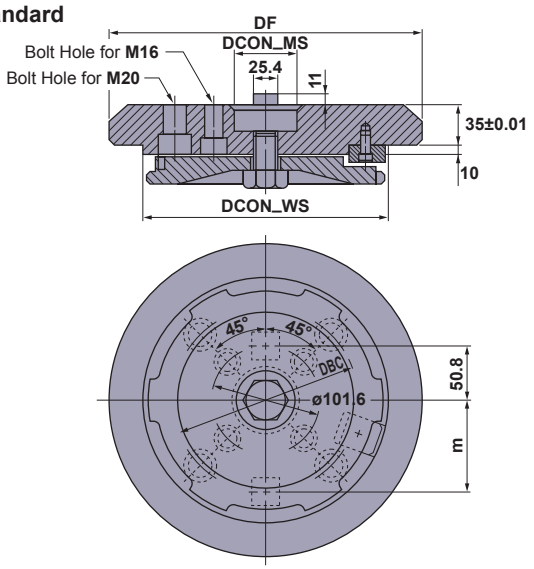


Order Number	Cutter Diameter (DC)	Cutter Dimensions (mm)			Machine Dimensions (mm)							Tool Weight (kg)
		BD	DCON	LB	DF	No.	d2	LS	KWW	L8	L24	
QFA08025N4R/L	80	70	25.4	25	70	40	44.45	93.4	16.1	16	22.5	1.4
QFA10025N4R/L	100	80	31.75	25	80	40	44.45	93.4	16.1	16	22.5	1.7
QFA12530N4R/L	125	100	38.1	30	100	40	44.45	93.4	16.1	16	22.5	2.7
QFA16030N4R/L	160	125	50.8	30	125	40	44.45	93.4	16.1	16	22.5	3.8
QFA08025N5R/L	80	70	25.4	25	100	50	69.85	126.8	25.7	19	35.3	3.2
QFA10025N5R/L	100	80	31.75	25	100	50	69.85	126.8	25.7	19	35.3	3.4
QFA12530N5R/L	125	100	38.1	30	100	50	69.85	126.8	25.7	19	35.3	4.0
QFA16030N5R/L	160	125	50.8	30	125	50	69.85	126.8	25.7	19	35.3	5.1

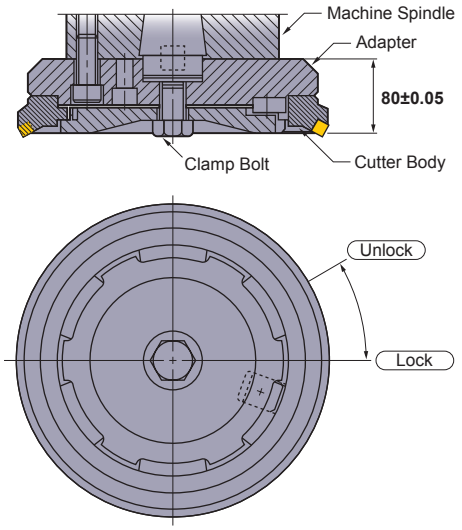
FACE MILLING ADAPTER

Q TYPE (SINGLE BOLT TYPE) φ200—φ500

Standard



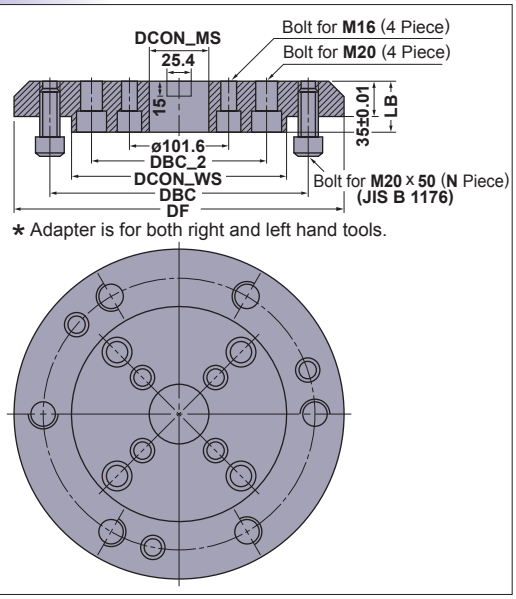
Installed Condition



Order Number	Cutter Diameter (DC)	Cutter Dimensions (mm)		Machine Dimensions (mm)			Tool Weight (kg)
		DCON_WS	DF	DCON_MS	DBC	m	
QFB20035KR/L	200	125	190	47.625	—	—	9
QFB25035KR/L	250	175	240	47.625	—	—	16
QFB31535PR/L	315	240	305	47.625	177.8	88.9	28
QFB35535PR/L	355	280	345	47.625	177.8	88.9	37
QFB40035PR/L	400	325	390	47.625	177.8	88.9	49
QFB50035PR/L	500	425	490	47.625	177.8	88.9	83

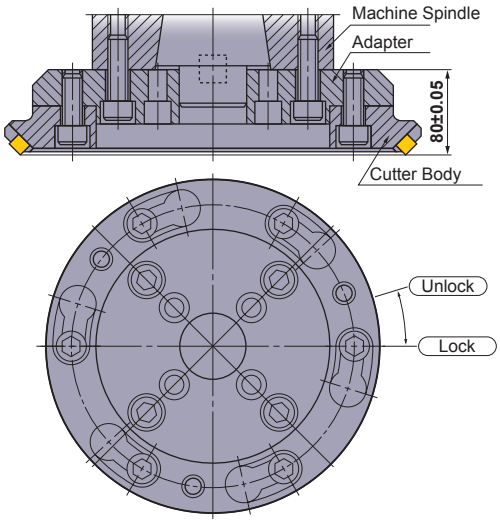
T TYPE (SIX BOLT TYPE) φ250—φ400

Standard



* Adapter is for both right and left hand tools.

Installed Condition



Order Number	Cutter Diameter (DC)	Cutter Dimensions (mm)					Machine Dimensions (mm)		Tool Weight (kg)
		DCON_WS	DBC	DF	LB	N	DCON_MS	DBC_2	
QFA25035K	250	110	155	230	45	4	47.625	—	9
QFA31535P	315	175	220	295	50	6	47.625	177.8	16
QFA35535P	355	215	260	335	50	6	47.625	177.8	22
QFA40035P	400	260	305	380	50	6	47.625	177.8	29

SIDE CUTTER

QC TYPE ADAPTER FOR PIN MILLING CUTTER

Cutter Body

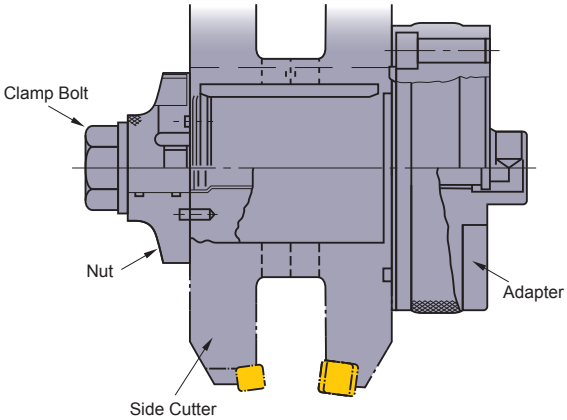
Adapter Body

FEATURES

1. Makes installation of Pin millng cutter easy, quick, and accurate.
2. Clamping the entire periphery of the cutter body improves rigidity and lateral run-out of the cutting edges.
3. Facilitates stable heavy cutting such as counter weight cutting and prevents sudden insert fracture.

QS2000 (INSTALLATION METHOD FOR SIDE CUTTER)

Appearance

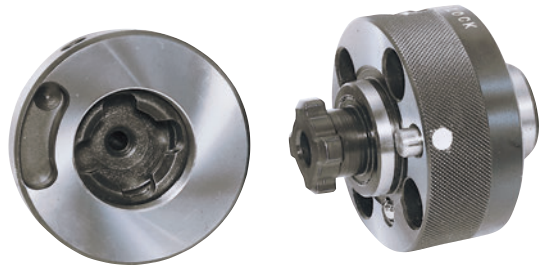


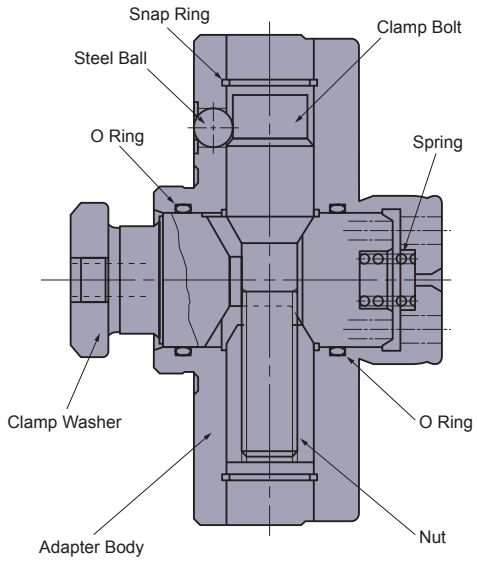
FEATURES

1. Turning the bolt a few times turns nut 45° and enables installation and detachment of the cutter.
2. Installation and detachment of the cutter is possible without taking the bolt and nut off the adapter.
3. The cutter is a solid type. Thus, the rigidity is high.
4. Cutter exchange time is less than 1 min.

BORING TOOL

QB4000 TYPE (SIDE CLAMP TYPE)

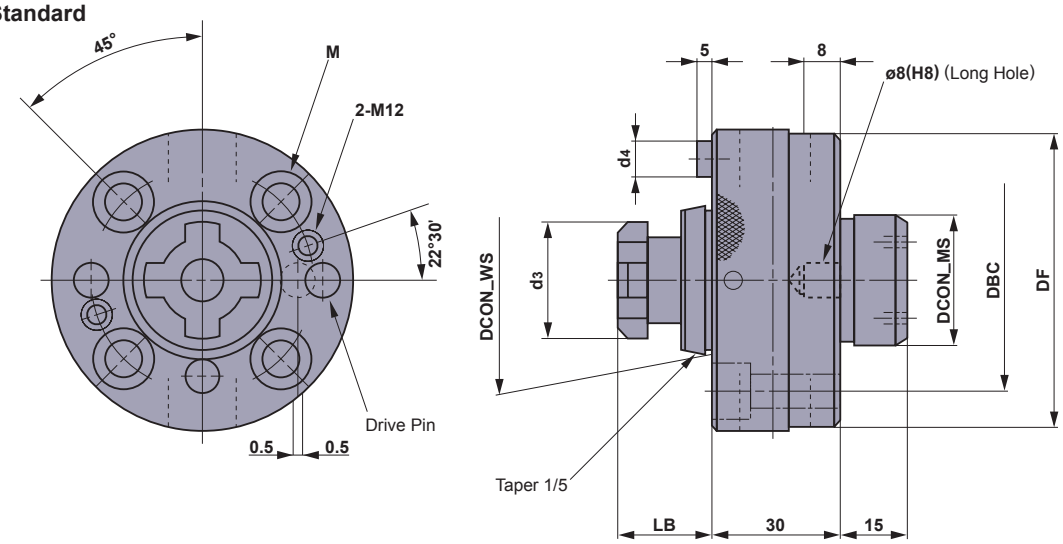




FEATURES

1. Tightening the clamp bolt (or clamp nut) draws the clamp washer in and securely holds the boring head.
2. The clamp washer has mounting teeth at the end. Turning the clamp washer 45° enables installation and detachment of the boring head.
3. Both 1/5 taper and cutter locating faces support the boring head. Thus, clamp rigidity and installation repeatability accuracy are high (2–3μm).
4. A side clamp structure is employed. Thus, a spindle turning stopper is unnecessary. This structure prevents the boring head from falling free.
5. Insert location close to the adapter body allows for convenient head exchange.
6. Suitable for a wide range of boring, from small to large diameters.
7. Head exchange time is less than 1 min.

Installation Standard



Order Number	DCON_WS	DCON_MS	DF	d3	DBC	M	LB	d4
QB4350070	35	30	70	28	52	M8	22	8
QB4350088	35	30	88	28	70	M8	22	8
QB4400098	40	30	98	34	80	M8	24	8
QB4400118	40	30	118	34	90	M10	24	10
QB4500138	50	40	138	42	110	M12	30	12

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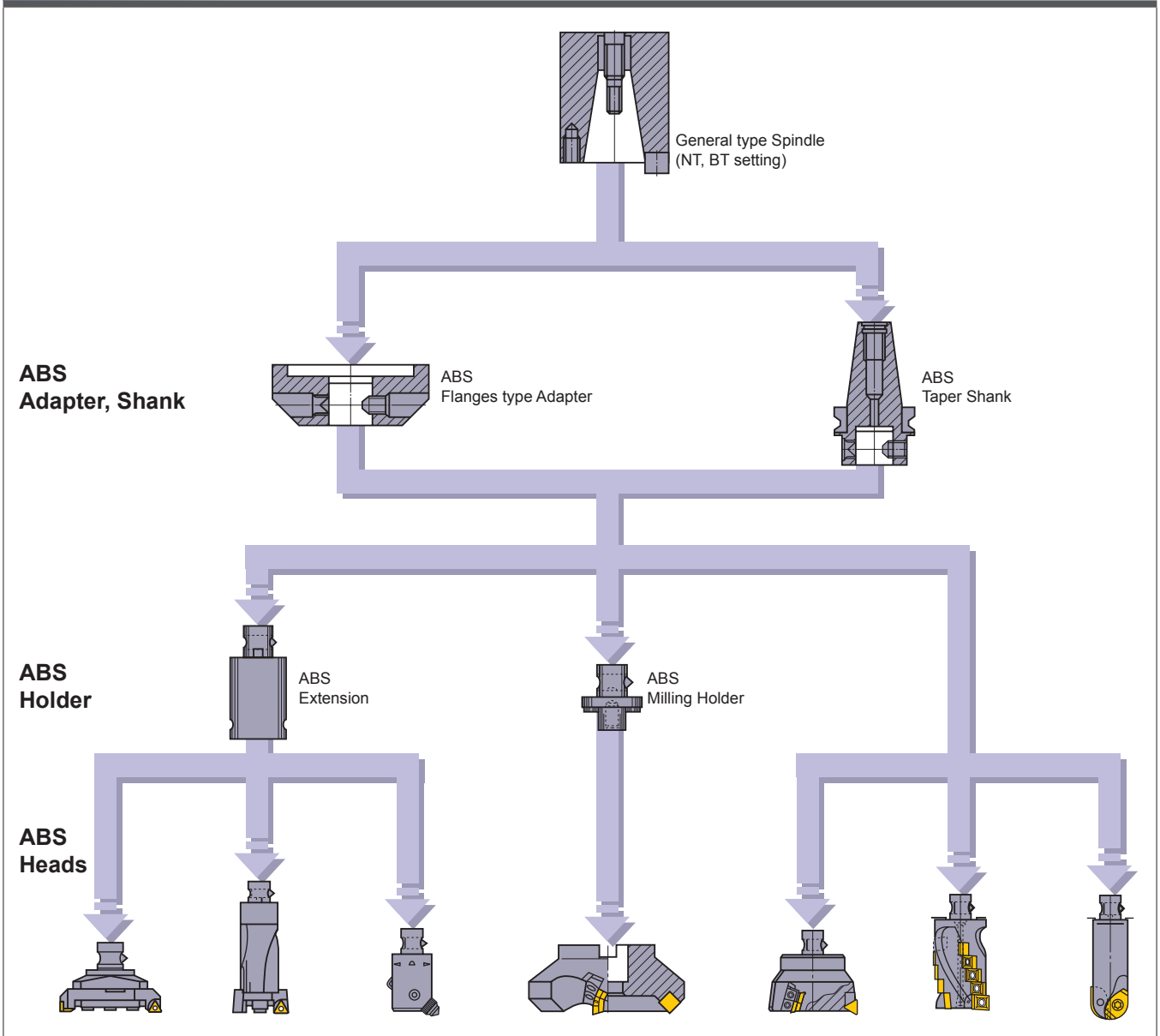
ABS SYSTEM CHARACTERISTIC

- High rigidity and high coupling strength.
  The taper wedge effects produced by the clamping screw, the taper screw, and the slide pin enable strong and firm coupling between the head and the adapter.
- As the cutting torque acts as torsion force on the axis, 50%—80% improvement is achieved for the clamping strength in the coupled portion axis direction.
- High accuracy is guaranteed.
  An attachment repeat accuracy of 2—3μm is constantly maintained in the coupled portion.
- From small (ϕ20) diameter to large diameter (ϕ200), a wide range of tooling is possible.
- Internal passage of the coolant (air) is possible without modifications to standard machinary.
- Tool head extensions are easy through the use of extension pieces.
- Through the use of reducers, tool head diameters are easily set.

ABS SYSTEM MECHANISM



(Note) The above chart also indicates the KOMET® standard.

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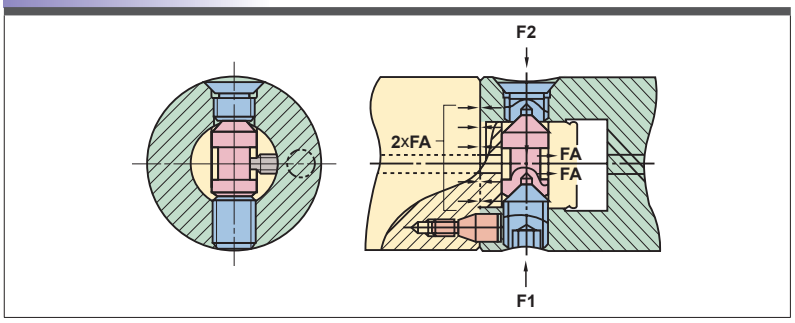
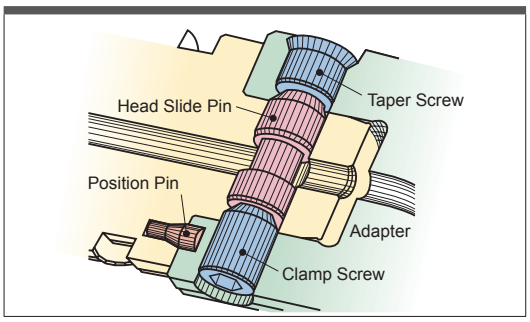
ABS SYSTEM COMPONENT

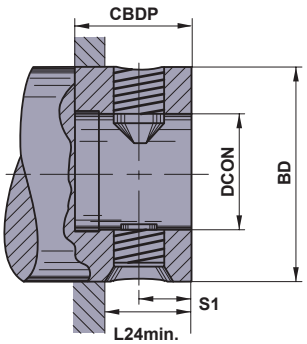




When the force F1 presses on the clamping screw, the slide pin moves in the radial direction and impinges on the taper screw, generation the reaction force F2. Since the centers of the clamping screw, the taper screw, and the slide pin are eccentric, a taper connection is made at sites separated by a 180° phase, with the clamping screw and the slide pin on the taper right impingement portion, and the slide pin and taper pin on the taper left impingement portion. The result is that, a vector analysis of those forces shows, as depicted in the diagram above, that the slides move in an identical direction, and the coupling force FA is doubled and transmitted accordingly. Further, cutting resistance generated during cutting becomes torsion stress and is transmitted accordingly. The forces F1 and F2 generated with the clamping screw and taper screw are expanded, and the coupling (jointing) force FA becomes as even greater force, and is generated accordingly.

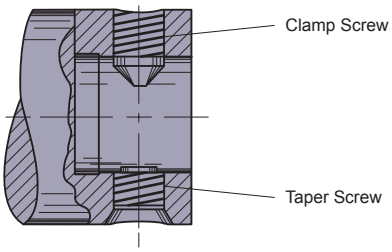
* This system is licensed from KOMET© of Germany. (JP Patent NO.1328669)

ABS SYSTEM SETTING STANDARDS Adapter Dimensions



Order Number	Dimensions(mm)				
	BD	DCON	CBDP	L24	S1
ABS25W	25	13	22	13	8.3
ABS32W	32	16	25	16	10.3
ABS40W	40	20	30	18.5	11.3
ABS50W	50	28	34	22	13.3
ABS63W	63	34	41	28	17.4
ABS80W	80	46	48	34	20.4
ABS100W	100	56	58	40.5	24.4
ABS125W	125	70	76	51	30.5

Parts for Adapter



Pack Order Number *	Stock	Clamp Screw	Taper Screw
ABS25-FS-W	●	ABS25-F1	ABS25-F2
ABS32-FS-W	●	ABS32-F1	ABS32-F2
ABS40-FS-W	●	ABS40-F1	ABS40-F2
ABS50-FS-W	●	ABS50-F1	ABS50-F2
ABS63-FS-W	●	ABS63-F1	ABS63-F2
ABS80-FS-W	●	ABS80-F1	ABS80-F2
ABS100-FS-W	●	ABS100-F1	ABS100-F2
ABS125-FS-W	●	ABS125-F1	ABS125-F2

* An order of the above type of screw and pin needs to be included in the set. Please use a "Pack Order Number" for your order.

● : **Inventory maintained in Japan.**

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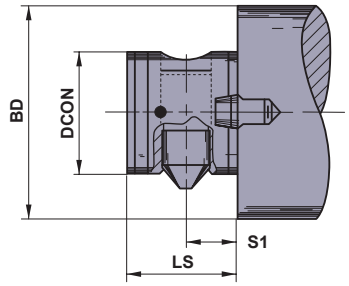
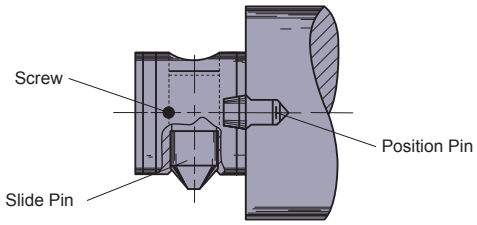
Head Dimensions



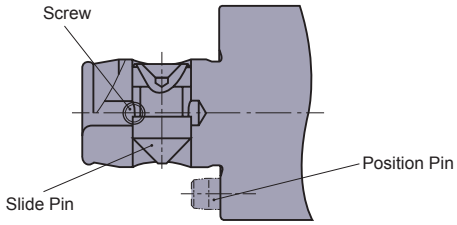
Order Number	Dimensions(mm)			
	BD	DCON	LS	S1
ABS25M	25	13	20	8
ABS32M	32	16	23	10
ABS40M	40	20	26	11
ABS50M	50	28	31	13
ABS63M	63	34	38	17
ABS80M	80	46	43	20
ABS100M	100	56	55	24
ABS125M	125	70	70	30

Parts for Head



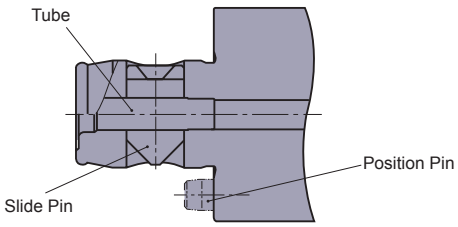
Pack Order Number *	Stock	Slide Pin	Position Pin	Screw
ABS25-ES-M	●	ABS25-E3	ABS25-E4	ABS25-E5
ABS32-ES-M	●	ABS32-E3	ABS32-E4	ABS32-E5
ABS40-ES-M	●	ABS40-E3	ABS40-E4	ABS40-E5
ABS50-ES-M	●	ABS50-E3	ABS50-E4	ABS50-E5
ABS63-ES-M	●	ABS63-E3	ABS63-E4	ABS63-E5
ABS80-ES-M	●	ABS80-E3	ABS80-E4	ABS80-E5
ABS100-ES-M	●	ABS100-E3	ABS100-E4	ABS100-E5
ABS125-ES-M	●	ABS125-E3	ABS125-E4	ABS125-E5

Parts for Head [For Fine Boring]



Pack Order Number *	Stock	Slide Pin	Position Pin	Screw
ABS25-ES-M1	●	ABS25-E3	ABS25-E4.1	ABS25-E5
ABS32-ES-M1	●	ABS32-E3	ABS32-E4.1	ABS32-E5
ABS40-ES-M1	●	ABS40-E3	ABS40-E4.1	ABS40-E5
ABS50-ES-M1	●	ABS50-E3	ABS50-E4.1	ABS50-E5
ABS63-ES-M1	●	ABS63-E3	ABS63-E4.1	ABS63-E5
ABS80-ES-M1	●	ABS80-E3	ABS80-E4.1	ABS80-E5
ABS100-ES-M1	●	ABS100-E3	ABS100-E4.1	ABS100-E5

Parts for Head [For Coolant Hole Type]



Pack Order Number *	Stock	Slide Pin	Position Pin	Tube
ABS25-ES-M3	●	ABS25-E3.2	ABS25-E4	ABS25-E6
ABS32-ES-M3	●	ABS32-E3.2	ABS32-E4	ABS32-E6
ABS40-ES-M3	●	ABS40-E3.2	ABS40-E4	ABS40-E6
ABS50-ES-M3	●	ABS50-E3.2	ABS50-E4	ABS50-E6
ABS63-ES-M3	●	ABS63-E3.2	ABS63-E4	ABS63-E6
ABS80-ES-M3	●	ABS80-E3.2	ABS80-E4	ABS80-E6
ABS100-ES-M3	●	ABS100-E3.2	ABS100-E4	ABS100-E6
ABS125-ES-M3	●	ABS125-E3.2	ABS125-E4	ABS125-E6

* An order of the above type of screw, pin and tube needs to be included in the set. Please use a "Pack Order Number" for your order.

● : **Inventory maintained in Japan.**

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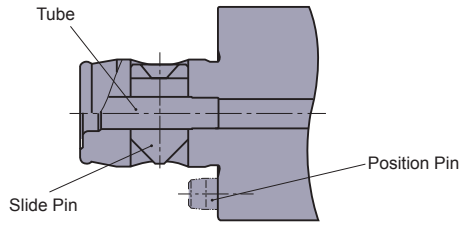
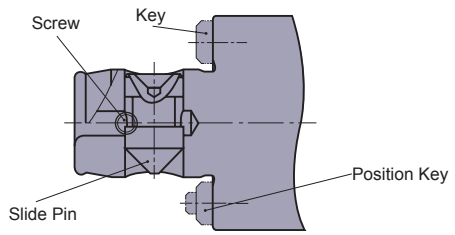
Parts for Head [For Fine Boring with Coolant Hole]



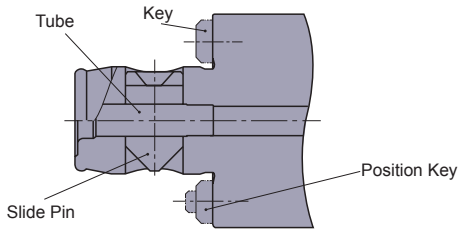
Pack Order Number *	Stock	Slide Pin	Position Pin	Tube
ABS25-ES-M4	●	ABS25-E3.2	ABS25-E4.1	ABS25-E6
ABS32-ES-M4	●	ABS32-E3.2	ABS32-E4.1	ABS32-E6
ABS40-ES-M4	●	ABS40-E3.2	ABS40-E4.1	ABS40-E6
ABS50-ES-M4	●	ABS50-E3.2	ABS50-E4.1	ABS50-E6
ABS63-ES-M4	●	ABS63-E3.2	ABS63-E4.1	ABS63-E6
ABS80-ES-M4	●	ABS80-E3.2	ABS80-E4.1	ABS80-E6
ABS100-ES-M4	●	ABS100-E3.2	ABS100-E4.1	ABS100-E6

Parts for Head [For Key Type]



Pack Order Number *	Stock	Slide Pin	Key	Position Key	Screw
SBA25-ES-M	●	ABS25-E3	SBA25-E4	SBA25-E4.1	ABS25-E5
SBA32-ES-M	●	ABS32-E3	SBA32-E4	SBA32-E4.1	ABS32-E5
SBA40-ES-M	●	ABS40-E3	SBA40-E4	SBA40-E4.1	ABS40-E5
SBA50-ES-M	●	ABS50-E3	SBA50-E4	SBA50-E4.1	ABS50-E5
SBA63-ES-M	●	ABS63-E3	SBA63-E4	SBA63-E4.1	ABS63-E5
SBA80-ES-M	●	ABS80-E3	SBA80-E4	SBA80-E4.1	ABS80-E5
SBA100-ES-M	●	ABS100-E3	SBA100-E4	SBA100-E4.1	ABS100-E5
SBA125-ES-M	●	ABS125-E3	SBA125-E4	SBA125-E4.1	ABS125-E5

Parts for Head [For Key Type with Coolant Hole]



Pack Order Number *	Stock	Slide Pin	Key	Position Key	Tube
SBA25-ES-M1	●	ABS25-E3.2	SBA25-E4	SBA25-E4.1	ABS25-E6
SBA32-ES-M1	●	ABS32-E3.2	SBA32-E4	SBA32-E4.1	ABS32-E6
SBA40-ES-M1	●	ABS40-E3.2	SBA40-E4	SBA40-E4.1	ABS40-E6
SBA50-ES-M1	●	ABS50-E3.2	SBA50-E4	SBA50-E4.1	ABS50-E6
SBA63-ES-M1	●	ABS63-E3.2	SBA63-E4	SBA63-E4.1	ABS63-E6
SBA80-ES-M1	●	ABS80-E3.2	SBA80-E4	SBA80-E4.1	ABS80-E6
SBA100-ES-M1	●	ABS100-E3.2	SBA100-E4	SBA100-E4.1	ABS100-E6
SBA125-ES-M1	●	ABS125-E3.2	SBA125-E4	SBA125-E4.1	ABS125-E6

* An order of the above type of screw, pin and tube needs to be included in the set. Please use a "Pack Order Number" for your order.

HSK SYSTEM

FEATURES OF THE HSK SYSTEM

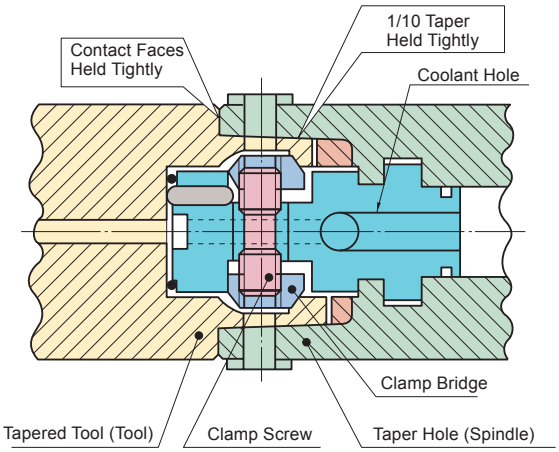
●**Suitable for high speed machining.**
When the taper hole is slightly seperated during high speed machining due to centrifugal force, the taper axis is continuously in contact with the taper hole because of elastic deformation. Thus, 2 face holding is maintained.

●**Guaranteed high accuracy.**
Installation repeatability of 2μm is guaranteed.

●**High rigidity.**
High rigidity in the radial and thrust direction due to the 2 face holding system.

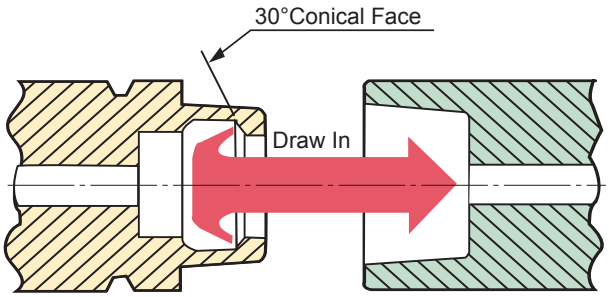
●**Easy installation.**
Detachable support structure ensures separation of the tool even when the tool has undergone thermal expansion.

●**Coolant system selection.**
Center coolant and anglar flow coolant type.



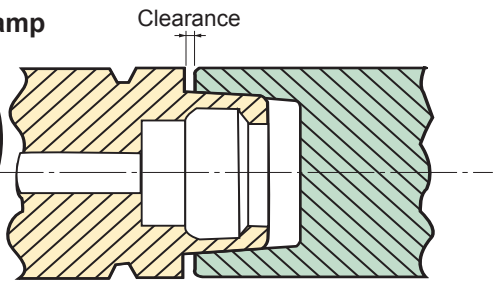
* HSK stands for **Hole** (Hollow) **Schaft** (axis) **Kegel** (taper) in German.

HSK CLAMPING METHOD



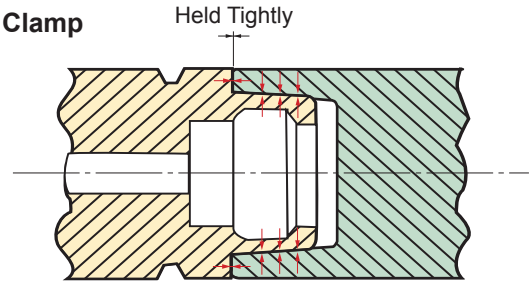
●The 30°conical face of the taper axis is pulled in the direction of the tapered hole to clamp.

●**Temporary Clamp Position**
(**The spindle taper face and the tool taper face contact.**)



●Temporary clamp position has a clearance between the spindle and the tool contact faces.
●Taper clamping force increases as the diameter increases.

●**Permanent Clamp Position**



●Hollow thin taper axis holds the taper faces and the contact faces tightly due to pressurized elastic deformation.

HSK SYSTEM

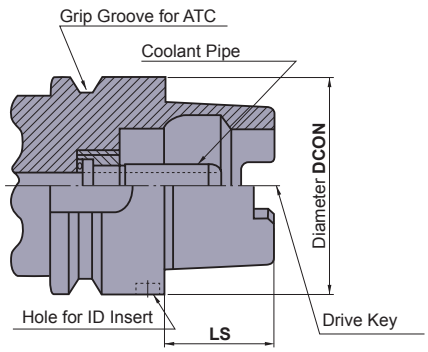
HSK SYSTEM FORM

There are various HSK types.
Mitsubishi Materials produces A, B, C, and D types of taper axis (tool size) and C and D types (manual operation) of taper hole (spindle side).

Type	Application	Tapered Tool (Tool)	Tapered Hole (Spindle)
A Type	Automatic tool change (ATC), center coolant (mainly milling tools)	□	
B Type	Automatic tool change (ATC), angular flow coolant (mainly turning tools)	□	
C Type	Manual tool change, center coolant (mainly milling tools)	□	□
D Type	Manual tool change, angular flow coolant (mainly turing tools)	□	□

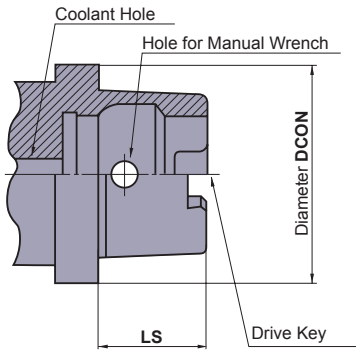
□ : Non stock, produced to order only.

Automatic Tool Change — **A Type** (Center Coolant Type) — Milling Tool



Order Number	Dimensions (mm)	
	DCON	**LS**
HSK-A32M	32	16
HSK-A40M	40	20
HSK-A50M	50	25
HSK-A63M	63	32
HSK-A80M	80	40
HSK-A100M	100	50

Manual Tool Change — **C Type** (Center Coolant Type) — Milling Tool



Order Number	Dimensions (mm)	
	DCON	**LS**
HSK-C32M	32	16
HSK-C40M	40	20
HSK-C50M	50	25
HSK-C63M	63	32
HSK-C80M	80	40
HSK-C100M	100	50

DRILLING

IDENTIFICATION 1622
SYMBOL DESCRIPTIONS 1623
DRILLS SELECTION CHART CEMENTED CARBIDE 1624
DRILLS SELECTION CHART HSS 1636
DRILLING APPLICATION RANGE 1642
DRILL STANDARD 1644
DRILLING 1644
SOLID CARBIDE 1644
WSTAR DRILLS 1644
WSTAR (FOR MACHINING OF STEEL AND CAST IRON) 1702
WSTAR (FOR MACHINING OF STAINLESS STEEL) 1708
WSTAR (FOR MACHINING OF ALUMINIUM ALLOYS) 1714
WSTAR (FOR DIE & MOULD MACHINING) 1722
MSE DRILLS 1732
MIRACLE DRILLS 1738
MZE/MZS DRILLS 1742
SOLID GUN DRILL 1758
MAE/MAS DRILLS 1762
MFE DRILLS 1768
Diamond coated drills 1774
High-Speed Steel Solid Type 1789
HSS MILLING SHANK DRILLS 1789
Violet coated precision drills 1793
VIOLET DRILLS 1818
STRAIGHT SHANK DRILLS 1823
TAPER SHANK DRILLS 1848
TRIANGULAR SHANK DRILLS 1866
BRAZED TYPE 1867
BRS/BRM/BRK DRILLS 1867
BRSB/BRB (FOR BRIDGE CONSTRUCTION) 1871
BRA/BRL DRILLS 1873
Exchangeable head 1880
TAW DRILLS 1880
TAW DRILLS 1880
INDEXABLE TYPE 1902
INDEXABLE TYPE 1902
INDEXABLE TYPE 1902
Others 1922
BRAZED TYPE 1922
CARBIDE 1922

★Arranged by Alphabetical order

3KD 1866
BRA 1873
BRB 1872
BRL 1876
BRM 1869
BRS 1867
BRS/MB 1871
DCBSS 1786
DCSSM 1784
DCSSS 1782
EPSS 1847
GSD 1823
GTD 1848
GTTD 1862
GUN DRILL 1922
GUN REAMER 1923–1924
GWSL 1840
GWSS 1837
GWTS 1860
KSD 1834
KTD 1854
LSD 1843
LTD 1857
MAE/MAS 1762
MCA 1775
MCAH 1779
MCC 1774
MCCH 1778
MCS 1780
MCT 1776
MCW 1777
MFE 1768
MGS 1758
MHS 1722
MICRO-MVS 1647
MMS 1708
MNS 1714
MQS 1702
MSE 1732
MSP 1736
MVE 1667
MVS 1649
MVX 1902
MWE 1694
MWS 1674
MZE/MZS 1742
MZE/MZS-STEP 1753
PILOT-MVS 1644
SD 1826, 1829
SDLS 1831
SEPDM 1791
SEPDS 1789
STAW 1880
TAF 1912
TAW 1890
TD 1850
TTD 1864
VAPDM 1798
VAPDMSUS 1809
VAPDS 1793
VAPDSCB 1815
VAPDSSUS 1802
VCHSM 1740
VCSSS 1738
VSD 1818
VTDS 1821

IDENTIFICATION

PRODUCT CODE OF DRILLS

MV S 0300 X S

Product name

- **MV** : New generation for general-purpose
- **MW** : General-purpose
- **MF** : Solid Carbide Flat Bottom Drills
- **MG** : Micro Solid Carbide Gun Drill
- **MS** : MSE Drills
- **MN** : For Machining of Aluminium Alloys
- **MH** : For die & mould machining
- **MM** : For Machining of Stainless Steel
- **MQ** : Steel • For high feed cast iron machining
- **MC** : Drill for CFRP machining
- **MZ** : MZE/MZS Drills
- **MA** : MAE/MAS Drills

Coolant

- **E** : External Coolant
- **S** : Internal Coolant

Diameter

ex.
0050 → ϕ0.5
0300 → ϕ3.0

l/d

- **S** : 2D
- **M** : 3D
- **L** : 5D (MAE, MAS : 6D)
- **X** : 12D
- **X∗∗D** : ∗∗D

Type of shank

- **A** : Straight shank
- **B** : Integral shank
- **S∗∗∗** : Shank Diameter (MV Series)

∗Other special types can be ordered.

VC S S S D0300 ∗∗∗

Product name

- **VC** : Miracle drills
- **DC** : Diamond coated drills
- **VA** : Violet coated precision drills (High Grade, High Speed Steel)
- **SE** : SE High Precision Drill (High-Speed Steel)
- **V** : Violet drills
- **G** : TiN coated drills (High-Speed Steel)
- **E** : Co-HSS drills
- **B** : Blister packed drills
- **None**: High-Speed Steel

Applications

- **SD** : General-purpose straight drill
- **TD** : General-purpose taper drill
- **S** : For steel
- **H** : For high hardness
- **N** : For CN
- **PD** : For high-precision machining
- **U** : For stainless
- **T** : For steel frame
- **W** : For deep hole

Type of shank

- **S** : Straight
- **T** : Taper
- **3K** : Triangular
- **6K** : Hexagonal

Flute length

- **S** : Short
- **M** : Medium
- **L** : Long

Diameter

ex.
D0050 → ϕ0.5
D0300 → ϕ3.0

Others

- **A∗∗∗** : Overall Length
- **S∗∗** : Shank Diameter
- **M∗** : Taper size

∗Other special types can be ordered.

SYMBOL DESCRIPTIONS

Tool material

Ultra micro grain carbide
Ultra micro grain carbide is used as the substrate material.

High grade high alloy HSS
High grade high alloy HSS is used as the substrate material.

Cobalt high speed steel
Cobalt high speed steel is used as the substrate material.

D-STH cobalt high-speed steel
Cobalt high-speed steel is used as the substrate material with D-STH.

High speed steel
High speed steel is used as the substrate material.

Web thinning

X web thinning
X web thinning is used at the drill point.

Z web thinning
Z web thinning is used at the drill point.

XR web thinning
XR web thinning is used at the drill point.

C web thinning
C web thinning is used at the drill point.

S web thinning
S web thinning is used at the drill point.

N web thinning
N web thinning is used at the drill point.

● : Inventory maintained.
▲: Inventory maintained.
To be replaced by new products.
□ : Non stock, produced to order only.

Application Range of Target Work Material

1st Recommenedation

P M S H N K

2nd Recommenedation

P M S H N K

Coating

Diamond Coating
Pure Diamond high performance coating excelling in film adhesion to the substrate.

Violet Coating
Increased tool life of 2–3 times that of TiN coated products.

TiN Coating
Increased tool life of 2–3 times that of non coated products.

Laminated PVD Coating
Exhibits outstanding wear resistance with a wide range of work materials including mild steel, carbon steel, alloy steel, stainless steel, cast iron-based materials, and aluminum alloys.

Super Multi-layer PVD Coating
Super multi-layer PVD coating material provides a life over 2 times longer than conventional materials.

PVD Coating
An ultra micro-grain cemented carbide optimal for stainless steel, and a PVD coating with outstanding heat resistance and lubricity.

MIRACLE Coating
The original Miracle (Al,Ti)N coating.
Also suitable for dry cutting.

CVD diamond coated end mills
Unique multi-layer micro-grain diamond crystal control technology drastically improves wear resistance and smoothness.

Angle and sharp corner edge

Point angle
Indicates drill point angle the tip.
∗ The icon shown is an example only.

·Solid Drills

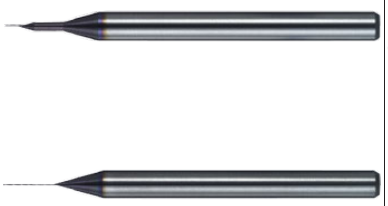
WSTAR DRILLS SERIES

Product name, Shape	Features	Coating	Size range(mm)	Hole Depth (l/d)	Work material	Page
New Generation Pilot Drills						
PILOT-MVS	WSTAR DRILLS ● Pilot Drill	DP1	φ1.0-φ14.0	2	P M K S	1644
New Generation for Small Diameter						
MICRO-MVS	WSTAR DRILLS ● Linear tooth profile improves both chip discharge and cutting edge strength. ● Double margin specifications offer optimum balance and high precision with small drills.	DP1	φ1.0-φ2.9	7-30	P M K S	1647
New Generation for General purpose						
MVS	WSTAR DRILLS ● New grade DP1020 offers long tool life for a wide range of work materials. ● Unique coolant supply technology, TRI-cooling offers high machining efficiency.(on drills over ø6)	DP1	φ3.0-φ20.0	3-40	P M K S	1649
MVE	WSTAR DRILLS ● New grade DP1020 offers long tool life for a wide range of work materials. ● The unique wavy cutting edge provides excellent sharpness and rigidity and helps to control wear at the periphery.	DP1	φ3.0-φ20.0	2,3	P M K S H	1667

Product name, Shape	Features	Coating	Size range(mm)	Hole Depth (l/d)	Work material	Page
For Small Diameter・General Drilling・For Deep Hole						
MWS	WSTAR DRILLS ● For high accuracy and efficient drilling of carbon steels through to difficult-to-cut materials.	VP	φ0.5-φ25.0	1-30	P M K S	1674
MWE	WSTAR DRILLS ● For high accuracy and efficient drilling of carbon steels through to difficult-to-cut materials. ● Also suitable for lower speed applications.	VP	φ3.0-φ20.0	2,3	P M K S H	1694
For Machining of Steel and Cast Iron						
MQS	WSTAR DRILLS ● New grade DP3020, unique coolant system, triple margin. ● High efficiency and high accuracy machining of steel and cast iron is possible.	DP3	φ3.0-φ20.0	3-8	P K	1702
For Machining of Stainless Steel						
MMS	WSTAR DRILLS ● New grade DP7020, unique coolant system, special fine margin. ● Long tool life and high efficiency drilling for stainless steel.	DP7	φ3.0-φ20.0	3,5	M	1708
For Machining of Aluminium Alloys						
MNS	WSTAR DRILLS ● 4 holes special coolant system, good for resistance to adhesion. ● High efficiency drilling for aluminium alloy.	—	φ3.0-φ20.0	5-30	N	1714

Product name, Shape	Features	Coating	Size range(mm)	Hole Depth (l/d)	Work material	Page
For Die & Mould Machining						
MHS	WSTAR DRILLS ● High backling strength and unique double margin. ● Non-step drilling with long tool life for high hardness steel,35HRC-55HRC.	VP	φ0.95-φ12.0	1-30	P M S H	1722

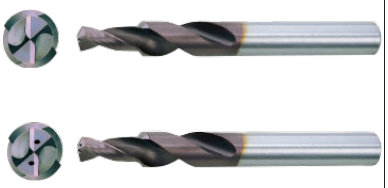
MIRACLE MINI STAR DRILLS SERIES

Product name, Shape	Features	Coating	Size range(mm)	Hole Depth (l/d)	Work material	Page
For Small Diameter						
MSE 	MIRACLE MINI STAR DRILLS ● Wide flute for preventing chip jamming. ● Stable, small diameter machining.	VP	φ0.1-φ0.99	5-12	P M K S H	1732
MSP	● SPOT DRILLS	VP	φ3.0	–	P M K S H	1736

MIRACLE DRILLS SERIES

Product name, Shape	Features	Coating	Size range(mm)	Hole Depth (l/d)	Work material	Page
For Hardened steel						
VCSSS 3mm shank series	MIRACLE DRILLS ● First recommendation for pilot hole drilling of hardened material.	VC	φ0.3-φ2.4	5	P M K S H	1738
VCHSM	MIRACLE DRILLS ● A suitable geometry for high hardness(60 HRC) material drilling.	VC	φ2.5-φ16.0	3	S H	1740

ZET1 DRILLS SERIES

Product name, Shape	Features	Coating	Size range(mm)	Hole Depth (l/d)	Work material	Page
General Drilling						
MZE/MZS	ZET1 DRILLS ● Helical coolant hole enables high speed machining(MZS type).	VP	φ1.0-φ20.0	2-12	P M K S	1742
With Chamfered Cutting Edges						
MZE/MZS_STEP 	ZET1 DRILLS ● Pre-hole drilling for metric screw thread. ● Helical coolant hole enables high speed machining(MZS type).	VP	φ3.4-φ10.3	2,3	P M K S	1753

MGS GUN DRILLS SERIES

Product name, Shape	Features	Coating	Size range(mm)	Hole Depth (l/d)	Work material	Page
For Deep Hole						
MGS	SOLID GUN DRILL ● Micro deep hole drilling is possible. ● Excellent run-out accuracy ensures high precision drilling.	—	φ0.7-φ3.0	20-100	P M K S H	1758

MAE/MAS DRILLS SERIES

Product name, Shape	Features	Coating	Size range(mm)	Hole Depth (l/d)	Work material	Page
For Aluminium Alloy, Cast Iron						
MAE/MAS	● Specially for aluminium and cast iron drilling. ● High hole accuracy. ● Pre-hole drilling for roll taps. ● Helical through coolant hole enables high speed machining(MAS type).	—	φ3.0-φ16.0	3,6	K N	1762

SOLID CARBIDE FLAT BOTTOM DRILLS

Product name, Shape	Features	Coating	Size range(mm)	Hole Depth (l/d)	Work material	Page
Flat Bottom Solid Carbide Drills						
MFE	● High efficiency drilling in various types of machining.	DP1	φ3.0-φ20.0	2	P M K N	1768

DRILL FOR COMPOSITES

Product name, Shape	Features	Coating	Size range(mm)	Hole Depth (l/d)	Work material	Page
FOR COMPOSITE MATERIALS						
MCC	DRILLS FOR COMPOSITES ● The acute cutting angle thoroughly reduces thrust and minimizes delamination. ● The cutting edge rake angle has been strengthened in the vertical direction on the axis of rotation. As a result, it is possible to minimize un-cutting and delamination on sharp cutting edges.	DD	φ4.76-φ11.14	3	N	1774
MCA	DRILLS FOR COMPOSITES ● The groove design that covers up chips also minimizes back counter in addition to minimizing contact between the chips and the CFRP hole wall surface. ● Controlling the cutting heat reduces deterioration of the CFRP hole precision caused by heat (improves the internal air effectiveness).	DD	φ6.38, φ9.55	5	N	1775
MCT	DRILLS FOR COMPOSITES ● The sharp cutting edge in titanium machining which requires good CFRP hole quality and machining that minimizes the generation of cutting heat with low thermal conductivity achieves high-quality CFRP and titanium stack material hole machining.	—	φ6.38, φ9.55	5	N	1776

Product name, Shape	Features	Coating	Size range(mm)	Hole Depth (l/d)	Work material	Page
MCW	DRILLS FOR COMPOSITES ● The unique cutting edge with V-shaped grooves on the cutting edge controls the flow of chips generated at the outer circumference. Furthermore, this minimizes the hole diameter gaps in stack materials. Burr on the hole exit side is controlled by shifting the cutting load to the rotating shaft.	DD	φ6.38, φ9.55	5	N	1777
MCCH	DRILLS FOR COMPOSITES ● The hand tool ultra-hard substrate with enhanced strength prevents sudden breakages and maintains high quality holes. The double angle design controls the thrust and enables a stable cutting speed even in hand tool machining.	—	φ2.5-φ9.55	2-15	N	1778
MCAH	DRILLS FOR COMPOSITES ● The hand tool ultra-hard substrate with enhanced strength prevents sudden breakages and produces highly reliable hole machining. The combination of the groove shape and optimal twisting ensures compatibility of the aluminum chip dividing and discharging. This leads to stable hole machining even in CFRP and Aluminum stack material machining.	—	φ2.5-φ9.55	3-15	N	1779
MCS	DRILLS FOR COMPOSITES ● For high accuracy and efficient drilling of CFRP. ● Unique diamond coating produces excellent wear resistance and smooth hole surface.	DD	φ4.366-φ12.725	3	N	1780

Product name, Shape	Features	Coating	Size range(mm)	Hole Depth (l/d)	Work material	Page
For Non-ferrous Material						
DCSSS	CVD DIAMOND COATED DRILLS ● The original CVD diamond coating technology provides excellent adhesion for coating layer and enables stable drilling without peeling or chipping.	DC	φ0.2-φ2.0	-	N	1782
DCSSM	CVD DIAMOND COATED DRILLS ● The original CVD diamond coating technology provides excellent adhesion for coating layer and enables stable drilling without peeling or chipping.	DC	φ2.1-φ3.0	-	N	1784
For Hard Brittle Materials						
DCBSS	CVD DIAMOND COATED DRILLS ● For machining materials such as sintered ceramics and quartz glass that cannot be machined with conventional drills.	DC	φ0.05-φ3.0	-	N	1786

·Indexable Drills

WSTAR INSERT TYPE DRILLS

Product name, Shape	Features	Coating	Size range(mm)	Hole Depth (l/d)	Work material	Page
General Drilling・For Bridge Construction						
STAW	SMALL DIAMETER INDEXABLE DRILLS ● Wavy cutting edge design for good chip control. ● Highly rigid clamping system offers stability and reliability for small hole drilling.	VP	φ10.0-φ18.4	1.5-8	P M K N	1880
TAW	WSTAR INSERT TYPE DRILLS ● Wavy cutting edge design for good chip control. ● Serration geometry for accurate insert location.	VP	φ18.5-φ30.4	3-8	P M K	1890

·BRAZED Drills

KEY POINT DRILLS

Product name, Shape	Features	Coating	Size range(mm)	Hole Depth (l/d)	Work material	Page
General Drilling						
BRS	● Excellent cutting sharpness and chip discharge due to high rake type insert. ● High efficiency, high accuracy machining.	UP	φ14.0-φ30.0	3	P M K	1867
BRM	● Excellent cutting sharpness and chip discharge due to high rake type insert. ● High efficiency, high accuracy machining.	UP	φ14.0-φ30.0	5	P M K	1869
For Bridge Construction						
BRSB/BRMB	KEY POINT DRILLS FOR BRIDGE CONSTRUCTION ● Excellent cutting sharpness and chip discharge due to high rake type insert. ● Unique flute shape is used. (l/d= 3,5)	UP	φ24.5-φ26.7	3,5	P	1871

NEW POINT DRILLS

Product name, Shape	Features	Coating	Size range(mm)	Hole Depth (l/d)	Work material	Page
General Drilling						
BRA	● Low thrust due to the absence of a chisel edge. ● Easy regrinding.	UP	φ8.0-φ40.0	3	P M K	1873
General Drilling (For turning)						
BRL	● Low thrust due to the absence of a chisel edge. ● Easy regrinding. ● Unique flute shape for lathes.	—	φ8.0-φ40.0	3	P M K	1876
For Bridge Construction						
BRB	NEW POINT DRILLS FOR BRIDGE CONSTRUCTION PARTS ● Low thrust due to the absence of a chisel edge. ● Easy regrinding.	—	φ24.5-φ26.7	3	P	1872

GUN DRILLS

Product name, Shape	Features	Coating	Size range(mm)	Hole Depth (l/d)	Work material	Page
Deep Hole Drills						
GUN DRILLS	● Gun drill for machining center. ● Easy regrinding. ● Unique flute shape for lathes.	—	φ2.0-φ30.3	–	–	1922

GUN REAMERS

Product name, Shape	Features	Coating	Size range(mm)	Hole Depth (l/d)	Work material	Page
Deep Hole Reaming						
GUN REAMERS	● Lead-angle is available to choose Straight or Spiral.	—	φ6.0-φ30.0	–	–	1923
Diamond Coated Deep Hole Reaming						
GUN REAMERS	● Suitable for Aluminum and Copper Alloys machining	—	φ6.0-φ30.3	–	–	1924

·Indexable Drill

MVX DRILLS SERIES

Product name, Shape	Features	Coating	Size range(mm)	Hole Depth（l/d）	Work material	Page
New Generation for General purpose						
MVX	MVX DRILLS SERIES ● Ideal combination of outer CVD insert and inner PVD insert. ● High rigidity body that enabled L/D=6 deep hole machining.	Additional Item	φ17.0-φ63.0	2-6	P M K	1902

TAF DRILLS SERIES

Product name, Shape	Features	Coating	Size range(mm)	Hole Depth（l/d）	Work material	Page
General Drilling						
TAF	TAF DRILLS SERIES ● High rigidity holder. ● 4 corner use insert. ● Various grades and chip breakers.	Additional Item	φ12.0-φ56.0	2-4	P M K	1912

DRILLS SELECTION CHART HSS

·Solid Drills

SE HIGH PRECISION DRILLS

Product name, Shape	Features	Coating	Size range(mm)	Hole Depth (l/d)	Work material	Page
General Drilling						
SEPDS	HSS MILLING SHANK DRILLS ● Unique D-STH process dramatically improves sharpness and welding resistance and smooth chip discharge.	—	φ0.5-φ4.0	-	P M K N	1789
SEPDM	HSS MILLING SHANK DRILLS ● Unique D-STH process dramatically improves sharpness and welding resistance and smooth chip discharge.	—	φ0.5-φ4.0	-	P M K N	1791

VIOLET COATED DRILLS

Product name, Shape	Features	Coating	Size range(mm)	Hole Depth (l/d)	Work material	Page
General, High Precision						
VAPDS	VIOLET DRILLS ● Highly efficient drilling and long tool life have been achieved with the newly developed Violet coating. (Standard drilling depth : 3 times or below the drill diameter)	V	φ0.5-φ13.0	–	P M K S	1793
VAPDM	VIOLET DRILLS ● Highly efficient drilling and long tool life have been achieved with the newly developed Violet coating. (Standard drilling depth : 5 times or below the drill diameter)	V	φ0.5-φ32.0	–	P M K S	1798
General, High Precision Steel						
VAPDSSUS	VIOLET DRILLS ● New design and the Violet coating combination enable high efficiency drilling and long tool life for drilling of stainless steels.	V	φ0.5-φ20.0	–	P M K N	1802

Product name, Shape	Features	Coating	Size range(mm)	Hole Depth (l/d)	Work material	Page
VAPDMSUS	VIOLET DRILLS ● New design and the Violet coating combination enable high efficiency drilling and long tool life for drilling of stainless steels.	V	φ0.5-φ13.0	–	P M K N	1809
Spot Milling						
VAPDSCB	VIOLET DRILLS ● Unique geometry offers high efficiency counter boring. Excellent chip breaking and flat counterbored surface.	V	φ2.0-φ32.0	–	P M K N	1815
General Drilling						
VSD	VIOLET DRILLS	V	φ0.5-φ13.0	–	P M K	1818
General Shot Taper						
VTDS	VIOLET DRILLS	V	φ6.0-φ32.0	–	P M K	1821

STRAIGHT SHANK DRILLS

Product name, Shape	Features	Coating	Size range(mm)	Hole Depth (l/d)	Work material	Page
General Drilling						
GSD	TiN, STRAIGHT SHANK	G	φ0.5-φ13.0	–	P M K N	1823
SD	● For general drilling.	—	φ0.2-φ17.5	–	P M K N	1826
SD	STRAIGHT SHANK, 1/100mm ● The diameter tolerance is 0~ -0.007 mm.	—	φ0.25-φ5.95	-	P M K N	1829
For Stainless Steel						
KSD	COBALT HSS, STRAIGHT SHANK DRILLS ● Sharp edge geometry for stainless steels up to 200HB.	—	φ1.0-φ13.0	–	P M N	1834

Product name, Shape	Features	Coating	Size range(mm)	Hole Depth (l/d)	Work material	Page
For Deep Hole						
SDLS	STRAIGHT SHANK DRILLS ● It is recommended to use when long overall length is demanded for preventing collision with workpiece with high rigidity. ● For both machining center and manually operated machines.	—	φ1.0-φ10.0	–	P K N S	1831
GWSS	TiN, FOR DEEP HOLE, CONVOLUTE FLUTE ● Suitable for general and deep hole drilling. It is also effective for shallow hole drilling.	G	φ1.0-φ13.0	-	P M K N	1837
GWSL	TiN, EXTRA LONG ● Suitable for general and deep hole drilling. Suitable for extra deep hole drilling.	G	φ2.0-φ13.0	-	P M K N	1840
LSD	EXTRA LONG ● Widely used for deep hole drilling.	—	φ1.0-φ13.0	–	P K N	1843
For Steel Sheet or Steel Thin Plates						
EPSS	PLATE PAL ● Special cutting edge geometry to prevent through hole burrs.	—	φ2.0-φ13.0	–	P M K N	1847

TAPER SHANK DRILLS

Product name, Shape	Features	Coating	Size range(mm)	Hole Depth (l/d)	Work material	Page
General Drilling						
GTD	TiN ● Original manufacturing and coating technology for improved performance.	G	φ6.0-φ40.0	–	P M K N	1848
TD	TAPER SHANK DRILLS ● For general drilling.	—	φ3.0-φ75.0	–	P M K N	1850
KTD	COBALT HSS ● Suitable for drilling of difficult-to-cut materials.	—	φ5.0-φ50.0	–	P M K N	1854

Product name, Shape	Features	Coating	Size range(mm)	Hole Depth (l/d)	Work material	Page
Deep Hole Drilling						
LTD	EXTRA LONG ● For deep hole drilling.	—	φ6.0-φ40.0	-	P K N	1857
GWTS	G-STEP FREE TAPER DRILLS ● Suitable for general and deep hole drilling. It is also effective for shallow hole drilling.	G	φ6.0-φ32.0	–	P M K N	1860

Product name, Shape	Features	Coating	Size range(mm)	Hole Depth (l/d)	Work material	Page
For Steel Frame						
GTTD	TiN, FOR STEEL FRAME ● Special point geometry for minimal through hole burrs.	G	φ17.0-φ32.0	–	P	1862
TTD	FOR STEEL FRAME ● Special point geometry for minimal through hole burrs.	—	φ17.0-φ32.0	–	P	1864

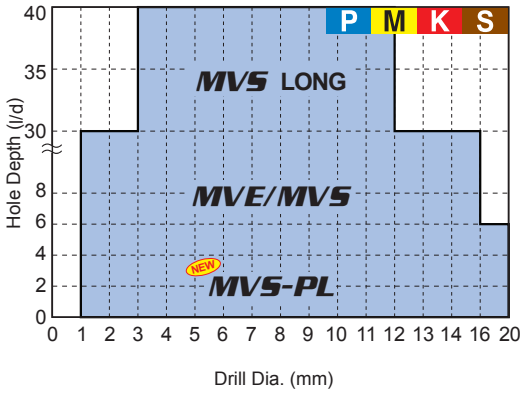
TRIANGULAR SHANK DRILL

Product name, Shape	Features	Coating	Size range(mm)	Hole Depth (l/d)	Work material	Page
For General Purpose Hand Drills(Electric Drill)						
3KD	TRIANGULAR SHANK DRILL ● 3 shank types for portable power tools.	—	φ7.0-φ26.0	–	P K N	1866

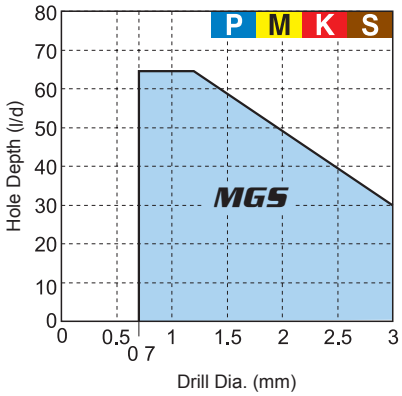
DRILLING APPLICATION RANGE

Carbide solid drills

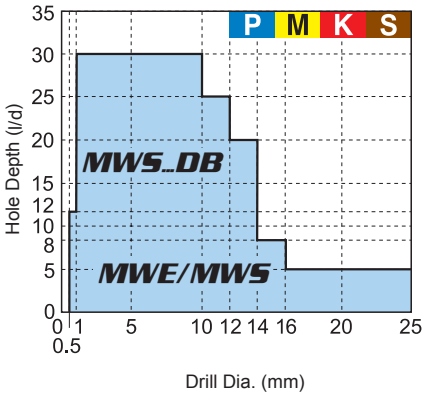
MVE/MVS New generation for general-purpose



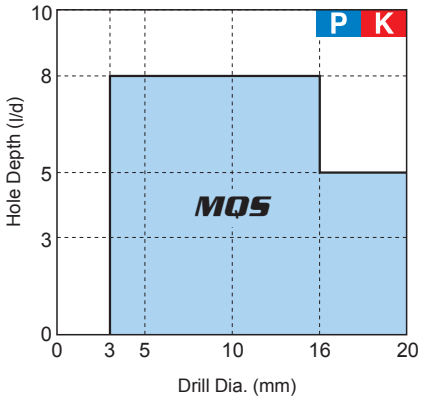
MGS (For small diameter and deep hole)



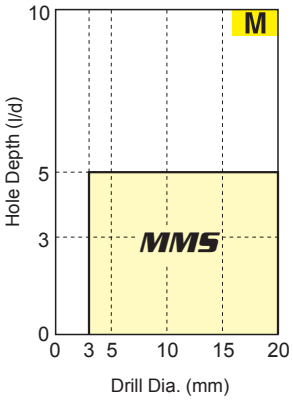
MWE/MWS,MWS...DB (SUPER LONG)



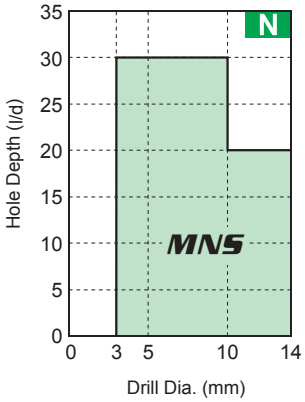
MQS Highly efficient drilling, High-precision
Steel • For high feed cast iron machining



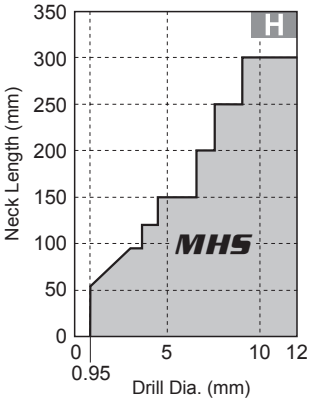
MMS Highly efficient drilling,Long tool life
For machining of stainless steel



MNS Highly efficient drilling
For machining of aluminium alloys

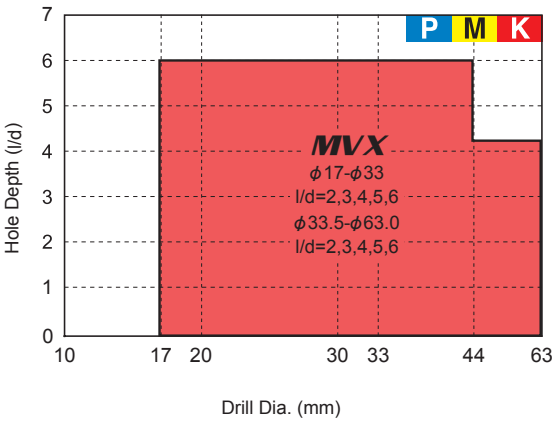


MHS High-precision deep hole
For die & mould machining

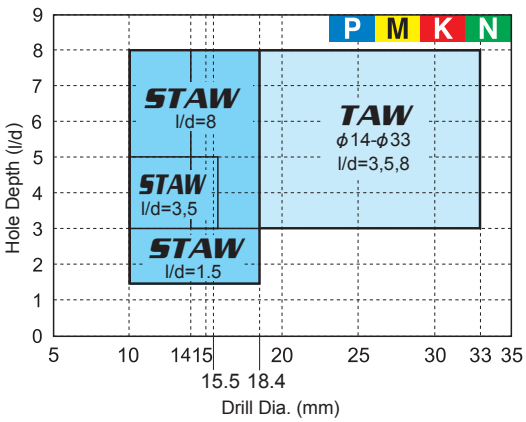


Indexable carbide drills

MVX



STAW,TAW



Memo

PILOT-MVS

WSTAR Drill Series

Product Information

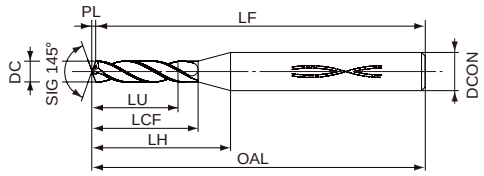
UWC DP1 145° SIG X Thinning

Work Material

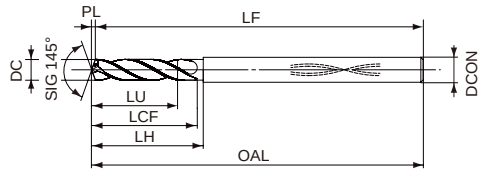
P M K N S

Recommended Cutting Condition >> 1663 ISO13399 Property >> 1966

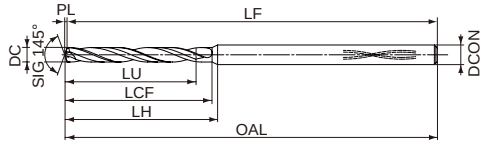
SYMBOL DESCRIPTIONS >> 1623 DRILLS SELECTION CHART >> 1624



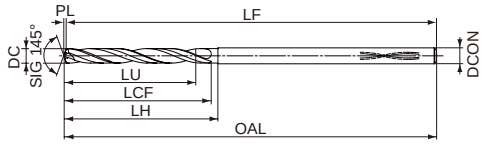
Type1



Type2



Type3



Type4

	1≦DC≦2.9	DC=3	3<DC≦6	1≦DC≦2.9	1≦DC≦2.9
	+ 0.014 0	0 —0.014	0 —0.018	0 —0.022	0 —0.027
h6	0 -0.006	0 -0.006	0 —0.008	0 —0.009	0 —0.011

Stock status indication:●: Inventory maintained in Japan.▲: This item to be discontinued within two years.□: Non stock, produced to order only.

Internal Coolant Unit（mm）

DC(mm)	Hole Depth(l/d)	DP1020	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
1.0	2	●	MVS0100X02S030	2.2	5.2	8.9	55.2	55	0.2	3	1
1.1	2	●	MVS0110X02S030	2.4	5.6	9.1	55.2	55	0.2	3	1
1.2	2	●	MVS0120X02S030	2.6	6.2	9.6	55.2	55	0.2	3	1
1.3	2	●	MVS0130X02S030	2.8	6.6	9.8	55.2	55	0.2	3	1
1.4	2	●	MVS0140X02S030	3.0	7.2	10.2	55.2	55	0.2	3	1
1.5	2	●	MVS0150X02S030	3.2	7.6	10.4	55.2	55	0.2	3	1
1.6	2	●	MVS0160X02S030	3.5	8.3	10.9	68.3	68	0.3	3	1
1.7	2	●	MVS0170X02S030	3.7	8.7	11.1	68.3	68	0.3	3	1
1.8	2	●	MVS0180X02S030	3.9	9.3	11.5	68.3	68	0.3	3	1
1.9	2	●	MVS0190X02S030	4.1	9.7	11.8	68.3	68	0.3	3	1
2.0	2	●	MVS0200X02S030	4.3	10.3	12.2	68.3	68	0.3	3	1

DC(mm)	Hole Depth(l/d)	DP1020	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
2.1	2	●	MVS0210X02S030	4.5	10.7	12.4	74.3	74	0.3	3	1
2.2	2	●	MVS0220X02S030	4.7	11.3	12.8	74.3	74	0.3	3	1
2.3	2	●	MVS0230X02S030	5.0	11.8	13.1	74.4	74	0.4	3	1
2.4	2	●	MVS0240X02S030	5.2	12.4	13.5	74.4	74	0.4	3	1
2.5	2	●	MVS0250X02S030	5.4	12.8	13.7	74.4	74	0.4	3	1
2.6	2	●	MVS0260X02S030	5.6	13.4	13.4	81.4	81	0.4	3	2
2.7	2	●	MVS0270X02S030	5.8	13.8	13.8	81.4	81	0.4	3	2
2.8	2	●	MVS0280X02S030	6.0	14.4	14.4	81.4	81	0.4	3	2
2.9	2	●	MVS0290X02S030	6.3	14.9	14.9	81.5	81	0.5	3	2
3.0	2	●	MVS0300X02S030PL	6.5	16.5	16.5	55.5	55	0.5	3	3
3.1	2	●	MVS0310X02S040PL	6.7	18.5	20.5	55.5	55	0.5	4	3

PILOT-MVS

DC(mm)	Hole Depth(l/d)	DP1020	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
3.2	2	●	MVS0320X02S040PL	6.9	18.5	20.5	55.5	55	0.5	4	3
3.3	2	●	MVS0330X02S040PL	7.1	18.5	20.5	55.5	55	0.5	4	3
3.4	2	●	MVS0340X02S040PL	7.3	18.5	20.5	55.5	55	0.5	4	3
3.5	2	●	MVS0350X02S040PL	7.6	18.5	20.6	55.6	55	0.6	4	3
3.6	2	●	MVS0360X02S040PL	7.8	20.6	20.6	55.6	55	0.6	4	3
3.7	2	●	MVS0370X02S040PL	8.0	20.6	20.6	55.6	55	0.6	4	3
3.8	2	●	MVS0380X02S040PL	8.2	20.6	20.6	55.6	55	0.6	4	3
3.9	2	●	MVS0390X02S040PL	8.4	20.6	20.6	55.6	55	0.6	4	3
4.0	2	●	MVS0400X02S040PL	8.6	20.6	20.6	55.6	55	0.6	4	3
4.1	2	●	MVS0410X02S050PL	8.8	22.6	24.6	62.6	62	0.6	5	3
4.2	2	●	MVS0420X02S050PL	9.1	22.7	24.7	62.7	62	0.7	5	3
4.3	2	●	MVS0430X02S050PL	9.3	22.7	24.7	62.7	62	0.7	5	3
4.4	2	●	MVS0440X02S050PL	9.5	22.7	24.7	62.7	62	0.7	5	3
4.5	2	●	MVS0450X02S050PL	9.7	22.7	24.7	62.7	62	0.7	5	3
4.6	2	●	MVS0460X02S050PL	9.9	24.7	24.7	62.7	62	0.7	5	4
4.7	2	●	MVS0470X02S050PL	10.1	24.7	24.7	62.7	62	0.7	5	4
4.8	2	●	MVS0480X02S050PL	10.4	24.8	24.8	62.8	62	0.8	5	4
4.9	2	●	MVS0490X02S050PL	10.6	24.8	24.8	62.8	62	0.8	5	4
5.0	2	●	MVS0500X02S050PL	10.8	24.8	24.8	62.8	62	0.8	5	4
5.1	2	●	MVS0510X02S060PL	11.0	26.8	28.8	66.8	66	0.8	6	4
5.2	2	●	MVS0520X02S060PL	11.2	26.8	28.8	66.8	66	0.8	6	4
5.3	2	●	MVS0530X02S060PL	11.4	26.8	28.8	66.8	66	0.8	6	4
5.4	2	●	MVS0540X02S060PL	11.7	26.9	28.9	66.9	66	0.9	6	4
5.5	2	●	MVS0550X02S060PL	11.9	26.9	28.9	66.9	66	0.9	6	4
5.6	2	●	MVS0560X02S060PL	12.1	28.9	28.9	66.9	66	0.9	6	4
5.7	2	●	MVS0570X02S060PL	12.3	28.9	28.9	66.9	66	0.9	6	4
5.8	2	●	MVS0580X02S060PL	12.5	28.9	28.9	66.9	66	0.9	6	4
5.9	2	●	MVS0590X02S060PL	12.7	28.9	28.9	66.9	66	0.9	6	4
6.0	2	●	MVS0600X02S060PL	12.9	28.9	28.9	66.9	66	0.9	6	4
6.1	2	●	MVS0610X02S070PL	13.2	32.0	35.0	75.0	74	1.0	7	4
6.2	2	●	MVS0620X02S070PL	13.4	32.0	35.0	75.0	74	1.0	7	4
6.3	2	●	MVS0630X02S070PL	13.6	32.0	35.0	75.0	74	1.0	7	4
6.4	2	●	MVS0640X02S070PL	13.8	32.0	35.0	75.0	74	1.0	7	4
6.5	2	●	MVS0650X02S070PL	14.0	32.0	35.0	75.0	74	1.0	7	4
6.6	2	●	MVS0660X02S070PL	14.2	35.0	35.0	75.0	74	1.0	7	4
6.7	2	●	MVS0670X02S070PL	14.5	35.1	35.1	75.1	74	1.1	7	4
6.8	2	●	MVS0680X02S070PL	14.7	35.1	35.1	75.1	74	1.1	7	4
6.9	2	●	MVS0690X02S070PL	14.9	35.1	35.1	75.1	74	1.1	7	4
7.0	2	●	MVS0700X02S070PL	15.1	35.1	35.1	75.1	74	1.1	7	4
7.1	2	●	MVS0710X02S080PL	15.3	35.1	38.1	80.1	79	1.1	8	4
7.2	2	●	MVS0720X02S080PL	15.5	35.1	38.1	80.1	79	1.1	8	4
7.3	2	●	MVS0730X02S080PL	15.8	35.2	38.2	80.2	79	1.2	8	4
7.4	2	●	MVS0740X02S080PL	16.0	35.2	38.2	80.2	79	1.2	8	4
7.5	2	●	MVS0750X02S080PL	16.2	35.2	38.2	80.2	79	1.2	8	4
7.6	2	●	MVS0760X02S080PL	16.4	38.2	38.2	80.2	79	1.2	8	4
7.7	2	●	MVS0770X02S080PL	16.6	38.2	38.2	80.2	79	1.2	8	4
7.8	2	●	MVS0780X02S080PL	16.8	38.2	38.2	80.2	79	1.2	8	4
7.9	2	●	MVS0790X02S080PL	17.0	38.2	38.2	80.2	79	1.2	8	4
8.0	2	●	MVS0800X02S080PL	17.3	38.3	38.3	80.3	79	1.3	8	4
8.1	2	●	MVS0810X02S090PL	17.5	38.3	41.3	85.3	84	1.3	9	4
8.2	2	●	MVS0820X02S090PL	17.7	38.3	41.3	85.3	84	1.3	9	4
8.3	2	●	MVS0830X02S090PL	17.9	38.3	41.3	85.3	84	1.3	9	4
8.4	2	●	MVS0840X02S090PL	18.1	38.3	41.3	85.3	84	1.3	9	4
8.5	2	●	MVS0850X02S090PL	18.3	38.3	41.3	85.3	84	1.3	9	4
8.6	2	●	MVS0860X02S090PL	18.6	41.4	41.4	85.4	84	1.4	9	4
8.7	2	●	MVS0870X02S090PL	18.8	41.4	41.4	85.4	84	1.4	9	4
8.8	2	●	MVS0880X02S090PL	19.0	41.4	41.4	85.4	84	1.4	9	4
8.9	2	●	MVS0890X02S090PL	19.2	41.4	41.4	85.4	84	1.4	9	4
9.0	2	●	MVS0900X02S090PL	19.4	41.4	41.4	85.4	84	1.4	9	4
9.1	2	●	MVS0910X02S100PL	19.6	41.4	44.4	90.4	89	1.4	10	4
9.2	2	●	MVS0920X02S100PL	19.9	41.5	44.5	90.5	89	1.5	10	4
9.3	2	●	MVS0930X02S100PL	20.1	41.5	44.5	90.5	89	1.5	10	4
9.4	2	●	MVS0940X02S100PL	20.3	41.5	44.5	90.5	89	1.5	10	4
9.5	2	●	MVS0950X02S100PL	20.5	41.5	44.5	90.5	89	1.5	10	4
9.6	2	●	MVS0960X02S100PL	20.7	44.5	44.5	90.5	89	1.5	10	4
9.7	2	●	MVS0970X02S100PL	20.9	44.5	44.5	90.5	89	1.5	10	4
9.8	2	●	MVS0980X02S100PL	21.1	44.5	44.5	90.5	89	1.5	10	4
9.9	2	●	MVS0990X02S100PL	21.4	44.6	44.6	90.6	89	1.6	10	4
10.0	2	●	MVS1000X02S100PL	21.6	44.6	44.6	90.6	89	1.6	10	4
10.1	2	●	MVS1010X02S110PL	21.8	44.6	47.6	96.6	95	1.6	11	4
10.2	2	●	MVS1020X02S110PL	22.0	44.6	47.6	96.6	95	1.6	11	4
10.3	2	●	MVS1030X02S110PL	22.2	44.6	47.6	96.6	95	1.6	11	4
10.4	2	●	MVS1040X02S110PL	22.4	44.6	47.6	96.6	95	1.6	11	4
10.5	2	●	MVS1050X02S110PL	22.7	44.7	47.7	96.7	95	1.7	11	4
10.6	2	●	MVS1060X02S110PL	22.9	48.7	48.7	96.7	95	1.7	11	4
10.7	2	●	MVS1070X02S110PL	23.1	48.7	48.7	96.7	95	1.7	11	4
10.8	2	●	MVS1080X02S110PL	23.3	48.7	48.7	96.7	95	1.7	11	4
10.9	2	●	MVS1090X02S110PL	23.5	48.7	48.7	96.7	95	1.7	11	4
11.0	2	●	MVS1100X02S110PL	23.7	48.7	48.7	96.7	95	1.7	11	4
11.1	2	●	MVS1110X02S120PL	23.9	48.7	51.7	96.7	95	1.7	12	4
11.2	2	●	MVS1120X02S120PL	24.2	48.8	51.8	96.8	95	1.8	12	4
11.3	2	●	MVS1130X02S120PL	24.4	48.8	51.8	96.8	95	1.8	12	4
11.4	2	●	MVS1140X02S120PL	24.6	48.8	51.8	96.8	95	1.8	12	4
11.5	2	●	MVS1150X02S120PL	24.8	48.8	51.8	96.8	95	1.8	12	4
11.6	2	●	MVS1160X02S120PL	25.0	48.8	48.8	96.8	95	1.8	12	4
11.7	2	●	MVS1170X02S120PL	25.2	48.8	48.8	96.8	95	1.8	12	4
11.8	2	●	MVS1180X02S120PL	25.5	48.9	48.9	96.9	95	1.9	12	4
11.9	2	●	MVS1190X02S120PL	25.7	48.9	48.9	96.9	95	1.9	12	4
12.0	2	●	MVS1200X02S120PL	25.9	48.9	48.9	96.9	95	1.9	12	4
12.1	2	●	MVS1210X02S130PL	26.1	52.9	55.9	103.9	102	1.9	13	4
12.2	2	●	MVS1220X02S130PL	26.3	52.9	55.9	103.9	102	1.9	13	4
12.3	2	●	MVS1230X02S130PL	26.5	52.9	55.9	103.9	102	1.9	13	4
12.4	2	●	MVS1240X02S130PL	26.8	53.0	56.0	104.0	102	2.0	13	4
12.5	2	●	MVS1250X02S130PL	27.0	53.0	56.0	104.0	102	2.0	13	4
12.6	2	●	MVS1260X02S130PL	27.2	53.0	53.0	104.0	102	2.0	13	4
12.7	2	●	MVS1270X02S130PL	27.4	53.0	53.0	104.0	102	2.0	13	4
12.8	2	●	MVS1280X02S130PL	27.6	53.0	53.0	104.0	102	2.0	13	4
12.9	2	●	MVS1290X02S130PL	27.8	53.0	53.0	104.0	102	2.0	13	4
13.0	2	●	MVS1300X02S130PL	28.0	53.0	53.0	104.0	102	2.0	13	4
13.1	2	●	MVS1310X02S140PL	28.3	56.1	59.1	109.1	107	2.1	14	4
13.2	2	●	MVS1320X02S140PL	28.5	56.1	59.1	109.1	107	2.1	14	4
13.3	2	●	MVS1330X02S140PL	28.7	56.1	59.1	109.1	107	2.1	14	4
13.4	2	●	MVS1340X02S140PL	28.9	56.1	59.1	109.1	107	2.1	14	4
13.5	2	●	MVS1350X02S140PL	29.1	56.1	59.1	109.1	107	2.1	14	4
13.6	2	●	MVS1360X02S140PL	29.3	56.1	56.1	109.1	107	2.1	14	4
13.7	2	●	MVS1370X02S140PL	29.6	56.2	56.2	109.2	107	2.2	14	4
13.8	2	●	MVS1380X02S140PL	29.8	56.2	56.2	109.2	107	2.2	14	4

PILOT-MVS

DC(mm)	Hole Depth(l/d)	DP1020	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
13.9	2	●	**MVS1390X02S140PL**	30.0	56.2	56.2	109.2	107	2.2	14	4

DC(mm)	Hole Depth(l/d)	DP1020	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
14.0	2	●	**MVS1400X02S140PL**	30.2	56.2	56.2	109.2	107	2.2	14	4

MICRO-MVS

WSTAR Drill Series

Small diameter drills

Product Information

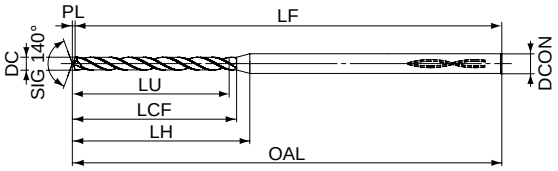
UWC DP1 140° SIG X Thinning

Work Material

P M K N S

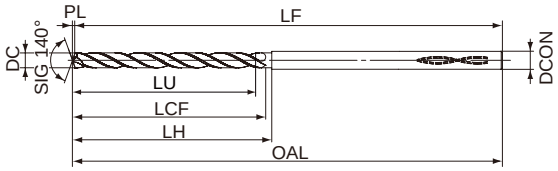
Recommended Cutting Condition >> 1663 ISO13399 Property >> 1966

SYMBOL DESCRIPTIONS >> 1623 DRILLS SELECTION CHART >> 1624



Type1

	1≦DC≦2.9
	0 -0.014
h6	0 -0.006



Type2

Stock status indication:●: Inventory maintained in Japan.▲: This item to be discontinued within two years.□: Non stock, produced to order only.

Internal Coolant Unit（mm）

DC(mm)	Hole Depth(l/d)	DP1020	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
1.0	7	●	MVS0100X07S030	7.2	10.2	14.2	55.2	55	0.2	3	1
1.0	12	●	MVS0100X12S030	12.2	15.2	19.2	55.2	55	0.2	3	1
1.0	20	●	MVS0100X20S030	20.2	24.2	28.2	60.2	60	0.2	3	1
1.0	25	●	MVS0100X25S030	25.2	28.2	32.2	66.2	66	0.2	3	1
1.0	30	●	MVS0100X30S030	30.2	33.2	37.2	72.2	72	0.2	3	1
1.1	7	●	MVS0110X07S030	7.9	11.2	15.2	55.2	55	0.2	3	1
1.1	12	●	MVS0110X12S030	13.4	17.2	21.2	55.2	55	0.2	3	1
1.1	20	●	MVS0110X20S030	22.2	25.2	29.2	60.2	60	0.2	3	1
1.1	25	●	MVS0110X25S030	27.7	31.2	34.2	66.2	66	0.2	3	1
1.1	30	●	MVS0110X30S030	33.2	36.2	40.2	72.2	72	0.2	3	1
1.2	7	●	MVS0120X07S030	8.6	12.2	15.2	55.2	55	0.2	3	1
1.2	12	●	MVS0120X12S030	14.6	18.2	21.2	55.2	55	0.2	3	1
1.2	20	●	MVS0120X20S030	24.2	28.2	31.2	60.2	60	0.2	3	1
1.2	25	●	MVS0120X25S030	30.2	34.2	37.2	66.2	66	0.2	3	1
1.2	30	●	MVS0120X30S030	36.2	40.2	43.2	72.2	72	0.2	3	1
1.3	7	●	MVS0130X07S030	9.3	13.2	16.2	55.2	55	0.2	3	1
1.3	12	●	MVS0130X12S030	15.8	20.2	23.2	55.2	55	0.2	3	1
1.3	20	●	MVS0130X20S030	26.2	30.2	33.2	68.2	68	0.2	3	1
1.3	25	●	MVS0130X25S030	32.7	36.2	40.2	74.2	74	0.2	3	1
1.3	30	●	MVS0130X30S030	39.2	43.2	46.2	82.2	82	0.2	3	1
1.4	7	●	MVS0140X07S030	10.1	14.3	17.3	55.3	55	0.3	3	1
1.4	12	●	MVS0140X12S030	17.1	21.3	24.3	55.3	55	0.3	3	1
1.4	20	●	MVS0140X20S030	28.3	32.3	35.3	68.3	68	0.3	3	1
1.4	25	●	MVS0140X25S030	35.3	39.3	42.3	74.3	74	0.3	3	1
1.4	30	●	MVS0140X30S030	42.3	46.3	49.3	82.3	82	0.3	3	1

DC(mm)	Hole Depth(l/d)	DP1020	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
1.5	7	●	MVS0150X07S030	10.8	15.3	18.3	55.3	55	0.3	3	1
1.5	12	●	MVS0150X12S030	18.3	23.3	26.3	55.3	55	0.3	3	1
1.5	20	●	MVS0150X20S030	30.3	35.3	37.3	68.3	68	0.3	3	1
1.5	25	●	MVS0150X25S030	37.8	42.3	45.3	74.3	74	0.3	3	1
1.5	30	●	MVS0150X30S030	45.3	50.3	52.3	82.3	82	0.3	3	1
1.6	7	●	MVS0160X07S030	11.5	16.3	19.3	68.3	68	0.3	3	1
1.6	12	●	MVS0160X12S030	19.5	24.3	27.3	68.3	68	0.3	3	1
1.6	20	●	MVS0160X20S030	32.3	37.3	39.3	78.3	78	0.3	3	1
1.6	25	●	MVS0160X25S030	40.3	45.3	47.3	86.3	86	0.3	3	1
1.6	30	●	MVS0160X30S030	48.3	53.3	55.3	95.3	95	0.3	3	1
1.7	7	●	MVS0170X07S030	12.2	17.3	19.3	68.3	68	0.3	3	1
1.7	12	●	MVS0170X12S030	20.7	26.3	28.3	68.3	68	0.3	3	1
1.7	20	●	MVS0170X20S030	34.3	39.3	42.3	78.3	78	0.3	3	1
1.7	25	●	MVS0170X25S030	42.8	48.3	50.3	86.3	86	0.3	3	1
1.7	30	●	MVS0170X30S030	51.3	56.3	59.3	95.3	95	0.3	3	1
1.8	7	●	MVS0180X07S030	12.9	18.3	20.3	68.3	68	0.3	3	1
1.8	12	●	MVS0180X12S030	21.9	27.3	29.3	68.3	68	0.3	3	1
1.8	20	●	MVS0180X20S030	36.3	41.3	44.3	84.3	84	0.3	3	1
1.8	25	●	MVS0180X25S030	45.3	50.3	53.3	94.3	94	0.3	3	1
1.8	30	●	MVS0180X30S030	54.3	59.3	62.3	102.3	102	0.3	3	1
1.9	7	●	MVS0190X07S030	13.6	19.3	21.3	68.3	68	0.3	3	1
1.9	12	●	MVS0190X12S030	23.1	29.3	31.3	68.3	68	0.3	3	1
1.9	20	●	MVS0190X20S030	38.3	44.3	46.3	84.3	84	0.3	3	1
1.9	25	●	MVS0190X25S030	47.8	53.3	55.3	94.3	94	0.3	3	1
1.9	30	●	MVS0190X30S030	57.3	63.3	65.3	102.3	102	0.3	3	1

MICRO-MVS

DC(mm)	Hole Depth(l/d)	DP1020	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
2.0	7	●	MVS0200X07S030	14.4	20.4	22.4	68.4	68	0.4	3	1
2.0	12	●	MVS0200X12S030	24.4	30.4	32.4	68.4	68	0.4	3	1
2.0	20	●	MVS0200X20S030	40.4	46.4	48.4	84.4	84	0.4	3	1
2.0	25	●	MVS0200X25S030	50.4	56.4	58.4	94.4	94	0.4	3	1
2.0	30	●	MVS0200X30S030	60.4	66.4	68.4	102.4	102	0.4	3	1
2.1	7	●	MVS0210X07S030	15.1	21.4	23.4	74.4	74	0.4	3	1
2.1	12	●	MVS0210X12S030	25.6	32.4	34.4	74.4	74	0.4	3	1
2.1	20	●	MVS0210X20S030	42.4	48.4	50.4	94.4	94	0.4	3	1
2.1	25	●	MVS0210X25S030	52.9	59.4	60.4	107.4	107	0.4	3	1
2.1	30	●	MVS0210X30S030	63.4	69.4	71.4	118.4	118	0.4	3	1
2.2	7	●	MVS0220X07S030	15.8	22.4	23.4	74.4	74	0.4	3	1
2.2	12	●	MVS0220X12S030	26.8	33.4	34.4	74.4	74	0.4	3	1
2.2	20	●	MVS0220X20S030	44.4	51.4	52.4	94.4	94	0.4	3	1
2.2	25	●	MVS0220X25S030	55.4	62.4	63.4	107.4	107	0.4	3	1
2.2	30	●	MVS0220X30S030	66.4	73.4	74.4	118.4	118	0.4	3	1
2.3	7	●	MVS0230X07S030	16.5	23.4	24.4	74.4	74	0.4	3	1
2.3	12	●	MVS0230X12S030	28.0	35.4	36.4	74.4	74	0.4	3	1
2.3	20	●	MVS0230X20S030	46.4	53.4	54.4	94.4	94	0.4	3	1
2.3	25	●	MVS0230X25S030	57.9	64.4	66.4	107.4	107	0.4	3	1
2.3	30	●	MVS0230X30S030	69.4	76.4	77.4	118.4	118	0.4	3	1
2.4	7	●	MVS0240X07S030	17.2	24.4	25.4	74.4	74	0.4	3	1
2.4	12	●	MVS0240X12S030	29.2	36.4	37.4	74.4	74	0.4	3	1
2.4	20	●	MVS0240X20S030	48.4	55.4	56.4	94.4	94	0.4	3	1
2.4	25	●	MVS0240X25S030	60.4	67.4	68.4	107.4	107	0.4	3	1
2.4	30	●	MVS0240X30S030	72.4	79.4	80.4	118.4	118	0.4	3	1

DC(mm)	Hole Depth(l/d)	DP1020	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
2.5	7	●	MVS0250X07S030	18.0	25.5	26.5	74.5	74	0.5	3	1
2.5	12	●	MVS0250X12S030	30.5	38.5	39.5	74.5	74	0.5	3	1
2.5	20	●	MVS0250X20S030	50.5	58.5	59.5	94.5	94	0.5	3	1
2.5	25	●	MVS0250X25S030	63.0	70.5	71.5	107.5	107	0.5	3	1
2.5	30	●	MVS0250X30S030	75.5	83.5	84.5	118.5	118	0.5	3	1
2.6	7	●	MVS0260X07S030	18.7	26.5	26.5	81.5	81	0.5	3	2
2.6	12	●	MVS0260X12S030	31.7	39.5	39.5	81.5	81	0.5	3	2
2.6	20	●	MVS0260X20S030	52.5	60.5	60.5	103.5	103	0.5	3	2
2.6	25	●	MVS0260X25S030	65.5	73.5	73.5	117.5	117	0.5	3	2
2.6	30	●	MVS0260X30S030	78.5	86.5	86.5	132.5	132	0.5	3	2
2.7	7	●	MVS0270X07S030	19.4	27.5	27.5	81.5	81	0.5	3	2
2.7	12	●	MVS0270X12S030	32.9	41.5	41.5	81.5	81	0.5	3	2
2.7	20	●	MVS0270X20S030	54.5	62.5	62.5	103.5	103	0.5	3	2
2.7	25	●	MVS0270X25S030	68.0	76.5	76.5	117.5	117	0.5	3	2
2.7	30	●	MVS0270X30S030	81.5	89.5	89.5	132.5	132	0.5	3	2
2.8	7	●	MVS0280X07S030	20.1	28.5	28.5	81.5	81	0.5	3	2
2.8	12	●	MVS0280X12S030	34.1	42.5	42.5	81.5	81	0.5	3	2
2.8	20	●	MVS0280X20S030	56.5	64.5	64.5	103.5	103	0.5	3	2
2.8	25	●	MVS0280X25S030	70.5	78.5	78.5	117.5	117	0.5	3	2
2.8	30	●	MVS0280X30S030	84.5	92.5	92.5	132.5	132	0.5	3	2
2.9	7	●	MVS0290X07S030	20.8	29.5	29.5	81.5	81	0.5	3	2
2.9	12	●	MVS0290X12S030	35.3	44.5	44.5	81.5	81	0.5	3	2
2.9	20	●	MVS0290X20S030	58.5	67.5	67.5	103.5	103	0.5	3	2
2.9	25	●	MVS0290X25S030	73.0	81.5	81.5	117.5	117	0.5	3	2
2.9	30	●	MVS0290X30S030	87.5	96.5	96.5	132.5	132	0.5	3	2

MVS

WSTAR Drill Series

General-purpose drills

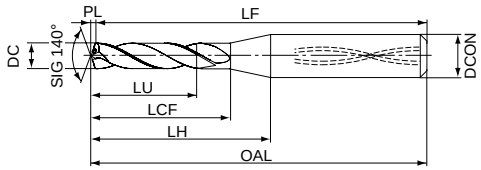
Product Information

UWC DP1 140° SIG X Thinning

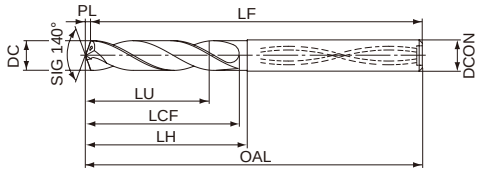
Work Material

P M K N S

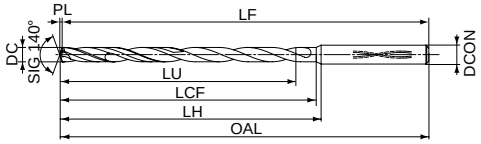
TECHNICAL DATA >> 1997 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 1623 DRILLS SELECTION CHART >> 1624



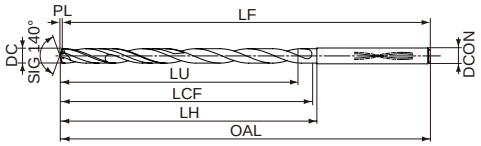
Type1



Type2



Type3



Type4

l/d	DC=3	3<DC≦6	6<DC≦10
3,5,6	0 -0.014	0 -0.018	0 -0.022
≧10	-0.017 -0.031	-0.025 -0.043	-0.033 -0.055
h6	0 -0.006	0 -0.008	0 -0.009

l/d	10<DC≦16	18<DC≦20
3,5,8	0 -0.027	0 -0.033
≧10	-0.041 -0.068	-
h6	0 -0.011	0 -0.013

The coolant hole of ø6mm or less will be round shape.

Stock status indication:●: Inventory maintained in Japan.▲: This item to be discontinued within two years.□: Non stock, produced to order only.

Internal Coolant Unit（mm）

DC(mm)	Hole Depth(l/d)	DP1020	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
3.0	3	●	MVS0300X03S030	9.5	21.5	21.5	72.5	72	0.5	3	2
3.0	3	●	MVS0300X03S060	9.5	21.5	24.7	72.5	72	0.5	6	1
3.0	5	●	MVS0300X05S030	15.5	28.5	28.5	81.5	81	0.5	3	2
3.0	5	●	MVS0300X05S060	15.5	28.5	31.7	81.5	81	0.5	6	1
3.0	8	●	MVS0300X08S030	24.5	35.5	35.5	81.5	81	0.5	3	2
3.0	8	●	MVS0300X08S060	24.5	35.5	38.7	81.5	81	0.5	6	1
3.0	10	●	MVS0300X10S030	30.5	39.5	42.5	90.5	90	0.5	3	3
3.0	15	●	MVS0300X15S030	45.5	54.5	57.5	105.5	105	0.5	3	3
3.0	20	●	MVS0300X20S030	60.5	69.5	72.5	120.5	120	0.5	3	3

DC(mm)	Hole Depth(l/d)	DP1020	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
3.0	25	●	MVS0300X25S030	75.5	84.5	87.5	135.5	135	0.5	3	3
3.0	30	●	MVS0300X30S030	90.5	99.5	102.5	150.5	150	0.5	3	3
3.0	35	●	MVS0300X35S030	105.5	115.5	118.5	166.5	166	0.5	3	3
3.0	40	●	MVS0300X40S030	120.5	130.5	133.5	181.5	181	0.5	3	3
3.1	3	●	MVS0310X03S040	9.9	21.6	23.6	76.6	76	0.6	4	2
3.1	3	●	MVS0310X03S060	9.9	21.6	24.7	76.6	76	0.6	6	1
3.1	5	●	MVS0310X05S040	16.1	32.6	32.6	87.6	87	0.6	4	2
3.1	5	●	MVS0310X05S060	16.1	32.6	35.7	87.6	87	0.6	6	1
3.1	8	●	MVS0310X08S040	25.4	41.6	41.6	87.6	87	0.6	4	2

MVS

DC(mm)	Hole Depth(l/d)	DP1020	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
3.1	8	●	MVS0310X08S060	25.4	41.6	44.7	87.6	87	0.6	6	1
3.1	10	●	MVS0310X10S040	31.6	46.6	49.6	97.6	97	0.6	4	3
3.1	15	●	MVS0310X15S040	47.1	63.6	66.6	114.6	114	0.6	4	3
3.1	20	●	MVS0310X20S040	62.6	81.6	84.6	132.6	132	0.6	4	3
3.1	25	●	MVS0310X25S040	78.1	98.6	101.6	149.6	149	0.6	4	3
3.1	30	●	MVS0310X30S040	93.6	116.6	119.6	167.6	167	0.6	4	3
3.1	35	□	MVS0310X35S040	109.1	134.6	137.6	185.6	185	0.6	4	3
3.1	40	□	MVS0310X40S040	124.6	150.6	153.6	201.6	201	0.6	4	3
3.2	3	●	MVS0320X03S040	10.2	21.6	23.6	76.6	76	0.6	4	2
3.2	3	●	MVS0320X03S060	10.2	21.6	24.6	76.6	76	0.6	6	1
3.2	5	●	MVS0320X05S040	16.6	32.6	32.6	87.6	87	0.6	4	2
3.2	5	●	MVS0320X05S060	16.6	32.6	35.6	87.6	87	0.6	6	1
3.2	8	●	MVS0320X08S040	26.2	41.6	41.6	87.6	87	0.6	4	2
3.2	8	●	MVS0320X08S060	26.2	41.6	44.6	87.6	87	0.6	6	1
3.2	10	●	MVS0320X10S040	32.6	46.6	49.6	97.6	97	0.6	4	3
3.2	15	●	MVS0320X15S040	48.6	63.6	66.6	114.6	114	0.6	4	3
3.2	20	●	MVS0320X20S040	64.6	81.6	84.6	132.6	132	0.6	4	3
3.2	25	●	MVS0320X25S040	80.6	98.6	101.6	149.6	149	0.6	4	3
3.2	30	●	MVS0320X30S040	96.6	116.6	119.6	167.6	167	0.6	4	3
3.2	35	□	MVS0320X35S040	112.6	134.6	137.6	185.6	185	0.6	4	3
3.2	40	□	MVS0320X40S040	128.6	150.6	153.6	201.6	201	0.6	4	3
3.3	3	●	MVS0330X03S040	10.5	21.6	23.6	76.6	76	0.6	4	2
3.3	3	●	MVS0330X03S060	10.5	21.6	24.5	76.6	76	0.6	6	1
3.3	5	●	MVS0330X05S040	17.1	32.6	32.6	87.6	87	0.6	4	2
3.3	5	●	MVS0330X05S060	17.1	32.6	35.5	87.6	87	0.6	6	1
3.3	8	●	MVS0330X08S040	27.0	41.6	41.6	87.6	87	0.6	4	2
3.3	8	●	MVS0330X08S060	27.0	41.6	44.5	87.6	87	0.6	6	1
3.3	10	●	MVS0330X10S040	33.6	46.6	49.6	97.6	97	0.6	4	3
3.3	15	●	MVS0330X15S040	50.1	63.6	66.6	114.6	114	0.6	4	3
3.3	20	●	MVS0330X20S040	66.6	81.6	84.6	132.6	132	0.6	4	3
3.3	25	●	MVS0330X25S040	83.1	98.6	101.6	149.6	149	0.6	4	3
3.3	30	●	MVS0330X30S040	99.6	116.6	119.6	167.6	167	0.6	4	3
3.3	35	□	MVS0330X35S040	116.1	134.6	137.6	185.6	185	0.6	4	3
3.3	40	□	MVS0330X40S040	132.6	150.6	153.6	201.6	201	0.6	4	3
3.4	3	●	MVS0340X03S040	10.8	21.6	23.6	76.6	76	0.6	4	2
3.4	3	●	MVS0340X03S060	10.8	21.6	24.4	76.6	76	0.6	6	1
3.4	5	●	MVS0340X05S040	17.6	32.6	32.6	87.6	87	0.6	4	2
3.4	5	●	MVS0340X05S060	17.6	32.6	35.4	87.6	87	0.6	6	1
3.4	8	●	MVS0340X08S040	27.8	41.6	41.6	87.6	87	0.6	4	2
3.4	8	●	MVS0340X08S060	27.8	41.6	44.4	87.6	87	0.6	6	1
3.4	10	●	MVS0340X10S040	34.6	46.6	49.6	97.6	97	0.6	4	3
3.4	15	●	MVS0340X15S040	51.6	63.6	66.6	114.6	114	0.6	4	3
3.4	20	●	MVS0340X20S040	68.6	81.6	84.6	132.6	132	0.6	4	3
3.4	25	●	MVS0340X25S040	85.6	98.6	101.6	149.6	149	0.6	4	3
3.4	30	●	MVS0340X30S040	102.6	116.6	119.6	167.6	167	0.6	4	3
3.4	35	□	MVS0340X35S040	119.6	134.6	137.6	185.6	185	0.6	4	3
3.4	40	□	MVS0340X40S040	136.6	150.6	153.6	201.6	201	0.6	4	3
3.5	3	●	MVS0350X03S040	11.1	21.6	23.6	76.6	76	0.6	4	2
3.5	3	●	MVS0350X03S060	11.1	21.6	24.3	76.6	76	0.6	6	1
3.5	5	●	MVS0350X05S040	18.1	32.6	32.6	87.6	87	0.6	4	2
3.5	5	●	MVS0350X05S060	18.1	32.6	35.3	87.6	87	0.6	6	1
3.5	8	●	MVS0350X08S040	28.6	41.6	41.6	87.6	87	0.6	4	2
3.5	8	●	MVS0350X08S060	28.6	41.6	44.3	87.6	87	0.6	6	1
3.5	10	●	MVS0350X10S040	35.6	46.6	49.6	97.6	97	0.6	4	3
3.5	15	●	MVS0350X15S040	53.1	63.6	66.6	114.6	114	0.6	4	3
3.5	20	●	MVS0350X20S040	70.6	81.6	84.6	132.6	132	0.6	4	3
3.5	25	●	MVS0350X25S040	88.1	98.6	101.6	149.6	149	0.6	4	3
3.5	30	●	MVS0350X30S040	105.6	116.6	119.6	167.6	167	0.6	4	3
3.5	35	●	MVS0350X35S040	123.1	134.6	137.6	185.6	185	0.6	4	3
3.5	40	●	MVS0350X40S040	140.6	150.6	153.6	201.6	201	0.6	4	3
3.6	3	●	MVS0360X03S040	11.5	23.7	23.7	80.7	80	0.7	4	2
3.6	3	●	MVS0360X03S060	11.5	23.7	26.3	80.7	80	0.7	6	1
3.6	5	●	MVS0360X05S040	18.7	36.7	36.7	92.7	92	0.7	4	2
3.6	5	●	MVS0360X05S060	18.7	36.7	39.3	92.7	92	0.7	6	1
3.6	8	●	MVS0360X08S040	29.5	46.7	46.7	92.7	92	0.7	4	2
3.6	8	●	MVS0360X08S060	29.5	46.7	49.3	92.7	92	0.7	6	1
3.6	10	●	MVS0360X10S040	36.7	52.7	55.7	103.7	103	0.7	4	3
3.6	15	●	MVS0360X15S040	54.7	72.7	75.7	123.7	123	0.7	4	3
3.6	20	●	MVS0360X20S040	72.7	92.7	95.7	143.7	143	0.7	4	3
3.6	25	●	MVS0360X25S040	90.7	112.7	115.7	163.7	163	0.7	4	3
3.6	30	●	MVS0360X30S040	108.7	132.7	135.7	183.7	183	0.7	4	3
3.6	35	□	MVS0360X35S040	126.7	152.7	155.7	203.7	203	0.7	4	3
3.6	40	□	MVS0360X40S040	144.7	172.7	175.7	223.7	223	0.7	4	3
3.7	3	●	MVS0370X03S040	11.8	23.7	23.7	80.7	80	0.7	4	2
3.7	3	●	MVS0370X03S060	11.8	23.7	26.2	80.7	80	0.7	6	1
3.7	5	●	MVS0370X05S040	19.2	36.7	36.7	92.7	92	0.7	4	2
3.7	5	●	MVS0370X05S060	19.2	36.7	39.2	92.7	92	0.7	6	1
3.7	8	●	MVS0370X08S040	30.3	46.7	46.7	92.7	92	0.7	4	2
3.7	8	●	MVS0370X08S060	30.3	46.7	49.2	92.7	92	0.7	6	1
3.7	10	●	MVS0370X10S040	37.7	52.7	55.7	103.7	103	0.7	4	3
3.7	15	●	MVS0370X15S040	56.2	72.7	75.7	123.7	123	0.7	4	3
3.7	20	●	MVS0370X20S040	74.7	92.7	95.7	143.7	143	0.7	4	3
3.7	25	●	MVS0370X25S040	93.2	112.7	115.7	163.7	163	0.7	4	3
3.7	30	●	MVS0370X30S040	111.7	132.7	135.7	183.7	183	0.7	4	3
3.7	35	□	MVS0370X35S040	130.2	152.7	155.7	203.7	203	0.7	4	3
3.7	40	□	MVS0370X40S040	148.7	172.7	175.7	223.7	223	0.7	4	3
3.8	3	●	MVS0380X03S040	12.1	23.7	23.7	80.7	80	0.7	4	2
3.8	3	●	MVS0380X03S060	12.1	23.7	26.1	80.7	80	0.7	6	1
3.8	5	●	MVS0380X05S040	19.7	36.7	36.7	92.7	92	0.7	4	2
3.8	5	●	MVS0380X05S060	19.7	36.7	39.1	92.7	92	0.7	6	1
3.8	8	●	MVS0380X08S040	31.1	46.7	46.7	92.7	92	0.7	4	2
3.8	8	●	MVS0380X08S060	31.1	46.7	49.1	92.7	92	0.7	6	1
3.8	10	●	MVS0380X10S040	38.7	52.7	55.7	103.7	103	0.7	4	3
3.8	15	●	MVS0380X15S040	57.7	72.7	75.7	123.7	123	0.7	4	3
3.8	20	●	MVS0380X20S040	76.7	92.7	95.7	143.7	143	0.7	4	3
3.8	25	●	MVS0380X25S040	95.7	112.7	115.7	163.7	163	0.7	4	3
3.8	30	●	MVS0380X30S040	114.7	132.7	135.7	183.7	183	0.7	4	3
3.8	35	□	MVS0380X35S040	133.7	152.7	155.7	203.7	203	0.7	4	3
3.8	40	□	MVS0380X40S040	152.7	172.7	175.7	223.7	223	0.7	4	3
3.9	3	●	MVS0390X03S040	12.4	23.7	23.7	80.7	80	0.7	4	2
3.9	3	●	MVS0390X03S060	12.4	23.7	26.0	80.7	80	0.7	6	1
3.9	5	●	MVS0390X05S040	20.2	36.7	36.7	92.7	92	0.7	4	2
3.9	5	●	MVS0390X05S060	20.2	36.7	39.0	92.7	92	0.7	6	1
3.9	8	●	MVS0390X08S040	31.9	46.7	46.7	92.7	92	0.7	4	2
3.9	8	●	MVS0390X08S060	31.9	46.7	49.0	92.7	92	0.7	6	1
3.9	10	●	MVS0390X10S040	39.7	52.7	55.7	103.7	103	0.7	4	3
3.9	15	●	MVS0390X15S040	59.2	72.7	75.7	123.7	123	0.7	4	3
3.9	20	●	MVS0390X20S040	78.7	92.7	95.7	143.7	143	0.7	4	3

MVS

DC(mm)	Hole Depth(l/d)	DP1020	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
3.9	25	●	MVS0390X25S040	98.2	112.7	115.7	163.7	163	0.7	4	3
3.9	30	●	MVS0390X30S040	117.7	132.7	135.7	183.7	183	0.7	4	3
3.9	35	□	MVS0390X35S040	137.2	152.7	155.7	203.7	203	0.7	4	3
3.9	40	□	MVS0390X40S040	156.7	172.7	175.7	223.7	223	0.7	4	3
4.0	3	●	MVS0400X03S040	12.7	23.7	23.7	80.7	80	0.7	4	2
4.0	3	●	MVS0400X03S060	12.7	23.7	25.8	80.7	80	0.7	6	1
4.0	5	●	MVS0400X05S040	20.7	36.7	36.7	92.7	92	0.7	4	2
4.0	5	●	MVS0400X05S060	20.7	36.7	38.8	92.7	92	0.7	6	1
4.0	8	●	MVS0400X08S040	32.7	46.7	46.7	92.7	92	0.7	4	2
4.0	8	●	MVS0400X08S060	32.7	46.7	48.8	92.7	92	0.7	6	1
4.0	10	●	MVS0400X10S040	40.7	52.7	55.7	103.7	103	0.7	4	3
4.0	15	●	MVS0400X15S040	60.7	72.7	75.7	123.7	123	0.7	4	3
4.0	20	●	MVS0400X20S040	80.7	92.7	95.7	143.7	143	0.7	4	3
4.0	25	●	MVS0400X25S040	100.7	112.7	115.7	163.7	163	0.7	4	3
4.0	30	●	MVS0400X30S040	120.7	132.7	135.7	183.7	183	0.7	4	3
4.0	35	●	MVS0400X35S040	140.7	152.7	155.7	203.7	203	0.7	4	3
4.0	40	●	MVS0400X40S040	160.7	172.7	175.7	223.7	223	0.7	4	3
4.1	3	●	MVS0410X03S050	13.0	25.7	25.7	86.7	86	0.7	5	2
4.1	3	●	MVS0410X03S060	13.0	25.7	27.7	86.7	86	0.7	6	1
4.1	5	●	MVS0410X05S050	21.2	40.7	40.7	100.7	100	0.7	5	2
4.1	5	●	MVS0410X05S060	21.2	40.7	42.7	100.7	100	0.7	6	1
4.1	8	●	MVS0410X08S050	33.5	52.7	52.7	100.7	100	0.7	5	2
4.1	8	●	MVS0410X08S060	33.5	52.7	54.7	100.7	100	0.7	6	1
4.1	10	●	MVS0410X10S050	41.7	59.7	62.7	112.7	112	0.7	5	3
4.1	15	●	MVS0410X15S050	62.2	81.7	84.7	134.7	134	0.7	5	3
4.1	20	●	MVS0410X20S050	82.7	104.7	107.7	157.7	157	0.7	5	3
4.1	25	●	MVS0410X25S050	103.2	126.7	129.7	179.7	179	0.7	5	3
4.1	30	●	MVS0410X30S050	123.7	149.7	152.7	202.7	202	0.7	5	3
4.1	35	□	MVS0410X35S050	144.2	171.7	174.7	224.7	224	0.7	5	3
4.1	40	□	MVS0410X40S050	164.7	195.7	198.7	248.7	248	0.7	5	3
4.2	3	●	MVS0420X03S050	13.4	25.8	25.8	86.8	86	0.8	5	2
4.2	3	●	MVS0420X03S060	13.4	25.8	27.7	86.8	86	0.8	6	1
4.2	5	●	MVS0420X05S050	21.8	40.8	40.8	100.8	100	0.8	5	2
4.2	5	●	MVS0420X05S060	21.8	40.8	42.7	100.8	100	0.8	6	1
4.2	8	●	MVS0420X08S050	34.4	52.8	52.8	100.8	100	0.8	5	2
4.2	8	●	MVS0420X08S060	34.4	52.8	54.7	100.8	100	0.8	6	1
4.2	10	●	MVS0420X10S050	42.8	59.8	62.8	112.8	112	0.8	5	3
4.2	15	●	MVS0420X15S050	63.8	81.8	84.8	134.8	134	0.8	5	3
4.2	20	●	MVS0420X20S050	84.8	104.8	107.8	157.8	157	0.8	5	3
4.2	25	●	MVS0420X25S050	105.8	126.8	129.8	179.8	179	0.8	5	3
4.2	30	●	MVS0420X30S050	126.8	149.8	152.8	202.8	202	0.8	5	3
4.2	35	□	MVS0420X35S050	147.8	171.8	174.8	224.8	224	0.8	5	3
4.2	40	□	MVS0420X40S050	168.8	195.8	198.8	248.8	248	0.8	5	3
4.3	3	●	MVS0430X03S050	13.7	25.8	25.8	86.8	86	0.8	5	2
4.3	3	●	MVS0430X03S060	13.7	25.8	27.6	86.8	86	0.8	6	1
4.3	5	●	MVS0430X05S050	22.3	40.8	40.8	100.8	100	0.8	5	2
4.3	5	●	MVS0430X05S060	22.3	40.8	42.6	100.8	100	0.8	6	1
4.3	8	●	MVS0430X08S050	35.2	52.8	52.8	100.8	100	0.8	5	2
4.3	8	●	MVS0430X08S060	35.2	52.8	54.6	100.8	100	0.8	6	1
4.3	10	●	MVS0430X10S050	43.8	59.8	62.8	112.8	112	0.8	5	3
4.3	15	●	MVS0430X15S050	65.3	81.8	84.8	134.8	134	0.8	5	3
4.3	20	●	MVS0430X20S050	86.8	104.8	107.8	157.8	157	0.8	5	3
4.3	25	●	MVS0430X25S050	108.3	126.8	129.8	179.8	179	0.8	5	3
4.3	30	●	MVS0430X30S050	129.8	149.8	152.8	202.8	202	0.8	5	3

DC(mm)	Hole Depth(l/d)	DP1020	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
4.3	35	□	MVS0430X35S050	151.3	171.8	174.8	224.8	224	0.8	5	3
4.3	40	□	MVS0430X40S050	172.8	195.8	198.8	248.8	248	0.8	5	3
4.4	3	●	MVS0440X03S050	14.0	25.8	25.8	86.8	86	0.8	5	2
4.4	3	●	MVS0440X03S060	14.0	25.8	27.5	86.8	86	0.8	6	1
4.4	5	●	MVS0440X05S050	22.8	40.8	40.8	100.8	100	0.8	5	2
4.4	5	●	MVS0440X05S060	22.8	40.8	42.5	100.8	100	0.8	6	1
4.4	8	●	MVS0440X08S050	36.0	52.8	52.8	100.8	100	0.8	5	2
4.4	8	●	MVS0440X08S060	36.0	52.8	54.5	100.8	100	0.8	6	1
4.4	10	●	MVS0440X10S050	44.8	59.8	62.8	112.8	112	0.8	5	3
4.4	15	●	MVS0440X15S050	66.8	81.8	84.8	134.8	134	0.8	5	3
4.4	20	●	MVS0440X20S050	88.8	104.8	107.8	157.8	157	0.8	5	3
4.4	25	●	MVS0440X25S050	110.8	126.8	129.8	179.8	179	0.8	5	3
4.4	30	●	MVS0440X30S050	132.8	149.8	152.8	202.8	202	0.8	5	3
4.4	35	□	MVS0440X35S050	154.8	171.8	174.8	224.8	224	0.8	5	3
4.4	40	□	MVS0440X40S050	176.8	195.8	198.8	248.8	248	0.8	5	3
4.5	3	●	MVS0450X03S050	14.3	25.8	25.8	86.8	86	0.8	5	2
4.5	3	●	MVS0450X03S060	14.3	25.8	27.4	86.8	86	0.8	6	1
4.5	5	●	MVS0450X05S050	23.3	40.8	40.8	100.8	100	0.8	5	2
4.5	5	●	MVS0450X05S060	23.3	40.8	42.4	100.8	100	0.8	6	1
4.5	8	●	MVS0450X08S050	36.8	52.8	52.8	100.8	100	0.8	5	2
4.5	8	●	MVS0450X08S060	36.8	52.8	54.4	100.8	100	0.8	6	1
4.5	10	●	MVS0450X10S050	45.8	59.8	62.8	112.8	112	0.8	5	3
4.5	15	●	MVS0450X15S050	68.3	81.8	84.8	134.8	134	0.8	5	3
4.5	20	●	MVS0450X20S050	90.8	104.8	107.8	157.8	157	0.8	5	3
4.5	25	●	MVS0450X25S050	113.3	126.8	129.8	179.8	179	0.8	5	3
4.5	30	●	MVS0450X30S050	135.8	149.8	152.8	202.8	202	0.8	5	3
4.5	35	●	MVS0450X35S050	158.3	171.8	174.8	224.8	224	0.8	5	3
4.5	40	●	MVS0450X40S050	180.8	195.8	198.8	248.8	248	0.8	5	3
4.6	3	●	MVS0460X03S050	14.6	28.3	28.3	90.8	90	0.8	5	2
4.6	3	●	MVS0460X03S060	14.6	28.3	31.3	90.8	90	0.8	6	2
4.6	5	●	MVS0460X05S050	23.8	44.8	44.8	105.8	105	0.8	5	2
4.6	5	●	MVS0460X05S060	23.8	44.8	47.8	105.8	105	0.8	6	2
4.6	8	●	MVS0460X08S050	37.6	57.8	57.8	105.8	105	0.8	5	2
4.6	8	●	MVS0460X08S060	37.6	57.8	60.8	105.8	105	0.8	6	2
4.6	10	●	MVS0460X10S050	46.8	65.8	68.8	118.8	118	0.8	5	4
4.6	15	●	MVS0460X15S050	69.8	90.8	93.8	143.8	143	0.8	5	4
4.6	20	●	MVS0460X20S050	92.8	115.8	118.8	168.8	168	0.8	5	4
4.6	25	●	MVS0460X25S050	115.8	140.8	143.8	193.8	193	0.8	5	4
4.6	30	●	MVS0460X30S050	138.8	165.8	168.8	218.8	218	0.8	5	4
4.6	35	□	MVS0460X35S050	161.8	190.8	193.8	243.8	243	0.8	5	4
4.6	40	□	MVS0460X40S050	184.8	215.8	218.8	268.8	268	0.8	5	4
4.7	3	●	MVS0470X03S050	15.0	28.4	28.4	90.9	90	0.9	5	2
4.7	3	●	MVS0470X03S060	15.0	28.4	31.4	90.9	90	0.9	6	2
4.7	5	●	MVS0470X05S050	24.4	44.9	44.9	105.9	105	0.9	5	2
4.7	5	●	MVS0470X05S060	24.4	44.9	47.9	105.9	105	0.9	6	2
4.7	8	●	MVS0470X08S050	38.5	57.9	57.9	105.9	105	0.9	5	2
4.7	8	●	MVS0470X08S060	38.5	57.9	60.9	105.9	105	0.9	6	2
4.7	10	●	MVS0470X10S050	47.9	65.9	68.9	118.9	118	0.9	5	4
4.7	15	●	MVS0470X15S050	71.4	90.9	93.9	143.9	143	0.9	5	4
4.7	20	●	MVS0470X20S050	94.9	115.9	118.9	168.9	168	0.9	5	4
4.7	25	●	MVS0470X25S050	118.4	140.9	143.9	193.9	193	0.9	5	4
4.7	30	●	MVS0470X30S050	141.9	165.9	168.9	218.9	218	0.9	5	4
4.7	35	□	MVS0470X35S050	165.4	190.9	193.9	243.9	243	0.9	5	4
4.7	40	□	MVS0470X40S050	188.9	215.9	218.9	268.9	268	0.9	5	4

MVS

DC(mm)	Hole Depth(l/d)	DP1020	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
4.8	3	●	MVS0480X03S050	15.3	28.4	28.4	90.9	90	0.9	5	2
4.8	3	●	MVS0480X03S060	15.3	28.4	31.4	90.9	90	0.9	6	2
4.8	5	●	MVS0480X05S050	24.9	44.9	44.9	105.9	105	0.9	5	2
4.8	5	●	MVS0480X05S060	24.9	44.9	47.9	105.9	105	0.9	6	2
4.8	8	●	MVS0480X08S050	39.3	57.9	57.9	105.9	105	0.9	5	2
4.8	8	●	MVS0480X08S060	39.3	57.9	60.9	105.9	105	0.9	6	2
4.8	10	●	MVS0480X10S050	48.9	65.9	68.9	118.9	118	0.9	5	4
4.8	15	●	MVS0480X15S050	72.9	90.9	93.9	143.9	143	0.9	5	4
4.8	20	●	MVS0480X20S050	96.9	115.9	118.9	168.9	168	0.9	5	4
4.8	25	●	MVS0480X25S050	120.9	140.9	143.9	193.9	193	0.9	5	4
4.8	30	●	MVS0480X30S050	144.9	165.9	168.9	218.9	218	0.9	5	4
4.8	35	□	MVS0480X35S050	168.9	190.9	193.9	243.9	243	0.9	5	4
4.8	40	□	MVS0480X40S050	192.9	215.9	218.9	268.9	268	0.9	5	4
4.9	3	●	MVS0490X03S050	15.6	28.4	28.4	90.9	90	0.9	5	2
4.9	3	●	MVS0490X03S060	15.6	28.4	31.4	90.9	90	0.9	6	2
4.9	5	●	MVS0490X05S050	25.4	44.9	44.9	105.9	105	0.9	5	2
4.9	5	●	MVS0490X05S060	25.4	44.9	47.9	105.9	105	0.9	6	2
4.9	8	●	MVS0490X08S050	40.1	57.9	57.9	105.9	105	0.9	5	2
4.9	8	●	MVS0490X08S060	40.1	57.9	60.9	105.9	105	0.9	6	2
4.9	10	●	MVS0490X10S050	49.9	65.9	68.9	118.9	118	0.9	5	4
4.9	15	●	MVS0490X15S050	74.4	90.9	93.9	143.9	143	0.9	5	4
4.9	20	●	MVS0490X20S050	98.9	115.9	118.9	168.9	168	0.9	5	4
4.9	25	●	MVS0490X25S050	123.4	140.9	143.9	193.9	193	0.9	5	4
4.9	30	●	MVS0490X30S050	147.9	165.9	168.9	218.9	218	0.9	5	4
4.9	35	□	MVS0490X35S050	172.4	190.9	193.9	243.9	243	0.9	5	4
4.9	40	□	MVS0490X40S050	196.9	215.9	218.9	268.9	268	0.9	5	4
5.0	3	●	MVS0500X03S050	15.9	28.4	28.4	90.9	90	0.9	5	2
5.0	3	●	MVS0500X03S060	15.9	28.4	31.4	90.9	90	0.9	6	2
5.0	5	●	MVS0500X05S050	25.9	44.9	44.9	105.9	105	0.9	5	2
5.0	5	●	MVS0500X05S060	25.9	44.9	47.9	105.9	105	0.9	6	2
5.0	8	●	MVS0500X08S050	40.9	57.9	57.9	105.9	105	0.9	5	2
5.0	8	●	MVS0500X08S060	40.9	57.9	60.9	105.9	105	0.9	6	2
5.0	10	●	MVS0500X10S050	50.9	65.9	68.9	118.9	118	0.9	5	4
5.0	15	●	MVS0500X15S050	75.9	90.9	93.9	143.9	143	0.9	5	4
5.0	20	●	MVS0500X20S050	100.9	115.9	118.9	168.9	168	0.9	5	4
5.0	25	●	MVS0500X25S050	125.9	140.9	143.9	193.9	193	0.9	5	4
5.0	30	●	MVS0500X30S050	150.9	165.9	168.9	218.9	218	0.9	5	4
5.0	35	●	MVS0500X35S050	175.9	190.9	193.9	243.9	243	0.9	5	4
5.0	40	●	MVS0500X40S050	200.9	215.9	218.9	268.9	268	0.9	5	4
5.1	3	●	MVS0510X03S060	16.2	28.4	30.9	82.9	82	0.9	6	2
5.1	5	●	MVS0510X05S060	26.4	44.9	48.9	100.9	100	0.9	6	2
5.1	8	●	MVS0510X08S060	41.7	61.9	66.9	118.9	118	0.9	6	2
5.1	10	●	MVS0510X10S060	51.9	72.9	75.9	127.9	127	0.9	6	4
5.1	15	●	MVS0510X15S060	77.4	99.9	102.9	154.9	154	0.9	6	4
5.1	20	●	MVS0510X20S060	102.9	127.9	130.9	182.9	182	0.9	6	4
5.1	25	●	MVS0510X25S060	128.4	154.9	157.9	209.9	209	0.9	6	4
5.1	30	●	MVS0510X30S060	153.9	182.9	185.9	237.9	237	0.9	6	4
5.1	35	□	MVS0510X35S060	179.4	209.9	212.9	264.9	264	0.9	6	4
5.1	40	□	MVS0510X40S060	204.9	240.9	243.9	295.9	295	0.9	6	4
5.2	3	●	MVS0520X03S060	16.5	28.4	30.9	82.9	82	0.9	6	2
5.2	5	●	MVS0520X05S060	26.9	44.9	48.9	100.9	100	0.9	6	2
5.2	8	●	MVS0520X08S060	42.5	61.9	66.9	118.9	118	0.9	6	2
5.2	10	●	MVS0520X10S060	52.9	72.9	75.9	127.9	127	0.9	6	4
5.2	15	●	MVS0520X15S060	78.9	99.9	102.9	154.9	154	0.9	6	4
5.2	20	●	MVS0520X20S060	104.9	127.9	130.9	182.9	182	0.9	6	4
5.2	25	●	MVS0520X25S060	130.9	154.9	157.9	209.9	209	0.9	6	4
5.2	30	●	MVS0520X30S060	156.9	182.9	185.9	237.9	237	0.9	6	4
5.2	35	□	MVS0520X35S060	182.9	209.9	212.9	264.9	264	0.9	6	4
5.2	40	□	MVS0520X40S060	208.9	240.9	243.9	295.9	295	0.9	6	4
5.3	3	●	MVS0530X03S060	16.9	28.5	31.0	83.0	82	1.0	6	2
5.3	5	●	MVS0530X05S060	27.5	45.0	49.0	101.0	100	1.0	6	2
5.3	8	●	MVS0530X08S060	43.4	62.0	67.0	119.0	118	1.0	6	2
5.3	10	●	MVS0530X10S060	54.0	73.0	76.0	128.0	127	1.0	6	4
5.3	15	●	MVS0530X15S060	80.5	100.0	103.0	155.0	154	1.0	6	4
5.3	20	●	MVS0530X20S060	107.0	128.0	131.0	183.0	182	1.0	6	4
5.3	25	●	MVS0530X25S060	133.5	155.0	158.0	210.0	209	1.0	6	4
5.3	30	●	MVS0530X30S060	160.0	183.0	186.0	238.0	237	1.0	6	4
5.3	35	□	MVS0530X35S060	186.5	210.0	213.0	265.0	264	1.0	6	4
5.3	40	□	MVS0530X40S060	213.0	241.0	244.0	296.0	295	1.0	6	4
5.4	3	●	MVS0540X03S060	17.2	28.5	31.0	83.0	82	1.0	6	2
5.4	5	●	MVS0540X05S060	28.0	45.0	49.0	101.0	100	1.0	6	2
5.4	8	●	MVS0540X08S060	44.2	62.0	67.0	119.0	118	1.0	6	2
5.4	10	●	MVS0540X10S060	55.0	73.0	76.0	128.0	127	1.0	6	4
5.4	15	●	MVS0540X15S060	82.0	100.0	103.0	155.0	154	1.0	6	4
5.4	20	●	MVS0540X20S060	109.0	128.0	131.0	183.0	182	1.0	6	4
5.4	25	●	MVS0540X25S060	136.0	155.0	158.0	210.0	209	1.0	6	4
5.4	30	●	MVS0540X30S060	163.0	183.0	186.0	238.0	237	1.0	6	4
5.4	35	□	MVS0540X35S060	190.0	210.0	213.0	265.0	264	1.0	6	4
5.4	40	□	MVS0540X40S060	217.0	241.0	244.0	296.0	295	1.0	6	4
5.5	3	●	MVS0550X03S060	17.5	28.5	31.0	83.0	82	1.0	6	2
5.5	5	●	MVS0550X05S060	28.5	45.0	49.0	101.0	100	1.0	6	2
5.5	8	●	MVS0550X08S060	45.0	62.0	67.0	119.0	118	1.0	6	2
5.5	10	●	MVS0550X10S060	56.0	73.0	76.0	128.0	127	1.0	6	4
5.5	15	●	MVS0550X15S060	83.5	100.0	103.0	155.0	154	1.0	6	4
5.5	20	●	MVS0550X20S060	111.0	128.0	131.0	183.0	182	1.0	6	4
5.5	25	●	MVS0550X25S060	138.5	155.0	158.0	210.0	209	1.0	6	4
5.5	30	●	MVS0550X30S060	166.0	183.0	186.0	238.0	237	1.0	6	4
5.5	35	●	MVS0550X35S060	193.5	210.0	213.0	265.0	264	1.0	6	4
5.5	40	●	MVS0550X40S060	221.0	241.0	244.0	296.0	295	1.0	6	4
5.6	3	●	MVS0560X03S060	17.8	31.0	31.0	83.0	82	1.0	6	2
5.6	5	●	MVS0560X05S060	29.0	49.0	49.0	101.0	100	1.0	6	2
5.6	8	●	MVS0560X08S060	45.8	67.0	67.0	119.0	118	1.0	6	2
5.6	10	●	MVS0560X10S060	57.0	79.0	82.0	134.0	133	1.0	6	4
5.6	15	●	MVS0560X15S060	85.0	109.0	112.0	164.0	163	1.0	6	4
5.6	20	●	MVS0560X20S060	113.0	139.0	142.0	194.0	193	1.0	6	4
5.6	25	●	MVS0560X25S060	141.0	169.0	172.0	224.0	223	1.0	6	4
5.6	30	●	MVS0560X30S060	169.0	199.0	202.0	254.0	253	1.0	6	4
5.6	35	□	MVS0560X35S060	197.0	229.0	232.0	284.0	283	1.0	6	4
5.6	40	□	MVS0560X40S060	225.0	261.0	264.0	316.0	315	1.0	6	4
5.7	3	●	MVS0570X03S060	18.1	31.0	31.0	83.0	82	1.0	6	2
5.7	5	●	MVS0570X05S060	29.5	49.0	49.0	101.0	100	1.0	6	2
5.7	8	●	MVS0570X08S060	46.6	67.0	67.0	119.0	118	1.0	6	2
5.7	10	●	MVS0570X10S060	58.0	79.0	82.0	134.0	133	1.0	6	4
5.7	15	●	MVS0570X15S060	86.5	109.0	112.0	164.0	163	1.0	6	4
5.7	20	●	MVS0570X20S060	115.0	139.0	142.0	194.0	193	1.0	6	4
5.7	25	●	MVS0570X25S060	143.5	169.0	172.0	224.0	223	1.0	6	4
5.7	30	●	MVS0570X30S060	172.0	199.0	202.0	254.0	253	1.0	6	4
5.7	35	□	MVS0570X35S060	200.5	229.0	232.0	284.0	283	1.0	6	4

MVS

DC(mm)	Hole Depth(l/d)	DP1020	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
5.7	40	□	MVS0570X40S060	229.0	261.0	264.0	316.0	315	1.0	6	4
5.8	3	●	MVS0580X03S060	18.5	31.1	31.1	83.1	82	1.1	6	2
5.8	5	●	MVS0580X05S060	30.1	49.1	49.1	101.1	100	1.1	6	2
5.8	8	●	MVS0580X08S060	47.5	67.1	67.1	119.1	118	1.1	6	2
5.8	10	●	MVS0580X10S060	59.1	79.1	82.1	134.1	133	1.1	6	4
5.8	15	●	MVS0580X15S060	88.1	109.1	112.1	164.1	163	1.1	6	4
5.8	20	●	MVS0580X20S060	117.1	139.1	142.1	194.1	193	1.1	6	4
5.8	25	●	MVS0580X25S060	146.1	169.1	172.1	224.1	223	1.1	6	4
5.8	30	●	MVS0580X30S060	175.1	199.1	202.1	254.1	253	1.1	6	4
5.8	35	□	MVS0580X35S060	204.1	229.1	232.1	284.1	283	1.1	6	4
5.8	40	□	MVS0580X40S060	233.1	261.1	264.1	316.1	315	1.1	6	4
5.9	3	●	MVS0590X03S060	18.8	31.1	31.1	83.1	82	1.1	6	2
5.9	5	●	MVS0590X05S060	30.6	49.1	49.1	101.1	100	1.1	6	2
5.9	8	●	MVS0590X08S060	48.3	67.1	67.1	119.1	118	1.1	6	2
5.9	10	●	MVS0590X10S060	60.1	79.1	82.1	134.1	133	1.1	6	4
5.9	15	●	MVS0590X15S060	89.6	109.1	112.1	164.1	163	1.1	6	4
5.9	20	●	MVS0590X20S060	119.1	139.1	142.1	194.1	193	1.1	6	4
5.9	25	●	MVS0590X25S060	148.6	169.1	172.1	224.1	223	1.1	6	4
5.9	30	●	MVS0590X30S060	178.1	199.1	202.1	254.1	253	1.1	6	4
5.9	35	□	MVS0590X35S060	207.6	229.1	232.1	284.1	283	1.1	6	4
5.9	40	□	MVS0590X40S060	237.1	261.1	264.1	316.1	315	1.1	6	4
6.0	3	●	MVS0600X03S060	19.1	31.1	31.1	83.1	82	1.1	6	2
6.0	5	●	MVS0600X05S060	31.1	49.1	49.1	101.1	100	1.1	6	2
6.0	8	●	MVS0600X08S060	49.1	67.1	67.1	119.1	118	1.1	6	2
6.0	10	●	MVS0600X10S060	61.1	79.1	82.1	134.1	133	1.1	6	4
6.0	15	●	MVS0600X15S060	91.1	109.1	112.1	164.1	163	1.1	6	4
6.0	20	●	MVS0600X20S060	121.1	139.1	142.1	194.1	193	1.1	6	4
6.0	25	●	MVS0600X25S060	151.1	169.1	172.1	224.1	223	1.1	6	4
6.0	30	●	MVS0600X30S060	181.1	199.1	202.1	254.1	253	1.1	6	4
6.0	35	●	MVS0600X35S060	211.1	229.1	232.1	284.1	283	1.1	6	4
6.0	40	●	MVS0600X40S060	241.1	261.1	264.1	316.1	315	1.1	6	4
6.1	3	●	MVS0610X03S070	19.4	33.6	36.1	89.1	88	1.1	7	2
6.1	3	●	MVS0610X03S080	19.4	33.6	36.1	89.1	88	1.1	8	2
6.1	5	●	MVS0610X05S070	31.6	53.1	57.1	110.1	109	1.1	7	2
6.1	5	●	MVS0610X05S080	31.6	53.1	57.1	110.1	109	1.1	8	2
6.1	8	●	MVS0610X08S070	49.9	73.1	78.1	131.1	130	1.1	7	2
6.1	8	●	MVS0610X08S080	49.9	73.1	78.1	131.1	130	1.1	8	2
6.1	10	●	MVS0610X10S070	62.1	86.1	89.1	142.1	141	1.1	7	4
6.1	15	●	MVS0610X15S070	92.6	118.1	121.1	174.1	173	1.1	7	4
6.1	20	●	MVS0610X20S070	123.1	151.1	154.1	207.1	206	1.1	7	4
6.1	25	●	MVS0610X25S070	153.6	183.1	186.1	239.1	238	1.1	7	4
6.1	30	●	MVS0610X30S070	184.1	216.1	219.1	272.1	271	1.1	7	4
6.1	35	□	MVS0610X35S070	214.6	248.1	253.1	306.1	305	1.1	7	4
6.1	40	□	MVS0610X40S070	245.1	281.1	284.1	337.1	336	1.1	7	4
6.2	3	●	MVS0620X03S070	19.7	33.6	36.1	89.1	88	1.1	7	2
6.2	3	●	MVS0620X03S080	19.7	33.6	36.1	89.1	88	1.1	8	2
6.2	5	●	MVS0620X05S070	32.1	53.1	57.1	110.1	109	1.1	7	2
6.2	5	●	MVS0620X05S080	32.1	53.1	57.1	110.1	109	1.1	8	2
6.2	8	●	MVS0620X08S070	50.7	73.1	78.1	131.1	130	1.1	7	2
6.2	8	●	MVS0620X08S080	50.7	73.1	78.1	131.1	130	1.1	8	2
6.2	10	●	MVS0620X10S070	63.1	86.1	89.1	142.1	141	1.1	7	4
6.2	15	●	MVS0620X15S070	94.1	118.1	121.1	174.1	173	1.1	7	4
6.2	20	●	MVS0620X20S070	125.1	151.1	154.1	207.1	206	1.1	7	4
6.2	25	●	MVS0620X25S070	156.1	183.1	186.1	239.1	238	1.1	7	4
6.2	30	●	MVS0620X30S070	187.1	216.1	219.1	272.1	271	1.1	7	4
6.2	35	□	MVS0620X35S070	218.1	248.1	253.1	306.1	305	1.1	7	4
6.2	40	□	MVS0620X40S070	249.1	281.1	284.1	337.1	336	1.1	7	4
6.3	3	●	MVS0630X03S070	20.0	33.6	36.1	89.1	88	1.1	7	2
6.3	3	●	MVS0630X03S080	20.0	33.6	36.1	89.1	88	1.1	8	2
6.3	5	●	MVS0630X05S070	32.6	53.1	57.1	110.1	109	1.1	7	2
6.3	5	●	MVS0630X05S080	32.6	53.1	57.1	110.1	109	1.1	8	2
6.3	8	●	MVS0630X08S070	51.5	73.1	78.1	131.1	130	1.1	7	2
6.3	8	●	MVS0630X08S080	51.5	73.1	78.1	131.1	130	1.1	8	2
6.3	10	●	MVS0630X10S070	64.1	86.1	89.1	142.1	141	1.1	7	4
6.3	15	●	MVS0630X15S070	95.6	118.1	121.1	174.1	173	1.1	7	4
6.3	20	●	MVS0630X20S070	127.1	151.1	154.1	207.1	206	1.1	7	4
6.3	25	●	MVS0630X25S070	158.6	183.1	186.1	239.1	238	1.1	7	4
6.3	30	●	MVS0630X30S070	190.1	216.1	219.1	272.1	271	1.1	7	4
6.3	35	□	MVS0630X35S070	221.6	248.1	253.1	306.1	305	1.1	7	4
6.3	40	□	MVS0630X40S070	253.1	281.1	284.1	337.1	336	1.1	7	4
6.4	3	●	MVS0640X03S070	20.4	33.7	36.2	89.2	88	1.2	7	2
6.4	3	●	MVS0640X03S080	20.4	33.7	36.2	89.2	88	1.2	8	2
6.4	5	●	MVS0640X05S070	33.2	53.2	57.2	110.2	109	1.2	7	2
6.4	5	●	MVS0640X05S080	33.2	53.2	57.2	110.2	109	1.2	8	2
6.4	8	●	MVS0640X08S070	52.4	73.2	78.2	131.2	130	1.2	7	2
6.4	8	●	MVS0640X08S080	52.4	73.2	78.2	131.2	130	1.2	8	2
6.4	10	●	MVS0640X10S070	65.2	86.2	89.2	142.2	141	1.2	7	4
6.4	15	●	MVS0640X15S070	97.2	118.2	121.2	174.2	173	1.2	7	4
6.4	20	●	MVS0640X20S070	129.2	151.2	154.2	207.2	206	1.2	7	4
6.4	25	●	MVS0640X25S070	161.2	183.2	186.2	239.2	238	1.2	7	4
6.4	30	●	MVS0640X30S070	193.2	216.2	219.2	272.2	271	1.2	7	4
6.4	35	□	MVS0640X35S070	225.2	248.2	253.2	306.2	305	1.2	7	4
6.4	40	□	MVS0640X40S070	257.2	281.2	284.2	337.2	336	1.2	7	4
6.5	3	●	MVS0650X03S070	20.7	33.7	36.2	89.2	88	1.2	7	2
6.5	3	●	MVS0650X03S080	20.7	33.7	36.2	89.2	88	1.2	8	2
6.5	5	●	MVS0650X05S070	33.7	53.2	57.2	110.2	109	1.2	7	2
6.5	5	●	MVS0650X05S080	33.7	53.2	57.2	110.2	109	1.2	8	2
6.5	8	●	MVS0650X08S070	53.2	73.2	78.2	131.2	130	1.2	7	2
6.5	8	●	MVS0650X08S080	53.2	73.2	78.2	131.2	130	1.2	8	2
6.5	10	●	MVS0650X10S070	66.2	86.2	89.2	142.2	141	1.2	7	4
6.5	15	●	MVS0650X15S070	98.7	118.2	121.2	174.2	173	1.2	7	4
6.5	20	●	MVS0650X20S070	131.2	151.2	154.2	207.2	206	1.2	7	4
6.5	25	●	MVS0650X25S070	163.7	183.2	186.2	239.2	238	1.2	7	4
6.5	30	●	MVS0650X30S070	196.2	216.2	219.2	272.2	271	1.2	7	4
6.5	35	●	MVS0650X35S070	228.7	248.2	253.2	306.2	305	1.2	7	4
6.5	40	●	MVS0650X40S070	261.2	281.2	284.2	337.2	336	1.2	7	4
6.6	3	●	MVS0660X03S070	21.0	36.2	36.2	89.2	88	1.2	7	2
6.6	3	●	MVS0660X03S080	21.0	36.2	38.2	89.2	88	1.2	8	2
6.6	5	●	MVS0660X05S070	34.2	57.2	57.2	110.2	109	1.2	7	2
6.6	5	●	MVS0660X05S080	34.2	57.2	59.2	110.2	109	1.2	8	2
6.6	8	●	MVS0660X08S070	54.0	78.2	78.2	131.2	130	1.2	7	2
6.6	8	●	MVS0660X08S080	54.0	78.2	80.2	131.2	130	1.2	8	2
6.6	10	●	MVS0660X10S070	67.2	92.2	95.2	148.2	147	1.2	7	4
6.6	15	●	MVS0660X15S070	100.2	127.2	130.2	183.2	182	1.2	7	4
6.6	20	●	MVS0660X20S070	133.2	162.2	165.2	218.2	217	1.2	7	4
6.6	25	●	MVS0660X25S070	166.2	197.2	200.2	253.2	252	1.2	7	4
6.6	30	●	MVS0660X30S070	199.2	232.2	235.2	288.2	287	1.2	7	4
6.6	35	□	MVS0660X35S070	232.2	267.2	270.2	323.2	322	1.2	7	4

MVS

DC(mm)	Hole Depth(l/d)	DP1020	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
6.6	40	□	MVS0660X40S070	265.2	301.2	304.2	357.2	356	1.2	7	4
6.7	3	●	MVS0670X03S070	21.3	36.2	36.2	89.2	88	1.2	7	2
6.7	3	●	MVS0670X03S080	21.3	36.2	38.2	89.2	88	1.2	8	2
6.7	5	●	MVS0670X05S070	34.7	57.2	57.2	110.2	109	1.2	7	2
6.7	5	●	MVS0670X05S080	34.7	57.2	59.2	110.2	109	1.2	8	2
6.7	8	●	MVS0670X08S070	54.8	78.2	78.2	131.2	130	1.2	7	2
6.7	8	●	MVS0670X08S080	54.8	78.2	80.2	131.2	130	1.2	8	2
6.7	10	●	MVS0670X10S070	68.2	92.2	95.2	148.2	147	1.2	7	4
6.7	15	●	MVS0670X15S070	101.7	127.2	130.2	183.2	182	1.2	7	4
6.7	20	●	MVS0670X20S070	135.2	162.2	165.2	218.2	217	1.2	7	4
6.7	25	●	MVS0670X25S070	168.7	197.2	200.2	253.2	252	1.2	7	4
6.7	30	●	MVS0670X30S070	202.2	232.2	235.2	288.2	287	1.2	7	4
6.7	35	□	MVS0670X35S070	235.7	267.2	270.2	323.2	322	1.2	7	4
6.7	40	□	MVS0670X40S070	269.2	301.2	304.2	357.2	356	1.2	7	4
6.8	3	●	MVS0680X03S070	21.6	36.2	36.2	89.2	88	1.2	7	2
6.8	3	●	MVS0680X03S080	21.6	36.2	38.2	89.2	88	1.2	8	2
6.8	5	●	MVS0680X05S070	35.2	57.2	57.2	110.2	109	1.2	7	2
6.8	5	●	MVS0680X05S080	35.2	57.2	59.2	110.2	109	1.2	8	2
6.8	8	●	MVS0680X08S070	55.6	78.2	78.2	131.2	130	1.2	7	2
6.8	8	●	MVS0680X08S080	55.6	78.2	80.2	131.2	130	1.2	8	2
6.8	10	●	MVS0680X10S070	69.2	92.2	95.2	148.2	147	1.2	7	4
6.8	15	●	MVS0680X15S070	103.2	127.2	130.2	183.2	182	1.2	7	4
6.8	20	●	MVS0680X20S070	137.2	162.2	165.2	218.2	217	1.2	7	4
6.8	25	●	MVS0680X25S070	171.2	197.2	200.2	253.2	252	1.2	7	4
6.8	30	●	MVS0680X30S070	205.2	232.2	235.2	288.2	287	1.2	7	4
6.8	35	□	MVS0680X35S070	239.2	267.2	270.2	323.2	322	1.2	7	4
6.8	40	□	MVS0680X40S070	273.2	301.2	304.2	357.2	356	1.2	7	4
6.9	3	●	MVS0690X03S070	22.0	36.3	36.3	89.3	88	1.3	7	2
6.9	3	●	MVS0690X03S080	22.0	36.3	38.3	89.3	88	1.3	8	2
6.9	5	●	MVS0690X05S070	35.8	57.3	57.3	110.3	109	1.3	7	2
6.9	5	●	MVS0690X05S080	35.8	57.3	59.3	110.3	109	1.3	8	2
6.9	8	●	MVS0690X08S070	56.5	78.3	78.3	131.3	130	1.3	7	2
6.9	8	●	MVS0690X08S080	56.5	78.3	80.3	131.3	130	1.3	8	2
6.9	10	●	MVS0690X10S070	70.3	92.3	95.3	148.3	147	1.3	7	4
6.9	15	●	MVS0690X15S070	104.8	127.3	130.3	183.3	182	1.3	7	4
6.9	20	●	MVS0690X20S070	139.3	162.3	165.3	218.3	217	1.3	7	4
6.9	25	●	MVS0690X25S070	173.8	197.3	200.3	253.3	252	1.3	7	4
6.9	30	●	MVS0690X30S070	208.3	232.3	235.3	288.3	287	1.3	7	4
6.9	35	□	MVS0690X35S070	242.8	267.3	270.3	323.3	322	1.3	7	4
6.9	40	□	MVS0690X40S070	277.3	301.3	304.3	357.3	356	1.3	7	4
7.0	3	●	MVS0700X03S070	22.3	36.3	36.3	89.3	88	1.3	7	2
7.0	3	●	MVS0700X03S080	22.3	36.3	38.3	89.3	88	1.3	8	2
7.0	5	●	MVS0700X05S070	36.3	57.3	57.3	110.3	109	1.3	7	2
7.0	5	●	MVS0700X05S080	36.3	57.3	59.3	110.3	109	1.3	8	2
7.0	8	●	MVS0700X08S070	57.3	78.3	78.3	131.3	130	1.3	7	2
7.0	8	●	MVS0700X08S080	57.3	78.3	80.3	131.3	130	1.3	8	2
7.0	10	●	MVS0700X10S070	71.3	92.3	95.3	148.3	147	1.3	7	4
7.0	15	●	MVS0700X15S070	106.3	127.3	130.3	183.3	182	1.3	7	4
7.0	20	●	MVS0700X20S070	141.3	162.3	165.3	218.3	217	1.3	7	4
7.0	25	●	MVS0700X25S070	176.3	197.3	200.3	253.3	252	1.3	7	4
7.0	30	●	MVS0700X30S070	211.3	232.3	235.3	288.3	287	1.3	7	4
7.0	35	●	MVS0700X35S070	246.3	267.3	270.3	323.3	322	1.3	7	4
7.0	40	●	MVS0700X40S070	281.3	301.3	304.3	357.3	356	1.3	7	4
7.1	3	●	MVS0710X03S080	22.6	38.8	41.3	95.3	94	1.3	8	2
7.1	5	●	MVS0710X05S080	36.8	61.3	65.3	119.3	118	1.3	8	2
7.1	8	●	MVS0710X08S080	58.1	84.3	89.3	143.3	142	1.3	8	2
7.1	10	●	MVS0710X10S080	72.3	99.3	102.3	156.3	155	1.3	8	4
7.1	15	●	MVS0710X15S080	107.8	136.3	139.3	193.3	192	1.3	8	4
7.1	20	●	MVS0710X20S080	143.3	174.3	177.3	231.3	230	1.3	8	4
7.1	25	●	MVS0710X25S080	178.8	211.3	214.3	268.3	267	1.3	8	4
7.1	30	●	MVS0710X30S080	214.3	249.3	252.3	306.3	305	1.3	8	4
7.1	35	□	MVS0710X35S080	249.8	286.3	289.3	343.3	342	1.3	8	4
7.1	40	□	MVS0710X40S080	285.3	321.3	324.3	378.3	377	1.3	8	4
7.2	3	●	MVS0720X03S080	22.9	38.8	41.3	95.3	94	1.3	8	2
7.2	5	●	MVS0720X05S080	37.3	61.3	65.3	119.3	118	1.3	8	2
7.2	8	●	MVS0720X08S080	58.9	84.3	89.3	143.3	142	1.3	8	2
7.2	10	●	MVS0720X10S080	73.3	99.3	102.3	156.3	155	1.3	8	4
7.2	15	●	MVS0720X15S080	109.3	136.3	139.3	193.3	192	1.3	8	4
7.2	20	●	MVS0720X20S080	145.3	174.3	177.3	231.3	230	1.3	8	4
7.2	25	●	MVS0720X25S080	181.3	211.3	214.3	268.3	267	1.3	8	4
7.2	30	●	MVS0720X30S080	217.3	249.3	252.3	306.3	305	1.3	8	4
7.2	35	□	MVS0720X35S080	253.3	286.3	289.3	343.3	342	1.3	8	4
7.2	40	□	MVS0720X40S080	289.3	321.3	324.3	378.3	377	1.3	8	4
7.3	3	●	MVS0730X03S080	23.2	38.8	41.3	95.3	94	1.3	8	2
7.3	5	●	MVS0730X05S080	37.8	61.3	65.3	119.3	118	1.3	8	2
7.3	8	●	MVS0730X08S080	59.7	84.3	89.3	143.3	142	1.3	8	2
7.3	10	●	MVS0730X10S080	74.3	99.3	102.3	156.3	155	1.3	8	4
7.3	15	●	MVS0730X15S080	110.8	136.3	139.3	193.3	192	1.3	8	4
7.3	20	●	MVS0730X20S080	147.3	174.3	177.3	231.3	230	1.3	8	4
7.3	25	●	MVS0730X25S080	183.8	211.3	214.3	268.3	267	1.3	8	4
7.3	30	●	MVS0730X30S080	220.3	249.3	252.3	306.3	305	1.3	8	4
7.3	35	□	MVS0730X35S080	256.8	286.3	289.3	343.3	342	1.3	8	4
7.3	40	□	MVS0730X40S080	293.3	321.3	324.3	378.3	377	1.3	8	4
7.4	3	●	MVS0740X03S080	23.5	38.8	41.3	95.3	94	1.3	8	2
7.4	5	●	MVS0740X05S080	38.3	61.3	65.3	119.3	118	1.3	8	2
7.4	8	●	MVS0740X08S080	60.5	84.3	89.3	143.3	142	1.3	8	2
7.4	10	●	MVS0740X10S080	75.3	99.3	102.3	156.3	155	1.3	8	4
7.4	15	●	MVS0740X15S080	112.3	136.3	139.3	193.3	192	1.3	8	4
7.4	20	●	MVS0740X20S080	149.3	174.3	177.3	231.3	230	1.3	8	4
7.4	25	●	MVS0740X25S080	186.3	211.3	214.3	268.3	267	1.3	8	4
7.4	30	●	MVS0740X30S080	223.3	249.3	252.3	306.3	305	1.3	8	4
7.4	35	□	MVS0740X35S080	260.3	286.3	289.3	343.3	342	1.3	8	4
7.4	40	□	MVS0740X40S080	297.3	321.3	324.3	378.3	377	1.3	8	4
7.5	3	●	MVS0750X03S080	23.9	38.9	41.4	95.4	94	1.4	8	2
7.5	5	●	MVS0750X05S080	38.9	61.4	65.4	119.4	118	1.4	8	2
7.5	8	●	MVS0750X08S080	61.4	84.4	89.4	143.4	142	1.4	8	2
7.5	10	●	MVS0750X10S080	76.4	99.4	102.4	156.4	155	1.4	8	4
7.5	15	●	MVS0750X15S080	113.9	136.4	139.4	193.4	192	1.4	8	4
7.5	20	●	MVS0750X20S080	151.4	174.4	177.4	231.4	230	1.4	8	4
7.5	25	●	MVS0750X25S080	188.9	211.4	214.4	268.4	267	1.4	8	4
7.5	30	●	MVS0750X30S080	226.4	249.4	252.4	306.4	305	1.4	8	4
7.5	35	●	MVS0750X35S080	263.9	286.4	289.4	343.4	342	1.4	8	4
7.5	40	●	MVS0750X40S080	301.4	321.4	324.4	378.4	377	1.4	8	4
7.6	3	●	MVS0760X03S080	24.2	41.4	41.4	95.4	94	1.4	8	2
7.6	5	●	MVS0760X05S080	39.4	65.4	65.4	119.4	118	1.4	8	2
7.6	8	●	MVS0760X08S080	62.2	89.4	89.4	143.4	142	1.4	8	2
7.6	10	●	MVS0760X10S080	77.4	105.4	108.4	162.4	161	1.4	8	4
7.6	15	●	MVS0760X15S080	115.4	145.4	148.4	202.4	201	1.4	8	4

MVS

DC(mm)	Hole Depth(l/d)	DP1020	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
7.6	20	●	MVS0760X20S080	153.4	185.4	188.4	242.4	241	1.4	8	4
7.6	25	●	MVS0760X25S080	191.4	225.4	228.4	282.4	281	1.4	8	4
7.6	30	●	MVS0760X30S080	229.4	265.4	268.4	322.4	321	1.4	8	4
7.6	35	□	MVS0760X35S080	267.4	305.4	308.4	362.4	361	1.4	8	4
7.6	40	□	MVS0760X40S080	305.4	341.4	344.4	398.4	397	1.4	8	4
7.7	3	●	MVS0770X03S080	24.5	41.4	41.4	95.4	94	1.4	8	2
7.7	5	●	MVS0770X05S080	39.9	65.4	65.4	119.4	118	1.4	8	2
7.7	8	●	MVS0770X08S080	63.0	89.4	89.4	143.4	142	1.4	8	2
7.7	10	●	MVS0770X10S080	78.4	105.4	108.4	162.4	161	1.4	8	4
7.7	15	●	MVS0770X15S080	116.9	145.4	148.4	202.4	201	1.4	8	4
7.7	20	●	MVS0770X20S080	155.4	185.4	188.4	242.4	241	1.4	8	4
7.7	25	●	MVS0770X25S080	193.9	225.4	228.4	282.4	281	1.4	8	4
7.7	30	●	MVS0770X30S080	232.4	265.4	268.4	322.4	321	1.4	8	4
7.7	35	□	MVS0770X35S080	270.9	305.4	308.4	362.4	361	1.4	8	4
7.7	40	□	MVS0770X40S080	309.4	341.4	344.4	398.4	397	1.4	8	4
7.8	3	●	MVS0780X03S080	24.8	41.4	41.4	95.4	94	1.4	8	2
7.8	5	●	MVS0780X05S080	40.4	65.4	65.4	119.4	118	1.4	8	2
7.8	8	●	MVS0780X08S080	63.8	89.4	89.4	143.4	142	1.4	8	2
7.8	10	●	MVS0780X10S080	79.4	105.4	108.4	162.4	161	1.4	8	4
7.8	15	●	MVS0780X15S080	118.4	145.4	148.4	202.4	201	1.4	8	4
7.8	20	●	MVS0780X20S080	157.4	185.4	188.4	242.4	241	1.4	8	4
7.8	25	●	MVS0780X25S080	196.4	225.4	228.4	282.4	281	1.4	8	4
7.8	30	●	MVS0780X30S080	235.4	265.4	268.4	322.4	321	1.4	8	4
7.8	35	□	MVS0780X35S080	274.4	305.4	308.4	362.4	361	1.4	8	4
7.8	40	□	MVS0780X40S080	313.4	341.4	344.4	398.4	397	1.4	8	4
7.9	3	●	MVS0790X03S080	25.1	41.4	41.4	95.4	94	1.4	8	2
7.9	5	●	MVS0790X05S080	40.9	65.4	65.4	119.4	118	1.4	8	2
7.9	8	●	MVS0790X08S080	64.6	89.4	89.4	143.4	142	1.4	8	2
7.9	10	●	MVS0790X10S080	80.4	105.4	108.4	162.4	161	1.4	8	4
7.9	15	●	MVS0790X15S080	119.9	145.4	148.4	202.4	201	1.4	8	4
7.9	20	●	MVS0790X20S080	159.4	185.4	188.4	242.4	241	1.4	8	4
7.9	25	●	MVS0790X25S080	198.9	225.4	228.4	282.4	281	1.4	8	4
7.9	30	●	MVS0790X30S080	238.4	265.4	268.4	322.4	321	1.4	8	4
7.9	35	□	MVS0790X35S080	277.9	305.4	308.4	362.4	361	1.4	8	4
7.9	40	□	MVS0790X40S080	317.4	341.4	344.4	398.4	397	1.4	8	4
8.0	3	●	MVS0800X03S080	25.5	41.5	41.5	95.5	94	1.5	8	2
8.0	5	●	MVS0800X05S080	41.5	65.5	65.5	119.5	118	1.5	8	2
8.0	8	●	MVS0800X08S080	65.5	89.5	89.5	143.5	142	1.5	8	2
8.0	10	●	MVS0800X10S080	81.5	105.5	108.5	162.5	161	1.5	8	4
8.0	15	●	MVS0800X15S080	121.5	145.5	148.5	202.5	201	1.5	8	4
8.0	20	●	MVS0800X20S080	161.5	185.5	188.5	242.5	241	1.5	8	4
8.0	25	●	MVS0800X25S080	201.5	225.5	228.5	282.5	281	1.5	8	4
8.0	30	●	MVS0800X30S080	241.5	265.5	268.5	322.5	321	1.5	8	4
8.0	35	●	MVS0800X35S080	281.5	305.5	308.5	362.5	361	1.5	8	4
8.0	40	●	MVS0800X40S080	321.5	341.5	344.5	398.5	397	1.5	8	4
8.1	3	●	MVS0810X03S090	25.8	44.0	46.5	101.5	100	1.5	9	2
8.1	3	●	MVS0810X03S100	25.8	44.0	46.5	101.5	100	1.5	10	2
8.1	5	●	MVS0810X05S090	42.0	69.5	73.5	128.5	127	1.5	9	2
8.1	5	●	MVS0810X05S100	42.0	69.5	73.5	128.5	127	1.5	10	2
8.1	8	●	MVS0810X08S090	66.3	95.5	100.5	155.5	154	1.5	9	2
8.1	8	●	MVS0810X08S100	66.3	95.5	100.5	155.5	154	1.5	10	2
8.1	10	●	MVS0810X10S090	82.5	112.5	115.5	170.5	169	1.5	9	4
8.1	15	●	MVS0810X15S090	123.0	154.5	157.5	212.5	211	1.5	9	4
8.1	20	●	MVS0810X20S090	163.5	197.5	200.5	255.5	254	1.5	9	4
8.1	25	●	MVS0810X25S090	204.0	239.5	242.5	297.5	296	1.5	9	4
8.1	30	●	MVS0810X30S090	244.5	282.5	285.5	340.5	339	1.5	9	4
8.1	35	□	MVS0810X35S090	285.0	324.5	327.5	382.5	381	1.5	9	4
8.1	40	□	MVS0810X40S090	325.5	366.5	369.5	424.5	423	1.5	9	4
8.2	3	●	MVS0820X03S090	26.1	44.0	46.5	101.5	100	1.5	9	2
8.2	3	●	MVS0820X03S100	26.1	44.0	46.5	101.5	100	1.5	10	2
8.2	5	●	MVS0820X05S090	42.5	69.5	73.5	128.5	127	1.5	9	2
8.2	5	●	MVS0820X05S100	42.5	69.5	73.5	128.5	127	1.5	10	2
8.2	8	●	MVS0820X08S090	67.1	95.5	100.5	155.5	154	1.5	9	2
8.2	8	●	MVS0820X08S100	67.1	95.5	100.5	155.5	154	1.5	10	2
8.2	10	●	MVS0820X10S090	83.5	112.5	115.5	170.5	169	1.5	9	4
8.2	15	●	MVS0820X15S090	124.5	154.5	157.5	212.5	211	1.5	9	4
8.2	20	●	MVS0820X20S090	165.5	197.5	200.5	255.5	254	1.5	9	4
8.2	25	●	MVS0820X25S090	206.5	239.5	242.5	297.5	296	1.5	9	4
8.2	30	●	MVS0820X30S090	247.5	282.5	285.5	340.5	339	1.5	9	4
8.2	35	□	MVS0820X35S090	288.5	324.5	327.5	382.5	381	1.5	9	4
8.2	40	□	MVS0820X40S090	329.5	366.5	369.5	424.5	423	1.5	9	4
8.3	3	●	MVS0830X03S090	26.4	44.0	46.5	101.5	100	1.5	9	2
8.3	3	●	MVS0830X03S100	26.4	44.0	46.5	101.5	100	1.5	10	2
8.3	5	●	MVS0830X05S090	43.0	69.5	73.5	128.5	127	1.5	9	2
8.3	5	●	MVS0830X05S100	43.0	69.5	73.5	128.5	127	1.5	10	2
8.3	8	●	MVS0830X08S090	67.9	95.5	100.5	155.5	154	1.5	9	2
8.3	8	●	MVS0830X08S100	67.9	95.5	100.5	155.5	154	1.5	10	2
8.3	10	●	MVS0830X10S090	84.5	112.5	115.5	170.5	169	1.5	9	4
8.3	15	●	MVS0830X15S090	126.0	154.5	157.5	212.5	211	1.5	9	4
8.3	20	●	MVS0830X20S090	167.5	197.5	200.5	255.5	254	1.5	9	4
8.3	25	●	MVS0830X25S090	209.0	239.5	242.5	297.5	296	1.5	9	4
8.3	30	●	MVS0830X30S090	250.5	282.5	285.5	340.5	339	1.5	9	4
8.3	35	□	MVS0830X35S090	292.0	324.5	327.5	382.5	381	1.5	9	4
8.3	40	□	MVS0830X40S090	333.5	366.5	369.5	424.5	423	1.5	9	4
8.4	3	●	MVS0840X03S090	26.7	44.0	46.5	101.5	100	1.5	9	2
8.4	3	●	MVS0840X03S100	26.7	44.0	46.5	101.5	100	1.5	10	2
8.4	5	●	MVS0840X05S090	43.5	69.5	73.5	128.5	127	1.5	9	2
8.4	5	●	MVS0840X05S100	43.5	69.5	73.5	128.5	127	1.5	10	2
8.4	8	●	MVS0840X08S090	68.7	95.5	100.5	155.5	154	1.5	9	2
8.4	8	●	MVS0840X08S100	68.7	95.5	100.5	155.5	154	1.5	10	2
8.4	10	●	MVS0840X10S090	85.5	112.5	115.5	170.5	169	1.5	9	4
8.4	15	●	MVS0840X15S090	127.5	154.5	157.5	212.5	211	1.5	9	4
8.4	20	●	MVS0840X20S090	169.5	197.5	200.5	255.5	254	1.5	9	4
8.4	25	●	MVS0840X25S090	211.5	239.5	242.5	297.5	296	1.5	9	4
8.4	30	●	MVS0840X30S090	253.5	282.5	285.5	340.5	339	1.5	9	4
8.4	35	□	MVS0840X35S090	295.5	324.5	327.5	382.5	381	1.5	9	4
8.4	40	□	MVS0840X40S090	337.5	366.5	369.5	424.5	423	1.5	9	4
8.5	3	●	MVS0850X03S090	27.0	44.0	46.5	101.5	100	1.5	9	2
8.5	3	●	MVS0850X03S100	27.0	44.0	46.5	101.5	100	1.5	10	2
8.5	5	●	MVS0850X05S090	44.0	69.5	73.5	128.5	127	1.5	9	2
8.5	5	●	MVS0850X05S100	44.0	69.5	73.5	128.5	127	1.5	10	2
8.5	8	●	MVS0850X08S090	69.5	95.5	100.5	155.5	154	1.5	9	2
8.5	8	●	MVS0850X08S100	69.5	95.5	100.5	155.5	154	1.5	10	2
8.5	10	●	MVS0850X10S090	86.5	112.5	115.5	170.5	169	1.5	9	4
8.5	15	●	MVS0850X15S090	129.0	154.5	157.5	212.5	211	1.5	9	4
8.5	20	●	MVS0850X20S090	171.5	197.5	200.5	255.5	254	1.5	9	4
8.5	25	●	MVS0850X25S090	214.0	239.5	242.5	297.5	296	1.5	9	4
8.5	30	●	MVS0850X30S090	256.5	282.5	285.5	340.5	339	1.5	9	4

MVS

DC(mm)	Hole Depth(l/d)	DP1020	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
8.5	35	●	MVS0850X35S090	299.0	324.5	327.5	382.5	381	1.5	9	4
8.5	40	●	MVS0850X40S090	341.5	366.5	369.5	424.5	423	1.5	9	4
8.6	3	●	MVS0860X03S090	27.4	46.6	46.6	101.6	100	1.6	9	2
8.6	3	●	MVS0860X03S100	27.4	46.6	48.6	101.6	100	1.6	10	2
8.6	5	●	MVS0860X05S090	44.6	73.6	73.6	128.6	127	1.6	9	2
8.6	5	●	MVS0860X05S100	44.6	73.6	75.6	128.6	127	1.6	10	2
8.6	8	●	MVS0860X08S090	70.4	100.6	100.6	155.6	154	1.6	9	2
8.6	8	●	MVS0860X08S100	70.4	100.6	102.6	155.6	154	1.6	10	2
8.6	10	●	MVS0860X10S090	87.6	118.6	121.6	176.6	175	1.6	9	4
8.6	15	●	MVS0860X15S090	130.6	163.6	166.6	221.6	220	1.6	9	4
8.6	20	●	MVS0860X20S090	173.6	208.6	211.6	266.6	265	1.6	9	4
8.6	25	●	MVS0860X25S090	216.6	253.6	256.6	311.6	310	1.6	9	4
8.6	30	●	MVS0860X30S090	259.6	298.6	301.6	356.6	355	1.6	9	4
8.6	35	□	MVS0860X35S090	302.6	343.6	346.6	401.6	400	1.6	9	4
8.6	40	□	MVS0860X40S090	345.6	391.6	394.6	449.6	448	1.6	9	4
8.7	3	●	MVS0870X03S090	27.7	46.6	46.6	101.6	100	1.6	9	2
8.7	3	●	MVS0870X03S100	27.7	46.6	48.6	101.6	100	1.6	10	2
8.7	5	●	MVS0870X05S090	45.1	73.6	73.6	128.6	127	1.6	9	2
8.7	5	●	MVS0870X05S100	45.1	73.6	75.6	128.6	127	1.6	10	2
8.7	8	●	MVS0870X08S090	71.2	100.6	100.6	155.6	154	1.6	9	2
8.7	8	●	MVS0870X08S100	71.2	100.6	102.6	155.6	154	1.6	10	2
8.7	10	●	MVS0870X10S090	88.6	118.6	121.6	176.6	175	1.6	9	4
8.7	15	●	MVS0870X15S090	132.1	163.6	166.6	221.6	220	1.6	9	4
8.7	20	●	MVS0870X20S090	175.6	208.6	211.6	266.6	265	1.6	9	4
8.7	25	●	MVS0870X25S090	219.1	253.6	256.6	311.6	310	1.6	9	4
8.7	30	●	MVS0870X30S090	262.6	298.6	301.6	356.6	355	1.6	9	4
8.7	35	□	MVS0870X35S090	306.1	343.6	346.6	401.6	400	1.6	9	4
8.7	40	□	MVS0870X40S090	349.6	391.6	394.6	449.6	448	1.6	9	4
8.8	3	●	MVS0880X03S090	28.0	46.6	46.6	101.6	100	1.6	9	2
8.8	3	●	MVS0880X03S100	28.0	46.6	48.6	101.6	100	1.6	10	2
8.8	5	●	MVS0880X05S090	45.6	73.6	73.6	128.6	127	1.6	9	2
8.8	5	●	MVS0880X05S100	45.6	73.6	75.6	128.6	127	1.6	10	2
8.8	8	●	MVS0880X08S090	72.0	100.6	100.6	155.6	154	1.6	9	2
8.8	8	●	MVS0880X08S100	72.0	100.6	102.6	155.6	154	1.6	10	2
8.8	10	●	MVS0880X10S090	89.6	118.6	121.6	176.6	175	1.6	9	4
8.8	15	●	MVS0880X15S090	133.6	163.6	166.6	221.6	220	1.6	9	4
8.8	20	●	MVS0880X20S090	177.6	208.6	211.6	266.6	265	1.6	9	4
8.8	25	●	MVS0880X25S090	221.6	253.6	256.6	311.6	310	1.6	9	4
8.8	30	●	MVS0880X30S090	265.6	298.6	301.6	356.6	355	1.6	9	4
8.8	35	□	MVS0880X35S090	309.6	343.6	346.6	401.6	400	1.6	9	4
8.8	40	□	MVS0880X40S090	353.6	391.6	394.6	449.6	448	1.6	9	4
8.9	3	●	MVS0890X03S090	28.3	46.6	46.6	101.6	100	1.6	9	2
8.9	3	●	MVS0890X03S100	28.3	46.6	48.6	101.6	100	1.6	10	2
8.9	5	●	MVS0890X05S090	46.1	73.6	73.6	128.6	127	1.6	9	2
8.9	5	●	MVS0890X05S100	46.1	73.6	75.6	128.6	127	1.6	10	2
8.9	8	●	MVS0890X08S090	72.8	100.6	100.6	155.6	154	1.6	9	2
8.9	8	●	MVS0890X08S100	72.8	100.6	102.6	155.6	154	1.6	10	2
8.9	10	●	MVS0890X10S090	90.6	118.6	121.6	176.6	175	1.6	9	4
8.9	15	●	MVS0890X15S090	135.1	163.6	166.6	221.6	220	1.6	9	4
8.9	20	●	MVS0890X20S090	179.6	208.6	211.6	266.6	265	1.6	9	4
8.9	25	●	MVS0890X25S090	224.1	253.6	256.6	311.6	310	1.6	9	4
8.9	30	●	MVS0890X30S090	268.6	298.6	301.6	356.6	355	1.6	9	4
8.9	35	□	MVS0890X35S090	313.1	343.6	346.6	401.6	400	1.6	9	4
8.9	40	□	MVS0890X40S090	357.6	391.6	394.6	449.6	448	1.6	9	4

DC(mm)	Hole Depth(l/d)	DP1020	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
9.0	3	●	MVS0900X03S090	28.6	46.6	46.6	101.6	100	1.6	9	2
9.0	3	●	MVS0900X03S100	28.6	46.6	48.6	101.6	100	1.6	10	2
9.0	5	●	MVS0900X05S090	46.6	73.6	73.6	128.6	127	1.6	9	2
9.0	5	●	MVS0900X05S100	46.6	73.6	75.6	128.6	127	1.6	10	2
9.0	8	●	MVS0900X08S090	73.6	100.6	100.6	155.6	154	1.6	9	2
9.0	8	●	MVS0900X08S100	73.6	100.6	102.6	155.6	154	1.6	10	2
9.0	10	●	MVS0900X10S090	91.6	118.6	121.6	176.6	175	1.6	9	4
9.0	15	●	MVS0900X15S090	136.6	163.6	166.6	221.6	220	1.6	9	4
9.0	20	●	MVS0900X20S090	181.6	208.6	211.6	266.6	265	1.6	9	4
9.0	25	●	MVS0900X25S090	226.6	253.6	256.6	311.6	310	1.6	9	4
9.0	30	●	MVS0900X30S090	271.6	298.6	301.6	356.6	355	1.6	9	4
9.0	35	●	MVS0900X35S090	316.6	343.6	346.6	401.6	400	1.6	9	4
9.0	40	●	MVS0900X40S090	361.6	391.6	394.6	449.6	448	1.6	9	4
9.1	3	●	MVS0910X03S100	29.0	49.2	51.7	107.7	106	1.7	10	2
9.1	5	●	MVS0910X05S100	47.2	77.7	81.7	137.7	136	1.7	10	2
9.1	8	●	MVS0910X08S100	74.5	106.7	111.7	167.7	166	1.7	10	2
9.1	10	●	MVS0910X10S100	92.7	125.7	128.7	183.7	182	1.7	10	4
9.1	15	●	MVS0910X15S100	138.2	172.7	175.7	230.7	229	1.7	10	4
9.1	20	●	MVS0910X20S100	183.7	220.7	223.7	278.7	277	1.7	10	4
9.1	25	●	MVS0910X25S100	229.2	267.7	270.7	325.7	324	1.7	10	4
9.1	30	●	MVS0910X30S100	274.7	315.7	318.7	373.7	372	1.7	10	4
9.1	35	□	MVS0910X35S100	320.2	362.7	365.7	420.7	419	1.7	10	4
9.2	3	●	MVS0920X03S100	29.3	49.2	51.7	107.7	106	1.7	10	2
9.2	5	●	MVS0920X05S100	47.7	77.7	81.7	137.7	136	1.7	10	2
9.2	8	●	MVS0920X08S100	75.3	106.7	111.7	167.7	166	1.7	10	2
9.2	10	●	MVS0920X10S100	93.7	125.7	128.7	183.7	182	1.7	10	4
9.2	15	●	MVS0920X15S100	139.7	172.7	175.7	230.7	229	1.7	10	4
9.2	20	●	MVS0920X20S100	185.7	220.7	223.7	278.7	277	1.7	10	4
9.2	25	●	MVS0920X25S100	231.7	267.7	270.7	325.7	324	1.7	10	4
9.2	30	●	MVS0920X30S100	277.7	315.7	318.7	373.7	372	1.7	10	4
9.2	35	□	MVS0920X35S100	323.7	362.7	365.7	420.7	419	1.7	10	4
9.3	3	●	MVS0930X03S100	29.6	49.2	51.7	107.7	106	1.7	10	2
9.3	5	●	MVS0930X05S100	48.2	77.7	81.7	137.7	136	1.7	10	2
9.3	8	●	MVS0930X08S100	76.1	106.7	111.7	167.7	166	1.7	10	2
9.3	10	●	MVS0930X10S100	94.7	125.7	128.7	183.7	182	1.7	10	4
9.3	15	●	MVS0930X15S100	141.2	172.7	175.7	230.7	229	1.7	10	4
9.3	20	●	MVS0930X20S100	187.7	220.7	223.7	278.7	277	1.7	10	4
9.3	25	●	MVS0930X25S100	234.2	267.7	270.7	325.7	324	1.7	10	4
9.3	30	●	MVS0930X30S100	280.7	315.7	318.7	373.7	372	1.7	10	4
9.3	35	□	MVS0930X35S100	327.2	362.7	365.7	420.7	419	1.7	10	4
9.4	3	●	MVS0940X03S100	29.9	49.2	51.7	107.7	106	1.7	10	2
9.4	5	●	MVS0940X05S100	48.7	77.7	81.7	137.7	136	1.7	10	2
9.4	8	●	MVS0940X08S100	76.9	106.7	111.7	167.7	166	1.7	10	2
9.4	10	●	MVS0940X10S100	95.7	125.7	128.7	183.7	182	1.7	10	4
9.4	15	●	MVS0940X15S100	142.7	172.7	175.7	230.7	229	1.7	10	4
9.4	20	●	MVS0940X20S100	189.7	220.7	223.7	278.7	277	1.7	10	4
9.4	25	●	MVS0940X25S100	236.7	267.7	270.7	325.7	324	1.7	10	4
9.4	30	●	MVS0940X30S100	283.7	315.7	318.7	373.7	372	1.7	10	4
9.4	35	□	MVS0940X35S100	330.7	362.7	365.7	420.7	419	1.7	10	4
9.5	3	●	MVS0950X03S100	30.2	49.2	51.7	107.7	106	1.7	10	2
9.5	5	●	MVS0950X05S100	49.2	77.7	81.7	137.7	136	1.7	10	2
9.5	8	●	MVS0950X08S100	77.7	106.7	111.7	167.7	166	1.7	10	2
9.5	10	●	MVS0950X10S100	96.7	125.7	128.7	183.7	182	1.7	10	4
9.5	15	●	MVS0950X15S100	144.2	172.7	175.7	230.7	229	1.7	10	4

MVS

DC(mm)	Hole Depth(l/d)	DP1020	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
9.5	20	●	MVS0950X20S100	191.7	220.7	223.7	278.7	277	1.7	10	4
9.5	25	●	MVS0950X25S100	239.2	267.7	270.7	325.7	324	1.7	10	4
9.5	30	●	MVS0950X30S100	286.7	315.7	318.7	373.7	372	1.7	10	4
9.5	35	●	MVS0950X35S100	334.2	362.7	365.7	420.7	419	1.7	10	4
9.6	3	●	MVS0960X03S100	30.5	51.7	51.7	107.7	106	1.7	10	2
9.6	5	●	MVS0960X05S100	49.7	81.7	81.7	137.7	136	1.7	10	2
9.6	8	●	MVS0960X08S100	78.5	111.7	111.7	167.7	166	1.7	10	2
9.6	10	●	MVS0960X10S100	97.7	131.7	134.7	189.7	188	1.7	10	4
9.6	15	●	MVS0960X15S100	145.7	181.7	184.7	239.7	238	1.7	10	4
9.6	20	●	MVS0960X20S100	193.7	231.7	234.7	289.7	288	1.7	10	4
9.6	25	●	MVS0960X25S100	241.7	281.7	284.7	339.7	338	1.7	10	4
9.6	30	●	MVS0960X30S100	289.7	331.7	334.7	389.7	388	1.7	10	4
9.6	35	□	MVS0960X35S100	337.7	381.7	384.7	439.7	438	1.7	10	4
9.7	3	●	MVS0970X03S100	30.9	51.8	51.8	107.8	106	1.8	10	2
9.7	5	●	MVS0970X05S100	50.3	81.8	81.8	137.8	136	1.8	10	2
9.7	8	●	MVS0970X08S100	79.4	111.8	111.8	167.8	166	1.8	10	2
9.7	10	●	MVS0970X10S100	98.8	131.8	134.8	189.8	188	1.8	10	4
9.7	15	●	MVS0970X15S100	147.3	181.8	184.8	239.8	238	1.8	10	4
9.7	20	●	MVS0970X20S100	195.8	231.8	234.8	289.8	288	1.8	10	4
9.7	25	●	MVS0970X25S100	244.3	281.8	284.8	339.8	338	1.8	10	4
9.7	30	●	MVS0970X30S100	292.8	331.8	334.8	389.8	388	1.8	10	4
9.7	35	□	MVS0970X35S100	341.3	381.8	384.8	439.8	438	1.8	10	4
9.8	3	●	MVS0980X03S100	31.2	51.8	51.8	107.8	106	1.8	10	2
9.8	5	●	MVS0980X05S100	50.8	81.8	81.8	137.8	136	1.8	10	2
9.8	8	●	MVS0980X08S100	80.2	111.8	111.8	167.8	166	1.8	10	2
9.8	10	●	MVS0980X10S100	99.8	131.8	134.8	189.8	188	1.8	10	4
9.8	15	●	MVS0980X15S100	148.8	181.8	184.8	239.8	238	1.8	10	4
9.8	20	●	MVS0980X20S100	197.8	231.8	234.8	289.8	288	1.8	10	4
9.8	25	●	MVS0980X25S100	246.8	281.8	284.8	339.8	338	1.8	10	4
9.8	30	●	MVS0980X30S100	295.8	331.8	334.8	389.8	388	1.8	10	4
9.8	35	□	MVS0980X35S100	344.8	381.8	384.8	439.8	438	1.8	10	4
9.9	3	●	MVS0990X03S100	31.5	51.8	51.8	107.8	106	1.8	10	2
9.9	5	●	MVS0990X05S100	51.3	81.8	81.8	137.8	136	1.8	10	2
9.9	8	●	MVS0990X08S100	81.0	111.8	111.8	167.8	166	1.8	10	2
9.9	10	●	MVS0990X10S100	100.8	131.8	134.8	189.8	188	1.8	10	4
9.9	15	●	MVS0990X15S100	150.3	181.8	184.8	239.8	238	1.8	10	4
9.9	20	●	MVS0990X20S100	199.8	231.8	234.8	289.8	288	1.8	10	4
9.9	25	●	MVS0990X25S100	249.3	281.8	284.8	339.8	338	1.8	10	4
9.9	30	●	MVS0990X30S100	298.8	331.8	334.8	389.8	388	1.8	10	4
9.9	35	□	MVS0990X35S100	348.3	381.8	384.8	439.8	438	1.8	10	4
10.0	3	●	MVS1000X03S100	31.8	51.8	51.8	107.8	106	1.8	10	2
10.0	5	●	MVS1000X05S100	51.8	81.8	81.8	137.8	136	1.8	10	2
10.0	8	●	MVS1000X08S100	81.8	111.8	111.8	167.8	166	1.8	10	2
10.0	10	●	MVS1000X10S100	101.8	131.8	134.8	189.8	188	1.8	10	4
10.0	15	●	MVS1000X15S100	151.8	181.8	184.8	239.8	238	1.8	10	4
10.0	20	●	MVS1000X20S100	201.8	231.8	234.8	289.8	288	1.8	10	4
10.0	25	●	MVS1000X25S100	251.8	281.8	284.8	339.8	338	1.8	10	4
10.0	30	●	MVS1000X30S100	301.8	331.8	334.8	389.8	388	1.8	10	4
10.0	35	●	MVS1000X35S100	351.8	381.8	384.8	439.8	438	1.8	10	4
10.1	3	●	MVS1010X03S110	32.1	54.3	56.8	117.8	116	1.8	11	2
10.1	3	●	MVS1010X03S120	32.1	54.3	56.8	117.8	116	1.8	12	2
10.1	5	●	MVS1010X05S110	52.3	85.8	89.8	150.8	149	1.8	11	2
10.1	5	●	MVS1010X05S120	52.3	85.8	89.8	150.8	149	1.8	12	2
10.1	8	●	MVS1010X08S110	82.6	117.8	122.8	183.8	182	1.8	11	2

DC(mm)	Hole Depth(l/d)	DP1020	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
10.1	8	●	MVS1010X08S120	82.6	117.8	122.8	183.8	182	1.8	12	2
10.1	10	●	MVS1010X10S110	102.8	138.8	141.8	202.8	201	1.8	11	4
10.1	15	●	MVS1010X15S110	153.3	190.8	193.8	254.8	253	1.8	11	4
10.1	20	●	MVS1010X20S110	203.8	243.8	246.8	307.8	306	1.8	11	4
10.1	25	●	MVS1010X25S110	254.3	295.8	298.8	359.8	358	1.8	11	4
10.2	3	●	MVS1020X03S110	32.5	54.4	56.9	117.9	116	1.9	11	2
10.2	3	●	MVS1020X03S120	32.5	54.4	56.9	117.9	116	1.9	12	2
10.2	5	●	MVS1020X05S110	52.9	85.9	89.9	150.9	149	1.9	11	2
10.2	5	●	MVS1020X05S120	52.9	85.9	89.9	150.9	149	1.9	12	2
10.2	8	●	MVS1020X08S110	83.5	117.9	122.9	183.9	182	1.9	11	2
10.2	8	●	MVS1020X08S120	83.5	117.9	122.9	183.9	182	1.9	12	2
10.2	10	●	MVS1020X10S110	103.9	138.9	141.9	202.9	201	1.9	11	4
10.2	15	●	MVS1020X15S110	154.9	190.9	193.9	254.9	253	1.9	11	4
10.2	20	●	MVS1020X20S110	205.9	243.9	246.9	307.9	306	1.9	11	4
10.2	25	●	MVS1020X25S110	256.9	295.9	298.9	359.9	358	1.9	11	4
10.3	3	●	MVS1030X03S110	32.8	54.4	56.9	117.9	116	1.9	11	2
10.3	3	●	MVS1030X03S120	32.8	54.4	56.9	117.9	116	1.9	12	2
10.3	5	●	MVS1030X05S110	53.4	85.9	89.9	150.9	149	1.9	11	2
10.3	5	●	MVS1030X05S120	53.4	85.9	89.9	150.9	149	1.9	12	2
10.3	8	●	MVS1030X08S110	84.3	117.9	122.9	183.9	182	1.9	11	2
10.3	8	●	MVS1030X08S120	84.3	117.9	122.9	183.9	182	1.9	12	2
10.3	10	●	MVS1030X10S110	104.9	138.9	141.9	202.9	201	1.9	11	4
10.3	15	●	MVS1030X15S110	156.4	190.9	193.9	254.9	253	1.9	11	4
10.3	20	●	MVS1030X20S110	207.9	243.9	246.9	307.9	306	1.9	11	4
10.3	25	●	MVS1030X25S110	259.4	295.9	298.9	359.9	358	1.9	11	4
10.4	3	●	MVS1040X03S110	33.1	54.4	56.9	117.9	116	1.9	11	2
10.4	3	●	MVS1040X03S120	33.1	54.4	56.9	117.9	116	1.9	12	2
10.4	5	●	MVS1040X05S110	53.9	85.9	89.9	150.9	149	1.9	11	2
10.4	5	●	MVS1040X05S120	53.9	85.9	89.9	150.9	149	1.9	12	2
10.4	8	●	MVS1040X08S110	85.1	117.9	122.9	183.9	182	1.9	11	2
10.4	8	●	MVS1040X08S120	85.1	117.9	122.9	183.9	182	1.9	12	2
10.4	10	●	MVS1040X10S110	105.9	138.9	141.9	202.9	201	1.9	11	4
10.4	15	●	MVS1040X15S110	157.9	190.9	193.9	254.9	253	1.9	11	4
10.4	20	●	MVS1040X20S110	209.9	243.9	246.9	307.9	306	1.9	11	4
10.4	25	●	MVS1040X25S110	261.9	295.9	298.9	359.9	358	1.9	11	4
10.5	3	●	MVS1050X03S110	33.4	54.4	56.9	117.9	116	1.9	11	2
10.5	3	●	MVS1050X03S120	33.4	54.4	56.9	117.9	116	1.9	12	2
10.5	5	●	MVS1050X05S110	54.4	85.9	89.9	150.9	149	1.9	11	2
10.5	5	●	MVS1050X05S120	54.4	85.9	89.9	150.9	149	1.9	12	2
10.5	8	●	MVS1050X08S110	85.9	117.9	122.9	183.9	182	1.9	11	2
10.5	8	●	MVS1050X08S120	85.9	117.9	122.9	183.9	182	1.9	12	2
10.5	10	●	MVS1050X10S110	106.9	138.9	141.9	202.9	201	1.9	11	4
10.5	15	●	MVS1050X15S110	159.4	190.9	193.9	254.9	253	1.9	11	4
10.5	20	●	MVS1050X20S110	211.9	243.9	246.9	307.9	306	1.9	11	4
10.5	25	●	MVS1050X25S110	264.4	295.9	298.9	359.9	358	1.9	11	4
10.6	3	●	MVS1060X03S110	33.7	56.9	56.9	117.9	116	1.9	11	2
10.6	3	●	MVS1060X03S120	33.7	56.9	57.9	117.9	116	1.9	12	2
10.6	5	●	MVS1060X05S110	54.9	89.9	89.9	150.9	149	1.9	11	2
10.6	5	●	MVS1060X05S120	54.9	89.9	90.9	150.9	149	1.9	12	2
10.6	8	●	MVS1060X08S110	86.7	122.9	122.9	183.9	182	1.9	11	2
10.6	8	●	MVS1060X08S120	86.7	122.9	123.9	183.9	182	1.9	12	2
10.6	10	●	MVS1060X10S110	107.9	144.9	147.9	208.9	207	1.9	11	4
10.6	15	●	MVS1060X15S110	160.9	199.9	202.9	263.9	262	1.9	11	4
10.6	20	●	MVS1060X20S110	213.9	254.9	257.9	318.9	317	1.9	11	4

MVS

DC(mm)	Hole Depth(l/d)	DP1020	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
10.6	25	●	MVS1060X25S110	266.9	309.9	312.9	373.9	372	1.9	11	4
10.7	3	●	MVS1070X03S110	34.0	56.9	56.9	117.9	116	1.9	11	2
10.7	3	●	MVS1070X03S120	34.0	56.9	57.9	117.9	116	1.9	12	2
10.7	5	●	MVS1070X05S110	55.4	89.9	89.9	150.9	149	1.9	11	2
10.7	5	●	MVS1070X05S120	55.4	89.9	90.9	150.9	149	1.9	12	2
10.7	8	●	MVS1070X08S110	87.5	122.9	122.9	183.9	182	1.9	11	2
10.7	8	●	MVS1070X08S120	87.5	122.9	123.9	183.9	182	1.9	12	2
10.7	10	●	MVS1070X10S110	108.9	144.9	147.9	208.9	207	1.9	11	4
10.7	15	●	MVS1070X15S110	162.4	199.9	202.9	263.9	262	1.9	11	4
10.7	20	●	MVS1070X20S110	215.9	254.9	257.9	318.9	317	1.9	11	4
10.7	25	●	MVS1070X25S110	269.4	309.9	312.9	373.9	372	1.9	11	4
10.8	3	●	MVS1080X03S110	34.4	57.0	57.0	118.0	116	2.0	11	2
10.8	3	●	MVS1080X03S120	34.4	57.0	58.0	118.0	116	2.0	12	2
10.8	5	●	MVS1080X05S110	56.0	90.0	90.0	151.0	149	2.0	11	2
10.8	5	●	MVS1080X05S120	56.0	90.0	91.0	151.0	149	2.0	12	2
10.8	8	●	MVS1080X08S110	88.4	123.0	123.0	184.0	182	2.0	11	2
10.8	8	●	MVS1080X08S120	88.4	123.0	124.0	184.0	182	2.0	12	2
10.8	10	●	MVS1080X10S110	110.0	145.0	148.0	209.0	207	2.0	11	4
10.8	15	●	MVS1080X15S110	164.0	200.0	203.0	264.0	262	2.0	11	4
10.8	20	●	MVS1080X20S110	218.0	255.0	258.0	319.0	317	2.0	11	4
10.8	25	●	MVS1080X25S110	272.0	310.0	313.0	374.0	372	2.0	11	4
10.9	3	●	MVS1090X03S110	34.7	57.0	57.0	118.0	116	2.0	11	2
10.9	3	●	MVS1090X03S120	34.7	57.0	58.0	118.0	116	2.0	12	2
10.9	5	●	MVS1090X05S110	56.5	90.0	90.0	151.0	149	2.0	11	2
10.9	5	●	MVS1090X05S120	56.5	90.0	91.0	151.0	149	2.0	12	2
10.9	8	●	MVS1090X08S110	89.2	123.0	123.0	184.0	182	2.0	11	2
10.9	8	●	MVS1090X08S120	89.2	123.0	124.0	184.0	182	2.0	12	2
10.9	10	●	MVS1090X10S110	111.0	145.0	148.0	209.0	207	2.0	11	4
10.9	15	●	MVS1090X15S110	165.5	200.0	203.0	264.0	262	2.0	11	4
10.9	20	●	MVS1090X20S110	220.0	255.0	258.0	319.0	317	2.0	11	4
10.9	25	●	MVS1090X25S110	274.5	310.0	313.0	374.0	372	2.0	11	4
11.0	3	●	MVS1100X03S110	35.0	57.0	57.0	118.0	116	2.0	11	2
11.0	3	●	MVS1100X03S120	35.0	57.0	58.0	118.0	116	2.0	12	2
11.0	5	●	MVS1100X05S110	57.0	90.0	90.0	151.0	149	2.0	11	2
11.0	5	●	MVS1100X05S120	57.0	90.0	91.0	151.0	149	2.0	12	2
11.0	8	●	MVS1100X08S110	90.0	123.0	123.0	184.0	182	2.0	11	2
11.0	8	●	MVS1100X08S120	90.0	123.0	124.0	184.0	182	2.0	12	2
11.0	10	●	MVS1100X10S110	112.0	145.0	147.0	209.0	207	2.0	11	4
11.0	15	●	MVS1100X15S110	167.0	200.0	203.0	264.0	262	2.0	11	4
11.0	20	●	MVS1100X20S110	222.0	255.0	258.0	319.0	317	2.0	11	4
11.0	25	●	MVS1100X25S110	277.0	310.0	313.0	374.0	372	2.0	11	4
11.1	3	●	MVS1110X03S120	35.3	59.5	62.0	124.0	122	2.0	12	2
11.1	5	●	MVS1110X05S120	57.5	94.0	98.0	160.0	158	2.0	12	2
11.1	8	●	MVS1110X08S120	90.8	129.0	134.0	196.0	194	2.0	12	2
11.1	10	●	MVS1110X10S120	113.0	152.0	155.0	217.0	215	2.0	12	4
11.1	15	●	MVS1110X15S120	168.5	209.0	212.0	274.0	272	2.0	12	4
11.1	20	●	MVS1110X20S120	224.0	267.0	270.0	332.0	330	2.0	12	4
11.1	25	●	MVS1110X25S120	279.5	324.0	327.0	389.0	387	2.0	12	4
11.2	3	●	MVS1120X03S120	35.6	59.5	62.0	124.0	122	2.0	12	2
11.2	5	●	MVS1120X05S120	58.0	94.0	98.0	160.0	158	2.0	12	2
11.2	8	●	MVS1120X08S120	91.6	129.0	134.0	196.0	194	2.0	12	2
11.2	10	●	MVS1120X10S120	114.0	152.0	155.0	217.0	215	2.0	12	4
11.2	15	●	MVS1120X15S120	170.0	209.0	212.0	274.0	272	2.0	12	4
11.2	20	●	MVS1120X20S120	226.0	267.0	270.0	332.0	330	2.0	12	4

DC(mm)	Hole Depth(l/d)	DP1020	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
11.2	25	●	MVS1120X25S120	282.0	324.0	327.0	389.0	387	2.0	12	4
11.3	3	●	MVS1130X03S120	36.0	59.6	62.1	124.1	122	2.1	12	2
11.3	5	●	MVS1130X05S120	58.6	94.1	98.1	160.1	158	2.1	12	2
11.3	8	●	MVS1130X08S120	92.5	129.1	134.1	196.1	194	2.1	12	2
11.3	10	●	MVS1130X10S120	115.1	152.1	155.1	217.1	215	2.1	12	4
11.3	15	●	MVS1130X15S120	171.6	209.1	212.1	274.1	272	2.1	12	4
11.3	20	●	MVS1130X20S120	228.1	267.1	270.1	332.1	330	2.1	12	4
11.3	25	●	MVS1130X25S120	284.6	324.1	327.1	389.1	387	2.1	12	4
11.4	3	●	MVS1140X03S120	36.3	59.6	62.1	124.1	122	2.1	12	2
11.4	5	●	MVS1140X05S120	59.1	94.1	98.1	160.1	158	2.1	12	2
11.4	8	●	MVS1140X08S120	93.3	129.1	134.1	196.1	194	2.1	12	2
11.4	10	●	MVS1140X10S120	116.1	152.1	155.1	217.1	215	2.1	12	4
11.4	15	●	MVS1140X15S120	173.1	209.1	212.1	274.1	272	2.1	12	4
11.4	20	●	MVS1140X20S120	230.1	267.1	270.1	332.1	330	2.1	12	4
11.4	25	●	MVS1140X25S120	287.1	324.1	327.1	389.1	387	2.1	12	4
11.5	3	●	MVS1150X03S120	36.6	59.6	62.1	124.1	122	2.1	12	2
11.5	5	●	MVS1150X05S120	59.6	94.1	98.1	160.1	158	2.1	12	2
11.5	8	●	MVS1150X08S120	94.1	129.1	134.1	196.1	194	2.1	12	2
11.5	10	●	MVS1150X10S120	117.1	152.1	155.1	217.1	215	2.1	12	4
11.5	15	●	MVS1150X15S120	174.6	209.1	212.1	274.1	272	2.1	12	4
11.5	20	●	MVS1150X20S120	232.1	267.1	270.1	332.1	330	2.1	12	4
11.5	25	●	MVS1150X25S120	289.6	324.1	327.1	389.1	387	2.1	12	4
11.6	3	●	MVS1160X03S120	36.9	62.1	62.1	124.1	122	2.1	12	2
11.6	5	●	MVS1160X05S120	60.1	98.1	98.1	160.1	158	2.1	12	2
11.6	8	●	MVS1160X08S120	94.9	134.1	134.1	196.1	194	2.1	12	2
11.6	10	●	MVS1160X10S120	118.1	158.1	161.1	223.1	221	2.1	12	4
11.6	15	●	MVS1160X15S120	176.1	218.1	221.1	283.1	281	2.1	12	4
11.6	20	●	MVS1160X20S120	234.1	278.1	281.1	343.1	341	2.1	12	4
11.6	25	●	MVS1160X25S120	292.1	338.1	341.1	403.1	401	2.1	12	4
11.7	3	●	MVS1170X03S120	37.2	62.1	62.1	124.1	122	2.1	12	2
11.7	5	●	MVS1170X05S120	60.6	98.1	98.1	160.1	158	2.1	12	2
11.7	8	●	MVS1170X08S120	95.7	134.1	134.1	196.1	194	2.1	12	2
11.7	10	●	MVS1170X10S120	119.1	158.1	161.1	223.1	221	2.1	12	4
11.7	15	●	MVS1170X15S120	177.6	218.1	221.1	283.1	281	2.1	12	4
11.7	20	●	MVS1170X20S120	236.1	278.1	281.1	343.1	341	2.1	12	4
11.7	25	●	MVS1170X25S120	294.6	338.1	341.1	403.1	401	2.1	12	4
11.8	3	●	MVS1180X03S120	37.5	62.1	62.1	124.1	122	2.1	12	2
11.8	5	●	MVS1180X05S120	61.1	98.1	98.1	160.1	158	2.1	12	2
11.8	8	●	MVS1180X08S120	96.5	134.1	134.1	196.1	194	2.1	12	2
11.8	10	●	MVS1180X10S120	120.1	158.1	161.1	223.1	221	2.1	12	4
11.8	15	●	MVS1180X15S120	179.1	218.1	221.1	283.1	281	2.1	12	4
11.8	20	●	MVS1180X20S120	238.1	278.1	281.1	343.1	341	2.1	12	4
11.8	25	●	MVS1180X25S120	297.1	338.1	341.1	403.1	401	2.1	12	4
11.9	3	●	MVS1190X03S120	37.9	62.2	62.2	124.2	122	2.2	12	2
11.9	5	●	MVS1190X05S120	61.7	98.2	98.2	160.2	158	2.2	12	2
11.9	8	●	MVS1190X08S120	97.4	134.2	134.2	196.2	194	2.2	12	2
11.9	10	●	MVS1190X10S120	121.2	158.2	161.2	223.2	221	2.2	12	4
11.9	15	●	MVS1190X15S120	180.7	218.2	221.2	283.2	281	2.2	12	4
11.9	20	●	MVS1190X20S120	240.2	278.2	281.2	343.2	341	2.2	12	4
11.9	25	●	MVS1190X25S120	299.7	338.2	341.2	403.2	401	2.2	12	4
12.0	3	●	MVS1200X03S120	38.2	62.2	62.2	124.2	122	2.2	12	2
12.0	5	●	MVS1200X05S120	62.2	98.2	98.2	160.2	158	2.2	12	2
12.0	8	●	MVS1200X08S120	98.2	134.2	134.2	196.2	194	2.2	12	2
12.0	10	●	MVS1200X10S120	122.2	158.2	161.2	223.2	221	2.2	12	4

MVS

DC(mm)	Hole Depth(l/d)	DP1020	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
12.0	15	●	MVS1200X15S120	182.2	218.2	221.2	283.2	281	2.2	12	4
12.0	20	●	MVS1200X20S120	242.2	278.2	281.2	343.2	341	2.2	12	4
12.0	25	●	MVS1200X25S120	302.2	338.2	341.2	403.2	401	2.2	12	4
12.1	3	●	MVS1210X03S130	38.5	64.7	67.2	130.2	128	2.2	13	2
12.1	3	□	MVS1210X03S140	38.5	64.7	67.2	130.2	128	2.2	14	2
12.1	5	●	MVS1210X05S130	62.7	102.2	106.2	169.2	167	2.2	13	2
12.1	5	□	MVS1210X05S140	62.7	102.2	106.2	169.2	167	2.2	14	2
12.1	8	□	MVS1210X08S130	99.0	140.2	145.2	208.2	206	2.2	13	2
12.1	8	□	MVS1210X08S140	99.0	140.2	145.2	208.2	206	2.2	14	2
12.1	10	□	MVS1210X10S130	123.2	165.2	168.2	231.2	229	2.2	13	4
12.1	15	□	MVS1210X15S130	183.7	227.2	230.2	293.2	291	2.2	13	4
12.1	20	□	MVS1210X20S130	244.2	290.2	293.2	356.2	354	2.2	13	4
12.2	3	●	MVS1220X03S130	38.8	64.7	67.2	130.2	128	2.2	13	2
12.2	3	□	MVS1220X03S140	38.8	64.7	67.2	130.2	128	2.2	14	2
12.2	5	●	MVS1220X05S130	63.2	102.2	106.2	169.2	167	2.2	13	2
12.2	5	□	MVS1220X05S140	63.2	102.2	106.2	169.2	167	2.2	14	2
12.2	8	□	MVS1220X08S130	99.8	140.2	145.2	208.2	206	2.2	13	2
12.2	8	□	MVS1220X08S140	99.8	140.2	145.2	208.2	206	2.2	14	2
12.2	10	□	MVS1220X10S130	124.2	165.2	168.2	231.2	229	2.2	13	4
12.2	15	□	MVS1220X15S130	185.2	227.2	230.2	293.2	291	2.2	13	4
12.2	20	□	MVS1220X20S130	246.2	290.2	293.2	356.2	354	2.2	13	4
12.3	3	●	MVS1230X03S130	39.1	64.7	67.2	130.2	128	2.2	13	2
12.3	3	□	MVS1230X03S140	39.1	64.7	67.2	130.2	128	2.2	14	2
12.3	5	●	MVS1230X05S130	63.7	102.2	106.2	169.2	167	2.2	13	2
12.3	5	□	MVS1230X05S140	63.7	102.2	106.2	169.2	167	2.2	14	2
12.3	8	□	MVS1230X08S130	100.6	140.2	145.2	208.2	206	2.2	13	2
12.3	8	□	MVS1230X08S140	100.6	140.2	145.2	208.2	206	2.2	14	2
12.3	10	□	MVS1230X10S130	125.2	165.2	168.2	231.2	229	2.2	13	4
12.3	15	□	MVS1230X15S130	186.7	227.2	230.2	293.2	291	2.2	13	4
12.3	20	□	MVS1230X20S130	248.2	290.2	293.2	356.2	354	2.2	13	4
12.4	3	●	MVS1240X03S130	39.5	64.8	67.3	130.3	128	2.3	13	2
12.4	3	□	MVS1240X03S140	39.5	64.8	67.3	130.3	128	2.3	14	2
12.4	5	●	MVS1240X05S130	64.3	102.3	106.3	169.3	167	2.3	13	2
12.4	5	□	MVS1240X05S140	64.3	102.3	106.3	169.3	167	2.3	14	2
12.4	8	□	MVS1240X08S130	101.5	140.3	145.3	208.3	206	2.3	13	2
12.4	8	□	MVS1240X08S140	101.5	140.3	145.3	208.3	206	2.3	14	2
12.4	10	□	MVS1240X10S130	126.3	165.3	168.3	231.3	229	2.3	13	4
12.4	15	□	MVS1240X15S130	188.3	227.3	230.3	293.3	291	2.3	13	4
12.4	20	□	MVS1240X20S130	250.3	290.3	293.3	356.3	354	2.3	13	4
12.5	3	●	MVS1250X03S130	39.8	64.8	67.3	130.3	128	2.3	13	2
12.5	3	□	MVS1250X03S140	39.8	64.8	67.3	130.3	128	2.3	14	2
12.5	5	●	MVS1250X05S130	64.8	102.3	106.3	169.3	167	2.3	13	2
12.5	5	□	MVS1250X05S140	64.8	102.3	106.3	169.3	167	2.3	14	2
12.5	8	●	MVS1250X08S130	102.3	140.3	145.3	208.3	206	2.3	13	2
12.5	8	□	MVS1250X08S140	102.3	140.3	145.3	208.3	206	2.3	14	2
12.5	10	●	MVS1250X10S130	127.3	165.3	168.3	231.3	229	2.3	13	4
12.5	15	●	MVS1250X15S130	189.8	227.3	230.3	293.3	291	2.3	13	4
12.5	20	●	MVS1250X20S130	252.3	290.3	293.3	356.3	354	2.3	13	4
12.6	3	●	MVS1260X03S130	40.1	67.3	67.3	130.3	128	2.3	13	2
12.6	3	□	MVS1260X03S140	40.1	67.3	67.3	130.3	128	2.3	14	2
12.6	5	●	MVS1260X05S130	65.3	106.3	106.3	169.3	167	2.3	13	2
12.6	5	□	MVS1260X05S140	65.3	106.3	106.3	169.3	167	2.3	14	2
12.6	8	□	MVS1260X08S130	103.1	145.3	145.3	208.3	206	2.3	13	2
12.6	8	□	MVS1260X08S140	103.1	145.3	145.3	208.3	206	2.3	14	2
12.6	10	□	MVS1260X10S130	128.3	171.3	174.3	237.3	235	2.3	13	4
12.6	15	□	MVS1260X15S130	191.3	236.3	239.3	302.3	300	2.3	13	4
12.6	20	□	MVS1260X20S130	254.3	301.3	304.3	367.3	365	2.3	13	4
12.7	3	●	MVS1270X03S130	40.4	67.3	67.3	130.3	128	2.3	13	2
12.7	3	□	MVS1270X03S140	40.4	67.3	67.3	130.3	128	2.3	14	2
12.7	5	●	MVS1270X05S130	65.8	106.3	106.3	169.3	167	2.3	13	2
12.7	5	□	MVS1270X05S140	65.8	106.3	106.3	169.3	167	2.3	14	2
12.7	8	□	MVS1270X08S130	103.9	145.3	145.3	208.3	206	2.3	13	2
12.7	8	□	MVS1270X08S140	103.9	145.3	145.3	208.3	206	2.3	14	2
12.7	10	□	MVS1270X10S130	129.3	171.3	174.3	237.3	235	2.3	13	4
12.7	15	□	MVS1270X15S130	192.8	236.3	239.3	302.3	300	2.3	13	4
12.7	20	□	MVS1270X20S130	256.3	301.3	304.3	367.3	365	2.3	13	4
12.8	3	●	MVS1280X03S130	40.7	67.3	67.3	130.3	128	2.3	13	2
12.8	3	□	MVS1280X03S140	40.7	67.3	67.3	130.3	128	2.3	14	2
12.8	5	●	MVS1280X05S130	66.3	106.3	106.3	169.3	167	2.3	13	2
12.8	5	□	MVS1280X05S140	66.3	106.3	106.3	169.3	167	2.3	14	2
12.8	8	□	MVS1280X08S130	104.7	145.3	145.3	208.3	206	2.3	13	2
12.8	8	□	MVS1280X08S140	104.7	145.3	145.3	208.3	206	2.3	14	2
12.8	10	□	MVS1280X10S130	130.3	171.3	174.3	237.3	235	2.3	13	4
12.8	15	□	MVS1280X15S130	194.3	236.3	239.3	302.3	300	2.3	13	4
12.8	20	□	MVS1280X20S130	258.3	301.3	304.3	367.3	365	2.3	13	4
12.9	3	●	MVS1290X03S130	41.0	67.3	67.3	130.3	128	2.3	13	2
12.9	3	□	MVS1290X03S140	41.0	67.3	67.3	130.3	128	2.3	14	2
12.9	5	●	MVS1290X05S130	66.8	106.3	106.3	169.3	167	2.3	13	2
12.9	5	□	MVS1290X05S140	66.8	106.3	106.3	169.3	167	2.3	14	2
12.9	8	□	MVS1290X08S130	105.5	145.3	145.3	208.3	206	2.3	13	2
12.9	8	□	MVS1290X08S140	105.5	145.3	145.3	208.3	206	2.3	14	2
12.9	10	□	MVS1290X10S130	131.3	171.3	174.3	237.3	235	2.3	13	4
12.9	15	□	MVS1290X15S130	195.8	236.3	239.3	302.3	300	2.3	13	4
12.9	20	□	MVS1290X20S130	260.3	301.3	304.3	367.3	365	2.3	13	4
13.0	3	●	MVS1300X03S130	41.4	67.4	67.4	130.4	128	2.4	13	2
13.0	3	□	MVS1300X03S140	41.4	67.4	67.4	130.4	128	2.4	14	2
13.0	5	●	MVS1300X05S130	67.4	106.4	106.4	169.4	167	2.4	13	2
13.0	5	□	MVS1300X05S140	67.4	106.4	106.4	169.4	167	2.4	14	2
13.0	8	●	MVS1300X08S130	106.4	145.4	145.4	208.4	206	2.4	13	2
13.0	8	□	MVS1300X08S140	106.4	145.4	145.4	208.4	206	2.4	14	2
13.0	10	●	MVS1300X10S130	132.4	171.4	174.4	237.4	235	2.4	13	4
13.0	15	●	MVS1300X15S130	197.4	236.4	239.4	302.4	300	2.4	13	4
13.0	20	●	MVS1300X20S130	262.4	301.4	304.4	367.4	365	2.4	13	4
13.1	3	●	MVS1310X03S140	41.7	69.9	72.4	136.4	134	2.4	14	2
13.1	5	●	MVS1310X05S140	67.9	110.4	114.4	178.4	176	2.4	14	2
13.1	8	□	MVS1310X08S140	107.2	151.4	156.4	220.4	218	2.4	14	2
13.1	10	□	MVS1310X10S140	133.4	178.4	181.4	245.4	243	2.4	14	4
13.1	15	□	MVS1310X15S140	198.9	245.4	248.4	312.4	310	2.4	14	4
13.1	20	□	MVS1310X20S140	264.4	313.4	316.4	380.4	378	2.4	14	4
13.2	3	●	MVS1320X03S140	42.0	69.9	72.4	136.4	134	2.4	14	2
13.2	5	●	MVS1320X05S140	68.4	110.4	114.4	178.4	176	2.4	14	2
13.2	8	□	MVS1320X08S140	108.0	151.4	156.4	220.4	218	2.4	14	2
13.2	10	□	MVS1320X10S140	134.4	178.4	181.4	245.4	243	2.4	14	4
13.2	15	□	MVS1320X15S140	200.4	245.4	248.4	312.4	310	2.4	14	4
13.2	20	□	MVS1320X20S140	266.4	313.4	316.4	380.4	378	2.4	14	4
13.3	3	●	MVS1330X03S140	42.3	69.9	72.4	136.4	134	2.4	14	2
13.3	5	●	MVS1330X05S140	68.9	110.4	114.4	178.4	176	2.4	14	2
13.3	8	□	MVS1330X08S140	108.8	151.4	156.4	220.4	218	2.4	14	2

MVS

DC(mm)	Hole Depth(l/d)	DP1020	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
13.3	10	□	MVS1330X10S140	135.4	178.4	181.4	245.4	243	2.4	14	4
13.3	15	□	MVS1330X15S140	201.9	245.4	248.4	312.4	310	2.4	14	4
13.3	20	□	MVS1330X20S140	268.4	313.4	316.4	380.4	378	2.4	14	4
13.4	3	●	MVS1340X03S140	42.6	69.9	72.4	136.4	134	2.4	14	2
13.4	5	●	MVS1340X05S140	69.4	110.4	114.4	178.4	176	2.4	14	2
13.4	8	□	MVS1340X08S140	109.6	151.4	156.4	220.4	218	2.4	14	2
13.4	10	□	MVS1340X10S140	136.4	178.4	181.4	245.4	243	2.4	14	4
13.4	15	□	MVS1340X15S140	203.4	245.4	248.4	312.4	310	2.4	14	4
13.4	20	□	MVS1340X20S140	270.4	313.4	316.4	380.4	378	2.4	14	4
13.5	3	●	MVS1350X03S140	43.0	70.0	72.5	136.5	134	2.5	14	2
13.5	5	●	MVS1350X05S140	70.0	110.5	114.5	178.5	176	2.5	14	2
13.5	8	●	MVS1350X08S140	110.5	151.5	156.5	220.5	218	2.5	14	2
13.5	10	●	MVS1350X10S140	137.5	178.5	181.5	245.5	243	2.5	14	4
13.5	15	●	MVS1350X15S140	205.0	245.5	248.5	312.5	310	2.5	14	4
13.5	20	●	MVS1350X20S140	272.5	313.5	316.5	380.5	378	2.5	14	4
13.6	3	●	MVS1360X03S140	43.3	72.5	72.5	136.5	134	2.5	14	2
13.6	5	●	MVS1360X05S140	70.5	114.5	114.5	178.5	176	2.5	14	2
13.6	8	□	MVS1360X08S140	111.3	156.5	156.5	220.5	218	2.5	14	2
13.6	10	□	MVS1360X10S140	138.5	184.5	187.5	251.5	249	2.5	14	4
13.6	15	□	MVS1360X15S140	206.5	254.5	257.5	321.5	319	2.5	14	4
13.6	20	□	MVS1360X20S140	274.5	324.5	327.5	391.5	389	2.5	14	4
13.7	3	●	MVS1370X03S140	43.6	72.5	72.5	136.5	134	2.5	14	2
13.7	5	●	MVS1370X05S140	71.0	114.5	114.5	178.5	176	2.5	14	2
13.7	8	□	MVS1370X08S140	112.1	156.5	156.5	220.5	218	2.5	14	2
13.7	10	□	MVS1370X10S140	139.5	184.5	187.5	251.5	249	2.5	14	4
13.7	15	□	MVS1370X15S140	208.0	254.5	257.5	321.5	319	2.5	14	4
13.7	20	□	MVS1370X20S140	276.5	324.5	327.5	391.5	389	2.5	14	4
13.8	3	●	MVS1380X03S140	43.9	72.5	72.5	136.5	134	2.5	14	2
13.8	5	●	MVS1380X05S140	71.5	114.5	114.5	178.5	176	2.5	14	2
13.8	8	□	MVS1380X08S140	112.9	156.5	156.5	220.5	218	2.5	14	2
13.8	10	□	MVS1380X10S140	140.5	184.5	187.5	251.5	249	2.5	14	4
13.8	15	□	MVS1380X15S140	209.5	254.5	257.5	321.5	319	2.5	14	4
13.8	20	□	MVS1380X20S140	278.5	324.5	327.5	391.5	389	2.5	14	4
13.9	3	●	MVS1390X03S140	44.2	72.5	72.5	136.5	134	2.5	14	2
13.9	5	●	MVS1390X05S140	72.0	114.5	114.5	178.5	176	2.5	14	2
13.9	8	□	MVS1390X08S140	113.7	156.5	156.5	220.5	218	2.5	14	2
13.9	10	□	MVS1390X10S140	141.5	184.5	187.5	251.5	249	2.5	14	4
13.9	15	□	MVS1390X15S140	211.0	254.5	257.5	321.5	319	2.5	14	4
13.9	20	□	MVS1390X20S140	280.5	324.5	327.5	391.5	389	2.5	14	4
14.0	3	●	MVS1400X03S140	44.5	72.5	72.5	136.5	134	2.5	14	2
14.0	5	●	MVS1400X05S140	72.5	114.5	114.5	178.5	176	2.5	14	2
14.0	8	●	MVS1400X08S140	114.5	156.5	156.5	220.5	218	2.5	14	2
14.0	10	●	MVS1400X10S140	142.5	184.5	187.5	251.5	249	2.5	14	4
14.0	15	●	MVS1400X15S140	212.5	254.5	257.5	321.5	319	2.5	14	4
14.0	20	●	MVS1400X20S140	282.5	324.5	327.5	391.5	389	2.5	14	4
14.1	3	●	MVS1410X03S150	44.9	75.1	77.6	142.6	140	2.6	15	2
14.1	3	□	MVS1410X03S160	44.9	75.1	77.6	142.6	140	2.6	16	2
14.1	5	●	MVS1410X05S150	73.1	118.6	122.6	187.6	185	2.6	15	2
14.1	5	□	MVS1410X05S160	73.1	118.6	122.6	187.6	185	2.6	16	2
14.1	8	□	MVS1410X08S150	115.4	162.6	167.6	227.6	225	2.6	15	2
14.1	8	□	MVS1410X08S160	115.4	162.6	167.6	227.6	225	2.6	16	2
14.2	3	●	MVS1420X03S150	45.2	75.1	77.6	142.6	140	2.6	15	2
14.2	3	□	MVS1420X03S160	45.2	75.1	77.6	142.6	140	2.6	16	2
14.2	5	●	MVS1420X05S150	73.6	118.6	122.6	187.6	185	2.6	15	2
14.2	5	□	MVS1420X05S160	73.6	118.6	122.6	187.6	185	2.6	16	2
14.2	8	●	MVS1420X08S150	116.2	162.6	167.6	227.6	225	2.6	15	2
14.2	8	□	MVS1420X08S160	116.2	162.6	167.6	227.6	225	2.6	16	2
14.3	3	●	MVS1430X03S150	45.5	75.1	77.6	142.6	140	2.6	15	2
14.3	3	□	MVS1430X03S160	45.5	75.1	77.6	142.6	140	2.6	16	2
14.3	5	●	MVS1430X05S150	74.1	118.6	122.6	187.6	185	2.6	15	2
14.3	5	□	MVS1430X05S160	74.1	118.6	122.6	187.6	185	2.6	16	2
14.3	8	□	MVS1430X08S150	117.0	162.6	167.6	227.6	225	2.6	15	2
14.3	8	□	MVS1430X08S160	117.0	162.6	167.6	227.6	225	2.6	16	2
14.4	3	●	MVS1440X03S150	45.8	75.1	77.6	142.6	140	2.6	15	2
14.4	3	□	MVS1440X03S160	45.8	75.1	77.6	142.6	140	2.6	16	2
14.4	5	●	MVS1440X05S150	74.6	118.6	122.6	187.6	185	2.6	15	2
14.4	5	□	MVS1440X05S160	74.6	118.6	122.6	187.6	185	2.6	16	2
14.4	8	□	MVS1440X08S150	117.8	162.6	167.6	227.6	225	2.6	15	2
14.4	8	□	MVS1440X08S160	117.8	162.6	167.6	227.6	225	2.6	16	2
14.5	3	●	MVS1450X03S150	46.1	75.1	77.6	142.6	140	2.6	15	2
14.5	3	□	MVS1450X03S160	46.1	75.1	77.6	142.6	140	2.6	16	2
14.5	5	●	MVS1450X05S150	75.1	118.6	122.6	187.6	185	2.6	15	2
14.5	5	□	MVS1450X05S160	75.1	118.6	122.6	187.6	185	2.6	16	2
14.5	8	●	MVS1450X08S150	118.6	162.6	167.6	227.6	225	2.6	15	2
14.5	8	□	MVS1450X08S160	118.6	162.6	167.6	227.6	225	2.6	16	2
14.6	3	●	MVS1460X03S150	46.5	77.7	77.7	142.7	140	2.7	15	2
14.6	3	□	MVS1460X03S160	46.5	77.7	77.7	142.7	140	2.7	16	2
14.6	5	●	MVS1460X05S150	75.7	122.7	122.7	187.7	185	2.7	15	2
14.6	5	□	MVS1460X05S160	75.7	122.7	122.7	187.7	185	2.7	16	2
14.6	8	□	MVS1460X08S150	119.5	167.7	167.7	227.7	225	2.7	15	2
14.6	8	□	MVS1460X08S160	119.5	167.7	167.7	227.7	225	2.7	16	2
14.7	3	●	MVS1470X03S150	46.8	77.7	77.7	142.7	140	2.7	15	2
14.7	3	□	MVS1470X03S160	46.8	77.7	77.7	142.7	140	2.7	16	2
14.7	5	●	MVS1470X05S150	76.2	122.7	122.7	187.7	185	2.7	15	2
14.7	5	□	MVS1470X05S160	76.2	122.7	122.7	187.7	185	2.7	16	2
14.7	8	□	MVS1470X08S150	120.3	167.7	167.7	227.7	225	2.7	15	2
14.7	8	□	MVS1470X08S160	120.3	167.7	167.7	227.7	225	2.7	16	2
14.8	3	●	MVS1480X03S150	47.1	77.7	77.7	142.7	140	2.7	15	2
14.8	3	□	MVS1480X03S160	47.1	77.7	77.7	142.7	140	2.7	16	2
14.8	5	●	MVS1480X05S150	76.7	122.7	122.7	187.7	185	2.7	15	2
14.8	5	□	MVS1480X05S160	76.7	122.7	122.7	187.7	185	2.7	16	2
14.8	8	□	MVS1480X08S150	121.1	167.7	167.7	227.7	225	2.7	15	2
14.8	8	□	MVS1480X08S160	121.1	167.7	167.7	227.7	225	2.7	16	2
14.9	3	●	MVS1490X03S150	47.4	77.7	77.7	142.7	140	2.7	15	2
14.9	3	□	MVS1490X03S160	47.4	77.7	77.7	142.7	140	2.7	16	2
14.9	5	●	MVS1490X05S150	77.2	122.7	122.7	187.7	185	2.7	15	2
14.9	5	□	MVS1490X05S160	77.2	122.7	122.7	187.7	185	2.7	16	2
14.9	8	□	MVS1490X08S150	121.9	167.7	167.7	227.7	225	2.7	15	2
14.9	8	□	MVS1490X08S160	121.9	167.7	167.7	227.7	225	2.7	16	2
15.0	3	●	MVS1500X03S150	47.7	77.7	77.7	142.7	140	2.7	15	2
15.0	3	□	MVS1500X03S160	47.7	77.7	77.7	142.7	140	2.7	16	2
15.0	5	●	MVS1500X05S150	77.7	122.7	122.7	187.7	185	2.7	15	2
15.0	5	□	MVS1500X05S160	77.7	122.7	122.7	187.7	185	2.7	16	2
15.0	8	●	MVS1500X08S150	122.7	167.7	167.7	227.7	225	2.7	15	2
15.0	8	□	MVS1500X08S160	122.7	167.7	167.7	227.7	225	2.7	16	2
15.1	3	●	MVS1510X03S160	48.0	80.2	82.7	147.7	145	2.7	16	2
15.1	5	●	MVS1510X05S160	78.2	126.7	130.7	195.7	193	2.7	16	2
15.1	8	□	MVS1510X08S160	123.5	173.7	183.7	243.7	241	2.7	16	2

MVS

DC(mm)	Hole Depth(l/d)	DP1020	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
15.2	3	●	MVS1520X03S160	48.4	80.3	82.8	147.8	145	2.8	16	2
15.2	5	●	MVS1520X05S160	78.8	126.8	130.8	195.8	193	2.8	16	2
15.2	8	□	MVS1520X08S160	124.4	173.8	183.8	243.8	241	2.8	16	2
15.3	3	●	MVS1530X03S160	48.7	80.3	82.8	147.8	145	2.8	16	2
15.3	5	●	MVS1530X05S160	79.3	126.8	130.8	195.8	193	2.8	16	2
15.3	8	□	MVS1530X08S160	125.2	173.8	183.8	243.8	241	2.8	16	2
15.4	3	●	MVS1540X03S160	49.0	80.3	82.8	147.8	145	2.8	16	2
15.4	5	●	MVS1540X05S160	79.8	126.8	130.8	195.8	193	2.8	16	2
15.4	8	□	MVS1540X08S160	126.0	173.8	183.8	243.8	241	2.8	16	2
15.5	3	●	MVS1550X03S160	49.3	80.3	82.8	147.8	145	2.8	16	2
15.5	5	●	MVS1550X05S160	80.3	126.8	130.8	195.8	193	2.8	16	2
15.5	8	●	MVS1550X08S160	126.8	173.8	183.8	243.8	241	2.8	16	2
15.6	3	●	MVS1560X03S160	49.6	82.8	82.8	147.8	145	2.8	16	2
15.6	5	●	MVS1560X05S160	80.8	130.8	130.8	195.8	193	2.8	16	2
15.6	8	□	MVS1560X08S160	127.6	178.8	183.8	243.8	241	2.8	16	2
15.7	3	●	MVS1570X03S160	50.0	82.9	82.9	147.9	145	2.9	16	2
15.7	5	●	MVS1570X05S160	81.4	130.9	130.9	195.9	193	2.9	16	2
15.7	8	□	MVS1570X08S160	128.5	178.9	183.9	243.9	241	2.9	16	2
15.8	3	●	MVS1580X03S160	50.3	82.9	82.9	147.9	145	2.9	16	2
15.8	5	●	MVS1580X05S160	81.9	130.9	130.9	195.9	193	2.9	16	2
15.8	8	□	MVS1580X08S160	129.3	178.9	183.9	243.9	241	2.9	16	2
15.9	3	●	MVS1590X03S160	50.6	82.9	82.9	147.9	145	2.9	16	2
15.9	5	●	MVS1590X05S160	82.4	130.9	130.9	195.9	193	2.9	16	2
15.9	8	□	MVS1590X08S160	130.1	178.9	183.9	243.9	241	2.9	16	2
16.0	3	●	MVS1600X03S160	50.9	82.9	82.9	147.9	145	2.9	16	2
16.0	5	●	MVS1600X05S160	82.9	130.9	130.9	195.9	193	2.9	16	2
16.0	8	●	MVS1600X08S160	130.9	178.9	183.9	243.9	241	2.9	16	2
16.1	3	□	MVS1610X03S170	51.2	85.4	87.9	152.9	150	2.9	17	2
16.1	3	□	MVS1610X03S180	51.2	85.4	87.9	152.9	150	2.9	18	2
16.1	5	□	MVS1610X05S170	83.4	134.9	138.9	203.9	201	2.9	17	2
16.1	5	□	MVS1610X05S180	83.4	134.9	138.9	203.9	201	2.9	18	2
16.2	3	□	MVS1620X03S170	51.5	85.4	87.9	152.9	150	2.9	17	2
16.2	3	□	MVS1620X03S180	51.5	85.4	87.9	152.9	150	2.9	18	2
16.2	5	□	MVS1620X05S170	83.9	134.9	138.9	203.9	201	2.9	17	2
16.2	5	□	MVS1620X05S180	83.9	134.9	138.9	203.9	201	2.9	18	2
16.3	3	□	MVS1630X03S170	51.9	85.5	88.0	153.0	150	3.0	17	2
16.3	3	□	MVS1630X03S180	51.9	85.5	88.0	153.0	150	3.0	18	2
16.3	5	□	MVS1630X05S170	84.5	135.0	139.0	204.0	201	3.0	17	2
16.3	5	□	MVS1630X05S180	84.5	135.0	139.0	204.0	201	3.0	18	2
16.4	3	□	MVS1640X03S170	52.2	85.5	88.0	153.0	150	3.0	17	2
16.4	3	□	MVS1640X03S180	52.2	85.5	88.0	153.0	150	3.0	18	2
16.4	5	□	MVS1640X05S170	85.0	135.0	139.0	204.0	201	3.0	17	2
16.4	5	□	MVS1640X05S180	85.0	135.0	139.0	204.0	201	3.0	18	2
16.5	3	●	MVS1650X03S170	52.5	85.5	88.0	153.0	150	3.0	17	2
16.5	3	□	MVS1650X03S180	52.5	85.5	88.0	153.0	150	3.0	18	2
16.5	5	●	MVS1650X05S170	85.5	135.0	139.0	204.0	201	3.0	17	2
16.5	5	□	MVS1650X05S180	85.5	135.0	139.0	204.0	201	3.0	18	2
16.6	3	□	MVS1660X03S170	52.8	88.0	88.0	153.0	150	3.0	17	2
16.6	3	□	MVS1660X03S180	52.8	88.0	88.0	153.0	150	3.0	18	2
16.6	5	□	MVS1660X05S170	86.0	139.0	139.0	204.0	201	3.0	17	2
16.6	5	□	MVS1660X05S180	86.0	139.0	139.0	204.0	201	3.0	18	2
16.7	3	□	MVS1670X03S170	53.1	88.0	88.0	153.0	150	3.0	17	2
16.7	3	□	MVS1670X03S180	53.1	88.0	88.0	153.0	150	3.0	18	2
16.7	5	□	MVS1670X05S170	86.5	139.0	139.0	204.0	201	3.0	17	2
16.7	5	□	MVS1670X05S180	86.5	139.0	139.0	204.0	201	3.0	18	2
16.8	3	□	MVS1680X03S170	53.5	88.1	88.1	153.1	150	3.1	17	2
16.8	3	□	MVS1680X03S180	53.5	88.1	88.1	153.1	150	3.1	18	2
16.8	5	□	MVS1680X05S170	87.1	139.1	139.1	204.1	201	3.1	17	2
16.8	5	□	MVS1680X05S180	87.1	139.1	139.1	204.1	201	3.1	18	2
16.9	3	□	MVS1690X03S170	53.8	88.1	88.1	153.1	150	3.1	17	2
16.9	3	□	MVS1690X03S180	53.8	88.1	88.1	153.1	150	3.1	18	2
16.9	5	□	MVS1690X05S170	87.6	139.1	139.1	204.1	201	3.1	17	2
16.9	5	□	MVS1690X05S180	87.6	139.1	139.1	204.1	201	3.1	18	2
17.0	3	●	MVS1700X03S170	54.1	88.1	88.1	153.1	150	3.1	17	2
17.0	3	□	MVS1700X03S180	54.1	88.1	88.1	153.1	150	3.1	18	2
17.0	5	●	MVS1700X05S170	88.1	139.1	139.1	204.1	201	3.1	17	2
17.0	5	□	MVS1700X05S180	88.1	139.1	139.1	204.1	201	3.1	18	2
17.1	3	□	MVS1710X03S180	54.4	90.6	93.1	158.1	155	3.1	18	2
17.1	5	□	MVS1710X05S180	88.6	143.1	147.1	212.1	209	3.1	18	2
17.2	3	□	MVS1720X03S180	54.7	90.6	93.1	158.1	155	3.1	18	2
17.2	5	□	MVS1720X05S180	89.1	143.1	147.1	212.1	209	3.1	18	2
17.3	3	□	MVS1730X03S180	55.0	90.6	93.1	158.1	155	3.1	18	2
17.3	5	□	MVS1730X05S180	89.6	143.1	147.1	212.1	209	3.1	18	2
17.4	3	□	MVS1740X03S180	55.4	90.7	93.2	158.2	155	3.2	18	2
17.4	5	□	MVS1740X05S180	90.2	143.2	147.2	212.2	209	3.2	18	2
17.5	3	●	MVS1750X03S180	55.7	90.7	93.2	158.2	155	3.2	18	2
17.5	5	●	MVS1750X05S180	90.7	143.2	147.2	212.2	209	3.2	18	2
17.6	3	□	MVS1760X03S180	56.0	93.2	93.2	158.2	155	3.2	18	2
17.6	5	□	MVS1760X05S180	91.2	147.2	147.2	212.2	209	3.2	18	2
17.7	3	□	MVS1770X03S180	56.3	93.2	93.2	158.2	155	3.2	18	2
17.7	5	□	MVS1770X05S180	91.7	147.2	147.2	212.2	209	3.2	18	2
17.8	3	□	MVS1780X03S180	56.6	93.2	93.2	158.2	155	3.2	18	2
17.8	5	□	MVS1780X05S180	92.2	147.2	147.2	212.2	209	3.2	18	2
17.9	3	□	MVS1790X03S180	57.0	93.3	93.3	158.3	155	3.3	18	2
17.9	5	□	MVS1790X05S180	92.8	147.3	147.3	212.3	209	3.3	18	2
18.0	3	●	MVS1800X03S180	57.3	93.3	93.3	158.3	155	3.3	18	2
18.0	5	●	MVS1800X05S180	93.3	147.3	147.3	212.3	209	3.3	18	2
18.1	3	□	MVS1810X03S190	57.6	95.8	98.3	163.3	160	3.3	19	2
18.1	3	□	MVS1810X03S200	57.6	95.8	98.3	163.3	160	3.3	20	2
18.1	5	□	MVS1810X05S190	93.8	151.3	155.3	220.3	217	3.3	19	2
18.1	5	□	MVS1810X05S200	93.8	151.3	155.3	220.3	217	3.3	20	2
18.2	3	□	MVS1820X03S190	57.9	95.8	98.3	163.3	160	3.3	19	2
18.2	3	□	MVS1820X03S200	57.9	95.8	98.3	163.3	160	3.3	20	2
18.2	5	□	MVS1820X05S190	94.3	151.3	155.3	220.3	217	3.3	19	2
18.2	5	□	MVS1820X05S200	94.3	151.3	155.3	220.3	217	3.3	20	2
18.3	3	□	MVS1830X03S190	58.2	95.8	98.3	163.3	160	3.3	19	2
18.3	3	□	MVS1830X03S200	58.2	95.8	98.3	163.3	160	3.3	20	2
18.3	5	□	MVS1830X05S190	94.8	151.3	155.3	220.3	217	3.3	19	2
18.3	5	□	MVS1830X05S200	94.8	151.3	155.3	220.3	217	3.3	20	2
18.4	3	□	MVS1840X03S190	58.5	95.8	98.3	163.3	160	3.3	19	2
18.4	3	□	MVS1840X03S200	58.5	95.8	98.3	163.3	160	3.3	20	2
18.4	5	□	MVS1840X05S190	95.3	151.3	155.3	220.3	217	3.3	19	2
18.4	5	□	MVS1840X05S200	95.3	151.3	155.3	220.3	217	3.3	20	2
18.5	3	●	MVS1850X03S190	58.9	95.9	98.4	163.4	160	3.4	19	2
18.5	3	□	MVS1850X03S200	58.9	95.9	98.4	163.4	160	3.4	20	2
18.5	5	●	MVS1850X05S190	95.9	151.4	155.4	220.4	217	3.4	19	2
18.5	5	□	MVS1850X05S200	95.9	151.4	155.4	220.4	217	3.4	20	2
18.6	3	□	MVS1860X03S190	59.2	98.4	98.4	163.4	160	3.4	19	2

MVS

DC(mm)	Hole Depth(l/d)	DP1020	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
18.6	3	□	**MVS1860X03S200**	59.2	98.4	98.4	163.4	160	3.4	20	2
18.6	5	□	**MVS1860X05S190**	96.4	155.4	155.4	220.4	217	3.4	19	2
18.6	5	□	**MVS1860X05S200**	96.4	155.4	155.4	220.4	217	3.4	20	2
18.7	3	□	**MVS1870X03S190**	59.5	98.4	98.4	163.4	160	3.4	19	2
18.7	3	□	**MVS1870X03S200**	59.5	98.4	98.4	163.4	160	3.4	20	2
18.7	5	□	**MVS1870X05S190**	96.9	155.4	155.4	220.4	217	3.4	19	2
18.7	5	□	**MVS1870X05S200**	96.9	155.4	155.4	220.4	217	3.4	20	2
18.8	3	□	**MVS1880X03S190**	59.8	98.4	98.4	163.4	160	3.4	19	2
18.8	3	□	**MVS1880X03S200**	59.8	98.4	98.4	163.4	160	3.4	20	2
18.8	5	□	**MVS1880X05S190**	97.4	155.4	155.4	220.4	217	3.4	19	2
18.8	5	□	**MVS1880X05S200**	97.4	155.4	155.4	220.4	217	3.4	20	2
18.9	3	□	**MVS1890X03S190**	60.1	98.4	98.4	163.4	160	3.4	19	2
18.9	3	□	**MVS1890X03S200**	60.1	98.4	98.4	163.4	160	3.4	20	2
18.9	5	□	**MVS1890X05S190**	97.9	155.4	155.4	220.4	217	3.4	19	2
18.9	5	□	**MVS1890X05S200**	97.9	155.4	155.4	220.4	217	3.4	20	2
19.0	3	●	**MVS1900X03S190**	60.5	98.5	98.5	163.5	160	3.5	19	2
19.0	3	□	**MVS1900X03S200**	60.5	98.5	98.5	163.5	160	3.5	20	2
19.0	5	●	**MVS1900X05S190**	98.5	155.5	155.5	220.5	217	3.5	19	2
19.0	5	□	**MVS1900X05S200**	98.5	155.5	155.5	220.5	217	3.5	20	2
19.1	3	□	**MVS1910X03S200**	60.8	101.0	103.5	168.5	165	3.5	20	2
19.1	5	□	**MVS1910X05S200**	99.0	159.5	163.5	228.5	225	3.5	20	2
19.2	3	□	**MVS1920X03S200**	61.1	101.0	103.5	168.5	165	3.5	20	2
19.2	5	□	**MVS1920X05S200**	99.5	159.5	163.5	228.5	225	3.5	20	2
19.3	3	□	**MVS1930X03S200**	61.4	101.0	103.5	168.5	165	3.5	20	2
19.3	5	□	**MVS1930X05S200**	100.0	159.5	163.5	228.5	225	3.5	20	2
19.4	3	□	**MVS1940X03S200**	61.7	101.0	103.5	168.5	165	3.5	20	2
19.4	5	□	**MVS1940X05S200**	100.5	159.5	163.5	228.5	225	3.5	20	2
19.5	3	●	**MVS1950X03S200**	62.0	101.0	103.5	168.5	165	3.5	20	2
19.5	5	●	**MVS1950X05S200**	101.0	159.5	163.5	228.5	225	3.5	20	2
19.6	3	□	**MVS1960X03S200**	62.4	103.6	103.6	168.6	165	3.6	20	2
19.6	5	□	**MVS1960X05S200**	101.6	163.6	163.6	228.6	225	3.6	20	2
19.7	3	□	**MVS1970X03S200**	62.7	103.6	103.6	168.6	165	3.6	20	2
19.7	5	□	**MVS1970X05S200**	102.1	163.6	163.6	228.6	225	3.6	20	2
19.8	3	□	**MVS1980X03S200**	63.0	103.6	103.6	168.6	165	3.6	20	2
19.8	5	□	**MVS1980X05S200**	102.6	163.6	163.6	228.6	225	3.6	20	2
19.9	3	□	**MVS1990X03S200**	63.3	103.6	103.6	168.6	165	3.6	20	2
19.9	5	□	**MVS1990X05S200**	103.1	163.6	163.6	228.6	225	3.6	20	2
20.0	3	●	**MVS2000X03S200**	63.6	103.6	103.6	168.6	165	3.6	20	2
20.0	5	●	**MVS2000X05S200**	103.6	163.6	163.6	228.6	225	3.6	20	2

MVS

Recommended Cutting Condition

*=For cutting a guide hole

Work material		Mild Steel(≦180HB) AISI 1010 etc		Carbon steel, Alloy steel(180—280HB) AISI 1045, AISI 4140 etc		Carbon steel, Alloy steel(280—350HB) AISI 4340 etc	
Dia. DC (mm)	L/D	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)
1.0	2DC*,7DC	15900	0.04(0.02—0.05)	15900	0.04(0.02—0.05)	12700	0.04(0.02—0.05)
	12DC - 30DC	15900	0.02(0.01—0.03)	12700	0.02(0.01—0.03)	9500	0.02(0.01—0.03)
1.5	2DC*,7DC	10600	0.05(0.03—0.08)	10600	0.05(0.03—0.08)	8400	0.05(0.03—0.08)
	12DC - 30DC	10600	0.05(0.02—0.08)	8400	0.05(0.03—0.08)	6300	0.05(0.02—0.08)
2.0	2DC*,7DC	7900	0.07(0.04—0.10)	7900	0.07(0.04—0.10)	6300	0.07(0.04—0.10)
	12DC - 30DC	7900	0.07(0.04—0.10)	7900	0.07(0.04—0.10)	7900	0.07(0.04—0.10)
2.5	2DC*,7DC	7600	0.09(0.05—0.13)	6300	0.09(0.05—0.13)	6300	0.09(0.05—0.13)
	12DC - 30DC	7600	0.09(0.06—0.13)	6300	0.08(0.05—0.13)	6300	0.08(0.05—0.13)
3.2	2DC*	8900	0.17(0.10—0.24)	8900	0.17(0.10—0.24)	8900	0.15(0.09—0.22)
	3DC - 8DC	8900	0.10(0.06—0.13)	6900	0.10(0.06—0.13)	6900	0.10(0.06—0.13)
	10DC - 30DC	8900	0.17(0.10—0.24)	8900	0.17(0.10—0.24)	7900	0.15(0.09—0.22)
	35DC,40DC	7400	0.14(0.08—0.19)	7400	0.14(0.08—0.19)	6400	0.15(0.07—0.18)
4.0	2DC*	7900	0.20(0.12—0.30)	7100	0.20(0.12—0.30)	7100	0.18(0.11—0.27)
	3DC - 8DC	7900	0.12(0.08—0.16)	7100	0.12(0.08—0.16)	6300	0.11(0.07—0.14)
	10DC - 30DC	7100	0.20(0.12—0.30)	7100	0.20(0.12—0.30)	6300	0.18(0.11—0.27)
	35DC,40DC	5900	0.16(0.10—0.24)	5900	0.16(0.10—0.24)	5100	0.18(0.09—0.22)
5.0	2DC*	6300	0.25(0.15—0.35)	5700	0.25(0.15—0.35)	5700	0.22(0.14—0.32)
	3DC - 8DC	6300	0.15(0.10—0.20)	5700	0.15(0.10—0.20)	5000	0.14(0.09—0.18)
	10DC - 30DC	5730	0.25(0.15—0.35)	5700	0.25(0.15—0.35)	5000	0.22(0.14—0.32)
	35DC,40DC	4700	0.20(0.12—0.28)	4700	0.20(0.12—0.28)	4100	0.22(0.11—0.26)
6.3	2DC*	5500	0.27(0.17—0.37)	5000	0.27(0.17—0.37)	5000	0.24(0.15—0.33)
	3DC - 8DC	5500	0.20(0.13—0.26)	5000	0.20(0.13—0.26)	4500	0.18(0.11—0.24)
	10DC - 30DC	5500	0.27(0.17—0.37)	5000	0.27(0.17—0.37)	4500	0.24(0.15—0.33)
	35DC,40DC	4500	0.22(0.14—0.30)	4000	0.22(0.14—0.30)	3700	0.24(0.12—0.26)
8.0	2DC*	4700	0.30(0.20—0.40)	4300	0.30(0.20—0.40)	3900	0.27(0.18—0.36)
	3DC - 8DC	4700	0.23(0.18—0.28)	4300	0.23(0.18—0.28)	3900	0.21(0.16—0.25)
	10DC - 30DC	4300	0.30(0.20—0.40)	3900	0.30(0.20—0.40)	3500	0.27(0.18—0.36)
	35DC,40DC	3500	0.24(0.16—0.32)	3100	0.24(0.16—0.32)	2900	0.27(0.14—0.29)
10.0	2DC*	4100	0.32(0.22—0.42)	3800	0.32(0.22—0.42)	3100	0.29(0.20—0.38)
	3DC - 8DC	4100	0.27(0.22—0.32)	3800	0.27(0.22—0.32)	3500	0.23(0.19—0.27)
	10DC - 30DC	3500	0.32(0.22—0.42)	3100	0.32(0.22—0.42)	2800	0.29(0.20—0.38)
	35DC	2800	0.26(0.18—0.34)	2500	0.26(0.18—0.34)	2300	0.29(0.16—0.30)
12.0	2DC*	3700	0.34(0.24—0.44)	3400	0.34(0.24—0.44)	3100	0.30(0.22—0.40)
	3DC - 8DC	3700	0.30(0.26—0.34)	3400	0.30(0.26—0.34)	3100	0.26(0.22—0.29)
	10DC - 25DC	3400	0.34(0.24—0.44)	3100	0.34(0.24—0.44)	2600	0.30(0.22—0.40)
16.0	3DC - 8DC	3100	0.33(0.27—0.38)	2700	0.33(0.27—0.38)	2500	0.28(0.23—0.33)
20.0	3DC,5DC	2500	0.35(0.30—0.40)	2200	0.35(0.30—0.40)	2000	0.30(0.26—0.34)

MVS

Work material		Austenitic Stainless Steel(≦200HB) AISI 304,AISI 316 etc		Gray Cast Iron(≦350MPa) No 45 B etc		Ductile Cast Iron(≦450MPa) 60-40-8 etc	
Dia. DC (mm)	L/D	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)
1.0	2DC*,7DC	9500	0.03(0.02—0.05)	15900	0.04(0.02—0.05)	12700	0.04(0.02—0.05)
	12DC - 30DC	9500	0.02(0.01—0.03)	12700	0.02(0.01—0.03)	9500	0.02(0.01—0.03)
1.5	2DC*,7DC	6300	0.05(0.03—0.07)	10600	0.05(0.02—0.08)	8400	0.05(0.03—0.08)
	12DC - 30DC	6300	0.05(0.02—0.08)	8400	0.05(0.02—0.08)	6300	0.05(0.02—0.08)
2.0	2DC*,7DC	4700	0.06(0.04—0.08)	7900	0.07(0.04—0.10)	6300	0.07(0.04—0.10)
	12DC - 30DC	4700	0.07(0.04—0.10)	7900	0.07(0.04—0.10)	7900	0.07(0.04—0.10)
2.5	2DC*,7DC	5000	0.08(0.05—0.10)	7600	0.09(0.05—0.13)	6300	0.09(0.05—0.13)
	12DC - 30DC	3800	0.08(0.05—0.12)	6300	0.09(0.06—0.13)	6300	0.08(0.05—0.12)
3.2	2DC*	3900	0.07(0.05—0.09)	8900	0.19(0.11—0.26)	8900	0.17(0.10—0.24)
	3DC - 8DC	3900	0.08(0.06—0.10)	8900	0.10(0.06—0.13)	6400	0.10(0.06—0.13)
	10DC - 30DC	3900	0.07(0.05—0.09)	5900	0.19(0.11—0.26)	8900	0.17(0.10—0.24)
	35DC,40DC	2900	0.06(0.04—0.07)	7400	0.15(0.09—0.21)	7460	0.14(0.08—0.19)
4.0	2DC*	3100	0.08(0.06—0.10)	7900	0.22(0.13—0.33)	7100	0.20(0.12—0.30)
	3DC - 8DC	3100	0.09(0.06—0.11)	7900	0.12(0.08—0.16)	5100	0.12(0.08—0.16)
	10DC - 30DC	3100	0.08(0.06—0.10)	7100	0.22(0.13—0.33)	7100	0.20(0.12—0.30)
	35DC,40DC	2300	0.06(0.05—0.08)	5900	0.18(0.10—0.26)	5900	0.16(0.10—0.24)
5.0	2DC*	2500	0.10(0.07—0.12)	6300	0.28(0.07—0.39)	5700	0.25(0.15—0.35)
	3DC - 8DC	2500	0.11(0.08—0.14)	6300	0.15(0.10—0.20)	4100	0.15(0.10—0.20)
	10DC - 30DC	2500	0.10(0.07—0.12)	5700	0.28(0.07—0.39)	5700	0.25(0.15—0.35)
	35DC,40DC	1900	0.08(0.06—0.10)	4700	0.22(0.06—0.31)	4700	0.20(0.12—0.28)
6.3	2DC*	2500	0.12(0.08—0.16)	5500	0.30(0.19—0.41)	5000	0.27(0.17—0.37)
	3DC - 8DC	2500	0.14(0.09—0.18)	5500	0.20(0.13—0.26)	3500	0.20(0.13—0.26)
	10DC - 30DC	2500	0.12(0.08—0.16)	5500	0.30(0.19—0.41)	5000	0.27(0.17—0.37)
	35DC,40DC	2000	0.10(0.06—0.13)	4500	0.24(0.15—0.33)	4000	0.22(0.14—0.30)
8.0	2DC*	1900	0.14(0.10—0.17)	4700	0.33(0.22—0.44)	3900	0.30(0.20—0.40)
	3DC - 8DC	1900	0.15(0.10—0.19)	4700	0.25(0.18—0.31)	2700	0.23(0.18—0.28)
	10DC - 30DC	1900	0.14(0.10—0.17)	4300	0.33(0.22—0.44)	3900	0.30(0.20—0.40)
	35DC,40DC	1500	0.11(0.08—0.14)	3500	0.26(0.18—0.35)	3000	0.24(0.16—0.32)
10.0	2DC*	1500	0.15(0.12—0.18)	4100	0.35(0.24—0.46)	3100	0.32(0.22—0.42)
	3DC - 8DC	1500	0.16(0.12—0.20)	4100	0.29(0.22—0.35)	2200	0.27(0.22—0.32)
	10DC - 30DC	1500	0.15(0.12—0.18)	3500	0.35(0.24—0.46)	3100	0.32(0.22—0.42)
	35DC	1200	0.12(0.10—0.14)	2800	0.28(0.19—0.37)	2500	0.26(0.18—0.34)
12.0	2DC*	1500	0.17(0.14—0.19)	3700	0.37(0.26—0.48)	3100	0.34(0.24—0.44)
	3DC - 8DC	1500	0.18(0.15—0.21)	3700	0.32(0.26—0.37)	2300	0.30(0.26—0.34)
	10DC - 25DC	1500	0.17(0.14—0.19)	3400	0.37(0.26—0.48)	3100	0.34(0.24—0.44)
16.0	3DC - 8DC	1100	0.19(0.14—0.24)	3100	0.35(0.28—0.42)	1700	0.33(0.28—0.38)
20.0	3DC,5DC	900	0.21(0.15—0.26)	2500	0.37(0.30—0.44)	1500	0.35(0.30—0.40)

MVS

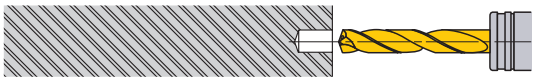
Work material		Aluminium Alloy(Si<5%) A6061, A7075		Heat resistant alloys Inconel718	
Dia. DC (mm)	L/D	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)
1.0	2DC*,7DC	19000	0.05(0.03—0.08)	3100	0.02(0.01—0.03)
	12DC - 30DC	15900	0.05(0.03—0.08)	3100	0.02(0.01—0.03)
1.5	2DC*,7DC	16900	0.07(0.05—0.12)	2100	0.03(0.02—0.04)
	12DC - 30DC	14800	0.08(0.05—0.12)	2100	0.03(0.02—0.04)
2.0	2DC*,7DC	14300	0.10(0.06—0.15)	2300	0.04(0.03—0.05)
	12DC - 30DC	12700	0.11(0.06—0.15)	2300	0.04(0.03—0.05)
2.5	2DC*,7DC	12700	0.13(0.08—0.20)	1900	0.05(0.04—0.06)
	12DC - 30DC	11400	0.14(0.08—0.20)	1900	0.05(0.04—0.06)
3.2	2DC*	11900	0.23(0.10 — 0.35)	1900	0.07(0.05 — 0.09)
	3DC - 8DC	11900	0.23(0.10—0.35)	1900	0.07(0.05—0.09)
	10DC - 30DC	9900	0.23(0.10 — 0.35)	1900	0.07(0.05 — 0.09)
	35DC,40DC	7900	0.18(0.08 — 0.28)	1400	0.06(0.04 — 0.07)
4.0	2DC*	9500	0.24(0.12—0.35)	1500	0.09(0.06—0.11)
	3DC - 8DC	9500	0.24(0.12—0.35)	1500	0.09(0.06—0.11)
	10DC - 30DC	7900	0.24(0.12 — 0.35)	1500	0.09(0.06 — 0.11)
	35DC,40DC	6300	0.19(0.10 — 0.28)	1100	0.07(0.05 — 0.09)
5.0	2DC*	7600	0.25(0.15—0.35)	1200	0.11(0.08—0.14)
	3DC - 8DC	7600	0.25(0.15—0.35)	1200	0.11(0.08—0.14)
	10DC - 30DC	6300	0.25(0.15 — 0.35)	1200	0.11(0.08 — 0.14)
	35DC,40DC	5000	0.20(0.12 — 0.28)	900	0.09(0.06 — 0.11)
6.3	2DC*	7500	0.35(0.20—0.50)	1200	0.13(0.09—0.16)
	3DC - 8DC	7500	0.35(0.20—0.50)	1200	0.13(0.09—0.16)
	10DC - 30DC	6500	0.35(0.20 — 0.50)	1000	0.13(0.09 — 0.16)
	35DC,40DC	5300	0.28(0.16 — 0.40)	700	0.10(0.07 — 0.13)
8.0	2DC*	5900	0.35(0.20—0.50)	900	0.14(0.11—0.16)
	3DC - 8DC	5900	0.35(0.20—0.50)	900	0.14(0.11—0.17)
	10DC - 30DC	5100	0.35(0.20 — 0.50)	700	0.14(0.11 — 0.16)
	35DC,40DC	4100	0.28(0.16 — 0.40)	500	0.11(0.09 — 0.13)
10.0	2DC*	4700	0.50(0.20—0.80)	700	0.15(0.12—0.17)
	3DC - 8DC	4700	0.50(0.20—0.80)	700	0.15(0.12—0.17)
	10DC - 30DC	4100	0.50(0.20 — 0.80)	600	0.15(0.12 — 0.17)
	35DC	3300	0.40(0.16 — 0.64)	400	0.12(0.10 — 0.14)
12.0	2DC*	4200	0.50(0.20—0.80)	600	0.16(0.13—0.18)
	3DC - 8DC	4200	0.50(0.20—0.80)	600	0.16(0.13—0.18)
	10DC - 25DC	3700	0.50(0.20 — 0.80)	500	0.16(0.13 — 0.18)
16.0	3DC - 8DC	3100	0.60(0.20—1.00)	400	0.18(0.14—0.21)
20.0	3DC,5DC	2700	0.60(0.20—1.00)	400	0.19(0.15—0.22)

MVS

Operational Guidance for the MVS of Small Diameter Long Type Drill (L/D≥10)

Flat Face Drilling ●Drilling a blind hole

1. Drilling a Pilot Hole



①Use a drill with a larger (flatter) point angle than the long type. Use the shortest flute possible.
②Ensure a high precision hole is drilled for the guide.
③Drill depth : Approx DCx1.
(Adjust the pilot hole depth according to the length of the long type drill.)

2. Initial Cutting with the Long Type Drill

①Penetrate the guide hole at low revolution.
(Revolution 1000 min^{-1}, feed rate 0.2—0.3 mm/rev)
②Stop the long type drill 0.5—1 mm short of the guide hole bottom.

3. Drill the Deep Hole

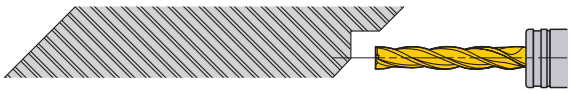
①Start cutting at the recommended speed and feed with a non-peck (continuous feed) cycle.

4. Drill Retraction

①After drilling, lower the cutting revolution about 0.5—1 mm short of the hole end. (Revolution 1000 min^{-1})
②Retract the drill to the pilot hole depth starting point at a feed rate of 3000 mm/min.
③Finally, clear the hole at a cutting speed of 20—30 m/min and feed rate of 0.2—0.3 mm/rev.

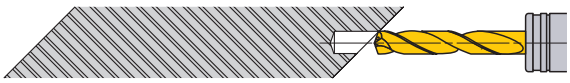
Interruped Drilling ●Drilling and breaking through on irregular faces or angles

1. Spot Facing



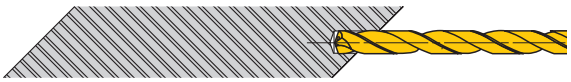
①Machine a flat or the irregular face by using an end mill or slot drill capable of spot facing. Make the spot face diameter the same size as the required deep hole diameter.

2. Drilling a Pilot Hole



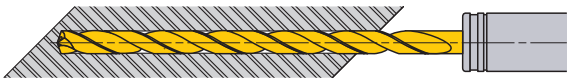
①Use a drill with a larger (flatter) point angle than the long type. Use the shortest flute possible.
②Ensure a high precision hole is drilled for the guide.
③Drill depth : Approx DCx1.
(Adjust the pilot hole depth according to the length of the long type drill.)

3. Initial Cutting with the Long Type Drill



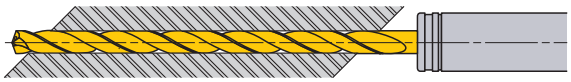
①Penetrate the guide hole at a low revolution.
(Revolution 1000 min^{-1}, feed rate 0.2—0.3 mm/rev)
②Stop the long type drill 0.5—1 mm short of the guide hole bottom.

4. Drill the Deep Hole



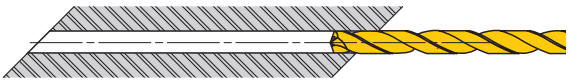
①Start cutting at the recommended speed and feed with a non-peck (continuous feed) cycle.
②Feed as usual until breaking through.

5. Breaking Through



①When breaking through, the cutting edge can be damaged.
②Recommend about half rate of the usual feed rate after breaking through.

6. Drill Retraction



①Finally clear the hole at a revolution speed of 1000 min^{-1} and feed rate of 0.2—0.3mm/rev.
②Retract the drill to the pilot hole depth starting point at a feed rate of 3000mm/min.

MVE

WSTAR Drill Series

General-purpose drills

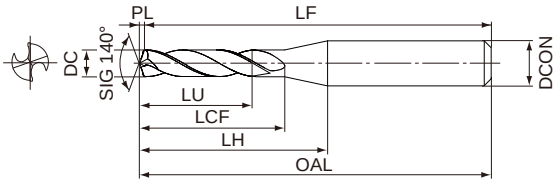
Product Information

UWC DP1 140° SIG X Thinning

Work Material

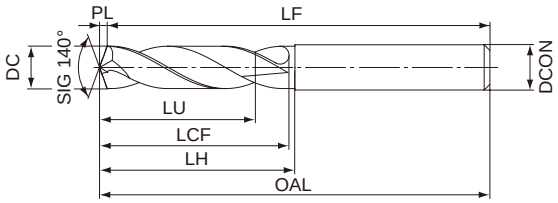
P M K N S H

TECHNICAL DATA >> 1997 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 1623 DRILLS SELECTION CHART >> 1624



Type1

	DC=3	3<DC≦6	6<DC≦10	10<DC≦18	18<DC≦20
	0 −0.014	0 −0.018	0 −0.022	0 −0.027	0 −0.033
h6	0 −0.006	0 −0.008	0 −0.009	0 −0.011	0 −0.013



Type2

Stock status indication:●: Inventory maintained in Japan.▲: This item to be discontinued within two years.□: Non stock, produced to order only.

External Coolant Unit（mm）

DC(mm)	Hole Depth(l/d)	DP1020	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
3.0	2	●	MVE0300X02S030	6.5	16.5	16.5	55.5	55	0.5	3	2
3.0	2	●	MVE0300X02S060	6.5	16.5	19.7	55.5	55	0.5	6	1
3.0	3	●	MVE0300X03S030	9.5	21.5	21.5	60.5	60	0.5	3	2
3.0	3	●	MVE0300X03S060	9.5	21.5	24.7	60.5	60	0.5	6	1
3.1	2	●	MVE0310X02S040	6.8	18.6	20.6	55.6	55	0.6	4	2
3.1	2	●	MVE0310X02S060	6.8	18.6	21.7	55.6	55	0.6	6	1
3.1	3	●	MVE0310X03S040	9.9	24.6	26.6	60.6	60	0.6	4	2
3.1	3	●	MVE0310X03S060	9.9	24.6	27.7	60.6	60	0.6	6	1
3.2	2	●	MVE0320X02S040	7.0	18.6	20.6	55.6	55	0.6	4	2
3.2	2	●	MVE0320X02S060	7.0	18.6	21.6	55.6	55	0.6	6	1
3.2	3	●	MVE0320X03S040	10.2	24.6	26.6	60.6	60	0.6	4	2
3.2	3	●	MVE0320X03S060	10.2	24.6	27.6	60.6	60	0.6	6	1
3.3	2	●	MVE0330X02S040	7.2	18.6	20.6	55.6	55	0.6	4	2
3.3	2	●	MVE0330X02S060	7.2	18.6	21.5	55.6	55	0.6	6	1
3.3	3	●	MVE0330X03S040	10.5	24.6	26.6	60.6	60	0.6	4	2
3.3	3	●	MVE0330X03S060	10.5	24.6	27.5	60.6	60	0.6	6	1
3.4	2	●	MVE0340X02S040	7.4	18.6	20.6	55.6	55	0.6	4	2
3.4	2	●	MVE0340X02S060	7.4	18.6	21.4	55.6	55	0.6	6	1
3.4	3	●	MVE0340X03S040	10.8	24.6	26.6	60.6	60	0.6	4	2
3.4	3	●	MVE0340X03S060	10.8	24.6	27.4	60.6	60	0.6	6	1
3.5	2	●	MVE0350X02S040	7.6	18.6	20.6	55.6	55	0.6	4	2
3.5	2	●	MVE0350X02S060	7.6	18.6	21.3	55.6	55	0.6	6	1
3.5	3	●	MVE0350X03S040	11.1	24.6	26.6	60.6	60	0.6	4	2
3.5	3	●	MVE0350X03S060	11.1	24.6	27.3	60.6	60	0.6	6	1
3.6	2	●	MVE0360X02S040	7.9	20.7	20.7	55.7	55	0.7	4	2
3.6	2	●	MVE0360X02S060	7.9	20.7	23.3	55.7	55	0.7	6	1
3.6	3	●	MVE0360X03S040	11.5	27.7	27.7	60.7	60	0.7	4	2
3.6	3	●	MVE0360X03S060	11.5	27.7	30.3	60.7	60	0.7	6	1
3.7	2	●	MVE0370X02S040	8.1	20.7	20.7	55.7	55	0.7	4	2
3.7	2	●	MVE0370X02S060	8.1	20.7	23.2	55.7	55	0.7	6	1
3.7	3	●	MVE0370X03S040	11.8	27.7	27.7	60.7	60	0.7	4	2
3.7	3	●	MVE0370X03S060	11.8	27.7	30.2	60.7	60	0.7	6	1
3.8	2	●	MVE0380X02S040	8.3	20.7	20.7	55.7	55	0.7	4	2
3.8	2	●	MVE0380X02S060	8.3	20.7	23.1	55.7	55	0.7	6	1
3.8	3	●	MVE0380X03S040	12.1	27.7	27.7	60.7	60	0.7	4	2
3.8	3	●	MVE0380X03S060	12.1	27.7	30.1	60.7	60	0.7	6	1
3.9	2	●	MVE0390X02S040	8.5	20.7	20.7	55.7	55	0.7	4	2
3.9	2	●	MVE0390X02S060	8.5	20.7	23.0	55.7	55	0.7	6	1
3.9	3	●	MVE0390X03S040	12.4	27.7	27.7	60.7	60	0.7	4	2
3.9	3	●	MVE0390X03S060	12.4	27.7	30.0	60.7	60	0.7	6	1
4.0	2	●	MVE0400X02S040	8.7	20.7	20.7	55.7	55	0.7	4	2
4.0	2	●	MVE0400X02S060	8.7	20.7	22.8	55.7	55	0.7	6	1
4.0	3	●	MVE0400X03S040	12.7	27.7	27.7	60.7	60	0.7	4	2
4.0	3	●	MVE0400X03S060	12.7	27.7	29.8	60.7	60	0.7	6	1
4.1	2	●	MVE0410X02S050	8.9	22.7	24.7	62.7	62	0.7	5	2
4.1	2	●	MVE0410X02S060	8.9	22.7	24.7	62.7	62	0.7	6	1
4.1	3	●	MVE0410X03S050	13.0	29.7	31.7	68.7	68	0.7	5	2
4.1	3	●	MVE0410X03S060	13.0	29.7	31.7	68.7	68	0.7	6	1
4.2	2	●	MVE0420X02S050	9.2	22.8	24.8	62.8	62	0.8	5	2
4.2	2	●	MVE0420X02S060	9.2	22.8	24.7	62.8	62	0.8	6	1

MVE

DC(mm)	Hole Depth(l/d)	DP1020	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
4.2	3	●	MVE0420X03S050	13.4	29.8	31.8	68.8	68	0.8	5	2
4.2	3	●	MVE0420X03S060	13.4	29.8	31.7	68.8	68	0.8	6	1
4.3	2	●	MVE0430X02S050	9.4	22.8	24.8	62.8	62	0.8	5	2
4.3	2	●	MVE0430X02S060	9.4	22.8	24.6	62.8	62	0.8	6	1
4.3	3	●	MVE0430X03S050	13.7	29.8	31.8	68.8	68	0.8	5	2
4.3	3	●	MVE0430X03S060	13.7	29.8	31.6	68.8	68	0.8	6	1
4.4	2	●	MVE0440X02S050	9.6	22.8	24.8	62.8	62	0.8	5	2
4.4	2	●	MVE0440X02S060	9.6	22.8	24.5	62.8	62	0.8	6	1
4.4	3	●	MVE0440X03S050	14.0	29.8	31.8	68.8	68	0.8	5	2
4.4	3	●	MVE0440X03S060	14.0	29.8	31.5	68.8	68	0.8	6	1
4.5	2	●	MVE0450X02S050	9.8	22.8	24.8	62.8	62	0.8	5	2
4.5	2	●	MVE0450X02S060	9.8	22.8	24.4	62.8	62	0.8	6	1
4.5	3	●	MVE0450X03S050	14.3	29.8	31.8	68.8	68	0.8	5	2
4.5	3	●	MVE0450X03S060	14.3	29.8	31.4	68.8	68	0.8	6	1
4.6	2	●	MVE0460X02S050	10.0	24.8	24.8	62.8	62	0.8	5	2
4.6	2	●	MVE0460X02S060	10.0	24.8	27.8	62.8	62	0.8	6	2
4.6	3	●	MVE0460X03S050	14.6	32.8	32.8	68.8	68	0.8	5	2
4.6	3	●	MVE0460X03S060	14.6	32.8	35.8	68.8	68	0.8	6	2
4.7	2	●	MVE0470X02S050	10.3	24.9	24.9	62.9	62	0.9	5	2
4.7	2	●	MVE0470X02S060	10.3	24.9	27.9	62.9	62	0.9	6	2
4.7	3	●	MVE0470X03S050	15.0	32.9	32.9	68.9	68	0.9	5	2
4.7	3	●	MVE0470X03S060	15.0	32.9	35.9	68.9	68	0.9	6	2
4.8	2	●	MVE0480X02S050	10.5	24.9	24.9	62.9	62	0.9	5	2
4.8	2	●	MVE0480X02S060	10.5	24.9	27.9	62.9	62	0.9	6	2
4.8	3	●	MVE0480X03S050	15.3	32.9	32.9	68.9	68	0.9	5	2
4.8	3	●	MVE0480X03S060	15.3	32.9	35.9	68.9	68	0.9	6	2
4.9	2	●	MVE0490X02S050	10.7	24.9	24.9	62.9	62	0.9	5	2
4.9	2	●	MVE0490X02S060	10.7	24.9	27.9	62.9	62	0.9	6	2
4.9	3	●	MVE0490X03S050	15.6	32.9	32.9	68.9	68	0.9	5	2
4.9	3	●	MVE0490X03S060	15.6	32.9	35.9	68.9	68	0.9	6	2
5.0	2	●	MVE0500X02S050	10.9	24.9	24.9	62.9	62	0.9	5	2
5.0	2	●	MVE0500X02S060	10.9	24.9	27.9	62.9	62	0.9	6	2
5.0	3	●	MVE0500X03S050	15.9	32.9	32.9	68.9	68	0.9	5	2
5.0	3	●	MVE0500X03S060	15.9	32.9	35.9	68.9	68	0.9	6	2
5.1	2	●	MVE0510X02S060	11.1	26.9	28.9	66.9	66	0.9	6	2
5.1	3	●	MVE0510X03S060	16.2	34.9	36.9	74.9	74	0.9	6	2
5.2	2	●	MVE0520X02S060	11.3	26.9	28.9	66.9	66	0.9	6	2
5.2	3	●	MVE0520X03S060	16.5	34.9	36.9	74.9	74	0.9	6	2
5.3	2	●	MVE0530X02S060	11.6	27.0	29.0	67.0	66	1.0	6	2
5.3	3	●	MVE0530X03S060	16.9	35.0	37.0	75.0	74	1.0	6	2
5.4	2	●	MVE0540X02S060	11.8	27.0	29.0	67.0	66	1.0	6	2
5.4	3	●	MVE0540X03S060	17.2	35.0	37.0	75.0	74	1.0	6	2
5.5	2	●	MVE0550X02S060	12.0	27.0	29.0	67.0	66	1.0	6	2
5.5	3	●	MVE0550X03S060	17.5	35.0	37.0	75.0	74	1.0	6	2
5.6	2	●	MVE0560X02S060	12.2	29.0	29.0	67.0	66	1.0	6	2
5.6	3	●	MVE0560X03S060	17.8	37.0	37.0	75.0	74	1.0	6	2
5.7	2	●	MVE0570X02S060	12.4	29.0	29.0	67.0	66	1.0	6	2
5.7	3	●	MVE0570X03S060	18.1	37.0	37.0	75.0	74	1.0	6	2
5.8	2	●	MVE0580X02S060	12.7	29.1	29.1	67.1	66	1.1	6	2
5.8	3	●	MVE0580X03S060	18.5	37.1	37.1	75.1	74	1.1	6	2
5.9	2	●	MVE0590X02S060	12.9	29.1	29.1	67.1	66	1.1	6	2
5.9	3	●	MVE0590X03S060	18.8	37.1	37.1	75.1	74	1.1	6	2
6.0	2	●	MVE0600X02S060	13.1	29.1	29.1	67.1	66	1.1	6	2
6.0	3	●	MVE0600X03S060	19.1	37.1	37.1	75.1	74	1.1	6	2

DC(mm)	Hole Depth(l/d)	DP1020	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
6.1	2	●	MVE0610X02S070	13.3	32.1	35.1	75.1	74	1.1	7	2
6.1	2	●	MVE0610X02S080	13.3	32.1	35.1	75.1	74	1.1	8	2
6.1	3	●	MVE0610X03S070	19.4	42.1	45.1	84.1	83	1.1	7	2
6.1	3	●	MVE0610X03S080	19.4	42.1	45.1	84.1	83	1.1	8	2
6.2	2	●	MVE0620X02S070	13.5	32.1	35.1	75.1	74	1.1	7	2
6.2	2	●	MVE0620X02S080	13.5	32.1	35.1	75.1	74	1.1	8	2
6.2	3	●	MVE0620X03S070	19.7	42.1	45.1	84.1	83	1.1	7	2
6.2	3	●	MVE0620X03S080	19.7	42.1	45.1	84.1	83	1.1	8	2
6.3	2	●	MVE0630X02S070	13.7	32.1	35.1	75.1	74	1.1	7	2
6.3	2	●	MVE0630X02S080	13.7	32.1	35.1	75.1	74	1.1	8	2
6.3	3	●	MVE0630X03S070	20.0	42.1	45.1	84.1	83	1.1	7	2
6.3	3	●	MVE0630X03S080	20.0	42.1	45.1	84.1	83	1.1	8	2
6.4	2	●	MVE0640X02S070	14.0	32.2	35.2	75.2	74	1.2	7	2
6.4	2	●	MVE0640X02S080	14.0	32.2	35.2	75.2	74	1.2	8	2
6.4	3	●	MVE0640X03S070	20.4	42.2	45.2	84.2	83	1.2	7	2
6.4	3	●	MVE0640X03S080	20.4	42.2	45.2	84.2	83	1.2	8	2
6.5	2	●	MVE0650X02S070	14.2	32.2	35.2	75.2	74	1.2	7	2
6.5	2	●	MVE0650X02S080	14.2	32.2	35.2	75.2	74	1.2	8	2
6.5	3	●	MVE0650X03S070	20.7	42.2	45.2	84.2	83	1.2	7	2
6.5	3	●	MVE0650X03S080	20.7	42.2	45.2	84.2	83	1.2	8	2
6.6	2	●	MVE0660X02S070	14.4	35.2	35.2	75.2	74	1.2	7	2
6.6	2	●	MVE0660X02S080	14.4	35.2	37.2	75.2	74	1.2	8	2
6.6	3	●	MVE0660X03S070	21.0	44.2	44.2	84.2	83	1.2	7	2
6.6	3	●	MVE0660X03S080	21.0	44.2	46.2	84.2	83	1.2	8	2
6.7	2	●	MVE0670X02S070	14.6	35.2	35.2	75.2	74	1.2	7	2
6.7	2	●	MVE0670X02S080	14.6	35.2	37.2	75.2	74	1.2	8	2
6.7	3	●	MVE0670X03S070	21.3	44.2	44.2	84.2	83	1.2	7	2
6.7	3	●	MVE0670X03S080	21.3	44.2	46.2	84.2	83	1.2	8	2
6.8	2	●	MVE0680X02S070	14.8	35.2	35.2	75.2	74	1.2	7	2
6.8	2	●	MVE0680X02S080	14.8	35.2	37.2	75.2	74	1.2	8	2
6.8	3	●	MVE0680X03S070	21.6	44.2	44.2	84.2	83	1.2	7	2
6.8	3	●	MVE0680X03S080	21.6	44.2	46.2	84.2	83	1.2	8	2
6.9	2	●	MVE0690X02S070	15.1	35.3	35.3	75.3	74	1.3	7	2
6.9	2	●	MVE0690X02S080	15.1	35.3	37.3	75.3	74	1.3	8	2
6.9	3	●	MVE0690X03S070	22.0	44.3	44.3	84.3	83	1.3	7	2
6.9	3	●	MVE0690X03S080	22.0	44.3	46.3	84.3	83	1.3	8	2
7.0	2	●	MVE0700X02S070	15.3	35.3	35.3	75.3	74	1.3	7	2
7.0	2	●	MVE0700X02S080	15.3	35.3	37.3	75.3	74	1.3	8	2
7.0	3	●	MVE0700X03S070	22.3	44.3	44.3	84.3	83	1.3	7	2
7.0	3	●	MVE0700X03S080	22.3	44.3	46.3	84.3	83	1.3	8	2
7.1	2	●	MVE0710X02S080	15.5	35.3	38.3	80.3	79	1.3	8	2
7.1	3	●	MVE0710X03S080	22.6	46.3	49.3	91.3	90	1.3	8	2
7.2	2	●	MVE0720X02S080	15.7	35.3	38.3	80.3	79	1.3	8	2
7.2	3	●	MVE0720X03S080	22.9	46.3	49.3	91.3	90	1.3	8	2
7.3	2	●	MVE0730X02S080	15.9	35.3	38.3	80.3	79	1.3	8	2
7.3	3	●	MVE0730X03S080	23.2	46.3	49.3	91.3	90	1.3	8	2
7.4	2	●	MVE0740X02S080	16.1	35.3	38.3	80.3	79	1.3	8	2
7.4	3	●	MVE0740X03S080	23.5	46.3	49.3	91.3	90	1.3	8	2
7.5	2	●	MVE0750X02S080	16.4	35.4	38.4	80.4	79	1.4	8	2
7.5	3	●	MVE0750X03S080	23.9	46.4	49.4	91.4	90	1.4	8	2
7.6	2	●	MVE0760X02S080	16.6	38.4	38.4	80.4	79	1.4	8	2
7.6	3	●	MVE0760X03S080	24.2	49.4	49.4	91.4	90	1.4	8	2
7.7	2	●	MVE0770X02S080	16.8	38.4	38.4	80.4	79	1.4	8	2
7.7	3	●	MVE0770X03S080	24.5	49.4	49.4	91.4	90	1.4	8	2

MVE

DC(mm)	Hole Depth(l/d)	DP1020	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
7.8	2	●	MVE0780X02S080	17.0	38.4	38.4	80.4	79	1.4	8	2
7.8	3	●	MVE0780X03S080	24.8	49.4	49.4	91.4	90	1.4	8	2
7.9	2	●	MVE0790X02S080	17.2	38.4	38.4	80.4	79	1.4	8	2
7.9	3	●	MVE0790X03S080	25.1	49.4	49.4	91.4	90	1.4	8	2
8.0	2	●	MVE0800X02S080	17.5	38.5	38.5	80.5	79	1.5	8	2
8.0	3	●	MVE0800X03S080	25.5	49.5	49.5	91.5	90	1.5	8	2
8.1	2	●	MVE0810X02S090	17.7	38.5	41.5	85.5	84	1.5	9	2
8.1	2	●	MVE0810X02S100	17.7	38.5	41.5	85.5	84	1.5	10	2
8.1	3	●	MVE0810X03S090	25.8	54.5	57.5	99.5	98	1.5	9	2
8.1	3	●	MVE0810X03S100	25.8	54.5	57.5	99.5	98	1.5	10	2
8.2	2	●	MVE0820X02S090	17.9	38.5	41.5	85.5	84	1.5	9	2
8.2	2	●	MVE0820X02S100	17.9	38.5	41.5	85.5	84	1.5	10	2
8.2	3	●	MVE0820X03S090	26.1	54.5	57.5	99.5	98	1.5	9	2
8.2	3	●	MVE0820X03S100	26.1	54.5	57.5	99.5	98	1.5	10	2
8.3	2	●	MVE0830X02S090	18.1	38.5	41.5	85.5	84	1.5	9	2
8.3	2	●	MVE0830X02S100	18.1	38.5	41.5	85.5	84	1.5	10	2
8.3	3	●	MVE0830X03S090	26.4	54.5	57.5	99.5	98	1.5	9	2
8.3	3	●	MVE0830X03S100	26.4	54.5	57.5	99.5	98	1.5	10	2
8.4	2	●	MVE0840X02S090	18.3	38.5	41.5	85.5	84	1.5	9	2
8.4	2	●	MVE0840X02S100	18.3	38.5	41.5	85.5	84	1.5	10	2
8.4	3	●	MVE0840X03S090	26.7	54.5	57.5	99.5	98	1.5	9	2
8.4	3	●	MVE0840X03S100	26.7	54.5	57.5	99.5	98	1.5	10	2
8.5	2	●	MVE0850X02S090	18.5	38.5	41.5	85.5	84	1.5	9	2
8.5	2	●	MVE0850X02S100	18.5	38.5	41.5	85.5	84	1.5	10	2
8.5	3	●	MVE0850X03S090	27.0	54.5	57.5	99.5	98	1.5	9	2
8.5	3	●	MVE0850X03S100	27.0	54.5	57.5	99.5	98	1.5	10	2
8.6	2	●	MVE0860X02S090	18.8	41.6	41.6	85.6	84	1.6	9	2
8.6	2	●	MVE0860X02S100	18.8	41.6	43.6	85.6	84	1.6	10	2
8.6	3	●	MVE0860X03S090	27.4	56.6	56.6	99.6	98	1.6	9	2
8.6	3	●	MVE0860X03S100	27.4	56.6	58.6	99.6	98	1.6	10	2
8.7	2	●	MVE0870X02S090	19.0	41.6	41.6	85.6	84	1.6	9	2
8.7	2	●	MVE0870X02S100	19.0	41.6	43.6	85.6	84	1.6	10	2
8.7	3	●	MVE0870X03S090	27.7	56.6	56.6	99.6	98	1.6	9	2
8.7	3	●	MVE0870X03S100	27.7	56.6	58.6	99.6	98	1.6	10	2
8.8	2	●	MVE0880X02S090	19.2	41.6	41.6	85.6	84	1.6	9	2
8.8	2	●	MVE0880X02S100	19.2	41.6	43.6	85.6	84	1.6	10	2
8.8	3	●	MVE0880X03S090	28.0	56.6	56.6	99.6	98	1.6	9	2
8.8	3	●	MVE0880X03S100	28.0	56.6	58.6	99.6	98	1.6	10	2
8.9	2	●	MVE0890X02S090	19.4	41.6	41.6	85.6	84	1.6	9	2
8.9	2	●	MVE0890X02S100	19.4	41.6	43.6	85.6	84	1.6	10	2
8.9	3	●	MVE0890X03S090	28.3	56.6	56.6	99.6	98	1.6	9	2
8.9	3	●	MVE0890X03S100	28.3	56.6	58.6	99.6	98	1.6	10	2
9.0	2	●	MVE0900X02S090	19.6	41.6	41.6	85.6	84	1.6	9	2
9.0	2	●	MVE0900X02S100	19.6	41.6	43.6	85.6	84	1.6	10	2
9.0	3	●	MVE0900X03S090	28.6	56.6	56.6	99.6	98	1.6	9	2
9.0	3	●	MVE0900X03S100	28.6	56.6	58.6	99.6	98	1.6	10	2
9.1	2	●	MVE0910X02S100	19.9	41.7	44.7	90.7	89	1.7	10	2
9.1	3	●	MVE0910X03S100	29.0	59.7	62.7	106.7	105	1.7	10	2
9.2	2	●	MVE0920X02S100	20.1	41.7	44.7	90.7	89	1.7	10	2
9.2	3	●	MVE0920X03S100	29.3	59.7	62.7	106.7	105	1.7	10	2
9.3	2	●	MVE0930X02S100	20.3	41.7	44.7	90.7	89	1.7	10	2
9.3	3	●	MVE0930X03S100	29.6	59.7	62.7	106.7	105	1.7	10	2
9.4	2	●	MVE0940X02S100	20.5	41.7	44.7	90.7	89	1.7	10	2
9.4	3	●	MVE0940X03S100	29.9	59.7	62.7	106.7	105	1.7	10	2

DC(mm)	Hole Depth(l/d)	DP1020	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
9.5	2	●	MVE0950X02S100	20.7	41.7	44.7	90.7	89	1.7	10	2
9.5	3	●	MVE0950X03S100	30.2	59.7	62.7	106.7	105	1.7	10	2
9.6	2	●	MVE0960X02S100	20.9	44.7	44.7	90.7	89	1.7	10	2
9.6	3	●	MVE0960X03S100	30.5	61.7	61.7	106.7	105	1.7	10	2
9.7	2	●	MVE0970X02S100	21.2	44.8	44.8	90.8	89	1.8	10	2
9.7	3	●	MVE0970X03S100	30.9	61.8	61.8	106.8	105	1.8	10	2
9.8	2	●	MVE0980X02S100	21.4	44.8	44.8	90.8	89	1.8	10	2
9.8	3	●	MVE0980X03S100	31.2	61.8	61.8	106.8	105	1.8	10	2
9.9	2	●	MVE0990X02S100	21.6	44.8	44.8	90.8	89	1.8	10	2
9.9	3	●	MVE0990X03S100	31.5	61.8	61.8	106.8	105	1.8	10	2
10.0	2	●	MVE1000X02S100	21.8	44.8	44.8	90.8	89	1.8	10	2
10.0	3	●	MVE1000X03S100	31.8	61.8	61.8	106.8	105	1.8	10	2
10.1	2	●	MVE1010X02S110	22.0	44.8	47.8	96.8	95	1.8	11	2
10.1	2	●	MVE1010X02S120	22.0	44.8	47.8	96.8	95	1.8	12	2
10.1	3	●	MVE1010X03S110	32.1	67.8	70.8	115.8	114	1.8	11	2
10.1	3	●	MVE1010X03S120	32.1	67.8	70.8	115.8	114	1.8	12	2
10.2	2	●	MVE1020X02S110	22.3	44.9	47.9	96.9	95	1.9	11	2
10.2	2	●	MVE1020X02S120	22.3	44.9	47.9	96.9	95	1.9	12	2
10.2	3	●	MVE1020X03S110	32.5	67.9	70.9	115.9	114	1.9	11	2
10.2	3	●	MVE1020X03S120	32.5	67.9	70.9	115.9	114	1.9	12	2
10.3	2	●	MVE1030X02S110	22.5	44.9	47.9	96.9	95	1.9	11	2
10.3	2	●	MVE1030X02S120	22.5	44.9	47.9	96.9	95	1.9	12	2
10.3	3	●	MVE1030X03S110	32.8	67.9	70.9	115.9	114	1.9	11	2
10.3	3	●	MVE1030X03S120	32.8	67.9	70.9	115.9	114	1.9	12	2
10.4	2	●	MVE1040X02S110	22.7	44.9	47.9	96.9	95	1.9	11	2
10.4	2	●	MVE1040X02S120	22.7	44.9	47.9	96.9	95	1.9	12	2
10.4	3	●	MVE1040X03S110	33.1	67.9	70.9	115.9	114	1.9	11	2
10.4	3	●	MVE1040X03S120	33.1	67.9	70.9	115.9	114	1.9	12	2
10.5	2	●	MVE1050X02S110	22.9	44.9	47.9	96.9	95	1.9	11	2
10.5	2	●	MVE1050X02S120	22.9	44.9	47.9	96.9	95	1.9	12	2
10.5	3	●	MVE1050X03S110	33.4	67.9	70.9	115.9	114	1.9	11	2
10.5	3	●	MVE1050X03S120	33.4	67.9	70.9	115.9	114	1.9	12	2
10.6	2	●	MVE1060X02S110	23.1	48.9	48.9	96.9	95	1.9	11	2
10.6	2	●	MVE1060X02S120	23.1	48.9	49.9	96.9	95	1.9	12	2
10.6	3	●	MVE1060X03S110	33.7	69.9	69.9	115.9	114	1.9	11	2
10.6	3	●	MVE1060X03S120	33.7	69.9	70.9	115.9	114	1.9	12	2
10.7	2	●	MVE1070X02S110	23.3	48.9	48.9	96.9	95	1.9	11	2
10.7	2	●	MVE1070X02S120	23.3	48.9	49.9	96.9	95	1.9	12	2
10.7	3	●	MVE1070X03S110	34.0	69.9	69.9	115.9	114	1.9	11	2
10.7	3	●	MVE1070X03S120	34.0	69.9	70.9	115.9	114	1.9	12	2
10.8	2	●	MVE1080X02S110	23.6	49.0	49.0	97.0	95	2.0	11	2
10.8	2	●	MVE1080X02S120	23.6	49.0	50.0	97.0	95	2.0	12	2
10.8	3	●	MVE1080X03S110	34.4	70.0	70.0	116.0	114	2.0	11	2
10.8	3	●	MVE1080X03S120	34.4	70.0	71.0	116.0	114	2.0	12	2
10.9	2	●	MVE1090X02S110	23.8	49.0	49.0	97.0	95	2.0	11	2
10.9	2	●	MVE1090X02S120	23.8	49.0	50.0	97.0	95	2.0	12	2
10.9	3	●	MVE1090X03S110	34.7	70.0	70.0	116.0	114	2.0	11	2
10.9	3	●	MVE1090X03S120	34.7	70.0	71.0	116.0	114	2.0	12	2
11.0	2	●	MVE1100X02S110	24.0	49.0	49.0	97.0	95	2.0	11	2
11.0	2	●	MVE1100X02S120	24.0	49.0	50.0	97.0	95	2.0	12	2
11.0	3	●	MVE1100X03S110	35.0	70.0	70.0	116.0	114	2.0	11	2
11.0	3	●	MVE1100X03S120	35.0	70.0	71.0	116.0	114	2.0	12	2
11.1	2	●	MVE1110X02S120	24.2	49.0	52.0	97.0	95	2.0	12	2
11.1	3	●	MVE1110X03S120	35.3	73.0	76.0	123.0	121	2.0	12	2

MVE

DC(mm)	Hole Depth(l/d)	DP1020	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
11.2	2	●	MVE1120X02S120	24.4	49.0	52.0	97.0	95	2.0	12	2
11.2	3	●	MVE1120X03S120	35.6	73.0	76.0	123.0	121	2.0	12	2
11.3	2	●	MVE1130X02S120	24.7	49.1	52.1	97.1	95	2.1	12	2
11.3	3	●	MVE1130X03S120	36.0	73.1	76.1	123.1	121	2.1	12	2
11.4	2	●	MVE1140X02S120	24.9	49.1	52.1	97.1	95	2.1	12	2
11.4	3	●	MVE1140X03S120	36.3	73.1	76.1	123.1	121	2.1	12	2
11.5	2	●	MVE1150X02S120	25.1	49.1	52.1	97.1	95	2.1	12	2
11.5	3	●	MVE1150X03S120	36.6	73.1	76.1	123.1	121	2.1	12	2
11.6	2	●	MVE1160X02S120	25.3	49.1	49.1	97.1	95	2.1	12	2
11.6	3	●	MVE1160X03S120	36.9	75.1	75.1	123.1	121	2.1	12	2
11.7	2	●	MVE1170X02S120	25.5	49.1	49.1	97.1	95	2.1	12	2
11.7	3	●	MVE1170X03S120	37.2	75.1	75.1	123.1	121	2.1	12	2
11.8	2	●	MVE1180X02S120	25.7	49.1	49.1	97.1	95	2.1	12	2
11.8	3	●	MVE1180X03S120	37.5	75.1	75.1	123.1	121	2.1	12	2
11.9	2	●	MVE1190X02S120	26.0	49.2	49.2	97.2	95	2.2	12	2
11.9	3	●	MVE1190X03S120	37.9	75.2	75.2	123.2	121	2.2	12	2
12.0	2	●	MVE1200X02S120	26.2	49.2	49.2	97.2	95	2.2	12	2
12.0	3	●	MVE1200X03S120	38.2	75.2	75.2	123.2	121	2.2	12	2
12.1	2	●	MVE1210X02S130	26.4	53.2	56.2	104.2	102	2.2	13	2
12.1	2	□	MVE1210X02S140	26.4	53.2	56.2	104.2	102	2.2	14	2
12.1	3	●	MVE1210X03S130	38.5	78.2	81.2	139.2	137	2.2	13	2
12.1	3	□	MVE1210X03S140	38.5	78.2	81.2	139.2	137	2.2	14	2
12.2	2	●	MVE1220X02S130	26.6	53.2	56.2	104.2	102	2.2	13	2
12.2	2	□	MVE1220X02S140	26.6	53.2	56.2	104.2	102	2.2	14	2
12.2	3	●	MVE1220X03S130	38.8	78.2	81.2	139.2	137	2.2	13	2
12.2	3	□	MVE1220X03S140	38.8	78.2	81.2	139.2	137	2.2	14	2
12.3	2	●	MVE1230X02S130	26.8	53.2	56.2	104.2	102	2.2	13	2
12.3	2	□	MVE1230X02S140	26.8	53.2	56.2	104.2	102	2.2	14	2
12.3	3	●	MVE1230X03S130	39.1	78.2	81.2	139.2	137	2.2	13	2
12.3	3	□	MVE1230X03S140	39.1	78.2	81.2	139.2	137	2.2	14	2
12.4	2	●	MVE1240X02S130	27.1	53.3	56.3	104.3	102	2.3	13	2
12.4	2	□	MVE1240X02S140	27.1	53.3	56.3	104.3	102	2.3	14	2
12.4	3	●	MVE1240X03S130	39.5	78.3	81.3	139.3	137	2.3	13	2
12.4	3	□	MVE1240X03S140	39.5	78.3	81.3	139.3	137	2.3	14	2
12.5	2	●	MVE1250X02S130	27.3	53.3	56.3	104.3	102	2.3	13	2
12.5	2	□	MVE1250X02S140	27.3	53.3	56.3	104.3	102	2.3	14	2
12.5	3	●	MVE1250X03S130	39.8	78.3	81.3	139.3	137	2.3	13	2
12.5	3	□	MVE1250X03S140	39.8	78.3	81.3	139.3	137	2.3	14	2
12.6	2	●	MVE1260X02S130	27.5	53.3	53.3	104.3	102	2.3	13	2
12.6	2	□	MVE1260X02S140	27.5	53.3	53.3	104.3	102	2.3	14	2
12.6	3	●	MVE1260X03S130	40.1	80.3	80.3	139.3	137	2.3	13	2
12.6	3	□	MVE1260X03S140	40.1	80.3	80.3	139.3	137	2.3	14	2
12.7	2	●	MVE1270X02S130	27.7	53.3	53.3	104.3	102	2.3	13	2
12.7	2	□	MVE1270X02S140	27.7	53.3	53.3	104.3	102	2.3	14	2
12.7	3	●	MVE1270X03S130	40.4	80.3	80.3	139.3	137	2.3	13	2
12.7	3	□	MVE1270X03S140	40.4	80.3	80.3	139.3	137	2.3	14	2
12.8	2	●	MVE1280X02S130	27.9	53.3	53.3	104.3	102	2.3	13	2
12.8	2	□	MVE1280X02S140	27.9	53.3	53.3	104.3	102	2.3	14	2
12.8	3	●	MVE1280X03S130	40.7	80.3	80.3	139.3	137	2.3	13	2
12.8	3	□	MVE1280X03S140	40.7	80.3	80.3	139.3	137	2.3	14	2
12.9	2	●	MVE1290X02S130	28.1	53.3	53.3	104.3	102	2.3	13	2
12.9	2	□	MVE1290X02S140	28.1	53.3	53.3	104.3	102	2.3	14	2
12.9	3	●	MVE1290X03S130	41.0	80.3	80.3	139.3	137	2.3	13	2
12.9	3	□	MVE1290X03S140	41.0	80.3	80.3	139.3	137	2.3	14	2

DC(mm)	Hole Depth(l/d)	DP1020	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
13.0	2	●	MVE1300X02S130	28.4	53.4	53.4	104.4	102	2.4	13	2
13.0	2	□	MVE1300X02S140	28.4	53.4	53.4	104.4	102	2.4	14	2
13.0	3	●	MVE1300X03S130	41.4	80.4	80.4	139.4	137	2.4	13	2
13.0	3	□	MVE1300X03S140	41.4	80.4	80.4	139.4	137	2.4	14	2
13.1	2	●	MVE1310X02S140	28.6	56.4	59.4	109.4	107	2.4	14	2
13.1	3	●	MVE1310X03S140	41.7	86.4	89.4	149.4	147	2.4	14	2
13.2	2	●	MVE1320X02S140	28.8	56.4	59.4	109.4	107	2.4	14	2
13.2	3	●	MVE1320X03S140	42.0	86.4	89.4	149.4	147	2.4	14	2
13.3	2	●	MVE1330X02S140	29.0	56.4	59.4	109.4	107	2.4	14	2
13.3	3	●	MVE1330X03S140	42.3	86.4	89.4	149.4	147	2.4	14	2
13.4	2	●	MVE1340X02S140	29.2	56.4	59.4	109.4	107	2.4	14	2
13.4	3	●	MVE1340X03S140	42.6	86.4	89.4	149.4	147	2.4	14	2
13.5	2	●	MVE1350X02S140	29.5	56.5	59.5	109.5	107	2.5	14	2
13.5	3	●	MVE1350X03S140	43.0	86.5	89.5	149.5	147	2.5	14	2
13.6	2	●	MVE1360X02S140	29.7	56.5	56.5	109.5	107	2.5	14	2
13.6	3	●	MVE1360X03S140	43.3	88.5	88.5	149.5	147	2.5	14	2
13.7	2	●	MVE1370X02S140	29.9	56.5	56.5	109.5	107	2.5	14	2
13.7	3	●	MVE1370X03S140	43.6	88.5	88.5	149.5	147	2.5	14	2
13.8	2	●	MVE1380X02S140	30.1	56.5	56.5	109.5	107	2.5	14	2
13.8	3	●	MVE1380X03S140	43.9	88.5	88.5	149.5	147	2.5	14	2
13.9	2	●	MVE1390X02S140	30.3	56.5	56.5	109.5	107	2.5	14	2
13.9	3	●	MVE1390X03S140	44.2	88.5	88.5	149.5	147	2.5	14	2
14.0	2	●	MVE1400X02S140	30.5	56.5	56.5	109.5	107	2.5	14	2
14.0	3	●	MVE1400X03S140	44.5	88.5	88.5	149.5	147	2.5	14	2
14.1	2	●	MVE1410X02S150	30.8	58.6	61.6	113.6	111	2.6	15	2
14.1	2	□	MVE1410X02S160	30.8	58.6	61.6	113.6	111	2.6	16	2
14.1	3	●	MVE1410X03S150	44.9	91.6	94.6	155.6	153	2.6	15	2
14.1	3	□	MVE1410X03S160	44.9	91.6	94.6	155.6	153	2.6	16	2
14.2	2	●	MVE1420X02S150	31.0	58.6	61.6	113.6	111	2.6	15	2
14.2	2	□	MVE1420X02S160	31.0	58.6	61.6	113.6	111	2.6	16	2
14.2	3	●	MVE1420X03S150	45.2	91.6	94.6	155.6	153	2.6	15	2
14.2	3	□	MVE1420X03S160	45.2	91.6	94.6	155.6	153	2.6	16	2
14.3	2	□	MVE1430X02S150	31.2	58.6	61.6	113.6	111	2.6	15	2
14.3	2	□	MVE1430X02S160	31.2	58.6	61.6	113.6	111	2.6	16	2
14.3	3	●	MVE1430X03S150	45.5	91.6	94.6	155.6	153	2.6	15	2
14.3	3	□	MVE1430X03S160	45.5	91.6	94.6	155.6	153	2.6	16	2
14.4	2	□	MVE1440X02S150	31.4	58.6	61.6	113.6	111	2.6	15	2
14.4	2	□	MVE1440X02S160	31.4	58.6	61.6	113.6	111	2.6	16	2
14.4	3	●	MVE1440X03S150	45.8	91.6	94.6	155.6	153	2.6	15	2
14.4	3	□	MVE1440X03S160	45.8	91.6	94.6	155.6	153	2.6	16	2
14.5	2	●	MVE1450X02S150	31.6	58.6	61.6	113.6	111	2.6	15	2
14.5	2	□	MVE1450X02S160	31.6	58.6	61.6	113.6	111	2.6	16	2
14.5	3	●	MVE1450X03S150	46.1	91.6	94.6	155.6	153	2.6	15	2
14.5	3	□	MVE1450X03S160	46.1	91.6	94.6	155.6	153	2.6	16	2
14.6	2	□	MVE1460X02S150	31.9	58.7	58.7	113.7	111	2.7	15	2
14.6	2	□	MVE1460X02S160	31.9	58.7	58.7	113.7	111	2.7	16	2
14.6	3	●	MVE1460X03S150	46.5	93.7	93.7	155.7	153	2.7	15	2
14.6	3	□	MVE1460X03S160	46.5	93.7	93.7	155.7	153	2.7	16	2
14.7	2	□	MVE1470X02S150	32.1	58.7	58.7	113.7	111	2.7	15	2
14.7	2	□	MVE1470X02S160	32.1	58.7	58.7	113.7	111	2.7	16	2
14.7	3	●	MVE1470X03S150	46.8	93.7	93.7	155.7	153	2.7	15	2
14.7	3	□	MVE1470X03S160	46.8	93.7	93.7	155.7	153	2.7	16	2
14.8	2	□	MVE1480X02S150	32.3	58.7	58.7	113.7	111	2.7	15	2
14.8	2	□	MVE1480X02S160	32.3	58.7	58.7	113.7	111	2.7	16	2

MVE

DC(mm)	Hole Depth(l/d)	DP1020	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
14.8	3	●	MVE1480X03S150	47.1	93.7	93.7	155.7	153	2.7	15	2
14.8	3	□	MVE1480X03S160	47.1	93.7	93.7	155.7	153	2.7	16	2
14.9	2	□	MVE1490X02S150	32.5	58.7	58.7	113.7	111	2.7	15	2
14.9	2	□	MVE1490X02S160	32.5	58.7	58.7	113.7	111	2.7	16	2
14.9	3	●	MVE1490X03S150	47.4	93.7	93.7	155.7	153	2.7	15	2
14.9	3	□	MVE1490X03S160	47.4	93.7	93.7	155.7	153	2.7	16	2
15.0	2	●	MVE1500X02S150	32.7	58.7	58.7	113.7	111	2.7	15	2
15.0	2	□	MVE1500X02S160	32.7	58.7	58.7	113.7	111	2.7	16	2
15.0	3	●	MVE1500X03S150	47.7	93.7	93.7	155.7	153	2.7	15	2
15.0	3	□	MVE1500X03S160	47.7	93.7	93.7	155.7	153	2.7	16	2
15.1	2	□	MVE1510X02S160	32.9	60.7	63.7	117.7	115	2.7	16	2
15.1	3	●	MVE1510X03S160	48.0	96.7	99.7	162.7	160	2.7	16	2
15.2	2	●	MVE1520X02S160	33.2	60.8	63.8	117.8	115	2.8	16	2
15.2	3	●	MVE1520X03S160	48.4	96.8	99.8	162.8	160	2.8	16	2
15.3	2	□	MVE1530X02S160	33.4	60.8	63.8	117.8	115	2.8	16	2
15.3	3	●	MVE1530X03S160	48.7	96.8	99.8	162.8	160	2.8	16	2
15.4	2	□	MVE1540X02S160	33.6	60.8	63.8	117.8	115	2.8	16	2
15.4	3	●	MVE1540X03S160	49.0	96.8	99.8	162.8	160	2.8	16	2
15.5	2	●	MVE1550X02S160	33.8	60.8	63.8	117.8	115	2.8	16	2
15.5	3	●	MVE1550X03S160	49.3	96.8	99.8	162.8	160	2.8	16	2
15.6	2	□	MVE1560X02S160	34.0	60.8	60.8	117.8	115	2.8	16	2
15.6	3	●	MVE1560X03S160	49.6	98.8	98.8	162.8	160	2.8	16	2
15.7	2	□	MVE1570X02S160	34.3	60.9	60.9	117.9	115	2.9	16	2
15.7	3	●	MVE1570X03S160	50.0	98.9	98.9	162.9	160	2.9	16	2
15.8	2	□	MVE1580X02S160	34.5	60.9	60.9	117.9	115	2.9	16	2
15.8	3	●	MVE1580X03S160	50.3	98.9	98.9	162.9	160	2.9	16	2
15.9	2	□	MVE1590X02S160	34.7	60.9	60.9	117.9	115	2.9	16	2
15.9	3	●	MVE1590X03S160	50.6	98.9	98.9	162.9	160	2.9	16	2
16.0	2	●	MVE1600X02S160	34.9	60.9	60.9	117.9	115	2.9	16	2
16.0	3	●	MVE1600X03S160	50.9	98.9	98.9	162.9	160	2.9	16	2
16.1	2	□	MVE1610X02S170	35.1	62.9	62.9	121.9	119	2.9	17	2
16.1	2	□	MVE1610X02S180	35.1	62.9	62.9	121.9	119	2.9	18	2
16.1	3	□	MVE1610X03S170	51.2	104.9	104.9	169.9	167	2.9	17	2
16.1	3	□	MVE1610X03S180	51.2	104.9	104.9	169.9	167	2.9	18	2
16.2	2	●	MVE1620X02S170	35.3	62.9	62.9	121.9	119	2.9	17	2
16.2	2	□	MVE1620X02S180	35.3	62.9	62.9	121.9	119	2.9	18	2
16.2	3	□	MVE1620X03S170	51.5	104.9	104.9	169.9	167	2.9	17	2
16.2	3	□	MVE1620X03S180	51.5	104.9	104.9	169.9	167	2.9	18	2
16.3	2	●	MVE1630X02S170	35.6	63.0	63.0	122.0	119	3.0	17	2
16.3	2	□	MVE1630X02S180	35.6	63.0	63.0	122.0	119	3.0	18	2
16.3	3	□	MVE1630X03S170	51.9	105.0	105.0	170.0	167	3.0	17	2
16.3	3	□	MVE1630X03S180	51.9	105.0	105.0	170.0	167	3.0	18	2
16.4	2	□	MVE1640X02S170	35.8	63.0	63.0	122.0	119	3.0	17	2
16.4	2	□	MVE1640X02S180	35.8	63.0	63.0	122.0	119	3.0	18	2
16.4	3	□	MVE1640X03S170	52.2	105.0	105.0	170.0	167	3.0	17	2
16.4	3	□	MVE1640X03S180	52.2	105.0	105.0	170.0	167	3.0	18	2
16.5	2	●	MVE1650X02S170	36.0	63.0	63.0	122.0	119	3.0	17	2
16.5	2	□	MVE1650X02S180	36.0	63.0	63.0	122.0	119	3.0	18	2
16.5	3	●	MVE1650X03S170	52.5	105.0	105.0	170.0	167	3.0	17	2
16.5	3	□	MVE1650X03S180	52.5	105.0	105.0	170.0	167	3.0	18	2
16.6	2	□	MVE1660X02S170	36.2	63.0	63.0	122.0	119	3.0	17	2
16.6	2	□	MVE1660X02S180	36.2	63.0	63.0	122.0	119	3.0	18	2
16.6	3	□	MVE1660X03S170	52.8	105.0	105.0	170.0	167	3.0	17	2
16.6	3	□	MVE1660X03S180	52.8	105.0	105.0	170.0	167	3.0	18	2

DC(mm)	Hole Depth(l/d)	DP1020	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
16.7	2	□	MVE1670X02S170	36.4	63.0	63.0	122.0	119	3.0	17	2
16.7	2	□	MVE1670X02S180	36.4	63.0	63.0	122.0	119	3.0	18	2
16.7	3	□	MVE1670X03S170	53.1	105.0	105.0	170.0	167	3.0	17	2
16.7	3	□	MVE1670X03S180	53.1	105.0	105.0	170.0	167	3.0	18	2
16.8	2	□	MVE1680X02S170	36.7	63.1	63.1	122.1	119	3.1	17	2
16.8	2	□	MVE1680X02S180	36.7	63.1	63.1	122.1	119	3.1	18	2
16.8	3	□	MVE1680X03S170	53.5	105.1	105.1	170.1	167	3.1	17	2
16.8	3	□	MVE1680X03S180	53.5	105.1	105.1	170.1	167	3.1	18	2
16.9	2	□	MVE1690X02S170	36.9	63.1	63.1	122.1	119	3.1	17	2
16.9	2	□	MVE1690X02S180	36.9	63.1	63.1	122.1	119	3.1	18	2
16.9	3	□	MVE1690X03S170	53.8	105.1	105.1	170.1	167	3.1	17	2
16.9	3	□	MVE1690X03S180	53.8	105.1	105.1	170.1	167	3.1	18	2
17.0	2	●	MVE1700X02S170	37.1	63.1	63.1	122.1	119	3.1	17	2
17.0	2	□	MVE1700X02S180	37.1	63.1	63.1	122.1	119	3.1	18	2
17.0	3	●	MVE1700X03S170	54.1	105.1	105.1	170.1	167	3.1	17	2
17.0	3	□	MVE1700X03S180	54.1	105.1	105.1	170.1	167	3.1	18	2
17.1	2	□	MVE1710X02S180	37.3	65.1	65.1	126.1	123	3.1	18	2
17.1	3	□	MVE1710X03S180	54.4	105.1	105.1	170.1	167	3.1	18	2
17.2	2	□	MVE1720X02S180	37.5	65.1	65.1	126.1	123	3.1	18	2
17.2	3	□	MVE1720X03S180	54.7	105.1	105.1	170.1	167	3.1	18	2
17.3	2	□	MVE1730X02S180	37.7	65.1	65.1	126.1	123	3.1	18	2
17.3	3	□	MVE1730X03S180	55.0	105.1	105.1	170.1	167	3.1	18	2
17.4	2	□	MVE1740X02S180	38.0	65.2	65.2	126.2	123	3.2	18	2
17.4	3	□	MVE1740X03S180	55.4	105.2	105.2	170.2	167	3.2	18	2
17.5	2	●	MVE1750X02S180	38.2	65.2	65.2	126.2	123	3.2	18	2
17.5	3	●	MVE1750X03S180	55.7	105.2	105.2	170.2	167	3.2	18	2
17.6	2	□	MVE1760X02S180	38.4	65.2	65.2	126.2	123	3.2	18	2
17.6	3	□	MVE1760X03S180	56.0	105.2	105.2	170.2	167	3.2	18	2
17.7	2	□	MVE1770X02S180	38.6	65.2	65.2	126.2	123	3.2	18	2
17.7	3	□	MVE1770X03S180	56.3	105.2	105.2	170.2	167	3.2	18	2
17.8	2	●	MVE1780X02S180	38.8	65.2	65.2	126.2	123	3.2	18	2
17.8	3	□	MVE1780X03S180	56.6	105.2	105.2	170.2	167	3.2	18	2
17.9	2	□	MVE1790X02S180	39.1	65.3	65.3	126.3	123	3.3	18	2
17.9	3	□	MVE1790X03S180	57.0	105.3	105.3	170.3	167	3.3	18	2
18.0	2	●	MVE1800X02S180	39.3	65.3	65.3	126.3	123	3.3	18	2
18.0	3	●	MVE1800X03S180	57.3	105.3	105.3	170.3	167	3.3	18	2
18.1	2	□	MVE1810X02S190	39.5	67.3	67.3	130.3	127	3.3	19	2
18.1	2	□	MVE1810X02S200	39.5	67.3	67.3	130.3	127	3.3	20	2
18.1	3	□	MVE1810X03S190	57.6	117.3	117.3	182.3	179	3.3	19	2
18.1	3	□	MVE1810X03S200	57.6	117.3	117.3	182.3	179	3.3	20	2
18.2	2	□	MVE1820X02S190	39.7	67.3	67.3	130.3	127	3.3	19	2
18.2	2	□	MVE1820X02S200	39.7	67.3	67.3	130.3	127	3.3	20	2
18.2	3	□	MVE1820X03S190	57.9	117.3	117.3	182.3	179	3.3	19	2
18.2	3	□	MVE1820X03S200	57.9	117.3	117.3	182.3	179	3.3	20	2
18.3	2	□	MVE1830X02S190	39.9	67.3	67.3	130.3	127	3.3	19	2
18.3	2	□	MVE1830X02S200	39.9	67.3	67.3	130.3	127	3.3	20	2
18.3	3	□	MVE1830X03S190	58.2	117.3	117.3	182.3	179	3.3	19	2
18.3	3	□	MVE1830X03S200	58.2	117.3	117.3	182.3	179	3.3	20	2
18.4	2	□	MVE1840X02S190	40.1	67.3	67.3	130.3	127	3.3	19	2
18.4	2	□	MVE1840X02S200	40.1	67.3	67.3	130.3	127	3.3	20	2
18.4	3	□	MVE1840X03S190	58.5	117.3	117.3	182.3	179	3.3	19	2
18.4	3	□	MVE1840X03S200	58.5	117.3	117.3	182.3	179	3.3	20	2
18.5	2	●	MVE1850X02S190	40.4	67.4	67.4	130.4	127	3.4	19	2
18.5	2	□	MVE1850X02S200	40.4	67.4	67.4	130.4	127	3.4	20	2

MVE

DC(mm)	Hole Depth(l/d)	DP1020	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
18.5	3	●	**MVE1850X03S190**	58.9	117.4	117.4	182.4	179	3.4	19	2
18.5	3	□	**MVE1850X03S200**	58.9	117.4	117.4	182.4	179	3.4	20	2
18.6	2	□	**MVE1860X02S190**	40.6	67.4	67.4	130.4	127	3.4	19	2
18.6	2	□	**MVE1860X02S200**	40.6	67.4	67.4	130.4	127	3.4	20	2
18.6	3	□	**MVE1860X03S190**	59.2	117.4	117.4	182.4	179	3.4	19	2
18.6	3	□	**MVE1860X03S200**	59.2	117.4	117.4	182.4	179	3.4	20	2
18.7	2	□	**MVE1870X02S190**	40.8	67.4	67.4	130.4	127	3.4	19	2
18.7	2	□	**MVE1870X02S200**	40.8	67.4	67.4	130.4	127	3.4	20	2
18.7	3	□	**MVE1870X03S190**	59.5	117.4	117.4	182.4	179	3.4	19	2
18.7	3	□	**MVE1870X03S200**	59.5	117.4	117.4	182.4	179	3.4	20	2
18.8	2	□	**MVE1880X02S190**	41.0	67.4	67.4	130.4	127	3.4	19	2
18.8	2	□	**MVE1880X02S200**	41.0	67.4	67.4	130.4	127	3.4	20	2
18.8	3	□	**MVE1880X03S190**	59.8	117.4	117.4	182.4	179	3.4	19	2
18.8	3	□	**MVE1880X03S200**	59.8	117.4	117.4	182.4	179	3.4	20	2
18.9	2	□	**MVE1890X02S190**	41.2	67.4	67.4	130.4	127	3.4	19	2
18.9	2	□	**MVE1890X02S200**	41.2	67.4	67.4	130.4	127	3.4	20	2
18.9	3	□	**MVE1890X03S190**	60.1	117.4	117.4	182.4	179	3.4	19	2
18.9	3	□	**MVE1890X03S200**	60.1	117.4	117.4	182.4	179	3.4	20	2
19.0	2	●	**MVE1900X02S190**	41.5	67.5	67.5	130.5	127	3.5	19	2
19.0	2	□	**MVE1900X02S200**	41.5	67.5	67.5	130.5	127	3.5	20	2
19.0	3	●	**MVE1900X03S190**	60.5	117.5	117.5	182.5	179	3.5	19	2
19.0	3	□	**MVE1900X03S200**	60.5	117.5	117.5	182.5	179	3.5	20	2
19.1	2	□	**MVE1910X02S200**	41.7	69.5	69.5	134.5	131	3.5	20	2
19.1	3	□	**MVE1910X03S200**	60.8	117.5	117.5	182.5	179	3.5	20	2
19.2	2	□	**MVE1920X02S200**	41.9	69.5	69.5	134.5	131	3.5	20	2
19.2	3	□	**MVE1920X03S200**	61.1	117.5	117.5	182.5	179	3.5	20	2
19.3	2	□	**MVE1930X02S200**	42.1	69.5	69.5	134.5	131	3.5	20	2
19.3	3	□	**MVE1930X03S200**	61.4	117.5	117.5	182.5	179	3.5	20	2
19.4	2	□	**MVE1940X02S200**	42.3	69.5	69.5	134.5	131	3.5	20	2
19.4	3	□	**MVE1940X03S200**	61.7	117.5	117.5	182.5	179	3.5	20	2
19.5	2	●	**MVE1950X02S200**	42.5	69.5	69.5	134.5	131	3.5	20	2
19.5	3	●	**MVE1950X03S200**	62.0	117.5	117.5	182.5	179	3.5	20	2
19.6	2	□	**MVE1960X02S200**	42.8	69.6	69.6	134.6	131	3.6	20	2
19.6	3	□	**MVE1960X03S200**	62.4	117.6	117.6	182.6	179	3.6	20	2
19.7	2	□	**MVE1970X02S200**	43.0	69.6	69.6	134.6	131	3.6	20	2
19.7	3	□	**MVE1970X03S200**	62.7	117.6	117.6	182.6	179	3.6	20	2
19.8	2	□	**MVE1980X02S200**	43.2	69.6	69.6	134.6	131	3.6	20	2
19.8	3	□	**MVE1980X03S200**	63.0	117.6	117.6	182.6	179	3.6	20	2
19.9	2	□	**MVE1990X02S200**	43.4	69.6	69.6	134.6	131	3.6	20	2
19.9	3	□	**MVE1990X03S200**	63.3	117.6	117.6	182.6	179	3.6	20	2
20.0	2	●	**MVE2000X02S200**	43.6	69.6	69.6	134.6	131	3.6	20	2
20.0	3	●	**MVE2000X03S200**	63.6	117.6	117.6	182.6	179	3.6	20	2

MVE

Recommended cutting condition

Work material	Mild Steel(≦180HB) AISI 1010 etc		Carbon steel, Alloy steel(180—280HB) AISI 1045, AISI 4140 etc		Carbon steel, Alloy steel(280—350HB) AISI 4340 etc	
Dia. DC (mm)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)
3.2	6400	0.1(0.06—0.13)	5900	0.1(0.06—0.13)	5400	0.09(0.06—0.12)
4.0	5500	0.12(0.08—0.16)	5100	0.12(0.08—0.16)	4700	0.11(0.07—0.14)
5.0	4400	0.15(0.10—0.20)	4100	0.15(0.10—0.20)	3800	0.14(0.09—0.18)
6.3	4000	0.2(0.13—0.26)	3700	0.2(0.13—0.26)	3500	0.18(0.11—0.24)
8.0	3300	0.23(0.18—0.28)	3100	0.23(0.18—0.28)	2900	0.21(0.16—0.25)
10.0	2800	0.27(0.22—0.32)	2700	0.27(0.22—0.32)	2500	0.23(0.19—0.27)
12.0	2500	0.31(0.28—0.34)	2300	0.31(0.28—0.34)	2200	0.26(0.23—0.29)
16.0	1900	0.33(0.28—0.38)	1700	0.33(0.28—0.38)	1600	0.29(0.24—0.33)
20.0	1500	0.35(0.30—0.40)	1400	0.35(0.30—0.40)	1300	0.3(0.26—0.34)

Work material	Austenitic Stainless Steel(≦200HB) AISI 304,AISI 316 etc		Gray Cast Iron(≦350MPa) No 45 B etc		Ductile Cast Iron(≦450MPa) 60-40-8 etc	
Dia. DC (mm)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)
3.2	1900	0.07(0.05—0.08)	6900	0.1(0.06—0.13)	6400	0.1(0.06—0.13)
4.0	1500	0.08(0.06—0.10)	5500	0.12(0.08—0.16)	5100	0.12(0.08—0.16)
5.0	1200	0.1(0.07—0.13)	4400	0.15(0.10—0.20)	4100	0.15(0.10—0.20)
6.3	1200	0.13(0.09—0.17)	3700	0.2(0.13—0.26)	3500	0.2(0.13—0.26)
8.0	900	0.14(0.10—0.18)	2900	0.25(0.18—0.31)	2700	0.23(0.18—0.28)
10.0	700	0.16(0.12—0.19)	2300	0.29(0.22—0.35)	2200	0.27(0.22—0.32)
12.0	600	0.18(0.15—0.20)	2100	0.33(0.28—0.37)	1900	0.31(0.28—0.34)
16.0	400	0.19(0.15—0.23)	1500	0.35(0.28—0.42)	1400	0.33(0.28—0.38)
20.0	300	0.2(0.15—0.24)	1300	0.37(0.30—0.44)	1200	0.35(0.30—0.40)

Work material	Aluminium Alloy(Si<5%) A6061, A7075		Heat resistant alloys Inconel718		Hardened Steel(40—55HRC) AISI H13, L6 etc	
Dia. DC (mm)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)
3.2	7900	0.1(0.06—0.13)	1900	0.07(0.05—0.09)	1900	0.07(0.05—0.09)
4.0	6300	0.12(0.08—0.16)	1500	0.09(0.06—0.11)	1500	0.09(0.06—0.11)
5.0	5000	0.15(0.10—0.20)	1200	0.11(0.08—0.14)	1200	0.11(0.08—0.14)
6.3	4500	0.2(0.13—0.26)	1200	0.14(0.09—0.19)	1200	0.14(0.09—0.19)
8.0	3500	0.23(0.18—0.28)	900	0.14(0.11—0.17)	900	0.14(0.11—0.17)
10.0	2800	0.27(0.22—0.32)	700	0.16(0.12—0.19)	700	0.16(0.12—0.19)
12.0	2600	0.31(0.28—0.34)	600	0.16(0.13—0.18)	600	0.16(0.13—0.18)
16.0	1900	0.33(0.28—0.38)	400	0.18(0.14—0.21)	400	0.18(0.14—0.21)
20.0	1700	0.35(0.30—0.40)	400	0.19(0.15—0.22)	400	0.19(0.15—0.22)

MWS

WSTAR Drill Series

General-purpose drills

Product Information

UWC VP 135° SIG 140° SIG 140° SIG 145° SIG X Thinning

0.5≦DC≦2 | 0.5≦DC≦2 | 2.05≦DC≦2.95 | 2.05≦DC≦2.95

TECHNICAL INFO >> 1997

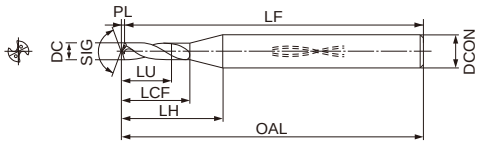
ISO13399 PROPERTY >> 1966

Work Material

P M K N S

SYMBOL DESCRIPTIONS >> 1623

DRILLS SELECTION CHART >> 1624



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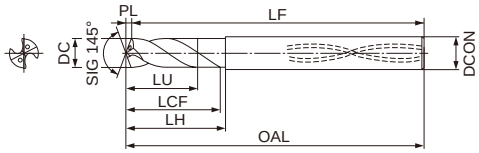

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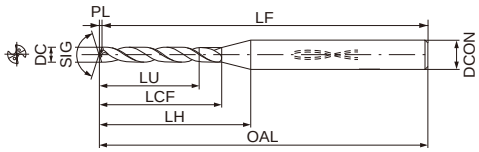

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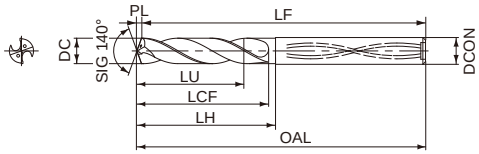

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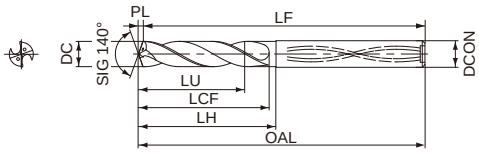

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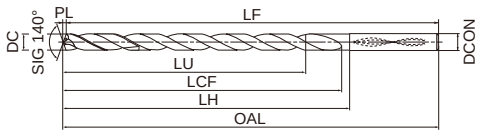


Type6

SB

	0.5≦DC<1	1≦DC<2.95
	+0.009 0	+0.014 0
h6	0 −0.006	0 −0.006

LB/XB/DB

	0.5≦DC<1	1≦DC<2.95
	0 −0.009	0 −0.014
h6	0 −0.006	0 −0.006

MB/LB/X8DB

	DC=3	3<DC≦6	6<DC≦10	10<DC≦18	18<DC≦25
	0 −0.014	0 −0.018	0 −0.022	0 −0.027	0 −0.033
h6	0 −0.006	0 −0.008	0 −0.009	0 −0.011	0 −0.013

X10DB/X15DB/X20DB/X25DB/X30DB

	DC=3	3<DC≦6	6<DC≦10	10<DC≦14
	−0.017 −0.031	−0.025 −0.043	−0.033 −0.055	−0.041 −0.068
h6	0 −0.006	0 −0.008	0 −0.009	0 −0.011

MWS

- MWS type bigger than φ5.0 have a recess in the end face.
- MWS drills are suitable for use with shrink fit holders.
- Point Anglel: Type 1 140°for drill diameter φ0.50-2.0 and 145° for φ2.05-2.95.
- Type 3 135°for drill diameter φ0.50-2.0 and 140° for φ2.05-2.95.
- To order non-stocked size of the DB Type(φ 3-φ 14, l/d>10), please provide the following.

Stock status indication:●: Inventory maintained in Japan.▲: This item to be discontinued within two years.□: Non stock, produced to order only.

Internal Coolant Unit (mm)

DC(mm)	Hole Depth(l/d)	VP15TF	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
0.50	1	▲	MWS0050SB	0.6	2.6	7.3	47.1	47	0.09	3	1
0.50	5	▲	MWS0050LB	2.6	8.1	13.1	47.1	47	0.10	3	3
0.50	12	▲	MWS0050XB	6.1	16.1	21.1	47.1	47	0.10	3	3
0.51	1	▲	MWS0051SB	0.6	2.7	7.3	47.1	47	0.09	3	1
0.51	5	▲	MWS0051LB	2.7	8.1	13.1	47.1	47	0.11	3	3
0.51	12	▲	MWS0051XB	6.2	16.1	21.1	47.1	47	0.11	3	3
0.52	1	▲	MWS0052SB	0.6	2.7	7.3	47.1	47	0.09	3	1
0.52	5	▲	MWS0052LB	2.7	8.1	13.1	47.1	47	0.11	3	3
0.52	12	▲	MWS0052XB	6.4	16.1	21.1	47.1	47	0.11	3	3
0.53	1	▲	MWS0053SB	0.6	2.7	7.3	47.1	47	0.10	3	1
0.53	5	▲	MWS0053LB	2.8	8.1	13.1	47.1	47	0.11	3	3
0.53	12	▲	MWS0053XB	6.5	16.1	21.1	47.1	47	0.11	3	3
0.54	1	▲	MWS0054SB	0.6	2.7	7.3	47.1	47	0.10	3	1
0.54	5	▲	MWS0054LB	2.8	8.1	13.1	47.1	47	0.11	3	3
0.54	12	▲	MWS0054XB	6.6	16.1	21.1	47.1	47	0.11	3	3
0.55	1	▲	MWS0055SB	0.7	2.7	7.3	47.1	47	0.10	3	1
0.55	5	▲	MWS0055LB	2.9	8.1	13.1	47.1	47	0.11	3	3
0.55	12	▲	MWS0055XB	6.7	16.1	21.1	47.1	47	0.11	3	3
0.56	1	▲	MWS0056SB	0.7	3.0	7.6	47.1	47	0.10	3	1
0.56	5	▲	MWS0056LB	2.9	8.1	13.1	47.1	47	0.12	3	3
0.56	12	▲	MWS0056XB	6.8	16.1	21.1	47.1	47	0.12	3	3
0.57	1	▲	MWS0057SB	0.7	3.0	7.5	47.1	47	0.10	3	1
0.57	5	▲	MWS0057LB	3.0	8.1	13.1	47.1	47	0.12	3	3
0.57	12	▲	MWS0057XB	7.0	16.1	21.1	47.1	47	0.12	3	3
0.58	1	▲	MWS0058SB	0.7	3.0	7.5	47.1	47	0.11	3	1
0.58	5	▲	MWS0058LB	3.0	8.1	13.1	47.1	47	0.12	3	3
0.58	12	▲	MWS0058XB	7.1	16.1	21.1	47.1	47	0.12	3	3
0.59	1	▲	MWS0059SB	0.7	3.0	7.5	47.1	47	0.11	3	1
0.59	5	▲	MWS0059LB	3.1	8.1	12.1	47.1	47	0.12	3	3
0.59	12	▲	MWS0059XB	7.2	16.1	20.1	47.1	47	0.12	3	3
0.60	1	▲	MWS0060SB	0.7	3.0	7.5	47.1	47	0.11	3	1
0.60	5	▲	MWS0060LB	3.1	8.1	12.1	47.1	47	0.12	3	3
0.60	12	▲	MWS0060XB	7.3	16.1	20.1	47.1	47	0.12	3	3
0.61	1	▲	MWS0061SB	0.7	3.2	7.7	47.1	47	0.11	3	1
0.61	5	▲	MWS0061LB	3.2	8.1	12.1	47.1	47	0.13	3	3
0.61	12	▲	MWS0061XB	7.5	16.1	20.1	47.1	47	0.13	3	3
0.62	1	▲	MWS0062SB	0.7	3.2	7.6	47.1	47	0.11	3	1
0.62	5	▲	MWS0062LB	3.2	8.1	12.1	47.1	47	0.13	3	3
0.62	12	▲	MWS0062XB	7.6	16.1	20.1	47.1	47	0.13	3	3
0.63	1	▲	MWS0063SB	0.7	3.2	7.6	47.1	47	0.11	3	1
0.63	5	▲	MWS0063LB	3.3	8.1	12.1	47.1	47	0.13	3	3
0.63	12	▲	MWS0063XB	7.7	16.1	20.1	47.1	47	0.13	3	3
0.64	1	▲	MWS0064SB	0.8	3.2	7.6	47.1	47	0.12	3	1
0.64	5	▲	MWS0064LB	3.3	8.1	12.1	47.1	47	0.13	3	3
0.64	12	▲	MWS0064XB	7.8	16.1	20.1	47.1	47	0.13	3	3
0.65	1	▲	MWS0065SB	0.8	3.2	7.6	47.1	47	0.12	3	1
0.65	5	▲	MWS0065LB	3.4	8.1	12.1	47.1	47	0.13	3	3
0.65	12	▲	MWS0065XB	7.9	16.1	20.1	47.1	47	0.13	3	3
0.66	1	▲	MWS0066SB	0.8	3.5	7.9	47.1	47	0.12	3	1
0.66	5	▲	MWS0066LB	3.4	8.1	12.1	47.1	47	0.14	3	3
0.66	12	▲	MWS0066XB	8.1	16.1	20.1	47.1	47	0.14	3	3
0.67	1	▲	MWS0067SB	0.8	3.5	7.8	47.1	47	0.12	3	1
0.67	5	▲	MWS0067LB	3.5	8.1	12.1	47.1	47	0.14	3	3
0.67	12	▲	MWS0067XB	8.2	16.1	20.1	47.1	47	0.14	3	3
0.68	1	▲	MWS0068SB	0.8	3.5	7.8	47.1	47	0.12	3	1
0.68	5	▲	MWS0068LB	3.5	8.1	12.1	47.1	47	0.14	3	3
0.68	12	▲	MWS0068XB	8.3	16.1	20.1	47.1	47	0.14	3	3
0.69	1	▲	MWS0069SB	0.8	3.5	7.8	47.1	47	0.13	3	1
0.69	5	▲	MWS0069LB	3.6	8.1	12.1	47.1	47	0.14	3	3
0.69	12	▲	MWS0069XB	8.4	16.1	20.1	47.1	47	0.14	3	3
0.70	1	▲	MWS0070SB	0.8	3.5	7.8	47.1	47	0.13	3	1
0.70	5	▲	MWS0070LB	3.6	8.1	12.1	47.1	47	0.14	3	3
0.70	12	▲	MWS0070XB	8.5	16.1	20.1	47.1	47	0.14	3	3
0.71	1	▲	MWS0071SB	0.8	3.7	8.0	50.1	50	0.13	3	1
0.71	5	▲	MWS0071LB	3.7	10.1	14.1	50.1	50	0.15	3	3
0.71	12	▲	MWS0071XB	8.7	20.1	24.1	50.1	50	0.15	3	3
0.72	1	▲	MWS0072SB	0.9	3.7	8.0	50.1	50	0.13	3	1
0.72	5	▲	MWS0072LB	3.8	10.1	14.1	50.1	50	0.15	3	3
0.72	12	▲	MWS0072XB	8.8	20.1	24.1	50.1	50	0.15	3	3
0.73	1	▲	MWS0073SB	0.9	3.7	7.9	50.1	50	0.13	3	1
0.73	5	▲	MWS0073LB	3.8	10.1	14.1	50.1	50	0.15	3	3
0.73	12	▲	MWS0073XB	8.9	20.1	24.1	50.1	50	0.15	3	3
0.74	1	▲	MWS0074SB	0.9	3.7	7.9	50.1	50	0.13	3	1
0.74	5	▲	MWS0074LB	3.9	10.1	14.1	50.1	50	0.15	3	3
0.74	12	▲	MWS0074XB	9.0	20.1	24.1	50.1	50	0.15	3	3
0.75	1	▲	MWS0075SB	0.9	3.7	7.9	50.1	50	0.14	3	1
0.75	5	▲	MWS0075LB	3.9	10.1	14.1	50.1	50	0.16	3	3
0.75	12	▲	MWS0075XB	9.2	20.1	24.1	50.1	50	0.16	3	3
0.76	1	▲	MWS0076SB	0.9	4.0	8.2	50.1	50	0.14	3	1
0.76	5	▲	MWS0076LB	4.0	10.1	14.1	50.1	50	0.16	3	3
0.76	12	▲	MWS0076XB	9.3	20.1	24.1	50.1	50	0.16	3	3
0.77	1	▲	MWS0077SB	0.9	4.0	8.2	50.1	50	0.14	3	1
0.77	5	▲	MWS0077LB	4.0	10.1	14.1	50.1	50	0.16	3	3
0.77	12	▲	MWS0077XB	9.4	20.1	24.1	50.1	50	0.16	3	3
0.78	1	▲	MWS0078SB	0.9	4.0	8.1	50.1	50	0.14	3	1
0.78	5	▲	MWS0078LB	4.1	10.1	14.1	50.1	50	0.16	3	3

MWS

DC(mm)	Hole Depth(l/d)	VP15TF	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
0.78	12	▲	MWS0078XB	9.5	20.1	24.1	50.1	50	0.16	3	3
0.79	1	▲	MWS0079SB	0.9	4.0	8.1	50.1	50	0.14	3	1
0.79	5	▲	MWS0079LB	4.1	10.1	14.1	50.1	50	0.16	3	3
0.79	12	▲	MWS0079XB	9.6	20.1	24.1	50.1	50	0.16	3	3
0.80	1	▲	MWS0080SB	1.0	4.1	8.2	50.2	50	0.15	3	1
0.80	5	▲	MWS0080LB	4.2	10.2	14.2	50.2	50	0.17	3	3
0.80	12	▲	MWS0080XB	9.8	20.2	24.2	50.2	50	0.17	3	3
0.81	1	▲	MWS0081SB	1.0	4.3	8.4	50.2	50	0.15	3	1
0.81	5	▲	MWS0081LB	4.2	10.2	14.2	50.2	50	0.17	3	3
0.81	12	▲	MWS0081XB	9.9	20.2	24.2	50.2	50	0.17	3	3
0.82	1	▲	MWS0082SB	1.0	4.3	8.4	50.2	50	0.15	3	1
0.82	5	▲	MWS0082LB	4.3	10.2	14.2	50.2	50	0.17	3	3
0.82	12	▲	MWS0082XB	10.0	20.2	24.2	50.2	50	0.17	3	3
0.83	1	▲	MWS0083SB	1.0	4.3	8.3	50.2	50	0.15	3	1
0.83	5	▲	MWS0083LB	4.3	10.2	14.2	50.2	50	0.17	3	3
0.83	12	▲	MWS0083XB	10.1	20.2	24.2	50.2	50	0.17	3	3
0.84	1	▲	MWS0084SB	1.0	4.3	8.3	50.2	50	0.15	3	1
0.84	5	▲	MWS0084LB	4.4	10.2	14.2	50.2	50	0.17	3	3
0.84	12	▲	MWS0084XB	10.3	20.2	24.2	50.2	50	0.17	3	3
0.85	1	▲	MWS0085SB	1.0	4.3	8.3	50.2	50	0.15	3	1
0.85	5	▲	MWS0085LB	4.4	10.2	14.2	50.2	50	0.18	3	3
0.85	12	▲	MWS0085XB	10.4	20.2	24.2	50.2	50	0.18	3	3
0.86	1	▲	MWS0086SB	1.0	4.6	8.6	50.2	50	0.16	3	1
0.86	5	▲	MWS0086LB	4.5	10.2	14.2	50.2	50	0.18	3	3
0.86	12	▲	MWS0086XB	10.5	20.2	24.2	50.2	50	0.18	3	3
0.87	1	▲	MWS0087SB	1.0	4.6	8.6	50.2	50	0.16	3	1
0.87	5	▲	MWS0087LB	4.5	10.2	14.2	50.2	50	0.18	3	3
0.87	12	▲	MWS0087XB	10.6	20.2	24.2	50.2	50	0.18	3	3
0.88	1	▲	MWS0088SB	1.0	4.6	8.6	50.2	50	0.16	3	1
0.88	5	▲	MWS0088LB	4.6	10.2	14.2	50.2	50	0.18	3	3
0.88	12	▲	MWS0088XB	10.7	20.2	24.2	50.2	50	0.18	3	3
0.89	1	▲	MWS0089SB	1.1	4.6	8.5	50.2	50	0.16	3	1
0.89	5	▲	MWS0089LB	4.6	10.2	14.2	50.2	50	0.18	3	3
0.89	12	▲	MWS0089XB	10.9	20.2	24.2	50.2	50	0.18	3	3
0.90	1	▲	MWS0090SB	1.1	4.6	8.5	50.2	50	0.16	3	1
0.90	5	▲	MWS0090LB	4.7	10.2	14.2	50.2	50	0.19	3	3
0.90	12	▲	MWS0090XB	11.0	20.2	24.2	50.2	50	0.19	3	3
0.91	1	▲	MWS0091SB	1.1	4.8	8.7	50.2	50	0.17	3	1
0.91	5	▲	MWS0091LB	4.7	10.2	14.2	50.2	50	0.19	3	3
0.91	12	▲	MWS0091XB	11.1	20.2	24.2	50.2	50	0.19	3	3
0.92	1	▲	MWS0092SB	1.1	4.8	8.7	50.2	50	0.17	3	1
0.92	5	▲	MWS0092LB	4.8	10.2	14.2	50.2	50	0.19	3	3
0.92	12	▲	MWS0092XB	11.2	20.2	24.2	50.2	50	0.19	3	3
0.93	1	▲	MWS0093SB	1.1	4.8	8.7	50.2	50	0.17	3	1
0.93	5	▲	MWS0093LB	4.8	10.2	14.2	50.2	50	0.19	3	3
0.93	12	▲	MWS0093XB	11.4	20.2	24.2	50.2	50	0.19	3	3
0.94	1	▲	MWS0094SB	1.1	4.8	8.6	50.2	50	0.17	3	1
0.94	5	▲	MWS0094LB	4.9	10.2	14.2	50.2	50	0.19	3	3
0.94	12	▲	MWS0094XB	11.5	20.2	24.2	50.2	50	0.19	3	3
0.95	1	▲	MWS0095SB	1.1	4.8	8.6	50.2	50	0.17	3	1
0.95	5	▲	MWS0095LB	5.0	10.2	14.2	50.2	50	0.20	3	3
0.95	12	▲	MWS0095XB	11.6	20.2	24.2	50.2	50	0.20	3	3
0.96	1	▲	MWS0096SB	1.1	5.1	8.9	50.2	50	0.17	3	1
0.96	5	▲	MWS0096LB	5.0	10.2	14.2	50.2	50	0.20	3	3
0.96	12	▲	MWS0096XB	11.7	20.2	24.2	50.2	50	0.20	3	3
0.97	1	▲	MWS0097SB	1.2	5.1	8.9	50.2	50	0.18	3	1
0.97	5	▲	MWS0097LB	5.1	10.2	14.2	50.2	50	0.20	3	3
0.97	12	▲	MWS0097XB	11.8	20.2	24.2	50.2	50	0.20	3	3
0.98	1	▲	MWS0098SB	1.2	5.1	8.9	50.2	50	0.18	3	1
0.98	5	▲	MWS0098LB	5.1	10.2	14.2	50.2	50	0.20	3	3
0.98	12	▲	MWS0098XB	12.0	20.2	24.2	50.2	50	0.20	3	3
0.99	1	▲	MWS0099SB	1.2	5.1	8.9	50.2	50	0.18	3	1
0.99	5	▲	MWS0099LB	5.2	10.2	14.2	50.2	50	0.21	3	3
0.99	12	▲	MWS0099XB	12.1	20.2	24.2	50.2	50	0.21	3	3
1.00	1	▲	MWS0100SB	1.2	5.2	8.9	55.2	55	0.2	3	1
1.00	5	▲	MWS0100LB	5.2	11.2	15.2	55.2	55	0.2	3	3
1.00	12	▲	MWS0100XB	12.2	23.2	27.2	55.2	55	0.2	3	3
1.00	20	▲	MWS0100X20DB	20.2	24.2	28.2	60.2	60	0.2	3	3
1.00	25	▲	MWS0100X25DB	25.2	28.2	32.2	66.2	66	0.2	3	3
1.00	30	▲	MWS0100X30DB	30.2	33.2	37.2	72.2	72	0.2	3	3
1.05	1	□	MWS0105SB	1.3	5.4	9.0	55.2	55	0.2	3	1
1.05	20	□	MWS0105X20DB	21.2	24.2	28.2	60.2	60	0.2	3	3
1.05	25	□	MWS0105X25DB	26.5	29.2	33.2	66.2	66	0.2	3	3
1.05	30	□	MWS0105X30DB	31.7	35.2	38.2	72.2	72	0.2	3	3
1.10	1	▲	MWS0110SB	1.3	5.6	9.1	55.2	55	0.2	3	1
1.10	5	▲	MWS0110LB	5.7	17.2	21.2	55.2	55	0.2	3	3
1.10	12	▲	MWS0110XB	13.4	23.2	27.2	55.2	55	0.2	3	3
1.10	20	▲	MWS0110X20DB	22.2	25.2	29.2	60.2	60	0.2	3	3
1.10	25	▲	MWS0110X25DB	27.7	31.2	34.2	66.2	66	0.2	3	3
1.10	30	▲	MWS0110X30DB	33.2	36.2	40.2	72.2	72	0.2	3	3
1.15	1	□	MWS0115SB	1.4	5.8	9.3	55.2	55	0.2	3	1
1.15	20	□	MWS0115X20DB	23.2	26.2	30.2	60.2	60	0.2	3	3
1.15	25	□	MWS0115X25DB	29.0	32.2	36.2	66.2	66	0.2	3	3
1.15	30	□	MWS0115X30DB	34.7	38.2	41.2	72.2	72	0.2	3	3
1.20	1	▲	MWS0120SB	1.4	6.2	9.6	55.2	55	0.2	3	1
1.20	5	▲	MWS0120LB	6.3	17.2	20.2	55.2	55	0.2	3	3
1.20	12	▲	MWS0120XB	14.7	23.2	26.2	55.2	55	0.2	3	3
1.20	20	▲	MWS0120X20DB	24.3	28.2	31.2	60.2	60	0.2	3	3
1.20	25	▲	MWS0120X25DB	30.3	34.2	37.2	66.2	66	0.2	3	3
1.20	30	▲	MWS0120X30DB	36.3	40.2	43.2	72.2	72	0.2	3	3
1.25	1	□	MWS0125SB	1.5	6.4	9.7	55.2	55	0.2	3	1
1.25	20	□	MWS0125X20DB	25.3	29.3	32.3	68.3	68	0.3	3	3
1.25	25	□	MWS0125X25DB	31.6	35.3	38.3	74.3	74	0.3	3	3
1.25	30	□	MWS0125X30DB	37.8	41.3	45.3	82.3	82	0.3	3	3
1.30	1	▲	MWS0130SB	1.5	6.6	9.8	55.2	55	0.2	3	1
1.30	5	▲	MWS0130LB	6.8	17.3	20.3	55.3	55	0.3	3	3
1.30	12	▲	MWS0130XB	15.9	23.3	26.3	55.3	55	0.3	3	3
1.30	20	▲	MWS0130X20DB	26.3	30.3	33.3	68.3	68	0.3	3	3
1.30	25	▲	MWS0130X25DB	32.8	36.3	40.3	74.3	74	0.3	3	3
1.30	30	▲	MWS0130X30DB	39.3	43.3	46.3	82.3	82	0.3	3	3
1.35	1	□	MWS0135SB	1.7	6.8	9.9	55.2	55	0.3	3	1
1.35	20	□	MWS0135X20DB	27.3	31.3	34.3	68.3	68	0.3	3	3
1.35	25	□	MWS0135X25DB	34.1	38.3	41.3	74.3	74	0.3	3	3
1.35	30	□	MWS0135X30DB	40.8	45.3	48.3	82.3	82	0.3	3	3
1.40	1	▲	MWS0140SB	1.7	7.3	10.3	55.3	55	0.3	3	1
1.40	5	▲	MWS0140LB	7.3	17.3	20.3	55.3	55	0.3	3	3
1.40	12	▲	MWS0140XB	17.1	23.3	26.3	55.3	55	0.3	3	3
1.40	20	▲	MWS0140X20DB	28.3	32.3	35.3	68.3	68	0.3	3	3

MWS

DC(mm)	Hole Depth(l/d)	VP15TF	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
1.40	25	▲	MWS0140X25DB	35.3	39.3	42.3	74.3	74	0.3	3	3
1.40	30	▲	MWS0140X30DB	42.3	46.3	49.3	82.3	82	0.3	3	3
1.45	1	□	MWS0145SB	1.8	7.5	10.4	55.3	55	0.3	3	1
1.45	20	□	MWS0145X20DB	29.3	33.3	36.3	68.3	68	0.3	3	3
1.45	25	□	MWS0145X25DB	36.6	41.3	43.3	74.3	74	0.3	3	3
1.45	30	□	MWS0145X30DB	43.8	48.3	51.3	82.3	82	0.3	3	3
1.50	1	▲	MWS0150SB	1.8	7.7	10.5	55.3	55	0.3	3	1
1.50	5	▲	MWS0150LB	7.8	17.3	20.3	55.3	55	0.3	3	3
1.50	12	▲	MWS0150XB	18.3	23.3	26.3	55.3	55	0.3	3	3
1.50	20	▲	MWS0150X20DB	30.3	35.3	37.3	68.3	68	0.3	3	3
1.50	25	▲	MWS0150X25DB	37.8	42.3	45.3	74.3	74	0.3	3	3
1.50	30	▲	MWS0150X30DB	45.3	50.3	52.3	82.3	82	0.3	3	3
1.55	1	□	MWS0155SB	1.9	7.9	10.6	68.3	68	0.3	3	1
1.55	20	□	MWS0155X20DB	31.3	36.3	38.3	78.3	78	0.3	3	3
1.55	25	□	MWS0155X25DB	39.1	43.3	46.3	86.3	86	0.3	3	3
1.55	30	□	MWS0155X30DB	46.8	51.3	54.3	95.3	95	0.3	3	3
1.60	1	▲	MWS0160SB	1.9	8.3	10.9	68.3	68	0.3	3	1
1.60	5	▲	MWS0160LB	8.3	22.3	25.3	68.3	68	0.3	3	3
1.60	12	▲	MWS0160XB	19.5	30.3	33.3	68.3	68	0.3	3	3
1.60	20	▲	MWS0160X20DB	32.3	37.3	39.3	78.3	78	0.3	3	3
1.60	25	▲	MWS0160X25DB	40.3	45.3	47.3	86.3	86	0.3	3	3
1.60	30	▲	MWS0160X30DB	48.3	53.3	55.3	95.3	95	0.3	3	3
1.65	1	□	MWS0165SB	2.0	8.5	11.0	68.3	68	0.3	3	1
1.65	20	□	MWS0165X20DB	33.3	38.3	40.3	78.3	78	0.3	3	3
1.65	25	□	MWS0165X25DB	41.6	46.3	49.3	86.3	86	0.3	3	3
1.65	30	□	MWS0165X30DB	49.8	54.3	57.3	95.3	95	0.3	3	3
1.70	1	▲	MWS0170SB	2.0	8.7	11.1	68.3	68	0.3	3	1
1.70	5	▲	MWS0170LB	8.9	22.4	24.4	68.4	68	0.4	3	3
1.70	12	▲	MWS0170XB	20.8	30.4	32.4	68.4	68	0.4	3	3
1.70	20	▲	MWS0170X20DB	34.4	39.4	42.4	78.4	78	0.4	3	3
1.70	25	▲	MWS0170X25DB	42.9	48.4	50.4	86.4	86	0.4	3	3
1.70	30	▲	MWS0170X30DB	51.4	56.4	59.4	95.4	95	0.4	3	3
1.75	1	□	MWS0175SB	2.1	8.9	11.2	68.3	68	0.3	3	1
1.75	20	□	MWS0175X20DB	35.4	40.4	43.4	84.4	84	0.4	3	3
1.75	25	□	MWS0175X25DB	44.2	49.4	51.4	94.4	94	0.4	3	3
1.75	30	□	MWS0175X30DB	52.9	58.4	60.4	102.4	102	0.4	3	3
1.80	1	▲	MWS0180SB	2.1	9.3	11.5	68.3	68	0.3	3	1
1.80	5	▲	MWS0180LB	9.4	22.4	24.4	68.4	68	0.4	3	3
1.80	12	▲	MWS0180XB	22.0	30.4	32.4	68.4	68	0.4	3	3
1.80	20	▲	MWS0180X20DB	36.4	41.4	44.4	84.4	84	0.4	3	3
1.80	25	▲	MWS0180X25DB	45.4	50.4	53.4	94.4	94	0.4	3	3
1.80	30	▲	MWS0180X30DB	54.4	59.4	62.4	102.4	102	0.4	3	3
1.85	1	□	MWS0185SB	2.2	9.5	11.6	68.3	68	0.3	3	1
1.85	20	□	MWS0185X20DB	37.4	43.4	45.4	84.4	84	0.4	3	3
1.85	25	□	MWS0185X25DB	46.7	52.4	54.4	94.4	94	0.4	3	3
1.85	30	□	MWS0185X30DB	55.9	61.4	63.4	102.4	102	0.4	3	3
1.90	1	▲	MWS0190SB	2.3	9.7	11.8	68.3	68	0.3	3	1
1.90	5	▲	MWS0190LB	9.9	22.4	24.4	68.4	68	0.4	3	3
1.90	12	▲	MWS0190XB	23.2	30.4	32.4	68.4	68	0.4	3	3
1.90	20	▲	MWS0190X20DB	38.4	44.4	46.4	84.4	84	0.4	3	3
1.90	25	▲	MWS0190X25DB	47.9	53.4	55.4	94.4	94	0.4	3	3
1.90	30	▲	MWS0190X30DB	57.4	63.4	65.4	102.4	102	0.4	3	3
1.95	1	□	MWS0195SB	2.4	10.0	12.0	68.4	68	0.4	3	1
1.95	20	□	MWS0195X20DB	39.4	45.4	47.4	84.4	84	0.4	3	3
1.95	25	□	MWS0195X25DB	49.2	55.4	57.4	94.4	94	0.4	3	3
1.95	30	□	MWS0195X30DB	58.9	64.4	66.4	102.4	102	0.4	3	3
2.00	1	▲	MWS0200SB	2.4	10.4	12.3	68.4	68	0.4	3	1
2.00	5	▲	MWS0200LB	10.4	22.4	24.4	68.4	68	0.4	3	3
2.00	12	▲	MWS0200XB	24.4	30.4	32.4	68.4	68	0.4	3	3
2.00	20	▲	MWS0200X20DB	40.4	46.4	48.4	84.4	84	0.4	3	3
2.00	25	▲	MWS0200X25DB	50.4	56.4	58.4	94.4	94	0.4	3	3
2.00	30	▲	MWS0200X30DB	60.4	66.4	68.4	102.4	102	0.4	3	3
2.05	1	□	MWS0205SB	2.4	10.5	12.3	74.3	74	0.3	3	1
2.05	20	□	MWS0205X20DB	41.4	47.4	49.4	94.4	94	0.4	3	3
2.05	25	□	MWS0205X25DB	51.7	57.4	59.4	107.4	107	0.4	3	3
2.05	30	□	MWS0205X30DB	61.9	68.4	69.4	118.4	118	0.4	3	3
2.10	1	▲	MWS0210SB	2.4	10.7	12.4	74.3	74	0.3	3	1
2.10	5	▲	MWS0210LB	10.9	28.4	30.4	74.4	74	0.4	3	3
2.10	12	▲	MWS0210XB	25.6	38.4	40.4	74.4	74	0.4	3	3
2.10	20	▲	MWS0210X20DB	42.4	48.4	50.4	94.4	94	0.4	3	3
2.10	25	▲	MWS0210X25DB	52.9	59.4	60.4	107.4	107	0.4	3	3
2.10	30	▲	MWS0210X30DB	63.4	69.4	71.4	118.4	118	0.4	3	3
2.15	1	□	MWS0215SB	2.5	10.9	12.5	74.3	74	0.3	3	1
2.15	20	□	MWS0215X20DB	43.4	49.4	51.4	94.4	94	0.4	3	3
2.15	25	□	MWS0215X25DB	54.2	60.4	62.4	107.4	107	0.4	3	3
2.15	30	□	MWS0215X30DB	64.9	71.4	73.4	118.4	118	0.4	3	3
2.20	1	▲	MWS0220SB	2.6	11.3	12.8	74.3	74	0.3	3	1
2.20	5	▲	MWS0220LB	11.4	28.4	29.4	74.4	74	0.4	3	3
2.20	12	▲	MWS0220XB	26.8	38.4	39.4	74.4	74	0.4	3	3
2.20	20	▲	MWS0220X20DB	44.4	51.4	52.4	94.4	94	0.4	3	3
2.20	25	▲	MWS0220X25DB	55.4	62.4	63.4	107.4	107	0.4	3	3
2.20	30	▲	MWS0220X30DB	66.4	73.4	74.4	118.4	118	0.4	3	3
2.25	1	□	MWS0225SB	2.7	11.6	13.0	74.4	74	0.4	3	1
2.25	20	□	MWS0225X20DB	45.4	52.4	53.4	94.4	94	0.4	3	3
2.25	25	□	MWS0225X25DB	56.7	63.4	64.4	107.4	107	0.4	3	3
2.25	30	□	MWS0225X30DB	67.9	74.4	76.4	118.4	118	0.4	3	3
2.30	1	▲	MWS0230SB	2.7	11.8	13.1	74.4	74	0.4	3	1
2.30	5	▲	MWS0230LB	11.9	28.4	29.4	74.4	74	0.4	3	3
2.30	12	▲	MWS0230XB	28.0	38.4	39.4	74.4	74	0.4	3	3
2.30	20	▲	MWS0230X20DB	46.4	53.4	54.4	94.4	94	0.4	3	3
2.30	25	▲	MWS0230X25DB	57.9	64.4	66.4	107.4	107	0.4	3	3
2.30	30	▲	MWS0230X30DB	69.4	76.4	77.4	118.4	118	0.4	3	3
2.35	1	□	MWS0235SB	2.8	12.0	13.2	74.4	74	0.4	3	1
2.35	20	□	MWS0235X20DB	47.4	54.4	55.4	94.4	94	0.4	3	3
2.35	25	□	MWS0235X25DB	59.2	66.4	67.4	107.4	107	0.4	3	3
2.35	30	□	MWS0235X30DB	70.9	78.4	79.4	118.4	118	0.4	3	3
2.40	1	▲	MWS0240SB	2.8	12.4	13.5	74.4	74	0.4	3	1
2.40	5	▲	MWS0240LB	12.4	28.4	29.4	74.4	74	0.4	3	3
2.40	12	▲	MWS0240XB	29.2	38.4	39.4	74.4	74	0.4	3	3
2.40	20	▲	MWS0240X20DB	48.4	55.4	56.4	94.4	94	0.4	3	3
2.40	25	▲	MWS0240X25DB	60.4	67.4	68.4	107.4	107	0.4	3	3
2.40	30	▲	MWS0240X30DB	72.4	79.4	80.4	118.4	118	0.4	3	3
2.45	1	□	MWS0245SB	2.9	12.6	13.6	74.4	74	0.4	3	1
2.45	20	□	MWS0245X20DB	49.5	56.4	57.4	94.4	94	0.4	3	3
2.45	25	□	MWS0245X25DB	61.8	69.4	70.4	107.4	107	0.4	3	3
2.45	30	□	MWS0245X30DB	74.0	81.4	82.4	118.4	118	0.4	3	3
2.50	1	▲	MWS0250SB	2.9	12.8	13.7	74.4	74	0.4	3	1
2.50	5	▲	MWS0250LB	13.0	28.5	29.5	74.5	74	0.5	3	3

MWS

DC(mm)	Hole Depth(l/d)	VP15TF	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
2.50	12	▲	MWS0250XB	30.5	38.5	39.5	74.5	74	0.5	3	3
2.50	20	▲	MWS0250X20DB	50.5	58.5	59.5	94.5	94	0.5	3	3
2.50	25	▲	MWS0250X25DB	63.0	70.5	71.5	107.5	107	0.5	3	3
2.50	30	▲	MWS0250X30DB	75.5	83.5	84.5	118.5	118	0.5	3	3
2.55	1	□	MWS0255SB	3.1	13.0	13.0	81.4	81	0.4	3	2
2.55	20	□	MWS0255X20DB	51.5	59.5	59.5	103.5	103	0.5	3	4
2.55	25	□	MWS0255X25DB	64.3	71.5	71.5	117.5	117	0.5	3	4
2.55	30	□	MWS0255X30DB	77.0	84.5	84.5	132.5	132	0.5	3	4
2.60	1	▲	MWS0260SB	3.1	13.4	13.4	81.4	81	0.4	3	2
2.60	5	▲	MWS0260LB	13.5	33.5	33.5	81.5	81	0.5	3	4
2.60	12	▲	MWS0260XB	31.7	45.5	45.5	81.5	81	0.5	3	4
2.60	20	▲	MWS0260X20DB	52.5	60.5	60.5	103.5	103	0.5	3	4
2.60	25	▲	MWS0260X25DB	65.5	73.5	73.5	117.5	117	0.5	3	4
2.60	30	▲	MWS0260X30DB	78.5	86.5	86.5	132.5	132	0.5	3	4
2.65	1	□	MWS0265SB	3.2	13.6	13.6	81.4	81	0.4	3	2
2.65	20	□	MWS0265X20DB	53.5	61.5	61.5	103.5	103	0.5	3	4
2.65	25	□	MWS0265X25DB	66.8	74.5	74.5	117.5	117	0.5	3	4
2.65	30	□	MWS0265X30DB	80.0	87.5	87.5	132.5	132	0.5	3	4
2.70	1	▲	MWS0270SB	3.2	13.8	13.8	81.4	81	0.4	3	2
2.70	5	▲	MWS0270LB	14.0	33.5	33.5	81.5	81	0.5	3	4
2.70	12	▲	MWS0270XB	32.9	45.5	45.5	81.5	81	0.5	3	4
2.70	20	▲	MWS0270X20DB	54.5	62.5	62.5	103.5	103	0.5	3	4
2.70	25	▲	MWS0270X25DB	68.0	76.5	76.5	117.5	117	0.5	3	4
2.70	30	▲	MWS0270X30DB	81.5	89.5	89.5	132.5	132	0.5	3	4
2.75	1	□	MWS0275SB	3.3	14.0	14.0	81.4	81	0.4	3	2
2.75	20	□	MWS0275X20DB	55.5	63.5	63.5	103.5	103	0.5	3	4
2.75	25	□	MWS0275X25DB	69.3	77.5	77.5	117.5	117	0.5	3	4
2.75	30	□	MWS0275X30DB	83.0	91.5	91.5	132.5	132	0.5	3	4
2.80	1	▲	MWS0280SB	3.3	14.4	14.4	81.4	81	0.4	3	2
2.80	5	▲	MWS0280LB	14.5	33.5	33.5	81.5	81	0.5	3	4
2.80	12	▲	MWS0280XB	34.1	45.5	45.5	81.5	81	0.5	3	4
2.80	20	▲	MWS0280X20DB	56.5	64.5	64.5	103.5	103	0.5	3	4
2.80	25	▲	MWS0280X25DB	70.5	78.5	78.5	117.5	117	0.5	3	4
2.80	30	▲	MWS0280X30DB	84.5	92.5	92.5	132.5	132	0.5	3	4
2.85	1	□	MWS0285SB	3.4	14.6	14.6	81.4	81	0.4	3	2
2.85	20	□	MWS0285X20DB	57.5	66.5	66.5	103.5	103	0.5	3	4
2.85	25	□	MWS0285X25DB	71.8	80.5	80.5	117.5	117	0.5	3	4
2.85	30	□	MWS0285X30DB	86.0	94.5	94.5	132.5	132	0.5	3	4
2.90	1	▲	MWS0290SB	3.4	14.9	14.9	81.5	81	0.5	3	2
2.90	5	▲	MWS0290LB	15.0	33.5	33.5	81.5	81	0.5	3	4
2.90	12	▲	MWS0290XB	35.3	45.5	45.5	81.5	81	0.5	3	4
2.90	20	▲	MWS0290X20DB	58.5	67.5	67.5	103.5	103	0.5	3	4
2.90	25	▲	MWS0290X25DB	73.0	81.5	81.5	117.5	117	0.5	3	4
2.90	30	▲	MWS0290X30DB	87.5	96.5	96.5	132.5	132	0.5	3	4
2.95	1	□	MWS0295SB	3.5	15.1	15.1	81.5	81	0.5	3	2
2.95	20	□	MWS0295X20DB	59.5	68.5	68.5	103.5	103	0.5	3	4
2.95	25	□	MWS0295X25DB	74.3	83.5	83.5	117.5	117	0.5	3	4
2.95	30	□	MWS0295X30DB	89.0	97.5	97.5	132.5	132	0.5	3	4
3.00	3	▲	MWS0300MB	9.5	24.5	24.5	72.5	72	0.5	3	5
3.00	5	▲	MWS0300LB	15.5	33.5	33.5	81.5	81	0.5	3	5
3.00	8	▲	MWS0300X8DB	24.5	35.5	35.5	81.5	81	0.5	3	5
3.00	10	▲	MWS0300X10DB	30.5	39.5	42.5	90.5	90	0.5	3	6
3.00	15	▲	MWS0300X15DB	45.5	54.5	57.5	105.5	105	0.5	3	6
3.00	20	▲	MWS0300X20DB	60.5	69.5	72.5	120.5	120	0.5	3	6

DC(mm)	Hole Depth(l/d)	VP15TF	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
3.00	25	▲	MWS0300X25DB	75.5	84.5	87.5	135.5	135	0.5	3	6
3.00	30	▲	MWS0300X30DB	90.5	99.5	102.5	150.5	150	0.5	3	6
3.10	3	▲	MWS0310MB	9.9	28.6	28.6	76.6	76	0.6	4	5
3.10	5	▲	MWS0310LB	16.1	39.6	39.6	87.6	87	0.6	4	5
3.10	8	▲	MWS0310X8DB	25.4	41.6	41.6	87.6	87	0.6	4	5
3.10	10	▲	MWS0310X10DB	31.6	46.6	49.6	97.6	97	0.6	4	6
3.10	15	▲	MWS0310X15DB	47.1	63.6	66.6	114.6	114	0.6	4	6
3.10	20	▲	MWS0310X20DB	62.6	81.6	84.6	132.6	132	0.6	4	6
3.10	25	▲	MWS0310X25DB	78.1	98.6	101.6	149.6	149	0.6	4	6
3.10	30	▲	MWS0310X30DB	93.6	116.6	119.6	167.6	167	0.6	4	6
3.20	3	▲	MWS0320MB	10.2	28.6	28.6	76.6	76	0.6	4	5
3.20	5	▲	MWS0320LB	16.6	39.6	39.6	87.6	87	0.6	4	5
3.20	8	▲	MWS0320X8DB	26.2	41.6	41.6	87.6	87	0.6	4	5
3.20	10	▲	MWS0320X10DB	32.6	46.6	49.6	97.6	97	0.6	4	6
3.20	15	▲	MWS0320X15DB	48.6	63.6	66.6	114.6	114	0.6	4	6
3.20	20	▲	MWS0320X20DB	64.6	81.6	84.6	132.6	132	0.6	4	6
3.20	25	▲	MWS0320X25DB	80.6	98.6	101.6	149.6	149	0.6	4	6
3.20	30	▲	MWS0320X30DB	96.6	116.6	119.6	167.6	167	0.6	4	6
3.30	3	▲	MWS0330MB	10.5	28.6	28.6	76.6	76	0.6	4	5
3.30	5	▲	MWS0330LB	17.1	39.6	39.6	87.6	87	0.6	4	5
3.30	8	▲	MWS0330X8DB	27.0	41.6	41.6	87.6	87	0.6	4	5
3.30	10	▲	MWS0330X10DB	33.6	46.6	49.6	97.6	97	0.6	4	6
3.30	15	▲	MWS0330X15DB	50.1	63.6	66.6	114.6	114	0.6	4	6
3.30	20	▲	MWS0330X20DB	66.6	81.6	84.6	132.6	132	0.6	4	6
3.30	25	▲	MWS0330X25DB	83.1	98.6	101.6	149.6	149	0.6	4	6
3.30	30	▲	MWS0330X30DB	99.6	116.6	119.6	167.6	167	0.6	4	6
3.40	3	▲	MWS0340MB	10.8	28.6	28.6	76.6	76	0.6	4	5
3.40	5	▲	MWS0340LB	17.6	39.6	39.6	87.6	87	0.6	4	5
3.40	8	▲	MWS0340X8DB	27.8	41.6	41.6	87.6	87	0.6	4	5
3.40	10	▲	MWS0340X10DB	34.6	46.6	49.6	97.6	97	0.6	4	6
3.40	15	▲	MWS0340X15DB	51.6	63.6	66.6	114.6	114	0.6	4	6
3.40	20	▲	MWS0340X20DB	68.6	81.6	84.6	132.6	132	0.6	4	6
3.40	25	▲	MWS0340X25DB	85.6	98.6	101.6	149.6	149	0.6	4	6
3.40	30	▲	MWS0340X30DB	102.6	116.6	119.6	167.6	167	0.6	4	6
3.50	3	▲	MWS0350MB	11.1	28.6	28.6	76.6	76	0.6	4	5
3.50	5	▲	MWS0350LB	18.1	39.6	39.6	87.6	87	0.6	4	5
3.50	8	▲	MWS0350X8DB	28.6	41.6	41.6	87.6	87	0.6	4	5
3.50	10	▲	MWS0350X10DB	35.6	46.6	49.6	97.6	97	0.6	4	6
3.50	15	▲	MWS0350X15DB	53.1	63.6	66.6	114.6	114	0.6	4	6
3.50	20	▲	MWS0350X20DB	70.6	81.6	84.6	132.6	132	0.6	4	6
3.50	25	▲	MWS0350X25DB	88.1	98.6	101.6	149.6	149	0.6	4	6
3.50	30	▲	MWS0350X30DB	105.6	116.6	119.6	167.6	167	0.6	4	6
3.6	3	▲	MWS0360MB	11.5	32.7	32.7	80.7	80	0.7	4	5
3.6	5	▲	MWS0360LB	18.7	44.7	44.7	92.7	92	0.7	4	5
3.6	8	▲	MWS0360X8DB	29.5	46.7	46.7	92.7	92	0.7	4	5
3.6	10	▲	MWS0360X10DB	36.7	52.7	55.7	103.7	103	0.7	4	6
3.6	15	▲	MWS0360X15DB	54.7	72.7	75.7	123.7	123	0.7	4	6
3.6	20	▲	MWS0360X20DB	72.7	92.7	95.7	143.7	143	0.7	4	6
3.6	25	▲	MWS0360X25DB	90.7	112.7	115.7	163.7	163	0.7	4	6
3.6	30	▲	MWS0360X30DB	108.7	132.7	135.7	183.7	183	0.7	4	6
3.7	3	▲	MWS0370MB	11.8	32.7	32.7	80.7	80	0.7	4	5
3.7	5	▲	MWS0370LB	19.2	44.7	44.7	92.7	92	0.7	4	5
3.7	8	▲	MWS0370X8DB	30.3	46.7	46.7	92.7	92	0.7	4	5
3.7	10	▲	MWS0370X10DB	37.7	52.7	55.7	103.7	103	0.7	4	6

MWS

DC(mm)	Hole Depth(l/d)	VP15TF	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
3.7	15	▲	MWS0370X15DB	56.2	72.7	75.7	123.7	123	0.7	4	6
3.7	20	▲	MWS0370X20DB	74.7	92.7	95.7	143.7	143	0.7	4	6
3.7	25	▲	MWS0370X25DB	93.2	112.7	115.7	163.7	163	0.7	4	6
3.7	30	▲	MWS0370X30DB	111.7	132.7	135.7	183.7	183	0.7	4	6
3.8	3	▲	MWS0380MB	12.1	32.7	32.7	80.7	80	0.7	4	5
3.8	5	▲	MWS0380LB	19.7	44.7	44.7	92.7	92	0.7	4	5
3.8	8	▲	MWS0380X8DB	31.1	46.7	46.7	92.7	92	0.7	4	5
3.8	10	▲	MWS0380X10DB	38.7	52.7	55.7	103.7	103	0.7	4	6
3.8	15	▲	MWS0380X15DB	57.7	72.7	75.7	123.7	123	0.7	4	6
3.8	20	▲	MWS0380X20DB	76.7	92.7	95.7	143.7	143	0.7	4	6
3.8	25	▲	MWS0380X25DB	95.7	112.7	115.7	163.7	163	0.7	4	6
3.8	30	▲	MWS0380X30DB	114.7	132.7	135.7	183.7	183	0.7	4	6
3.9	3	▲	MWS0390MB	12.4	32.7	32.7	80.7	80	0.7	4	5
3.9	5	▲	MWS0390LB	20.2	44.7	44.7	92.7	92	0.7	4	5
3.9	8	▲	MWS0390X8DB	31.9	46.7	46.7	92.7	92	0.7	4	5
3.9	10	▲	MWS0390X10DB	39.7	52.7	55.7	103.7	103	0.7	4	6
3.9	15	▲	MWS0390X15DB	59.2	72.7	75.7	123.7	123	0.7	4	6
3.9	20	▲	MWS0390X20DB	78.7	92.7	95.7	143.7	143	0.7	4	6
3.9	25	▲	MWS0390X25DB	98.2	112.7	115.7	163.7	163	0.7	4	6
3.9	30	▲	MWS0390X30DB	117.7	132.7	135.7	183.7	183	0.7	4	6
4.0	3	▲	MWS0400MB	12.7	32.7	32.7	80.7	80	0.7	4	5
4.0	5	▲	MWS0400LB	20.7	44.7	44.7	92.7	92	0.7	4	5
4.0	8	▲	MWS0400X8DB	32.7	46.7	46.7	92.7	92	0.7	4	5
4.0	10	▲	MWS0400X10DB	40.7	52.7	55.7	103.7	103	0.7	4	6
4.0	15	▲	MWS0400X15DB	60.7	72.7	75.7	123.7	123	0.7	4	6
4.0	20	▲	MWS0400X20DB	80.7	92.7	95.7	143.7	143	0.7	4	6
4.0	25	▲	MWS0400X25DB	100.7	112.7	115.7	163.7	163	0.7	4	6
4.0	30	▲	MWS0400X30DB	120.7	132.7	135.7	183.7	183	0.7	4	6
4.1	3	▲	MWS0410MB	13.0	36.7	36.7	86.7	86	0.7	5	5
4.1	5	▲	MWS0410LB	21.2	50.7	50.7	100.7	100	0.7	5	5
4.1	8	▲	MWS0410X8DB	33.5	52.7	52.7	100.7	100	0.7	5	5
4.1	10	▲	MWS0410X10DB	41.7	59.7	62.7	112.7	112	0.7	5	6
4.1	15	▲	MWS0410X15DB	62.2	81.7	84.7	134.7	134	0.7	5	6
4.1	20	▲	MWS0410X20DB	82.7	104.7	107.7	157.7	157	0.7	5	6
4.1	25	▲	MWS0410X25DB	103.2	126.7	129.7	179.7	179	0.7	5	6
4.1	30	▲	MWS0410X30DB	123.7	149.7	152.7	202.7	202	0.7	5	6
4.2	3	▲	MWS0420MB	13.4	36.8	36.8	86.8	86	0.8	5	5
4.2	5	▲	MWS0420LB	21.8	50.8	50.8	100.8	100	0.8	5	5
4.2	8	▲	MWS0420X8DB	34.4	52.8	52.8	100.8	100	0.8	5	5
4.2	10	▲	MWS0420X10DB	42.8	59.8	62.8	112.8	112	0.8	5	6
4.2	15	▲	MWS0420X15DB	63.8	81.8	84.8	134.8	134	0.8	5	6
4.2	20	▲	MWS0420X20DB	84.8	104.8	107.8	157.8	157	0.8	5	6
4.2	25	▲	MWS0420X25DB	105.8	126.8	129.8	179.8	179	0.8	5	6
4.2	30	▲	MWS0420X30DB	126.8	149.8	152.8	202.8	202	0.8	5	6
4.3	3	▲	MWS0430MB	13.7	36.8	36.8	86.8	86	0.8	5	5
4.3	5	▲	MWS0430LB	22.3	50.8	50.8	100.8	100	0.8	5	5
4.3	8	▲	MWS0430X8DB	35.2	52.8	52.8	100.8	100	0.8	5	5
4.3	10	▲	MWS0430X10DB	43.8	59.8	62.8	112.8	112	0.8	5	6
4.3	15	▲	MWS0430X15DB	65.3	81.8	84.8	134.8	134	0.8	5	6
4.3	20	▲	MWS0430X20DB	86.8	104.8	107.8	157.8	157	0.8	5	6
4.3	25	▲	MWS0430X25DB	108.3	126.8	129.8	179.8	179	0.8	5	6
4.3	30	▲	MWS0430X30DB	129.8	149.8	152.8	202.8	202	0.8	5	6
4.4	3	▲	MWS0440MB	14.0	36.8	36.8	86.8	86	0.8	5	5
4.4	5	▲	MWS0440LB	22.8	50.8	50.8	100.8	100	0.8	5	5
4.4	8	▲	MWS0440X8DB	36.0	52.8	52.8	100.8	100	0.8	5	5
4.4	10	▲	MWS0440X10DB	44.8	59.8	62.8	112.8	112	0.8	5	6
4.4	15	▲	MWS0440X15DB	66.8	81.8	84.8	134.8	134	0.8	5	6
4.4	20	▲	MWS0440X20DB	88.8	104.8	107.8	157.8	157	0.8	5	6
4.4	25	▲	MWS0440X25DB	110.8	126.8	129.8	179.8	179	0.8	5	6
4.4	30	▲	MWS0440X30DB	132.8	149.8	152.8	202.8	202	0.8	5	6
4.5	3	▲	MWS0450MB	14.3	36.8	36.8	86.8	86	0.8	5	5
4.5	5	▲	MWS0450LB	23.3	50.8	50.8	100.8	100	0.8	5	5
4.5	8	▲	MWS0450X8DB	36.8	52.8	52.8	100.8	100	0.8	5	5
4.5	10	▲	MWS0450X10DB	45.8	59.8	62.8	112.8	112	0.8	5	6
4.5	15	▲	MWS0450X15DB	68.3	81.8	84.8	134.8	134	0.8	5	6
4.5	20	▲	MWS0450X20DB	90.8	104.8	107.8	157.8	157	0.8	5	6
4.5	25	▲	MWS0450X25DB	113.3	126.8	129.8	179.8	179	0.8	5	6
4.5	30	▲	MWS0450X30DB	135.8	149.8	152.8	202.8	202	0.8	5	6
4.6	3	▲	MWS0460MB	14.6	40.8	40.8	90.8	90	0.8	5	5
4.6	5	▲	MWS0460LB	23.8	55.8	55.8	105.8	105	0.8	5	5
4.6	8	▲	MWS0460X8DB	37.6	57.8	57.8	105.8	105	0.8	5	5
4.6	10	▲	MWS0460X10DB	46.8	65.8	68.8	118.8	118	0.8	5	6
4.6	15	▲	MWS0460X15DB	69.8	90.8	93.8	143.8	143	0.8	5	6
4.6	20	▲	MWS0460X20DB	92.8	115.8	118.8	168.8	168	0.8	5	6
4.6	25	▲	MWS0460X25DB	115.8	140.8	143.8	193.8	193	0.8	5	6
4.6	30	▲	MWS0460X30DB	138.8	165.8	168.8	218.8	218	0.8	5	6
4.7	3	▲	MWS0470MB	15.0	40.9	40.9	90.9	90	0.9	5	5
4.7	5	▲	MWS0470LB	24.4	55.9	55.9	105.9	105	0.9	5	5
4.7	8	▲	MWS0470X8DB	38.5	57.9	57.9	105.9	105	0.9	5	5
4.7	10	▲	MWS0470X10DB	47.9	65.9	68.9	118.9	118	0.9	5	6
4.7	15	▲	MWS0470X15DB	71.4	90.9	93.9	143.9	143	0.9	5	6
4.7	20	▲	MWS0470X20DB	94.9	115.9	118.9	168.9	168	0.9	5	6
4.7	25	▲	MWS0470X25DB	118.4	140.9	143.9	193.9	193	0.9	5	6
4.7	30	▲	MWS0470X30DB	141.9	165.9	168.9	218.9	218	0.9	5	6
4.8	3	▲	MWS0480MB	15.3	40.9	40.9	90.9	90	0.9	5	5
4.8	5	▲	MWS0480LB	24.9	55.9	55.9	105.9	105	0.9	5	5
4.8	8	▲	MWS0480X8DB	39.3	57.9	57.9	105.9	105	0.9	5	5
4.8	10	▲	MWS0480X10DB	48.9	65.9	68.9	118.9	118	0.9	5	6
4.8	15	▲	MWS0480X15DB	72.9	90.9	93.9	143.9	143	0.9	5	6
4.8	20	▲	MWS0480X20DB	96.9	115.9	118.9	168.9	168	0.9	5	6
4.8	25	▲	MWS0480X25DB	120.9	140.9	143.9	193.9	193	0.9	5	6
4.8	30	▲	MWS0480X30DB	144.9	165.9	168.9	218.9	218	0.9	5	6
4.9	3	▲	MWS0490MB	15.6	40.9	40.9	90.9	90	0.9	5	5
4.9	5	▲	MWS0490LB	25.4	55.9	55.9	105.9	105	0.9	5	5
4.9	8	▲	MWS0490X8DB	40.1	57.9	57.9	105.9	105	0.9	5	5
4.9	10	▲	MWS0490X10DB	49.9	65.9	68.9	118.9	118	0.9	5	6
4.9	15	▲	MWS0490X15DB	74.4	90.9	93.9	143.9	143	0.9	5	6
4.9	20	▲	MWS0490X20DB	98.9	115.9	118.9	168.9	168	0.9	5	6
4.9	25	▲	MWS0490X25DB	123.4	140.9	143.9	193.9	193	0.9	5	6
4.9	30	▲	MWS0490X30DB	147.9	165.9	168.9	218.9	218	0.9	5	6
5.0	3	▲	MWS0500MB	15.9	28.4	30.9	82.9	82	0.9	6	5
5.0	5	▲	MWS0500LB	25.9	44.9	48.9	100.9	100	0.9	6	5
5.0	8	▲	MWS0500X8DB	40.9	57.9	57.9	105.9	105	0.9	5	5
5.0	10	▲	MWS0500X10DB	50.9	65.9	68.9	118.9	118	0.9	5	6
5.0	15	▲	MWS0500X15DB	75.9	90.9	93.9	143.9	143	0.9	5	6
5.0	20	▲	MWS0500X20DB	100.9	115.9	118.9	168.9	168	0.9	5	6
5.0	25	▲	MWS0500X25DB	125.9	140.9	143.9	193.9	193	0.9	5	6
5.0	30	▲	MWS0500X30DB	150.9	165.9	168.9	218.9	218	0.9	5	6

MWS

DC(mm)	Hole Depth(l/d)	VP15TF	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
5.1	3	▲	MWS0510MB	16.2	28.4	30.9	82.9	82	0.9	6	5
5.1	5	▲	MWS0510LB	26.4	44.9	48.9	100.9	100	0.9	6	5
5.1	8	▲	MWS0510X8DB	41.7	61.9	66.9	118.9	118	0.9	6	5
5.1	10	▲	MWS0510X10DB	51.9	72.9	75.9	127.9	127	0.9	6	6
5.1	15	▲	MWS0510X15DB	77.4	99.9	102.9	154.9	154	0.9	6	6
5.1	20	▲	MWS0510X20DB	102.9	127.9	130.9	182.9	182	0.9	6	6
5.1	25	▲	MWS0510X25DB	128.4	154.9	157.9	209.9	209	0.9	6	6
5.1	30	▲	MWS0510X30DB	153.9	182.9	185.9	237.9	237	0.9	6	6
5.2	3	▲	MWS0520MB	16.5	28.4	30.9	82.9	82	0.9	6	5
5.2	5	▲	MWS0520LB	26.9	44.9	48.9	100.9	100	0.9	6	5
5.2	8	▲	MWS0520X8DB	42.5	61.9	66.9	118.9	118	0.9	6	5
5.2	10	▲	MWS0520X10DB	52.9	72.9	75.9	127.9	127	0.9	6	6
5.2	15	▲	MWS0520X15DB	78.9	99.9	102.9	154.9	154	0.9	6	6
5.2	20	▲	MWS0520X20DB	104.9	127.9	130.9	182.9	182	0.9	6	6
5.2	25	▲	MWS0520X25DB	130.9	154.9	157.9	209.9	209	0.9	6	6
5.2	30	▲	MWS0520X30DB	156.9	182.9	185.9	237.9	237	0.9	6	6
5.3	3	▲	MWS0530MB	16.9	28.5	31.0	83.0	82	1.0	6	5
5.3	5	▲	MWS0530LB	27.5	45.0	49.0	101.0	100	1.0	6	5
5.3	8	▲	MWS0530X8DB	43.4	62.0	67.0	119.0	118	1.0	6	5
5.3	10	▲	MWS0530X10DB	54.0	73.0	76.0	128.0	127	1.0	6	6
5.3	15	▲	MWS0530X15DB	80.5	100.0	103.0	155.0	154	1.0	6	6
5.3	20	▲	MWS0530X20DB	107.0	128.0	131.0	183.0	182	1.0	6	6
5.3	25	▲	MWS0530X25DB	133.5	155.0	158.0	210.0	209	1.0	6	6
5.3	30	▲	MWS0530X30DB	160.0	183.0	186.0	238.0	237	1.0	6	6
5.4	3	▲	MWS0540MB	17.2	28.5	31.0	83.0	82	1.0	6	5
5.4	5	▲	MWS0540LB	28.0	45.0	49.0	101.0	100	1.0	6	5
5.4	8	▲	MWS0540X8DB	44.2	62.0	67.0	119.0	118	1.0	6	5
5.4	10	▲	MWS0540X10DB	55.0	73.0	76.0	128.0	127	1.0	6	6
5.4	15	▲	MWS0540X15DB	82.0	100.0	103.0	155.0	154	1.0	6	6
5.4	20	▲	MWS0540X20DB	109.0	128.0	131.0	183.0	182	1.0	6	6
5.4	25	▲	MWS0540X25DB	136.0	155.0	158.0	210.0	209	1.0	6	6
5.4	30	▲	MWS0540X30DB	163.0	183.0	186.0	238.0	237	1.0	6	6
5.5	3	▲	MWS0550MB	17.5	28.5	31.0	83.0	82	1.0	6	5
5.5	5	▲	MWS0550LB	28.5	45.0	49.0	101.0	100	1.0	6	5
5.5	8	▲	MWS0550X8DB	45.0	62.0	67.0	119.0	118	1.0	6	5
5.5	10	▲	MWS0550X10DB	56.0	73.0	76.0	128.0	127	1.0	6	6
5.5	15	▲	MWS0550X15DB	83.5	100.0	103.0	155.0	154	1.0	6	6
5.5	20	▲	MWS0550X20DB	111.0	128.0	131.0	183.0	182	1.0	6	6
5.5	25	▲	MWS0550X25DB	138.5	155.0	158.0	210.0	209	1.0	6	6
5.5	30	▲	MWS0550X30DB	166.0	183.0	186.0	238.0	237	1.0	6	6
5.6	3	▲	MWS0560MB	17.8	31.0	31.0	83.0	82	1.0	6	5
5.6	5	▲	MWS0560LB	29.0	49.0	49.0	101.0	100	1.0	6	5
5.6	8	▲	MWS0560X8DB	45.8	67.0	67.0	119.0	118	1.0	6	5
5.6	10	▲	MWS0560X10DB	57.0	79.0	82.0	134.0	133	1.0	6	6
5.6	15	▲	MWS0560X15DB	85.0	109.0	112.0	164.0	163	1.0	6	6
5.6	20	▲	MWS0560X20DB	113.0	139.0	142.0	194.0	193	1.0	6	6
5.6	25	▲	MWS0560X25DB	141.0	169.0	172.0	224.0	223	1.0	6	6
5.6	30	▲	MWS0560X30DB	169.0	199.0	202.0	254.0	253	1.0	6	6
5.7	3	▲	MWS0570MB	18.1	31.0	31.0	83.0	82	1.0	6	5
5.7	5	▲	MWS0570LB	29.5	49.0	49.0	101.0	100	1.0	6	5
5.7	8	▲	MWS0570X8DB	46.6	67.0	67.0	119.0	118	1.0	6	5
5.7	10	▲	MWS0570X10DB	58.0	79.0	82.0	134.0	133	1.0	6	6
5.7	15	▲	MWS0570X15DB	86.5	109.0	112.0	164.0	163	1.0	6	6
5.7	20	▲	MWS0570X20DB	115.0	139.0	142.0	194.0	193	1.0	6	6
5.7	25	▲	MWS0570X25DB	143.5	169.0	172.0	224.0	223	1.0	6	6
5.7	30	▲	MWS0570X30DB	172.0	199.0	202.0	254.0	253	1.0	6	6
5.8	3	▲	MWS0580MB	18.5	31.1	31.1	83.1	82	1.1	6	5
5.8	5	▲	MWS0580LB	30.1	49.1	49.1	101.1	100	1.1	6	5
5.8	8	▲	MWS0580X8DB	47.5	67.1	67.1	119.1	118	1.1	6	5
5.8	10	▲	MWS0580X10DB	59.1	79.1	82.1	134.1	133	1.1	6	6
5.8	15	▲	MWS0580X15DB	88.1	109.1	112.1	164.1	163	1.1	6	6
5.8	20	▲	MWS0580X20DB	117.1	139.1	142.1	194.1	193	1.1	6	6
5.8	25	▲	MWS0580X25DB	146.1	169.1	172.1	224.1	223	1.1	6	6
5.8	30	▲	MWS0580X30DB	175.1	199.1	202.1	254.1	253	1.1	6	6
5.9	3	▲	MWS0590MB	18.8	31.1	31.1	83.1	82	1.1	6	5
5.9	5	▲	MWS0590LB	30.6	49.1	49.1	101.1	100	1.1	6	5
5.9	8	▲	MWS0590X8DB	48.3	67.1	67.1	119.1	118	1.1	6	5
5.9	10	▲	MWS0590X10DB	60.1	79.1	82.1	134.1	133	1.1	6	6
5.9	15	▲	MWS0590X15DB	89.6	109.1	112.1	164.1	163	1.1	6	6
5.9	20	▲	MWS0590X20DB	119.1	139.1	142.1	194.1	193	1.1	6	6
5.9	25	▲	MWS0590X25DB	148.6	169.1	172.1	224.1	223	1.1	6	6
5.9	30	▲	MWS0590X30DB	178.1	199.1	202.1	254.1	253	1.1	6	6
6.0	3	▲	MWS0600MB	19.1	31.1	31.1	83.1	82	1.1	6	5
6.0	5	▲	MWS0600LB	31.1	49.1	49.1	101.1	100	1.1	6	5
6.0	8	▲	MWS0600X8DB	49.1	67.1	67.1	119.1	118	1.1	6	5
6.0	10	▲	MWS0600X10DB	61.1	79.1	82.1	134.1	133	1.1	6	6
6.0	15	▲	MWS0600X15DB	91.1	109.1	112.1	164.1	163	1.1	6	6
6.0	20	▲	MWS0600X20DB	121.1	139.1	142.1	194.1	193	1.1	6	6
6.0	25	▲	MWS0600X25DB	151.1	169.1	172.1	224.1	223	1.1	6	6
6.0	30	▲	MWS0600X30DB	181.1	199.1	202.1	254.1	253	1.1	6	6
6.1	3	▲	MWS0610MB	19.4	33.6	36.1	89.1	88	1.1	7	5
6.1	5	▲	MWS0610LB	31.6	53.1	57.1	110.1	109	1.1	7	5
6.1	8	▲	MWS0610X8DB	49.9	73.1	78.1	131.1	130	1.1	7	5
6.1	10	▲	MWS0610X10DB	62.1	86.1	89.1	142.1	141	1.1	7	6
6.1	15	▲	MWS0610X15DB	92.6	118.1	121.1	174.1	173	1.1	7	6
6.1	20	▲	MWS0610X20DB	123.1	151.1	154.1	207.1	206	1.1	7	6
6.1	25	▲	MWS0610X25DB	153.6	183.1	186.1	239.1	238	1.1	7	6
6.1	30	▲	MWS0610X30DB	184.1	216.1	219.1	272.1	271	1.1	7	6
6.2	3	▲	MWS0620MB	19.7	33.6	36.1	89.1	88	1.1	7	5
6.2	5	▲	MWS0620LB	32.1	53.1	57.1	110.1	109	1.1	7	5
6.2	8	▲	MWS0620X8DB	50.7	73.1	78.1	131.1	130	1.1	7	5
6.2	10	▲	MWS0620X10DB	63.1	86.1	89.1	142.1	141	1.1	7	6
6.2	15	▲	MWS0620X15DB	94.1	118.1	121.1	174.1	173	1.1	7	6
6.2	20	▲	MWS0620X20DB	125.1	151.1	154.1	207.1	206	1.1	7	6
6.2	25	▲	MWS0620X25DB	156.1	183.1	186.1	239.1	238	1.1	7	6
6.2	30	▲	MWS0620X30DB	187.1	216.1	219.1	272.1	271	1.1	7	6
6.3	3	▲	MWS0630MB	20.0	33.6	36.1	89.1	88	1.1	7	5
6.3	5	▲	MWS0630LB	32.6	53.1	57.1	110.1	109	1.1	7	5
6.3	8	▲	MWS0630X8DB	51.5	73.1	78.1	131.1	130	1.1	7	5
6.3	10	▲	MWS0630X10DB	64.1	86.1	89.1	142.1	141	1.1	7	6
6.3	15	▲	MWS0630X15DB	95.6	118.1	121.1	174.1	173	1.1	7	6
6.3	20	▲	MWS0630X20DB	127.1	151.1	154.1	207.1	206	1.1	7	6
6.3	25	▲	MWS0630X25DB	158.6	183.1	186.1	239.1	238	1.1	7	6
6.3	30	▲	MWS0630X30DB	190.1	216.1	219.1	272.1	271	1.1	7	6
6.4	3	▲	MWS0640MB	20.4	33.7	36.2	89.2	88	1.2	7	5
6.4	5	▲	MWS0640LB	33.2	53.2	57.2	110.2	109	1.2	7	5
6.4	8	▲	MWS0640X8DB	52.4	73.2	78.2	131.2	130	1.2	7	5
6.4	10	▲	MWS0640X10DB	65.2	86.2	89.2	142.2	141	1.2	7	6

MWS

DC(mm)	Hole Depth(l/d)	VP15TF	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
6.4	15	▲	MWS0640X15DB	97.2	118.2	121.2	174.2	173	1.2	7	6
6.4	20	▲	MWS0640X20DB	129.2	151.2	154.2	207.2	206	1.2	7	6
6.4	25	▲	MWS0640X25DB	161.2	183.2	186.2	239.2	238	1.2	7	6
6.4	30	▲	MWS0640X30DB	193.2	216.2	219.2	272.2	271	1.2	7	6
6.5	3	▲	MWS0650MB	20.7	33.7	36.2	89.2	88	1.2	7	5
6.5	5	▲	MWS0650LB	33.7	53.2	57.2	110.2	109	1.2	7	5
6.5	8	▲	MWS0650X8DB	53.2	73.2	78.2	131.2	130	1.2	7	5
6.5	10	▲	MWS0650X10DB	66.2	86.2	89.2	142.2	141	1.2	7	6
6.5	15	▲	MWS0650X15DB	98.7	118.2	121.2	174.2	173	1.2	7	6
6.5	20	▲	MWS0650X20DB	131.2	151.2	154.2	207.2	206	1.2	7	6
6.5	25	▲	MWS0650X25DB	163.7	183.2	186.2	239.2	238	1.2	7	6
6.5	30	▲	MWS0650X30DB	196.2	216.2	219.2	272.2	271	1.2	7	6
6.6	3	▲	MWS0660MB	21.0	36.2	36.2	89.2	88	1.2	7	5
6.6	5	▲	MWS0660LB	34.2	57.2	57.2	110.2	109	1.2	7	5
6.6	8	▲	MWS0660X8DB	54.0	78.2	78.2	131.2	130	1.2	7	5
6.6	10	▲	MWS0660X10DB	67.2	92.2	95.2	148.2	147	1.2	7	6
6.6	15	▲	MWS0660X15DB	100.2	127.2	130.2	183.2	182	1.2	7	6
6.6	20	▲	MWS0660X20DB	133.2	162.2	165.2	218.2	217	1.2	7	6
6.6	25	▲	MWS0660X25DB	166.2	197.2	200.2	253.2	252	1.2	7	6
6.6	30	▲	MWS0660X30DB	199.2	232.2	235.2	288.2	287	1.2	7	6
6.7	3	▲	MWS0670MB	21.3	36.2	36.2	89.2	88	1.2	7	5
6.7	5	▲	MWS0670LB	34.7	57.2	57.2	110.2	109	1.2	7	5
6.7	8	▲	MWS0670X8DB	54.8	78.2	78.2	131.2	130	1.2	7	5
6.7	10	▲	MWS0670X10DB	68.2	92.2	95.2	148.2	147	1.2	7	6
6.7	15	▲	MWS0670X15DB	101.7	127.2	130.2	183.2	182	1.2	7	6
6.7	20	▲	MWS0670X20DB	135.2	162.2	165.2	218.2	217	1.2	7	6
6.7	25	▲	MWS0670X25DB	168.7	197.2	200.2	253.2	252	1.2	7	6
6.7	30	▲	MWS0670X30DB	202.2	232.2	235.2	288.2	287	1.2	7	6
6.8	3	▲	MWS0680MB	21.6	36.2	36.2	89.2	88	1.2	7	5
6.8	5	▲	MWS0680LB	35.2	57.2	57.2	110.2	109	1.2	7	5
6.8	8	▲	MWS0680X8DB	55.6	78.2	78.2	131.2	130	1.2	7	5
6.8	10	▲	MWS0680X10DB	69.2	92.2	95.2	148.2	147	1.2	7	6
6.8	15	▲	MWS0680X15DB	103.2	127.2	130.2	183.2	182	1.2	7	6
6.8	20	▲	MWS0680X20DB	137.2	162.2	165.2	218.2	217	1.2	7	6
6.8	25	▲	MWS0680X25DB	171.2	197.2	200.2	253.2	252	1.2	7	6
6.8	30	▲	MWS0680X30DB	205.2	232.2	235.2	288.2	287	1.2	7	6
6.9	3	▲	MWS0690MB	22.0	36.3	36.3	89.3	88	1.3	7	5
6.9	5	▲	MWS0690LB	35.8	57.3	57.3	110.3	109	1.3	7	5
6.9	8	▲	MWS0690X8DB	56.5	78.3	78.3	131.3	130	1.3	7	5
6.9	10	▲	MWS0690X10DB	70.3	92.3	95.3	148.3	147	1.3	7	6
6.9	15	▲	MWS0690X15DB	104.8	127.3	130.3	183.3	182	1.3	7	6
6.9	20	▲	MWS0690X20DB	139.3	162.3	165.3	218.3	217	1.3	7	6
6.9	25	▲	MWS0690X25DB	173.8	197.3	200.3	253.3	252	1.3	7	6
6.9	30	▲	MWS0690X30DB	208.3	232.3	235.3	288.3	287	1.3	7	6
7.0	3	▲	MWS0700MB	22.3	36.3	36.3	89.3	88	1.3	7	5
7.0	5	▲	MWS0700LB	36.3	57.3	57.3	110.3	109	1.3	7	5
7.0	8	▲	MWS0700X8DB	57.3	78.3	78.3	131.3	130	1.3	7	5
7.0	10	▲	MWS0700X10DB	71.3	92.3	95.3	148.3	147	1.3	7	6
7.0	15	▲	MWS0700X15DB	106.3	127.3	130.3	183.3	182	1.3	7	6
7.0	20	▲	MWS0700X20DB	141.3	162.3	165.3	218.3	217	1.3	7	6
7.0	25	▲	MWS0700X25DB	176.3	197.3	200.3	253.3	252	1.3	7	6
7.0	30	▲	MWS0700X30DB	211.3	232.3	235.3	288.3	287	1.3	7	6
7.1	3	▲	MWS0710MB	22.6	38.8	41.3	95.3	94	1.3	8	5
7.1	5	▲	MWS0710LB	36.8	61.3	65.3	119.3	118	1.3	8	5
7.1	8	▲	MWS0710X8DB	58.1	84.3	89.3	143.3	142	1.3	8	5
7.1	10	▲	MWS0710X10DB	72.3	99.3	102.3	156.3	155	1.3	8	6
7.1	15	▲	MWS0710X15DB	107.8	136.3	139.3	193.3	192	1.3	8	6
7.1	20	▲	MWS0710X20DB	143.3	174.3	177.3	231.3	230	1.3	8	6
7.1	25	▲	MWS0710X25DB	178.8	211.3	214.3	268.3	267	1.3	8	6
7.1	30	▲	MWS0710X30DB	214.3	249.3	252.3	306.3	305	1.3	8	6
7.2	3	▲	MWS0720MB	22.9	38.8	41.3	95.3	94	1.3	8	5
7.2	5	▲	MWS0720LB	37.3	61.3	65.3	119.3	118	1.3	8	5
7.2	8	▲	MWS0720X8DB	58.9	84.3	89.3	143.3	142	1.3	8	5
7.2	10	▲	MWS0720X10DB	73.3	99.3	102.3	156.3	155	1.3	8	6
7.2	15	▲	MWS0720X15DB	109.3	136.3	139.3	193.3	192	1.3	8	6
7.2	20	▲	MWS0720X20DB	145.3	174.3	177.3	231.3	230	1.3	8	6
7.2	25	▲	MWS0720X25DB	181.3	211.3	214.3	268.3	267	1.3	8	6
7.2	30	▲	MWS0720X30DB	217.3	249.3	252.3	306.3	305	1.3	8	6
7.3	3	▲	MWS0730MB	23.2	38.8	41.3	95.3	94	1.3	8	5
7.3	5	▲	MWS0730LB	37.8	61.3	65.3	119.3	118	1.3	8	5
7.3	8	▲	MWS0730X8DB	59.7	84.3	89.3	143.3	142	1.3	8	5
7.3	10	▲	MWS0730X10DB	74.3	99.3	102.3	156.3	155	1.3	8	6
7.3	15	▲	MWS0730X15DB	110.8	136.3	139.3	193.3	192	1.3	8	6
7.3	20	▲	MWS0730X20DB	147.3	174.3	177.3	231.3	230	1.3	8	6
7.3	25	▲	MWS0730X25DB	183.8	211.3	214.3	268.3	267	1.3	8	6
7.3	30	▲	MWS0730X30DB	220.3	249.3	252.3	306.3	305	1.3	8	6
7.4	3	▲	MWS0740MB	23.5	38.8	41.3	95.3	94	1.3	8	5
7.4	5	▲	MWS0740LB	38.3	61.3	65.3	119.3	118	1.3	8	5
7.4	8	▲	MWS0740X8DB	60.5	84.3	89.3	143.3	142	1.3	8	5
7.4	10	▲	MWS0740X10DB	75.3	99.3	102.3	156.3	155	1.3	8	6
7.4	15	▲	MWS0740X15DB	112.3	136.3	139.3	193.3	192	1.3	8	6
7.4	20	▲	MWS0740X20DB	149.3	174.3	177.3	231.3	230	1.3	8	6
7.4	25	▲	MWS0740X25DB	186.3	211.3	214.3	268.3	267	1.3	8	6
7.4	30	▲	MWS0740X30DB	223.3	249.3	252.3	306.3	305	1.3	8	6
7.5	3	▲	MWS0750MB	23.9	38.9	41.4	95.4	94	1.4	8	5
7.5	5	▲	MWS0750LB	38.9	61.4	65.4	119.4	118	1.4	8	5
7.5	8	▲	MWS0750X8DB	61.4	84.4	89.4	143.4	142	1.4	8	5
7.5	10	▲	MWS0750X10DB	76.4	99.4	102.4	156.4	155	1.4	8	6
7.5	15	▲	MWS0750X15DB	113.9	136.4	139.4	193.4	192	1.4	8	6
7.5	20	▲	MWS0750X20DB	151.4	174.4	177.4	231.4	230	1.4	8	6
7.5	25	▲	MWS0750X25DB	188.9	211.4	214.4	268.4	267	1.4	8	6
7.5	30	▲	MWS0750X30DB	226.4	249.4	252.4	306.4	305	1.4	8	6
7.6	3	▲	MWS0760MB	24.2	41.4	41.4	95.4	94	1.4	8	5
7.6	5	▲	MWS0760LB	39.4	65.4	65.4	119.4	118	1.4	8	5
7.6	8	▲	MWS0760X8DB	62.2	89.4	89.4	143.4	142	1.4	8	5
7.6	10	▲	MWS0760X10DB	77.4	105.4	108.4	162.4	161	1.4	8	6
7.6	15	▲	MWS0760X15DB	115.4	145.4	148.4	202.4	201	1.4	8	6
7.6	20	▲	MWS0760X20DB	153.4	185.4	188.4	242.4	241	1.4	8	6
7.6	25	▲	MWS0760X25DB	191.4	225.4	228.4	282.4	281	1.4	8	6
7.6	30	▲	MWS0760X30DB	229.4	265.4	268.4	322.4	321	1.4	8	6
7.7	3	▲	MWS0770MB	24.5	41.4	41.4	95.4	94	1.4	8	5
7.7	5	▲	MWS0770LB	39.9	65.4	65.4	119.4	118	1.4	8	5
7.7	8	▲	MWS0770X8DB	63.0	89.4	89.4	143.4	142	1.4	8	5
7.7	10	▲	MWS0770X10DB	78.4	105.4	108.4	162.4	161	1.4	8	6
7.7	15	▲	MWS0770X15DB	116.9	145.4	148.4	202.4	201	1.4	8	6
7.7	20	▲	MWS0770X20DB	155.4	185.4	188.4	242.4	241	1.4	8	6
7.7	25	▲	MWS0770X25DB	193.9	225.4	228.4	282.4	281	1.4	8	6
7.7	30	▲	MWS0770X30DB	232.4	265.4	268.4	322.4	321	1.4	8	6

MWS

DC(mm)	Hole Depth(l/d)	VP15TF	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
7.8	3	▲	MWS0780MB	24.8	41.4	41.4	95.4	94	1.4	8	5
7.8	5	▲	MWS0780LB	40.4	65.4	65.4	119.4	118	1.4	8	5
7.8	8	▲	MWS0780X8DB	63.8	89.4	89.4	143.4	142	1.4	8	5
7.8	10	▲	MWS0780X10DB	79.4	105.4	108.4	162.4	161	1.4	8	6
7.8	15	▲	MWS0780X15DB	118.4	145.4	148.4	202.4	201	1.4	8	6
7.8	20	▲	MWS0780X20DB	157.4	185.4	188.4	242.4	241	1.4	8	6
7.8	25	▲	MWS0780X25DB	196.4	225.4	228.4	282.4	281	1.4	8	6
7.8	30	▲	MWS0780X30DB	235.4	265.4	268.4	322.4	321	1.4	8	6
7.9	3	▲	MWS0790MB	25.1	41.4	41.4	95.4	94	1.4	8	5
7.9	5	▲	MWS0790LB	40.9	65.4	65.4	119.4	118	1.4	8	5
7.9	8	▲	MWS0790X8DB	64.6	89.4	89.4	143.4	142	1.4	8	5
7.9	10	▲	MWS0790X10DB	80.4	105.4	108.4	162.4	161	1.4	8	6
7.9	15	▲	MWS0790X15DB	119.9	145.4	148.4	202.4	201	1.4	8	6
7.9	20	▲	MWS0790X20DB	159.4	185.4	188.4	242.4	241	1.4	8	6
7.9	25	▲	MWS0790X25DB	198.9	225.4	228.4	282.4	281	1.4	8	6
7.9	30	▲	MWS0790X30DB	238.4	265.4	268.4	322.4	321	1.4	8	6
8.0	3	▲	MWS0800MB	25.5	41.5	41.5	95.5	94	1.5	8	5
8.0	5	▲	MWS0800LB	41.5	65.5	65.5	119.5	118	1.5	8	5
8.0	8	▲	MWS0800X8DB	65.5	89.5	89.5	143.5	142	1.5	8	5
8.0	10	▲	MWS0800X10DB	81.5	105.5	108.5	162.5	161	1.5	8	6
8.0	15	▲	MWS0800X15DB	121.5	145.5	148.5	202.5	201	1.5	8	6
8.0	20	▲	MWS0800X20DB	161.5	185.5	188.5	242.5	241	1.5	8	6
8.0	25	▲	MWS0800X25DB	201.5	225.5	228.5	282.5	281	1.5	8	6
8.0	30	▲	MWS0800X30DB	241.5	265.5	268.5	322.5	321	1.5	8	6
8.1	3	▲	MWS0810MB	25.8	44.0	46.5	101.5	100	1.5	9	5
8.1	5	▲	MWS0810LB	42.0	69.5	73.5	128.5	127	1.5	9	5
8.1	8	▲	MWS0810X8DB	66.3	95.5	100.5	155.5	154	1.5	9	5
8.1	10	▲	MWS0810X10DB	82.5	112.5	115.5	170.5	169	1.5	9	6
8.1	15	▲	MWS0810X15DB	123.0	154.5	157.5	212.5	211	1.5	9	6
8.1	20	▲	MWS0810X20DB	163.5	197.5	200.5	255.5	254	1.5	9	6
8.1	25	▲	MWS0810X25DB	204.0	239.5	242.5	297.5	296	1.5	9	6
8.1	30	▲	MWS0810X30DB	244.5	282.5	285.5	340.5	339	1.5	9	6
8.2	3	▲	MWS0820MB	26.1	44.0	46.5	101.5	100	1.5	9	5
8.2	5	▲	MWS0820LB	42.5	69.5	73.5	128.5	127	1.5	9	5
8.2	8	▲	MWS0820X8DB	67.1	95.5	100.5	155.5	154	1.5	9	5
8.2	10	▲	MWS0820X10DB	83.5	112.5	115.5	170.5	169	1.5	9	6
8.2	15	▲	MWS0820X15DB	124.5	154.5	157.5	212.5	211	1.5	9	6
8.2	20	▲	MWS0820X20DB	165.5	197.5	200.5	255.5	254	1.5	9	6
8.2	25	▲	MWS0820X25DB	206.5	239.5	242.5	297.5	296	1.5	9	6
8.2	30	▲	MWS0820X30DB	247.5	282.5	285.5	340.5	339	1.5	9	6
8.3	3	▲	MWS0830MB	26.4	44.0	46.5	101.5	100	1.5	9	5
8.3	5	▲	MWS0830LB	43.0	69.5	73.5	128.5	127	1.5	9	5
8.3	8	▲	MWS0830X8DB	67.9	95.5	100.5	155.5	154	1.5	9	5
8.3	10	▲	MWS0830X10DB	84.5	112.5	115.5	170.5	169	1.5	9	6
8.3	15	▲	MWS0830X15DB	126.0	154.5	157.5	212.5	211	1.5	9	6
8.3	20	▲	MWS0830X20DB	167.5	197.5	200.5	255.5	254	1.5	9	6
8.3	25	▲	MWS0830X25DB	209.0	239.5	242.5	297.5	296	1.5	9	6
8.3	30	▲	MWS0830X30DB	250.5	282.5	285.5	340.5	339	1.5	9	6
8.4	3	▲	MWS0840MB	26.7	44.0	46.5	101.5	100	1.5	9	5
8.4	5	▲	MWS0840LB	43.5	69.5	73.5	128.5	127	1.5	9	5
8.4	8	▲	MWS0840X8DB	68.7	95.5	100.5	155.5	154	1.5	9	5
8.4	10	▲	MWS0840X10DB	85.5	112.5	115.5	170.5	169	1.5	9	6
8.4	15	▲	MWS0840X15DB	127.5	154.5	157.5	212.5	211	1.5	9	6
8.4	20	▲	MWS0840X20DB	169.5	197.5	200.5	255.5	254	1.5	9	6
8.4	25	▲	MWS0840X25DB	211.5	239.5	242.5	297.5	296	1.5	9	6
8.4	30	▲	MWS0840X30DB	253.5	282.5	285.5	340.5	339	1.5	9	6
8.5	3	▲	MWS0850MB	27.0	44.0	46.5	101.5	100	1.5	9	5
8.5	5	▲	MWS0850LB	44.0	69.5	73.5	128.5	127	1.5	9	5
8.5	8	▲	MWS0850X8DB	69.5	95.5	100.5	155.5	154	1.5	9	5
8.5	10	▲	MWS0850X10DB	86.5	112.5	115.5	170.5	169	1.5	9	6
8.5	15	▲	MWS0850X15DB	129.0	154.5	157.5	212.5	211	1.5	9	6
8.5	20	▲	MWS0850X20DB	171.5	197.5	200.5	255.5	254	1.5	9	6
8.5	25	▲	MWS0850X25DB	214.0	239.5	242.5	297.5	296	1.5	9	6
8.5	30	▲	MWS0850X30DB	256.5	282.5	285.5	340.5	339	1.5	9	6
8.6	3	▲	MWS0860MB	27.4	46.6	46.6	101.6	100	1.6	9	5
8.6	5	▲	MWS0860LB	44.6	73.6	73.6	128.6	127	1.6	9	5
8.6	8	▲	MWS0860X8DB	70.4	100.6	100.6	155.6	154	1.6	9	5
8.6	10	▲	MWS0860X10DB	87.6	118.6	121.6	176.6	175	1.6	9	6
8.6	15	▲	MWS0860X15DB	130.6	163.6	166.6	221.6	220	1.6	9	6
8.6	20	▲	MWS0860X20DB	173.6	208.6	211.6	266.6	265	1.6	9	6
8.6	25	▲	MWS0860X25DB	216.6	253.6	256.6	311.6	310	1.6	9	6
8.6	30	▲	MWS0860X30DB	259.6	298.6	301.6	356.6	355	1.6	9	6
8.7	3	▲	MWS0870MB	27.7	46.6	46.6	101.6	100	1.6	9	5
8.7	5	▲	MWS0870LB	45.1	73.6	73.6	128.6	127	1.6	9	5
8.7	8	▲	MWS0870X8DB	71.2	100.6	100.6	155.6	154	1.6	9	5
8.7	10	▲	MWS0870X10DB	88.6	118.6	121.6	176.6	175	1.6	9	6
8.7	15	▲	MWS0870X15DB	132.1	163.6	166.6	221.6	220	1.6	9	6
8.7	20	▲	MWS0870X20DB	175.6	208.6	211.6	266.6	265	1.6	9	6
8.7	25	▲	MWS0870X25DB	219.1	253.6	256.6	311.6	310	1.6	9	6
8.7	30	▲	MWS0870X30DB	262.6	298.6	301.6	356.6	355	1.6	9	6
8.8	3	▲	MWS0880MB	28.0	46.6	46.6	101.6	100	1.6	9	5
8.8	5	▲	MWS0880LB	45.6	73.6	73.6	128.6	127	1.6	9	5
8.8	8	▲	MWS0880X8DB	72.0	100.6	100.6	155.6	154	1.6	9	5
8.8	10	▲	MWS0880X10DB	89.6	118.6	121.6	176.6	175	1.6	9	6
8.8	15	▲	MWS0880X15DB	133.6	163.6	166.6	221.6	220	1.6	9	6
8.8	20	▲	MWS0880X20DB	177.6	208.6	211.6	266.6	265	1.6	9	6
8.8	25	▲	MWS0880X25DB	221.6	253.6	256.6	311.6	310	1.6	9	6
8.8	30	▲	MWS0880X30DB	265.6	298.6	301.6	356.6	355	1.6	9	6
8.9	3	▲	MWS0890MB	28.3	46.6	46.6	101.6	100	1.6	9	5
8.9	5	▲	MWS0890LB	46.1	73.6	73.6	128.6	127	1.6	9	5
8.9	8	▲	MWS0890X8DB	72.8	100.6	100.6	155.6	154	1.6	9	5
8.9	10	▲	MWS0890X10DB	90.6	118.6	121.6	176.6	175	1.6	9	6
8.9	15	▲	MWS0890X15DB	135.1	163.6	166.6	221.6	220	1.6	9	6
8.9	20	▲	MWS0890X20DB	179.6	208.6	211.6	266.6	265	1.6	9	6
8.9	25	▲	MWS0890X25DB	224.1	253.6	256.6	311.6	310	1.6	9	6
8.9	30	▲	MWS0890X30DB	268.6	298.6	301.6	356.6	355	1.6	9	6
9.0	3	▲	MWS0900MB	28.6	46.6	46.6	101.6	100	1.6	9	5
9.0	5	▲	MWS0900LB	46.6	73.6	73.6	128.6	127	1.6	9	5
9.0	8	▲	MWS0900X8DB	73.6	100.6	100.6	155.6	154	1.6	9	5
9.0	10	▲	MWS0900X10DB	91.6	118.6	121.6	176.6	175	1.6	9	6
9.0	15	▲	MWS0900X15DB	136.6	163.6	166.6	221.6	220	1.6	9	6
9.0	20	▲	MWS0900X20DB	181.6	208.6	211.6	266.6	265	1.6	9	6
9.0	25	▲	MWS0900X25DB	226.6	253.6	256.6	311.6	310	1.6	9	6
9.0	30	▲	MWS0900X30DB	271.6	298.6	301.6	356.6	355	1.6	9	6
9.1	3	▲	MWS0910MB	29.0	49.2	51.7	107.7	106	1.7	10	5
9.1	5	▲	MWS0910LB	47.2	77.7	81.7	137.7	136	1.7	10	5
9.1	8	▲	MWS0910X8DB	74.5	106.7	111.7	167.7	166	1.7	10	5
9.1	10	▲	MWS0910X10DB	92.7	125.7	128.7	183.7	182	1.7	10	6

MWS

DC(mm)	Hole Depth(l/d)	VP15TF	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
9.1	15	▲	MWS0910X15DB	138.2	172.7	175.7	230.7	229	1.7	10	6
9.1	20	▲	MWS0910X20DB	183.7	220.7	223.7	278.7	277	1.7	10	6
9.1	25	▲	MWS0910X25DB	229.2	267.7	270.7	325.7	324	1.7	10	6
9.1	30	▲	MWS0910X30DB	274.7	315.7	318.7	373.7	372	1.7	10	6
9.2	3	▲	MWS0920MB	29.3	49.2	51.7	107.7	106	1.7	10	5
9.2	5	▲	MWS0920LB	47.7	77.7	81.7	137.7	136	1.7	10	5
9.2	8	▲	MWS0920X8DB	75.3	106.7	111.7	167.7	166	1.7	10	5
9.2	10	▲	MWS0920X10DB	93.7	125.7	128.7	183.7	182	1.7	10	6
9.2	15	▲	MWS0920X15DB	139.7	172.7	175.7	230.7	229	1.7	10	6
9.2	20	▲	MWS0920X20DB	185.7	220.7	223.7	278.7	277	1.7	10	6
9.2	25	▲	MWS0920X25DB	231.7	267.7	270.7	325.7	324	1.7	10	6
9.2	30	▲	MWS0920X30DB	277.7	315.7	318.7	373.7	372	1.7	10	6
9.3	3	▲	MWS0930MB	29.6	49.2	51.7	107.7	106	1.7	10	5
9.3	5	▲	MWS0930LB	48.2	77.7	81.7	137.7	136	1.7	10	5
9.3	8	▲	MWS0930X8DB	76.1	106.7	111.7	167.7	166	1.7	10	5
9.3	10	▲	MWS0930X10DB	94.7	125.7	128.7	183.7	182	1.7	10	6
9.3	15	▲	MWS0930X15DB	141.2	172.7	175.7	230.7	229	1.7	10	6
9.3	20	▲	MWS0930X20DB	187.7	220.7	223.7	278.7	277	1.7	10	6
9.3	25	▲	MWS0930X25DB	234.2	267.7	270.7	325.7	324	1.7	10	6
9.3	30	▲	MWS0930X30DB	280.7	315.7	318.7	373.7	372	1.7	10	6
9.4	3	▲	MWS0940MB	29.9	49.2	51.7	107.7	106	1.7	10	5
9.4	5	▲	MWS0940LB	48.7	77.7	81.7	137.7	136	1.7	10	5
9.4	8	▲	MWS0940X8DB	76.9	106.7	111.7	167.7	166	1.7	10	5
9.4	10	▲	MWS0940X10DB	95.7	125.7	128.7	183.7	182	1.7	10	6
9.4	15	▲	MWS0940X15DB	142.7	172.7	175.7	230.7	229	1.7	10	6
9.4	20	▲	MWS0940X20DB	189.7	220.7	223.7	278.7	277	1.7	10	6
9.4	25	▲	MWS0940X25DB	236.7	267.7	270.7	325.7	324	1.7	10	6
9.4	30	▲	MWS0940X30DB	283.7	315.7	318.7	373.7	372	1.7	10	6
9.5	3	▲	MWS0950MB	30.2	49.2	51.7	107.7	106	1.7	10	5
9.5	5	▲	MWS0950LB	49.2	77.7	81.7	137.7	136	1.7	10	5
9.5	8	▲	MWS0950X8DB	77.7	106.7	111.7	167.7	166	1.7	10	5
9.5	10	▲	MWS0950X10DB	96.7	125.7	128.7	183.7	182	1.7	10	6
9.5	15	▲	MWS0950X15DB	144.2	172.7	175.7	230.7	229	1.7	10	6
9.5	20	▲	MWS0950X20DB	191.7	220.7	223.7	278.7	277	1.7	10	6
9.5	25	▲	MWS0950X25DB	239.2	267.7	270.7	325.7	324	1.7	10	6
9.5	30	▲	MWS0950X30DB	286.7	315.7	318.7	373.7	372	1.7	10	6
9.6	3	▲	MWS0960MB	30.5	51.7	51.7	107.7	106	1.7	10	5
9.6	5	▲	MWS0960LB	49.7	81.7	81.7	137.7	136	1.7	10	5
9.6	8	▲	MWS0960X8DB	78.5	111.7	111.7	167.7	166	1.7	10	5
9.6	10	▲	MWS0960X10DB	97.7	131.7	134.7	189.7	188	1.7	10	6
9.6	15	▲	MWS0960X15DB	145.7	181.7	184.7	239.7	238	1.7	10	6
9.6	20	▲	MWS0960X20DB	193.7	231.7	234.7	289.7	288	1.7	10	6
9.6	25	▲	MWS0960X25DB	241.7	281.7	284.7	339.7	338	1.7	10	6
9.6	30	▲	MWS0960X30DB	289.7	331.7	334.7	389.7	388	1.7	10	6
9.7	3	▲	MWS0970MB	30.9	51.8	51.8	107.8	106	1.8	10	5
9.7	5	▲	MWS0970LB	50.3	81.8	81.8	137.8	136	1.8	10	5
9.7	8	▲	MWS0970X8DB	79.4	111.8	111.8	167.8	166	1.8	10	5
9.7	10	▲	MWS0970X10DB	98.8	131.8	134.8	189.8	188	1.8	10	6
9.7	15	▲	MWS0970X15DB	147.3	181.8	184.8	239.8	238	1.8	10	6
9.7	20	▲	MWS0970X20DB	195.8	231.8	234.8	289.8	288	1.8	10	6
9.7	25	▲	MWS0970X25DB	244.3	281.8	284.8	339.8	338	1.8	10	6
9.7	30	▲	MWS0970X30DB	292.8	331.8	334.8	389.8	388	1.8	10	6
9.8	3	▲	MWS0980MB	31.2	51.8	51.8	107.8	106	1.8	10	5
9.8	5	▲	MWS0980LB	50.8	81.8	81.8	137.8	136	1.8	10	5
9.8	8	▲	MWS0980X8DB	80.2	111.8	111.8	167.8	166	1.8	10	5
9.8	10	▲	MWS0980X10DB	99.8	131.8	134.8	189.8	188	1.8	10	6
9.8	15	▲	MWS0980X15DB	148.8	181.8	184.8	239.8	238	1.8	10	6
9.8	20	▲	MWS0980X20DB	197.8	231.8	234.8	289.8	288	1.8	10	6
9.8	25	▲	MWS0980X25DB	246.8	281.8	284.8	339.8	338	1.8	10	6
9.8	30	▲	MWS0980X30DB	295.8	331.8	334.8	389.8	388	1.8	10	6
9.9	3	▲	MWS0990MB	31.5	51.8	51.8	107.8	106	1.8	10	5
9.9	5	▲	MWS0990LB	51.3	81.8	81.8	137.8	136	1.8	10	5
9.9	8	▲	MWS0990X8DB	81.0	111.8	111.8	167.8	166	1.8	10	5
9.9	10	▲	MWS0990X10DB	100.8	131.8	134.8	189.8	188	1.8	10	6
9.9	15	▲	MWS0990X15DB	150.3	181.8	184.8	239.8	238	1.8	10	6
9.9	20	▲	MWS0990X20DB	199.8	231.8	234.8	289.8	288	1.8	10	6
9.9	25	▲	MWS0990X25DB	249.3	281.8	284.8	339.8	338	1.8	10	6
9.9	30	▲	MWS0990X30DB	298.8	331.8	334.8	389.8	388	1.8	10	6
10.0	3	▲	MWS1000MB	31.8	51.8	51.8	107.8	106	1.8	10	5
10.0	5	▲	MWS1000LB	51.8	81.8	81.8	137.8	136	1.8	10	5
10.0	8	▲	MWS1000X8DB	81.8	111.8	111.8	167.8	166	1.8	10	5
10.0	10	▲	MWS1000X10DB	101.8	131.8	134.8	189.8	188	1.8	10	6
10.0	15	▲	MWS1000X15DB	151.8	181.8	184.8	239.8	238	1.8	10	6
10.0	20	▲	MWS1000X20DB	201.8	231.8	234.8	289.8	288	1.8	10	6
10.0	25	▲	MWS1000X25DB	251.8	281.8	284.8	339.8	338	1.8	10	6
10.0	30	▲	MWS1000X30DB	301.8	331.8	334.8	389.8	388	1.8	10	6
10.1	3	▲	MWS1010MB	32.1	54.3	56.8	117.8	116	1.8	11	5
10.1	5	▲	MWS1010LB	52.3	85.8	89.8	150.8	149	1.8	11	5
10.1	8	▲	MWS1010X8DB	82.6	117.8	122.8	183.8	182	1.8	11	5
10.1	10	▲	MWS1010X10DB	102.8	138.8	141.8	202.8	201	1.8	11	6
10.1	15	▲	MWS1010X15DB	153.3	190.8	193.8	254.8	253	1.8	11	6
10.1	20	▲	MWS1010X20DB	203.8	243.8	246.8	307.8	306	1.8	11	6
10.1	25	▲	MWS1010X25DB	254.3	295.8	298.8	359.8	358	1.8	11	6
10.2	3	▲	MWS1020MB	32.5	54.4	56.9	117.9	116	1.9	11	5
10.2	5	▲	MWS1020LB	52.9	85.9	89.9	150.9	149	1.9	11	5
10.2	8	▲	MWS1020X8DB	83.5	117.9	122.9	183.9	182	1.9	11	5
10.2	10	▲	MWS1020X10DB	103.9	138.9	141.9	202.9	201	1.9	11	6
10.2	15	▲	MWS1020X15DB	154.9	190.9	193.9	254.9	253	1.9	11	6
10.2	20	▲	MWS1020X20DB	205.9	243.9	246.9	307.9	306	1.9	11	6
10.2	25	▲	MWS1020X25DB	256.9	295.9	298.9	359.9	358	1.9	11	6
10.3	3	▲	MWS1030MB	32.8	54.4	56.9	117.9	116	1.9	11	5
10.3	5	▲	MWS1030LB	53.4	85.9	89.9	150.9	149	1.9	11	5
10.3	8	▲	MWS1030X8DB	84.3	117.9	122.9	183.9	182	1.9	11	5
10.3	10	▲	MWS1030X10DB	104.9	138.9	141.9	202.9	201	1.9	11	6
10.3	15	▲	MWS1030X15DB	156.4	190.9	193.9	254.9	253	1.9	11	6
10.3	20	▲	MWS1030X20DB	207.9	243.9	246.9	307.9	306	1.9	11	6
10.3	25	▲	MWS1030X25DB	259.4	295.9	298.9	359.9	358	1.9	11	6
10.4	3	▲	MWS1040MB	33.1	54.4	56.9	117.9	116	1.9	11	5
10.4	5	▲	MWS1040LB	53.9	85.9	89.9	150.9	149	1.9	11	5
10.4	8	▲	MWS1040X8DB	85.1	117.9	122.9	183.9	182	1.9	11	5
10.4	10	▲	MWS1040X10DB	105.9	138.9	141.9	202.9	201	1.9	11	6
10.4	15	▲	MWS1040X15DB	157.9	190.9	193.9	254.9	253	1.9	11	6
10.4	20	▲	MWS1040X20DB	209.9	243.9	246.9	307.9	306	1.9	11	6
10.4	25	▲	MWS1040X25DB	261.9	295.9	298.9	359.9	358	1.9	11	6
10.5	3	▲	MWS1050MB	33.4	54.4	56.9	117.9	116	1.9	11	5
10.5	5	▲	MWS1050LB	54.4	85.9	89.9	150.9	149	1.9	11	5
10.5	8	▲	MWS1050X8DB	85.9	117.9	122.9	183.9	182	1.9	11	5
10.5	10	▲	MWS1050X10DB	106.9	138.9	141.9	202.9	201	1.9	11	6

MWS

DC(mm)	Hole Depth(l/d)	VP15TF	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
10.5	15	▲	MWS1050X15DB	159.4	190.9	193.9	254.9	253	1.9	11	6
10.5	20	▲	MWS1050X20DB	211.9	243.9	246.9	307.9	306	1.9	11	6
10.5	25	▲	MWS1050X25DB	264.4	295.9	298.9	359.9	358	1.9	11	6
10.6	3	▲	MWS1060MB	33.7	56.9	56.9	117.9	116	1.9	11	5
10.6	5	▲	MWS1060LB	54.9	89.9	89.9	150.9	149	1.9	11	5
10.6	8	▲	MWS1060X8DB	86.7	122.9	122.9	183.9	182	1.9	11	5
10.6	10	▲	MWS1060X10DB	107.9	144.9	147.9	208.9	207	1.9	11	6
10.6	15	▲	MWS1060X15DB	160.9	199.9	202.9	263.9	262	1.9	11	6
10.6	20	▲	MWS1060X20DB	213.9	254.9	257.9	318.9	317	1.9	11	6
10.6	25	▲	MWS1060X25DB	266.9	309.9	312.9	373.9	372	1.9	11	6
10.7	3	▲	MWS1070MB	34.0	56.9	56.9	117.9	116	1.9	11	5
10.7	5	▲	MWS1070LB	55.4	89.9	89.9	150.9	149	1.9	11	5
10.7	8	▲	MWS1070X8DB	87.5	122.9	122.9	183.9	182	1.9	11	5
10.7	10	▲	MWS1070X10DB	108.9	144.9	147.9	208.9	207	1.9	11	6
10.7	15	▲	MWS1070X15DB	162.4	199.9	202.9	263.9	262	1.9	11	6
10.7	20	▲	MWS1070X20DB	215.9	254.9	257.9	318.9	317	1.9	11	6
10.7	25	▲	MWS1070X25DB	269.4	309.9	312.9	373.9	372	1.9	11	6
10.8	3	▲	MWS1080MB	34.4	57.0	57.0	118.0	116	2.0	11	5
10.8	5	▲	MWS1080LB	56.0	90.0	90.0	151.0	149	2.0	11	5
10.8	8	▲	MWS1080X8DB	88.4	123.0	123.0	184.0	182	2.0	11	5
10.8	10	▲	MWS1080X10DB	110.0	145.0	148.0	209.0	207	2.0	11	6
10.8	15	▲	MWS1080X15DB	164.0	200.0	203.0	264.0	262	2.0	11	6
10.8	20	▲	MWS1080X20DB	218.0	255.0	258.0	319.0	317	2.0	11	6
10.8	25	▲	MWS1080X25DB	272.0	310.0	313.0	374.0	372	2.0	11	6
10.9	3	▲	MWS1090MB	34.7	57.0	57.0	118.0	116	2.0	11	5
10.9	5	▲	MWS1090LB	56.5	90.0	90.0	151.0	149	2.0	11	5
10.9	8	▲	MWS1090X8DB	89.2	123.0	123.0	184.0	182	2.0	11	5
10.9	10	▲	MWS1090X10DB	111.0	145.0	148.0	209.0	207	2.0	11	6
10.9	15	▲	MWS1090X15DB	165.5	200.0	203.0	264.0	262	2.0	11	6
10.9	20	▲	MWS1090X20DB	220.0	255.0	258.0	319.0	317	2.0	11	6
10.9	25	▲	MWS1090X25DB	274.5	310.0	313.0	374.0	372	2.0	11	6
11.0	3	▲	MWS1100MB	35.0	57.0	57.0	118.0	116	2.0	11	5
11.0	5	▲	MWS1100LB	57.0	90.0	90.0	151.0	149	2.0	11	5
11.0	8	▲	MWS1100X8DB	90.0	123.0	123.0	184.0	182	2.0	11	5
11.0	10	▲	MWS1100X10DB	112.0	145.0	148.0	209.0	207	2.0	11	6
11.0	15	▲	MWS1100X15DB	167.0	200.0	203.0	264.0	262	2.0	11	6
11.0	20	▲	MWS1100X20DB	222.0	255.0	258.0	319.0	317	2.0	11	6
11.0	25	▲	MWS1100X25DB	277.0	310.0	313.0	374.0	372	2.0	11	6
11.1	3	▲	MWS1110MB	35.3	59.5	62.0	124.0	122	2.0	12	5
11.1	5	▲	MWS1110LB	57.5	94.0	98.0	160.0	158	2.0	12	5
11.1	8	▲	MWS1110X8DB	90.8	129.0	134.0	196.0	194	2.0	12	5
11.1	10	▲	MWS1110X10DB	113.0	152.0	155.0	217.0	215	2.0	12	6
11.1	15	▲	MWS1110X15DB	168.5	209.0	212.0	274.0	272	2.0	12	6
11.1	20	▲	MWS1110X20DB	224.0	267.0	270.0	332.0	330	2.0	12	6
11.1	25	▲	MWS1110X25DB	279.5	324.0	327.0	389.0	387	2.0	12	6
11.2	3	▲	MWS1120MB	35.6	59.5	62.0	124.0	122	2.0	12	5
11.2	5	▲	MWS1120LB	58.0	94.0	98.0	160.0	158	2.0	12	5
11.2	8	▲	MWS1120X8DB	91.6	129.0	134.0	196.0	194	2.0	12	5
11.2	10	▲	MWS1120X10DB	114.0	152.0	155.0	217.0	215	2.0	12	6
11.2	15	▲	MWS1120X15DB	170.0	209.0	212.0	274.0	272	2.0	12	6
11.2	20	▲	MWS1120X20DB	226.0	267.0	270.0	332.0	330	2.0	12	6
11.2	25	▲	MWS1120X25DB	282.0	324.0	327.0	389.0	387	2.0	12	6
11.3	3	▲	MWS1130MB	36.0	59.6	62.1	124.1	122	2.1	12	5
11.3	5	▲	MWS1130LB	58.6	94.1	98.1	160.1	158	2.1	12	5
11.3	8	▲	MWS1130X8DB	92.5	129.1	134.1	196.1	194	2.1	12	5
11.3	10	▲	MWS1130X10DB	115.1	152.1	155.1	217.1	215	2.1	12	6
11.3	15	▲	MWS1130X15DB	171.6	209.1	212.1	274.1	272	2.1	12	6
11.3	20	▲	MWS1130X20DB	228.1	267.1	270.1	332.1	330	2.1	12	6
11.3	25	▲	MWS1130X25DB	284.6	324.1	327.1	389.1	387	2.1	12	6
11.4	3	▲	MWS1140MB	36.3	59.6	62.1	124.1	122	2.1	12	5
11.4	5	▲	MWS1140LB	59.1	94.1	98.1	160.1	158	2.1	12	5
11.4	8	▲	MWS1140X8DB	93.3	129.1	134.1	196.1	194	2.1	12	5
11.4	10	▲	MWS1140X10DB	116.1	152.1	155.1	217.1	215	2.1	12	6
11.4	15	▲	MWS1140X15DB	173.1	209.1	212.1	274.1	272	2.1	12	6
11.4	20	▲	MWS1140X20DB	230.1	267.1	270.1	332.1	330	2.1	12	6
11.4	25	▲	MWS1140X25DB	287.1	324.1	327.1	389.1	387	2.1	12	6
11.5	3	▲	MWS1150MB	36.6	59.6	62.1	124.1	122	2.1	12	5
11.5	5	▲	MWS1150LB	59.6	94.1	98.1	160.1	158	2.1	12	5
11.5	8	▲	MWS1150X8DB	94.1	129.1	134.1	196.1	194	2.1	12	5
11.5	10	▲	MWS1150X10DB	117.1	152.1	155.1	217.1	215	2.1	12	6
11.5	15	▲	MWS1150X15DB	174.6	209.1	212.1	274.1	272	2.1	12	6
11.5	20	▲	MWS1150X20DB	232.1	267.1	270.1	332.1	330	2.1	12	6
11.5	25	▲	MWS1150X25DB	289.6	324.1	327.1	389.1	387	2.1	12	6
11.6	3	▲	MWS1160MB	36.9	62.1	62.1	124.1	122	2.1	12	5
11.6	5	▲	MWS1160LB	60.1	98.1	98.1	160.1	158	2.1	12	5
11.6	8	▲	MWS1160X8DB	94.9	134.1	134.1	196.1	194	2.1	12	5
11.6	10	▲	MWS1160X10DB	118.1	158.1	161.1	223.1	221	2.1	12	6
11.6	15	▲	MWS1160X15DB	176.1	218.1	221.1	283.1	281	2.1	12	6
11.6	20	▲	MWS1160X20DB	234.1	278.1	281.1	343.1	341	2.1	12	6
11.6	25	▲	MWS1160X25DB	292.1	338.1	341.1	403.1	401	2.1	12	6
11.7	3	▲	MWS1170MB	37.2	62.1	62.1	124.1	122	2.1	12	5
11.7	5	▲	MWS1170LB	60.6	98.1	98.1	160.1	158	2.1	12	5
11.7	8	▲	MWS1170X8DB	95.7	134.1	134.1	196.1	194	2.1	12	5
11.7	10	▲	MWS1170X10DB	119.1	158.1	161.1	223.1	221	2.1	12	6
11.7	15	▲	MWS1170X15DB	177.6	218.1	221.1	283.1	281	2.1	12	6
11.7	20	▲	MWS1170X20DB	236.1	278.1	281.1	343.1	341	2.1	12	6
11.7	25	▲	MWS1170X25DB	294.6	338.1	341.1	403.1	401	2.1	12	6
11.8	3	▲	MWS1180MB	37.5	62.1	62.1	124.1	122	2.1	12	5
11.8	5	▲	MWS1180LB	61.1	98.1	98.1	160.1	158	2.1	12	5
11.8	8	▲	MWS1180X8DB	96.5	134.1	134.1	196.1	194	2.1	12	5
11.8	10	▲	MWS1180X10DB	120.1	158.1	161.1	223.1	221	2.1	12	6
11.8	15	▲	MWS1180X15DB	179.1	218.1	221.1	283.1	281	2.1	12	6
11.8	20	▲	MWS1180X20DB	238.1	278.1	281.1	343.1	341	2.1	12	6
11.8	25	▲	MWS1180X25DB	297.1	338.1	341.1	403.1	401	2.1	12	6
11.9	3	▲	MWS1190MB	37.9	62.2	62.2	124.2	122	2.2	12	5
11.9	5	▲	MWS1190LB	61.7	98.2	98.2	160.2	158	2.2	12	5
11.9	8	▲	MWS1190X8DB	97.4	134.2	134.2	196.2	194	2.2	12	5
11.9	10	▲	MWS1190X10DB	121.2	158.2	161.2	223.2	221	2.2	12	6
11.9	15	▲	MWS1190X15DB	180.7	218.2	221.2	283.2	281	2.2	12	6
11.9	20	▲	MWS1190X20DB	240.2	278.2	281.2	343.2	341	2.2	12	6
11.9	25	▲	MWS1190X25DB	299.7	338.2	341.2	403.2	401	2.2	12	6
12.0	3	▲	MWS1200MB	38.2	62.2	62.2	124.2	122	2.2	12	5
12.0	5	▲	MWS1200LB	62.2	98.2	98.2	160.2	158	2.2	12	5
12.0	8	▲	MWS1200X8DB	98.2	134.2	134.2	196.2	194	2.2	12	5
12.0	10	▲	MWS1200X10DB	122.2	158.2	161.2	223.2	221	2.2	12	6
12.0	15	▲	MWS1200X15DB	182.2	218.2	221.2	283.2	281	2.2	12	6
12.0	20	▲	MWS1200X20DB	242.2	278.2	281.2	343.2	341	2.2	12	6
12.0	25	▲	MWS1200X25DB	302.2	338.2	341.2	403.2	401	2.2	12	6

MWS

DC(mm)	Hole Depth(l/d)	VP15TF	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
12.1	3	▲	MWS1210MB	38.5	64.7	67.2	130.2	128	2.2	13	5
12.1	5	▲	MWS1210LB	62.7	102.2	106.2	169.2	167	2.2	13	5
12.1	8	□	MWS1210X8DB	99.0	140.2	145.2	208.2	206	2.2	13	5
12.1	10	□	MWS1210X10DB	123.2	165.2	168.2	231.2	229	2.2	13	6
12.1	15	□	MWS1210X15DB	183.7	227.2	230.2	293.2	291	2.2	13	6
12.1	20	□	MWS1210X20DB	244.2	290.2	293.2	356.2	354	2.2	13	6
12.2	3	▲	MWS1220MB	38.8	64.7	67.2	130.2	128	2.2	13	5
12.2	5	▲	MWS1220LB	63.2	102.2	106.2	169.2	167	2.2	13	5
12.2	8	□	MWS1220X8DB	99.8	140.2	145.2	208.2	206	2.2	13	5
12.2	10	□	MWS1220X10DB	124.2	165.2	168.2	231.2	229	2.2	13	6
12.2	15	□	MWS1220X15DB	185.2	227.2	230.2	293.2	291	2.2	13	6
12.2	20	□	MWS1220X20DB	246.2	290.2	293.2	356.2	354	2.2	13	6
12.3	3	▲	MWS1230MB	39.1	64.7	67.2	130.2	128	2.2	13	5
12.3	5	▲	MWS1230LB	63.7	102.2	106.2	169.2	167	2.2	13	5
12.3	8	□	MWS1230X8DB	100.6	140.2	145.2	208.2	206	2.2	13	5
12.3	10	□	MWS1230X10DB	125.2	165.2	168.2	231.2	229	2.2	13	6
12.3	15	□	MWS1230X15DB	186.7	227.2	230.2	293.2	291	2.2	13	6
12.3	20	□	MWS1230X20DB	248.2	290.2	293.2	356.2	354	2.2	13	6
12.4	3	▲	MWS1240MB	39.5	64.8	67.3	130.3	128	2.3	13	5
12.4	5	▲	MWS1240LB	64.3	102.3	106.3	169.3	167	2.3	13	5
12.4	8	□	MWS1240X8DB	101.5	140.3	145.3	208.3	206	2.3	13	5
12.4	10	□	MWS1240X10DB	126.3	165.3	168.3	231.3	229	2.3	13	6
12.4	15	□	MWS1240X15DB	188.3	227.3	230.3	293.3	291	2.3	13	6
12.4	20	□	MWS1240X20DB	250.3	290.3	293.3	356.3	354	2.3	13	6
12.5	3	▲	MWS1250MB	39.8	64.8	67.3	130.3	128	2.3	13	5
12.5	5	▲	MWS1250LB	64.8	102.3	106.3	169.3	167	2.3	13	5
12.5	8	▲	MWS1250X8DB	102.3	140.3	145.3	208.3	206	2.3	13	5
12.5	10	▲	MWS1250X10DB	127.3	165.3	168.3	231.3	229	2.3	13	6
12.5	15	▲	MWS1250X15DB	189.8	227.3	230.3	293.3	291	2.3	13	6
12.5	20	▲	MWS1250X20DB	252.3	290.3	293.3	356.3	354	2.3	13	6
12.6	3	▲	MWS1260MB	40.1	67.3	67.3	130.3	128	2.3	13	5
12.6	5	▲	MWS1260LB	65.3	106.3	106.3	169.3	167	2.3	13	5
12.6	8	□	MWS1260X8DB	103.1	145.3	145.3	208.3	206	2.3	13	5
12.6	10	□	MWS1260X10DB	128.3	171.3	174.3	237.3	235	2.3	13	6
12.6	15	□	MWS1260X15DB	191.3	236.3	239.3	302.3	300	2.3	13	6
12.6	20	□	MWS1260X20DB	254.3	301.3	304.3	367.3	365	2.3	13	6
12.7	3	▲	MWS1270MB	40.4	67.3	67.3	130.3	128	2.3	13	5
12.7	5	▲	MWS1270LB	65.8	106.3	106.3	169.3	167	2.3	13	5
12.7	8	□	MWS1270X8DB	103.9	145.3	145.3	208.3	206	2.3	13	5
12.7	10	□	MWS1270X10DB	129.3	171.3	174.3	237.3	235	2.3	13	6
12.7	15	□	MWS1270X15DB	192.8	236.3	239.3	302.3	300	2.3	13	6
12.7	20	□	MWS1270X20DB	256.3	301.3	304.3	367.3	365	2.3	13	6
12.8	3	▲	MWS1280MB	40.7	67.3	67.3	130.3	128	2.3	13	5
12.8	5	▲	MWS1280LB	66.3	106.3	106.3	169.3	167	2.3	13	5
12.8	8	□	MWS1280X8DB	104.7	145.3	145.3	208.3	206	2.3	13	5
12.8	10	□	MWS1280X10DB	130.3	171.3	174.3	237.3	235	2.3	13	6
12.8	15	□	MWS1280X15DB	194.3	236.3	239.3	302.3	300	2.3	13	6
12.8	20	□	MWS1280X20DB	258.3	301.3	304.3	367.3	365	2.3	13	6
12.9	3	▲	MWS1290MB	41.0	67.3	67.3	130.3	128	2.3	13	5
12.9	5	▲	MWS1290LB	66.8	106.3	106.3	169.3	167	2.3	13	5
12.9	8	□	MWS1290X8DB	105.5	145.3	145.3	208.3	206	2.3	13	5
12.9	10	□	MWS1290X10DB	131.3	171.3	174.3	237.3	235	2.3	13	6
12.9	15	□	MWS1290X15DB	195.8	236.3	239.3	302.3	300	2.3	13	6
12.9	20	□	MWS1290X20DB	260.3	301.3	304.3	367.3	365	2.3	13	6

DC(mm)	Hole Depth(l/d)	VP15TF	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
13.0	3	▲	MWS1300MB	41.4	67.4	67.4	130.4	128	2.4	13	5
13.0	5	▲	MWS1300LB	67.4	106.4	106.4	169.4	167	2.4	13	5
13.0	8	▲	MWS1300X8DB	106.4	145.4	145.4	208.4	206	2.4	13	5
13.0	10	▲	MWS1300X10DB	132.4	171.4	174.4	237.4	235	2.4	13	6
13.0	15	▲	MWS1300X15DB	197.4	236.4	239.4	302.4	300	2.4	13	6
13.0	20	▲	MWS1300X20DB	262.4	301.4	304.4	367.4	365	2.4	13	6
13.1	3	▲	MWS1310MB	41.7	89.9	72.4	136.4	134	2.4	14	5
13.1	5	▲	MWS1310LB	67.9	110.4	114.4	178.4	176	2.4	14	5
13.1	8	□	MWS1310X8DB	107.2	151.4	156.4	220.4	218	2.4	14	5
13.1	10	□	MWS1310X10DB	133.4	178.4	181.4	245.4	243	2.4	14	6
13.1	15	□	MWS1310X15DB	198.9	245.4	248.4	312.4	310	2.4	14	6
13.1	20	□	MWS1310X20DB	264.4	313.4	316.4	380.4	378	2.4	14	6
13.2	3	▲	MWS1320MB	42.0	69.9	72.4	136.4	134	2.4	14	5
13.2	5	▲	MWS1320LB	68.4	110.4	114.4	178.4	176	2.4	14	5
13.2	8	□	MWS1320X8DB	108.0	151.4	156.4	220.4	218	2.4	14	5
13.2	10	□	MWS1320X10DB	134.4	178.4	181.4	245.4	243	2.4	14	6
13.2	15	□	MWS1320X15DB	200.4	245.4	248.4	312.4	310	2.4	14	6
13.2	20	□	MWS1320X20DB	266.4	313.4	316.4	380.4	378	2.4	14	6
13.3	3	▲	MWS1330MB	42.3	69.9	72.4	136.4	134	2.4	14	5
13.3	5	▲	MWS1330LB	68.9	110.4	114.4	178.4	176	2.4	14	5
13.3	8	□	MWS1330X8DB	108.8	151.4	156.4	220.4	218	2.4	14	5
13.3	10	□	MWS1330X10DB	135.4	178.4	181.4	245.4	243	2.4	14	6
13.3	15	□	MWS1330X15DB	201.9	245.4	248.4	312.4	310	2.4	14	6
13.3	20	□	MWS1330X20DB	268.4	313.4	316.4	380.4	378	2.4	14	6
13.4	3	▲	MWS1340MB	42.6	69.9	72.4	136.4	134	2.4	14	5
13.4	5	▲	MWS1340LB	69.4	110.4	114.4	178.4	176	2.4	14	5
13.4	8	□	MWS1340X8DB	109.6	151.4	156.4	220.4	218	2.4	14	5
13.4	10	□	MWS1340X10DB	136.4	178.4	181.4	245.4	243	2.4	14	6
13.4	15	□	MWS1340X15DB	203.4	245.4	248.4	312.4	310	2.4	14	6
13.4	20	□	MWS1340X20DB	270.4	313.4	316.4	380.4	378	2.4	14	6
13.5	3	▲	MWS1350MB	43.0	70.0	72.5	136.5	134	2.5	14	5
13.5	5	▲	MWS1350LB	70.0	110.5	114.5	178.5	176	2.5	14	5
13.5	8	▲	MWS1350X8DB	110.5	151.5	156.5	220.5	218	2.5	14	5
13.5	10	▲	MWS1350X10DB	137.5	178.5	181.5	245.5	243	2.5	14	6
13.5	15	▲	MWS1350X15DB	205.0	245.5	248.5	312.5	310	2.5	14	6
13.5	20	▲	MWS1350X20DB	272.5	313.5	316.5	380.5	378	2.5	14	6
13.6	3	▲	MWS1360MB	43.3	72.5	72.5	136.5	134	2.5	14	5
13.6	5	▲	MWS1360LB	70.5	114.5	114.5	178.5	176	2.5	14	5
13.6	8	□	MWS1360X8DB	111.3	156.5	156.5	220.5	218	2.5	14	5
13.6	10	□	MWS1360X10DB	138.5	184.5	187.5	251.5	249	2.5	14	6
13.6	15	□	MWS1360X15DB	206.5	254.5	257.5	321.5	319	2.5	14	6
13.6	20	□	MWS1360X20DB	274.5	324.5	327.5	391.5	389	2.5	14	6
13.7	3	▲	MWS1370MB	43.6	72.5	72.5	136.5	134	2.5	14	5
13.7	5	▲	MWS1370LB	71.0	114.5	114.5	178.5	176	2.5	14	5
13.7	8	□	MWS1370X8DB	112.1	156.5	156.5	220.5	218	2.5	14	5
13.7	10	□	MWS1370X10DB	139.5	184.5	187.5	251.5	249	2.5	14	6
13.7	15	□	MWS1370X15DB	208.0	254.5	257.5	321.5	319	2.5	14	6
13.7	20	□	MWS1370X20DB	276.5	324.5	327.5	391.5	389	2.5	14	6
13.8	3	▲	MWS1380MB	43.9	72.5	72.5	136.5	134	2.5	14	5
13.8	5	▲	MWS1380LB	71.5	114.5	114.5	178.5	176	2.5	14	5
13.8	8	□	MWS1380X8DB	112.9	156.5	156.5	220.5	218	2.5	14	5
13.8	10	□	MWS1380X10DB	140.5	184.5	187.5	251.5	249	2.5	14	6
13.8	15	□	MWS1380X15DB	209.5	254.5	257.5	321.5	319	2.5	14	6
13.8	20	□	MWS1380X20DB	278.5	324.5	327.5	391.5	389	2.5	14	6

MWS

DC(mm)	Hole Depth(l/d)	VP15TF	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
13.9	3	▲	MWS1390MB	44.2	72.5	72.5	136.5	134	2.5	14	5
13.9	5	▲	MWS1390LB	72.0	114.5	114.5	178.5	176	2.5	14	5
13.9	8	□	MWS1390X8DB	113.7	156.5	156.5	220.5	218	2.5	14	5
13.9	10	□	MWS1390X10DB	141.5	184.5	187.5	251.5	249	2.5	14	6
13.9	15	□	MWS1390X15DB	211.0	254.5	257.5	321.5	319	2.5	14	6
13.9	20	□	MWS1390X20DB	280.5	324.5	327.5	391.5	389	2.5	14	6
14.0	3	▲	MWS1400MB	44.5	72.5	72.5	136.5	134	2.5	14	5
14.0	5	▲	MWS1400LB	72.5	114.5	114.5	178.5	176	2.5	14	5
14.0	8	▲	MWS1400X8DB	114.5	156.5	156.5	220.5	218	2.5	14	5
14.0	10	▲	MWS1400X10DB	142.5	184.5	187.5	251.5	249	2.5	14	6
14.0	15	▲	MWS1400X15DB	212.5	254.5	257.5	321.5	319	2.5	14	6
14.0	20	▲	MWS1400X20DB	282.5	324.5	327.5	391.5	389	2.5	14	6
14.1	3	▲	MWS1410MB	44.9	75.1	77.6	142.6	140	2.6	15	5
14.1	5	▲	MWS1410LB	73.1	118.6	122.6	187.6	185	2.6	15	5
14.1	8	□	MWS1410X8DB	115.4	162.6	167.6	227.6	225	2.6	15	5
14.2	3	▲	MWS1420MB	45.2	75.1	77.6	142.6	140	2.6	15	5
14.2	5	▲	MWS1420LB	73.6	118.6	122.6	187.6	185	2.6	15	5
14.2	8	▲	MWS1420X8DB	116.2	162.6	167.6	227.6	225	2.6	15	5
14.3	3	▲	MWS1430MB	45.5	75.1	77.6	142.6	140	2.6	15	5
14.3	5	▲	MWS1430LB	74.1	118.6	122.6	187.6	185	2.6	15	5
14.3	8	□	MWS1430X8DB	117.0	162.6	167.6	227.6	225	2.6	15	5
14.4	3	▲	MWS1440MB	45.8	75.1	77.6	142.6	140	2.6	15	5
14.4	5	▲	MWS1440LB	74.6	118.6	122.6	187.6	185	2.6	15	5
14.4	8	□	MWS1440X8DB	117.8	162.6	167.6	227.6	225	2.6	15	5
14.5	3	▲	MWS1450MB	46.1	75.1	77.6	142.6	140	2.6	15	5
14.5	5	▲	MWS1450LB	75.1	118.6	122.6	187.6	185	2.6	15	5
14.5	8	▲	MWS1450X8DB	118.6	162.6	167.6	227.6	225	2.6	15	5
14.6	3	▲	MWS1460MB	46.5	77.7	77.7	142.7	140	2.7	15	5
14.6	5	▲	MWS1460LB	75.7	122.7	122.7	187.7	185	2.7	15	5
14.6	8	□	MWS1460X8DB	119.5	167.7	167.7	227.7	225	2.7	15	5
14.7	3	▲	MWS1470MB	46.8	77.7	77.7	142.7	140	2.7	15	5
14.7	5	▲	MWS1470LB	76.2	122.7	122.7	187.7	185	2.7	15	5
14.7	8	□	MWS1470X8DB	120.3	167.7	167.7	227.7	225	2.7	15	5
14.8	3	▲	MWS1480MB	47.1	77.7	77.7	142.7	140	2.7	15	5
14.8	5	▲	MWS1480LB	76.7	122.7	122.7	187.7	185	2.7	15	5
14.8	8	□	MWS1480X8DB	121.1	167.7	167.7	227.7	225	2.7	15	5
14.9	3	▲	MWS1490MB	47.4	77.7	77.7	142.7	140	2.7	15	5
14.9	5	▲	MWS1490LB	77.2	122.7	122.7	187.7	185	2.7	15	5
14.9	8	□	MWS1490X8DB	121.9	167.7	167.7	227.7	225	2.7	15	5
15.0	3	▲	MWS1500MB	47.7	77.7	77.7	142.7	140	2.7	15	5
15.0	5	▲	MWS1500LB	77.7	122.7	122.7	187.7	185	2.7	15	5
15.0	8	▲	MWS1500X8DB	122.7	167.7	167.7	227.7	225	2.7	15	5
15.1	3	▲	MWS1510MB	48.0	80.2	82.7	147.7	145	2.7	16	5
15.1	5	▲	MWS1510LB	78.2	126.7	130.7	195.7	193	2.7	16	5
15.1	8	□	MWS1510X8DB	123.5	173.7	183.7	243.7	241	2.7	16	5
15.2	3	▲	MWS1520MB	48.4	80.3	82.8	147.8	145	2.8	16	5
15.2	5	▲	MWS1520LB	78.8	126.8	130.8	195.8	193	2.8	16	5
15.2	8	□	MWS1520X8DB	124.4	173.8	183.8	243.8	241	2.8	16	5
15.3	3	▲	MWS1530MB	48.7	80.3	82.8	147.8	145	2.8	16	5
15.3	5	▲	MWS1530LB	79.3	126.8	130.8	195.8	193	2.8	16	5
15.3	8	□	MWS1530X8DB	125.2	173.8	183.8	243.8	241	2.8	16	5
15.4	3	▲	MWS1540MB	49.0	80.3	82.8	147.8	145	2.8	16	5
15.4	5	▲	MWS1540LB	79.8	126.8	130.8	195.8	193	2.8	16	5
15.4	8	□	MWS1540X8DB	126.0	173.8	183.8	243.8	241	2.8	16	5

DC(mm)	Hole Depth(l/d)	VP15TF	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
15.5	3	▲	MWS1550MB	49.3	80.3	82.8	147.8	145	2.8	16	5
15.5	5	▲	MWS1550LB	80.3	126.8	130.8	195.8	193	2.8	16	5
15.5	8	▲	MWS1550X8DB	126.8	173.8	183.8	243.8	241	2.8	16	5
15.6	3	▲	MWS1560MB	49.6	82.8	82.8	147.8	145	2.8	16	5
15.6	5	▲	MWS1560LB	80.8	130.8	130.8	195.8	193	2.8	16	5
15.6	8	□	MWS1560X8DB	127.6	178.8	183.8	243.8	241	2.8	16	5
15.7	3	▲	MWS1570MB	50.0	82.9	82.9	147.9	145	2.9	16	5
15.7	5	▲	MWS1570LB	81.4	130.9	130.9	195.9	193	2.9	16	5
15.7	8	□	MWS1570X8DB	128.5	178.9	183.9	243.9	241	2.9	16	5
15.8	3	▲	MWS1580MB	50.3	82.9	82.9	147.9	145	2.9	16	5
15.8	5	▲	MWS1580LB	81.9	130.9	130.9	195.9	193	2.9	16	5
15.8	8	□	MWS1580X8DB	129.3	178.9	183.9	243.9	241	2.9	16	5
15.9	3	▲	MWS1590MB	50.6	82.9	82.9	147.9	145	2.9	16	5
15.9	5	▲	MWS1590LB	82.4	130.9	130.9	195.9	193	2.9	16	5
15.9	8	□	MWS1590X8DB	130.1	178.9	183.9	243.9	241	2.9	16	5
16.0	3	▲	MWS1600MB	50.9	82.9	82.9	147.9	145	2.9	16	5
16.0	5	▲	MWS1600LB	82.9	130.9	130.9	195.9	193	2.9	16	5
16.0	8	▲	MWS1600X8DB	130.9	178.9	183.9	243.9	241	2.9	16	5
16.1	3	□	MWS1610MB	51.2	85.4	87.9	152.9	150	2.9	17	5
16.1	5	□	MWS1610LB	83.4	134.9	138.9	203.9	201	2.9	17	5
16.2	3	□	MWS1620MB	51.5	85.4	87.9	152.9	150	2.9	17	5
16.2	5	□	MWS1620LB	83.9	134.9	138.9	203.9	201	2.9	17	5
16.3	3	□	MWS1630MB	51.9	85.5	88.0	153.0	150	3.0	17	5
16.3	5	□	MWS1630LB	84.5	135.0	139.0	204.0	201	3.0	17	5
16.4	3	□	MWS1640MB	52.2	85.5	88.0	153.0	150	3.0	17	5
16.4	5	□	MWS1640LB	85.0	135.0	139.0	204.0	201	3.0	17	5
16.5	3	▲	MWS1650MB	52.5	85.5	88.0	153.0	150	3.0	17	5
16.5	5	▲	MWS1650LB	85.5	135.0	139.0	204.0	201	3.0	17	5
16.6	3	□	MWS1660MB	52.8	88.0	88.0	153.0	150	3.0	17	5
16.6	5	□	MWS1660LB	86.0	139.0	139.0	204.0	201	3.0	17	5
16.7	3	□	MWS1670MB	53.1	88.0	88.0	153.0	150	3.0	17	5
16.7	5	□	MWS1670LB	86.5	139.0	139.0	204.0	201	3.0	17	5
16.8	3	□	MWS1680MB	53.5	88.1	88.1	153.1	150	3.1	17	5
16.8	5	□	MWS1680LB	87.1	139.1	139.1	204.1	201	3.1	17	5
16.9	3	□	MWS1690MB	53.8	88.1	88.1	153.1	150	3.1	17	5
16.9	5	□	MWS1690LB	87.6	139.1	139.1	204.1	201	3.1	17	5
17.0	3	▲	MWS1700MB	54.1	88.1	88.1	153.1	150	3.1	17	5
17.0	5	▲	MWS1700LB	88.1	139.1	139.1	204.1	201	3.1	17	5
17.1	3	□	MWS1710MB	54.4	90.6	93.1	158.1	155	3.1	18	5
17.1	5	□	MWS1710LB	88.6	143.1	147.1	212.1	209	3.1	18	5
17.2	3	□	MWS1720MB	54.7	90.6	93.1	158.1	155	3.1	18	5
17.2	5	□	MWS1720LB	89.1	143.1	147.1	212.1	209	3.1	18	5
17.3	3	□	MWS1730MB	55.0	90.6	93.1	158.1	155	3.1	18	5
17.3	5	□	MWS1730LB	89.6	143.1	147.1	212.1	209	3.1	18	5
17.4	3	□	MWS1740MB	55.4	90.7	93.2	158.2	155	3.2	18	5
17.4	5	□	MWS1740LB	90.2	143.2	147.2	212.2	209	3.2	18	5
17.5	3	▲	MWS1750MB	55.7	90.7	93.2	158.2	155	3.2	18	5
17.5	5	▲	MWS1750LB	90.7	143.2	147.2	212.2	209	3.2	18	5
17.6	3	□	MWS1760MB	56.0	93.2	93.2	158.2	155	3.2	18	5
17.6	5	□	MWS1760LB	91.2	147.2	147.2	212.2	209	3.2	18	5
17.7	3	□	MWS1770MB	56.3	93.2	93.2	158.2	155	3.2	18	5
17.7	5	□	MWS1770LB	91.7	147.2	147.2	212.2	209	3.2	18	5
17.8	3	□	MWS1780MB	56.6	93.2	93.2	158.2	155	3.2	18	5
17.8	5	□	MWS1780LB	92.2	147.2	147.2	212.2	209	3.2	18	5

MWS

DC(mm)	Hole Depth(l/d)	VP15TF	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
17.9	3	□	**MWS1790MB**	57.0	93.3	93.3	158.3	155	3.3	18	5
17.9	5	□	**MWS1790LB**	92.8	147.3	147.3	212.3	209	3.3	18	5
18.0	3	▲	**MWS1800MB**	57.3	93.3	93.3	158.3	155	3.3	18	5
18.0	5	▲	**MWS1800LB**	93.3	147.3	147.3	212.3	209	3.3	18	5
18.1	3	□	**MWS1810MB**	57.6	95.8	98.3	163.3	160	3.3	19	5
18.1	5	□	**MWS1810LB**	93.8	151.3	155.3	220.3	217	3.3	19	5
18.2	3	□	**MWS1820MB**	57.9	95.8	98.3	163.3	160	3.3	19	5
18.2	5	□	**MWS1820LB**	94.3	151.3	155.3	220.3	217	3.3	19	5
18.3	3	□	**MWS1830MB**	58.2	95.8	98.3	163.3	160	3.3	19	5
18.3	5	□	**MWS1830LB**	94.8	151.3	155.3	220.3	217	3.3	19	5
18.4	3	□	**MWS1840MB**	58.5	95.8	98.3	163.3	160	3.3	19	5
18.4	5	□	**MWS1840LB**	95.3	151.3	155.3	220.3	217	3.3	19	5
18.5	3	▲	**MWS1850MB**	58.9	95.9	98.4	163.4	160	3.4	19	5
18.5	5	▲	**MWS1850LB**	95.9	151.4	155.4	220.4	217	3.4	19	5
18.6	3	□	**MWS1860MB**	59.2	98.4	98.4	163.4	160	3.4	19	5
18.6	5	□	**MWS1860LB**	96.4	155.4	155.4	220.4	217	3.4	19	5
18.7	3	□	**MWS1870MB**	59.5	98.4	98.4	163.4	160	3.4	19	5
18.7	5	□	**MWS1870LB**	96.9	155.4	155.4	220.4	217	3.4	19	5
18.8	3	□	**MWS1880MB**	59.8	98.4	98.4	163.4	160	3.4	19	5
18.8	5	□	**MWS1880LB**	97.4	155.4	155.4	220.4	217	3.4	19	5
18.9	3	□	**MWS1890MB**	60.1	98.4	98.4	163.4	160	3.4	19	5
18.9	5	□	**MWS1890LB**	97.9	155.4	155.4	220.4	217	3.4	19	5
19.0	3	▲	**MWS1900MB**	60.5	98.5	98.5	163.5	160	3.5	19	5
19.0	5	▲	**MWS1900LB**	98.5	155.5	155.5	220.5	217	3.5	19	5
19.1	3	□	**MWS1910MB**	60.8	101.0	103.5	168.5	165	3.5	20	5
19.1	5	□	**MWS1910LB**	99.0	159.5	163.5	228.5	225	3.5	20	5
19.2	3	□	**MWS1920MB**	61.1	101.0	103.5	168.5	165	3.5	20	5
19.2	5	□	**MWS1920LB**	99.5	159.5	163.5	228.5	225	3.5	20	5
19.3	3	□	**MWS1930MB**	61.4	101.0	103.5	168.5	165	3.5	20	5
19.3	5	□	**MWS1930LB**	100.0	159.5	163.5	228.5	225	3.5	20	5
19.4	3	□	**MWS1940MB**	61.7	101.0	103.5	168.5	165	3.5	20	5
19.4	5	□	**MWS1940LB**	100.5	159.5	163.5	228.5	225	3.5	20	5

DC(mm)	Hole Depth(l/d)	VP15TF	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
19.5	3	▲	**MWS1950MB**	62.0	101.0	103.5	168.5	165	3.5	20	5
19.5	5	▲	**MWS1950LB**	101.0	159.5	163.5	228.5	225	3.5	20	5
19.6	3	□	**MWS1960MB**	62.4	103.6	103.6	168.6	165	3.6	20	5
19.6	5	□	**MWS1960LB**	101.6	163.6	163.6	228.6	225	3.6	20	5
19.7	3	□	**MWS1970MB**	62.7	103.6	103.6	168.6	165	3.6	20	5
19.7	5	□	**MWS1970LB**	102.1	163.6	163.6	228.6	225	3.6	20	5
19.8	3	□	**MWS1980MB**	63.0	103.6	103.6	168.6	165	3.6	20	5
19.8	5	□	**MWS1980LB**	102.6	163.6	163.6	228.6	225	3.6	20	5
19.9	3	□	**MWS1990MB**	63.3	103.6	103.6	168.6	165	3.6	20	5
19.9	5	□	**MWS1990LB**	103.1	163.6	163.6	228.6	225	3.6	20	5
20.0	3	▲	**MWS2000MB**	63.6	103.6	103.6	168.6	165	3.6	20	5
20.0	5	▲	**MWS2000LB**	103.6	163.6	163.6	228.6	225	3.6	20	5
20.5	3	▲	**MWS2050MB**	65.2	106.7	108.7	179.7	176	3.7	21	5
20.5	5	▲	**MWS2050LB**	106.2	169.7	171.7	242.7	239	3.7	21	5
21.0	3	▲	**MWS2100MB**	66.8	108.8	108.8	179.8	176	3.8	21	5
21.0	5	▲	**MWS2100LB**	108.8	171.8	171.8	242.8	239	3.8	21	5
21.5	3	▲	**MWS2150MB**	68.4	111.9	113.9	185.9	182	3.9	22	5
21.5	5	▲	**MWS2150LB**	111.4	177.9	179.9	251.9	248	3.9	22	5
22.0	3	▲	**MWS2200MB**	70.0	114.0	114.0	186.0	182	4.0	22	5
22.0	5	▲	**MWS2200LB**	114.0	180.0	180.0	252.0	248	4.0	22	5
22.5	3	▲	**MWS2250MB**	71.6	117.1	119.1	192.1	188	4.1	23	5
22.5	5	▲	**MWS2250LB**	116.6	186.1	188.1	261.1	257	4.1	23	5
23.0	3	▲	**MWS2300MB**	73.2	119.2	119.2	192.2	188	4.2	23	5
23.0	5	▲	**MWS2300LB**	119.2	188.2	188.2	261.2	257	4.2	23	5
23.5	3	▲	**MWS2350MB**	74.8	122.3	124.3	198.3	194	4.3	24	5
23.5	5	▲	**MWS2350LB**	121.8	194.3	196.3	270.3	266	4.3	24	5
24.0	3	▲	**MWS2400MB**	76.4	124.4	124.4	198.4	194	4.4	24	5
24.0	5	▲	**MWS2400LB**	124.4	196.4	196.4	270.4	266	4.4	24	5
24.5	3	▲	**MWS2450MB**	78.0	127.5	129.5	204.5	200	4.5	25	5
24.5	5	▲	**MWS2450LB**	127.0	202.5	204.5	274.5	270	4.5	25	5
25.0	3	▲	**MWS2500MB**	79.5	129.5	129.5	204.5	200	4.5	25	5
25.0	5	▲	**MWS2500LB**	129.5	204.5	204.5	274.5	270	4.5	25	5

MWS

RECOMMENDED CUTTING CONDITIONS

SB/MB/LB/XB/DB Type Drill(l/d<10)

Work Material	Mild Steel (≤180HB) AISI 1010 etc					Carbon Steel·Alloy Steel (180—280HB) AISI 1045, AISI 4140 etc				
Drill Dia. DC (mm)	Cutting Speed (m/min)	Revolution (min-1)	Feed rate (Min.—Max.) (mm/rev)		Table Feed (mm/min)	Cutting Speed (m/min)	Revolution (min-1)	Feed rate (Min.—Max.) (mm/rev)		Table Feed (mm/min)
0.5	40	25400	0.01	(0.005—0.015)	250	40	25400	0.01	(0.005—0.015)	250
0.63	40	20200	0.014	(0.008—0.020)	280	40	20200	0.014	(0.008—0.020)	280
0.8	45	17900	0.028	(0.016—0.040)	500	45	17900	0.028	(0.016—0.040)	500
1.0	50	15900	0.035	(0.020—0.050)	555	50	15900	0.035	(0.020—0.050)	555
1.2	50	13200	0.045	(0.030—0.060)	590	50	13200	0.045	(0.030—0.060)	590
1.6	50	9900	0.055	(0.035—0.080)	540	50	9900	0.055	(0.035—0.080)	540
2.0	50	7900	0.07	(0.040—0.100)	550	50	7900	0.07	(0.040—0.100)	550
2.5	60	7600	0.085	(0.050—0.125)	645	60	7600	0.085	(0.050—0.125)	645
3.2	90	8900	0.1	(0.06—0.13)	890	80	7900	0.1	(0.06—0.13)	790
4.0	100	7900	0.12	(0.08—0.16)	945	90	7100	0.12	(0.08—0.16)	850
5.0	100	6300	0.15	(0.10—0.20)	945	90	5700	0.15	(0.10—0.20)	855
6.3	110	5500	0.2	(0.13—0.26)	1100	100	5000	0.2	(0.13—0.26)	1000
8.0	120	4700	0.23	(0.18—0.28)	1080	110	4300	0.23	(0.18—0.28)	985
10.0	130	4100	0.27	(0.22—0.32)	1105	120	3800	0.27	(0.22—0.32)	1025
12.0	140	3700	0.3	(0.26—0.34)	1110	130	3400	0.3	(0.26—0.34)	1020
16.0	160	3100	0.33	(0.27—0.38)	1020	140	2700	0.33	(0.27—0.38)	890
20.0	160	2500	0.35	(0.30—0.40)	875	140	2200	0.35	(0.30—0.40)	770
25.0	160	2000	0.35	(0.30—0.40)	700	140	1700	0.35	(0.30—0.40)	595

Work Material	Carbon Steel·Alloy Steel (280—350HB) AISI 4340 etc					Austenitic Stainless Steel (≤200HB) AISI 304, AISI 316 etc				
Drill Dia. DC (mm)	Cutting Speed (m/min)	Revolution (min-1)	Feed rate (Min.—Max.) (mm/rev)		Table Feed (mm/min)	Cutting Speed (m/min)	Revolution (min-1)	Feed rate (Min.—Max.) (mm/rev)		Table Feed (mm/min)
0.5	30	19000	0.01	(0.005—0.015)	190	20	12700	0.008	(0.005—0.010)	100
0.63	30	15100	0.014	(0.008—0.020)	210	20	10100	0.01	(0.008—0.013)	100
0.8	35	13900	0.028	(0.016—0.040)	385	25	9900	0.02	(0.016—0.026)	195
1.0	40	12700	0.035	(0.020—0.050)	440	30	9500	0.03	(0.020—0.044)	285
1.2	40	10600	0.045	(0.030—0.060)	475	30	7900	0.04	(0.030—0.053)	315
1.6	40	7900	0.055	(0.035—0.080)	430	30	5900	0.05	(0.035—0.070)	295
2.0	40	6300	0.07	(0.040—0.100)	440	30	4700	0.06	(0.040—0.080)	280
2.5	50	6300	0.085	(0.050—0.125)	535	40	5000	0.075	(0.050—0.100)	375
3.2	70	6900	0.1	(0.06—0.13)	690	40	3900	0.08	(0.06—0.10)	310
4.0	80	6300	0.11	(0.07—0.14)	690	40	3100	0.09	(0.06—0.11)	275
5.0	80	5000	0.14	(0.09—0.18)	700	40	2500	0.11	(0.08—0.14)	275
6.3	90	4500	0.18	(0.11—0.24)	810	50	2500	0.14	(0.09—0.18)	350
8.0	100	3900	0.21	(0.16—0.25)	815	50	1900	0.15	(0.10—0.19)	285
10.0	110	3500	0.23	(0.19—0.27)	805	50	1500	0.16	(0.12—0.20)	240
12.0	120	3100	0.26	(0.22—0.29)	805	60	1500	0.18	(0.15—0.21)	270
16.0	130	2500	0.28	(0.23—0.33)	700	60	1100	0.19	(0.14—0.24)	205
20.0	130	2000	0.3	(0.26—0.34)	600	60	900	0.21	(0.15—0.26)	185
25.0	130	1600	0.32	(0.28—0.35)	510	60	700	0.21	(0.17—0.25)	145

MWS

Work Material	Gray Cast Iron (≤350MPa) No 45 B etc				Ductile Cast Iron (≤450MPa) 60-40-8 etc			
Drill Dia. DC (mm)	Cutting Speed (m/min)	Revolution (min-1)	Feed rate (Min.—Max.) (mm/rev)	Table Feed (mm/min)	Cutting Speed (m/min)	Revolution (min-1)	Feed rate (Min.—Max.) (mm/rev)	Table Feed (mm/min)
0.5	40	25400	0.01 (0.005—0.015)	250	30	19000	0.01 (0.005—0.015)	190
0.63	40	20200	0.014 (0.008—0.020)	280	30	15100	0.014 (0.008—0.020)	210
0.8	45	17900	0.028 (0.016—0.040)	500	35	13900	0.028 (0.016—0.040)	385
1.0	50	15900	0.035 (0.020—0.050)	555	40	12700	0.035 (0.020—0.050)	440
1.2	50	13200	0.045 (0.030—0.060)	590	40	10600	0.045 (0.030—0.060)	475
1.6	50	9900	0.055 (0.035—0.080)	540	40	7900	0.055 (0.035—0.080)	430
2.0	50	7900	0.07 (0.040—0.100)	550	40	6300	0.07 (0.040—0.100)	440
2.5	60	7600	0.085 (0.050—0.125)	645	50	6300	0.085 (0.050—0.125)	535
3.2	90	8900	0.1 (0.06—0.13)	890	65	6400	0.1 (0.06—0.13)	640
4.0	100	7900	0.12 (0.08—0.16)	945	65	5100	0.12 (0.08—0.16)	610
5.0	100	6300	0.15 (0.10—0.20)	945	65	4100	0.15 (0.10—0.20)	615
6.3	110	5500	0.2 (0.13—0.26)	1100	70	3500	0.2 (0.13—0.26)	700
8.0	120	4700	0.25 (0.18—0.31)	1175	70	2700	0.23 (0.18—0.28)	620
10.0	130	4100	0.29 (0.22—0.35)	1185	70	2200	0.27 (0.22—0.32)	590
12.0	140	3700	0.32 (0.26—0.37)	1180	90	2300	0.3 (0.26—0.34)	690
16.0	160	3100	0.35 (0.28—0.42)	1085	90	1700	0.33 (0.28—0.38)	560
20.0	160	2500	0.37 (0.30—0.44)	925	100	1500	0.35 (0.30—0.40)	525
25.0	160	2000	0.37 (0.30—0.44)	740	100	1200	0.35 (0.30—0.40)	420

Work Material	Aluminium Alloy (Si<5%) ASTM A6061, ASTM A7075 etc				Heat Resistant Alloy Inconel718			
Drill Dia. DC (mm)	Cutting Speed (m/min)	Revolution (min-1)	Feed rate (Min.—Max.) (mm/rev)	Table Feed (mm/min)	Cutting Speed (m/min)	Revolution (min-1)	Feed rate (Min.—Max.) (mm/rev)	Table Feed (mm/min)
0.5	40	25400	0.014 (0.008—0.020)	355	10	6300	0.006 (0.004—0.008)	35
0.63	40	20200	0.02 (0.012—0.030)	400	10	5000	0.008 (0.007—0.010)	40
0.8	45	17900	0.036 (0.024—0.050)	640	10	3900	0.016 (0.013—0.021)	60
1.0	60	19000	0.05 (0.030—0.075)	950	10	3100	0.02 (0.016—0.027)	60
1.2	70	18500	0.065 (0.045—0.090)	1200	10	2600	0.025 (0.022—0.032)	65
1.6	80	15900	0.085 (0.053—0.120)	1350	10	1900	0.03 (0.025—0.040)	55
2.0	90	14300	0.105 (0.060—0.150)	1500	15	2300	0.04 (0.032—0.050)	90
2.5	100	12700	0.135 (0.075—0.200)	1710	15	1900	0.05 (0.040—0.060)	95
3.2	120	11900	0.23 (0.10—0.35)	2735	20	1900	0.07 (0.05—0.09)	130
4.0	120	9500	0.24 (0.12—0.35)	2280	20	1500	0.09 (0.06—0.11)	135
5.0	120	7600	0.25 (0.15—0.35)	1900	20	1200	0.11 (0.08—0.14)	130
6.3	150	7500	0.35 (0.20—0.50)	2625	25	1200	0.13 (0.09—0.16)	155
8.0	150	5900	0.35 (0.20—0.50)	2065	25	900	0.14 (0.11—0.17)	125
10.0	150	4700	0.5 (0.20—0.80)	2350	25	700	0.15 (0.12—0.17)	105
12.0	160	4200	0.5 (0.20—0.80)	2100	25	600	0.16 (0.13—0.18)	95
16.0	160	3100	0.6 (0.20—1.00)	1860	25	400	0.18 (0.14—0.21)	70
20.0	170	2700	0.6 (0.20—1.00)	1620	30	400	0.19 (0.15—0.22)	75
25.0	170	2100	0.6 (0.20—1.00)	1260	30	300	0.19 (0.15—0.22)	55

MWS

RECOMMENDED CUTTING CONDITIONS

DB Type Drill(l/d≥10)

Work Material	Mild Steel (≤180 HB) AISI 1010 etc					Carbon Steel·Alloy Steel (180—280HB) AISI 1045, AISI 4140 etc				
Drill Dia. DC (mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)		Table Feed (mm/min)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)		Table Feed (mm/min)
1.0	50	15900	0.02	(0.010—0.030)	320	40	12700	0.02	(0.010—0.030)	255
1.2	50	13200	0.025	(0.016—0.037)	330	40	10600	0.025	(0.016—0.037)	265
1.6	50	9900	0.055	(0.032—0.080)	545	40	7900	0.055	(0.032—0.080)	435
2.0	60	9500	0.07	(0.040—0.100)	665	50	7900	0.07	(0.040—0.100)	550
2.5	60	7600	0.09	(0.063—0.125)	685	50	6300	0.09	(0.055—0.125)	565
3.2	90	8900	0.1	(0.06—0.13)	890	80	7900	0.1	(0.06—0.13)	790
4.0	90	7100	0.12	(0.08—0.16)	850	80	6300	0.12	(0.08—0.16)	755
5.0	90	5700	0.15	(0.10—0.20)	855	80	5000	0.15	(0.10—0.20)	750
6.3	110	5500	0.2	(0.13—0.26)	1100	90	4500	0.2	(0.13—0.26)	900
8.0	110	4300	0.23	(0.18—0.28)	990	90	3500	0.23	(0.18—0.28)	805
10.0	110	3500	0.26	(0.20—0.32)	910	90	2800	0.26	(0.20—0.32)	730
12.0	130	3400	0.3	(0.25—0.34)	1020	110	2900	0.3	(0.25—0.34)	870
16.0	130	2500	0.31	(0.24—0.38)	775	110	2100	0.31	(0.24—0.38)	650

Work Material	Carbon Steel·Alloy Steel (280—350HB) AISI 4340 etc					Austenitic Stainless Steel (≤200HB) AISI 304, AISI 316 etc				
Drill Dia. DC (mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)		Table Feed (mm/min)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)		Table Feed (mm/min)
1.0	30	9500	0.015	(0.009—0.028)	140	30	9500	0.015	(0.009—0.028)	140
1.2	30	7900	0.02	(0.013—0.035)	160	30	7900	0.02	(0.013—0.035)	155
1.6	30	5900	0.05	(0.027—0.076)	295	30	5900	0.045	(0.025—0.065)	265
2.0	50	7900	0.065	(0.034—0.095)	515	30	4700	0.055	(0.030—0.080)	255
2.5	50	6300	0.08	(0.045—0.120)	505	40	5000	0.06	(0.035—0.085)	300
3.2	70	6900	0.09	(0.05—0.12)	620	40	3900	0.07	(0.05—0.09)	270
4.0	70	5500	0.11	(0.07—0.15)	605	40	3100	0.08	(0.06—0.10)	245
5.0	70	4400	0.14	(0.09—0.19)	615	40	2500	0.1	(0.07—0.12)	250
6.3	80	4000	0.18	(0.11—0.25)	720	50	2500	0.12	(0.08—0.16)	300
8.0	80	3100	0.21	(0.15—0.26)	650	50	1900	0.14	(0.10—0.17)	265
10.0	80	2500	0.23	(0.15—0.30)	575	50	1500	0.15	(0.12—0.18)	225
12.0	90	2300	0.25	(0.19—0.31)	575	60	1500	0.17	(0.14—0.19)	255
16.0	90	1700	0.28	(0.19—0.36)	475	60	1100	0.18	(0.13—0.22)	195

MWS

Work Material	Gray Cast Iron (≤350MPa) No 45 B etc				Ductile Cast Iron (≤450MPa) 60-40-8 etc			
Drill Dia. DC (mm)	Cutting Speed (m/min)	Revolution (min-1)	Feed rate (Min.—Max.) (mm/rev)	Table Feed (mm/min)	Cutting Speed (m/min)	Revolution (min-1)	Feed rate (Min.—Max.) (mm/rev)	Table Feed (mm/min)
1.0	40	12700	0.02 (0.010—0.030)	255	30	9500	0.015 (0.009—0.028)	140
1.2	40	10600	0.025 (0.016—0.037)	265	30	7900	0.02 (0.013—0.035)	160
1.6	40	7900	0.055 (0.032—0.080)	435	30	5900	0.05 (0.027—0.076)	295
2.0	50	7900	0.07 (0.040—0.100)	550	50	7900	0.065 (0.034—0.095)	515
2.5	50	6300	0.09 (0.055—0.125)	565	50	6300	0.08 (0.045—0.120)	505
3.2	90	8900	0.1 (0.06—0.13)	890	50	4900	0.09 (0.05—0.12)	440
4.0	90	7100	0.12 (0.08—0.16)	850	50	3900	0.11 (0.07—0.15)	430
5.0	90	5700	0.15 (0.10—0.20)	855	50	3100	0.14 (0.09—0.19)	435
6.3	110	5500	0.2 (0.13—0.26)	1100	60	3000	0.18 (0.11—0.25)	540
8.0	110	4300	0.23 (0.18—0.28)	990	60	2300	0.21 (0.15—0.26)	480
10.0	110	3500	0.26 (0.20—0.32)	910	60	1900	0.23 (0.15—0.30)	435
12.0	130	3400	0.3 (0.25—0.34)	1020	80	2100	0.25 (0.19—0.31)	525
16.0	130	2500	0.31 (0.24—0.38)	775	80	1500	0.28 (0.19—0.36)	420

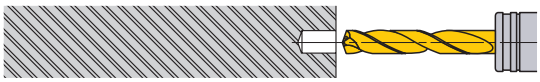
Work Material	Aluminium Alloy (Si<5%) ASTM A6061, ASTM A7075 etc				Heat Resistant Alloy Inconel718			
Drill Dia. DC (mm)	Cutting Speed (m/min)	Revolution (min-1)	Feed rate (Min.—Max.) (mm/rev)	Table Feed (mm/min)	Cutting Speed (m/min)	Revolution (min-1)	Feed rate (Min.—Max.) (mm/rev)	Table Feed (mm/min)
1.0	50	15900	0.05 (0.030—0.075)	795	10	3100	0.02 (0.016—0.027)	60
1.2	60	15900	0.065 (0.045—0.090)	1035	10	2600	0.025 (0.022—0.032)	65
1.6	70	13900	0.085 (0.053—0.120)	1180	10	1900	0.03 (0.025—0.040)	55
2.0	80	12700	0.105 (0.060—0.150)	1335	15	2300	0.04 (0.032—0.050)	90
2.5	90	11400	0.135 (0.075—0.200)	1540	15	1900	0.05 (0.040—0.060)	95
3.2	100	9900	0.23 (0.10—0.35)	2275	20	1900	0.07 (0.05—0.09)	130
4.0	100	7900	0.24 (0.12—0.35)	1895	20	1500	0.09 (0.06—0.11)	135
5.0	100	6300	0.25 (0.15—0.35)	1575	20	1200	0.11 (0.08—0.14)	130
6.3	130	6500	0.35 (0.20—0.50)	2275	20	1000	0.13 (0.09—0.16)	130
8.0	130	5100	0.35 (0.20—0.50)	1785	20	700	0.14 (0.11—0.16)	100
10.0	130	4100	0.5 (0.20—0.80)	2050	20	600	0.15 (0.12—0.17)	90
12.0	140	3700	0.5 (0.20—0.80)	1850	20	500	0.16 (0.13—0.18)	80
16.0	140	2700	0.5 (0.20—0.80)	1350	20	300	0.17 (0.14—0.19)	50

MWS

MWS...DB Type Drill(L/D≥10, DC<3) OPERATIONAL GUIDANCE

FLAT FACE DRILLING ●Drilling a blind hole

1. Drilling a pilot hole



①Use the SB type drill.
②Ensure a high precision hole is drilled for the guide.
③Drill depth : Approx 1DC.
(Adjust the pilot hole depth according to the length of the long type drill.)

2. Initial cutting with the long type drill

①Penetrate the guide hole at low revolution. (Revolution 1000min^{-1}, feed rate 0.2–0.3mm/rev)
②Stop the long type drill 0.5–1.0mm short of the guide hole bottom.

3. Drill the deep hole

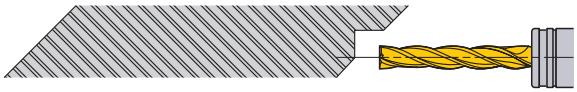
①Start cutting at the recommended speed and feed with a non-peck (continuous feed) cycle.

4. Drill retraction

①After drilling, lower the cutting revolution about 0.5–1.0mm short of the hole end. (Revolution of around 1000min^{-1})
②Retract the drill to the pilot hole depth starting point at a feed rate of 3000mm/min.
③Finally, clear the hole at a cutting speed of 20–30m/min and feed rate of 0.2–0.3mm/rev.

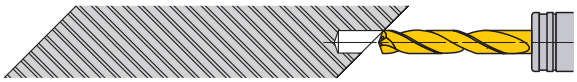
INTERRUPED DRILLING ●Drilling and breaking through on irregular faces or angles

1. Spot facing



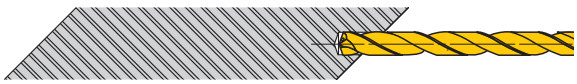
①Machine a flat or the irregular face by using an end mill or slot drill capable of spot facing. Make the spot face diameter the same size as the required deep hole diameter.

2. Drilling a pilot hole



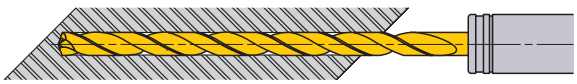
①Use a drill with a larger (flatter) point angle than the long type. TheMWS-SB type is recommended.
②Ensure a high precision hole is drilled for the guide.
③Drill depth : Approx 1DC.
(Adjust the pilot hole depth according to the length of the long type drill.)

3. Initial cutting with the long type drill



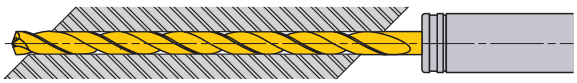
①Penetrate the guide hole at a low revolution. (Revolution 1000min^{-1}, feed rate 0.2–0.3mm/rev)
②Stop the long type drill 0.5–1.0mm short of the guide hole bottom.

4. Drill the deep hole



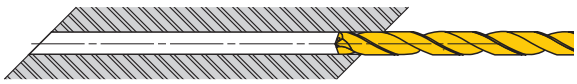
①Start cutting at the recommended speed and feed with a non-peck (continuous feed) cycle.

5. Breaking through



①When breaking through, the cutting edge can be damaged.
②Feed rate should be half the normal feed.

6. Drill retraction



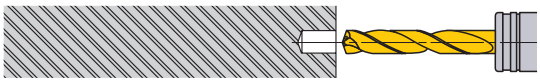
①Finally clear the hole at a revolution speed of 1000min^{-1} and feed rate of 0.2–0.3mm/rev.
②Retract the drill to the pilot hole depth starting point at a feed rate of 3000mm/min.

MWS

OPERATIONAL GUIDANCE FOR THE MWS LONG TYPE DRILL (L/D≥3)

FLAT FACE DRILLING ●Drilling a blind hole

1. Drilling a pilot hole



①Use a drill with a larger (flatter) point angle than the super long type. Mitsubishi type MZE, MZS, MWE or MWS is recommended.
②Use a drill with the same diameter as the deep hole drill.
③Drill depth : Approx 1DC or deeper.
④Ensure a high precision hole is drilled for the guide.

2. Initial cutting with the long type drill

①Penetrate the guide hole at low revolution. (Cutting speed 20—30m/min, feed rate 0.2—0.3mm/rev)
②Stop the long type drill 1—3mm short of the guide hole bottom.

3. Drill the deep hole

①Start cutting at the recommended speed and feed with a non-peck (continuous feed) cycle.

4. Drill retraction

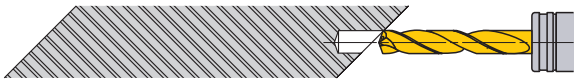
①After drilling, lower the cutting revolution about 1—2mm short of the hole end. (Cutting speed of around 20—30m/min)
②Retract the drill to the pilot hole depth starting point at a feed rate of 3000mm/min.
③Finally, clear the hole at a cutting speed of 20—30m/min and feed rate of 0.2—0.3mm/rev.

INTERRUPED DRILLING ●Drilling and breaking through on irregular faces or angles

1. Spot facing

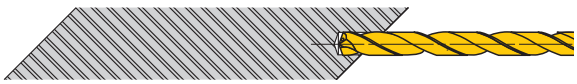
①Machine a flat or the irregular face by using an end mill or slot drill capable of spot facing. Make the spot face diameter the same size as the required deep hole diameter.

2. Drilling a pilot hole



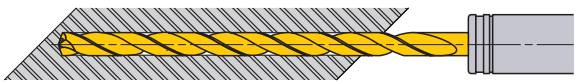
①Use a drill with a larger (flatter) point angle than the super long type. Mitsubishi type MZE, MZS, MWE or MWS is recommended.
②Use a drill with the same diameter as the deep hole drill.
③Drill depth : Approx 1DC or deeper.
④Ensure a high precision hole is drilled for the guide.

3. Initial cutting with the long type drill



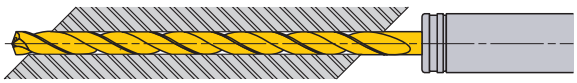
①Penetrate the guide hole at a low revolution. (Cutting speed 20—30m/min, feed rate 0.2—0.3mm/rev)
②Stop the long type drill 1—3mm short of the guide hole bottom.

4. Drill the deep hole



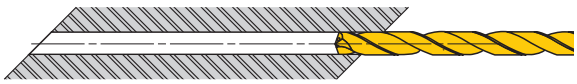
①Start cutting at the recommended speed and feed with a non-peck (continuous feed) cycle.

5. Breaking through



①When breaking through, the cutting edge can be damaged.
②A feed rate of 0.05—0.1mm/rev is recommended.

6. Drill retraction



①Finally clear the hole at a cutting speed of 20—30m/min and feed rate of 0.2—0.3mm/rev.
②Retract the drill to the pilot hole depth starting point at a feed rate of 3000mm/min.

MWE

WSTAR Drill Series

General-purpose drills

Product Information

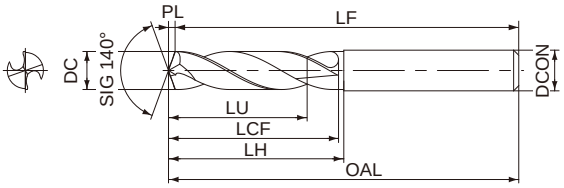
UWC VP 140° SIG X Thinning

Work Material

P M K N S H

TECHNICAL DATA >> 1997 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 1623 DRILLS SELECTION CHART >> 1624

	—	DC=3	3<DC≦6	6<DC≦10	10<DC≦18	18<DC≦25
		0 −0.014	0 −0.018	0 −0.022	0 −0.027	0 −0.033
h8	MWE-SA/MA	0 −0.014	0 −0.018	0 −0.022	0 −0.027	0 −0.033
h6	MWE-SB/MB	0 −0.006	0 −0.008	0 −0.009	0 −0.011	0 −0.013



Type1

MWE-SB/MB drills are suitable for use with shrink fit holders.

Stock status indication:●: Inventory maintained in Japan.▲: This item to be discontinued within two years.□: Non stock, produced to order only.

External Coolant Unit（mm）

DC(mm)	Hole Depth(l/d)	VP15TF	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
3.0	2	▲	MWE0300SA	6.5	16.5	16.5	55.5	55	0.5	3.0	1
3.0	2	▲	MWE0300SB	6.5	16.5	16.5	55.5	55	0.5	3.0	1
3.0	3	▲	MWE0300MA	9.5	21.5	21.5	60.5	60	0.5	3.0	1
3.0	3	▲	MWE0300MB	9.5	21.5	21.5	60.5	60	0.5	3.0	1
3.1	2	▲	MWE0310SA	6.8	18.6	18.6	55.6	55	0.6	3.1	1
3.1	2	□	MWE0310SB	6.8	18.6	20.6	55.6	55	0.6	4.0	1
3.1	3	▲	MWE0310MA	9.9	24.6	24.6	60.6	60	0.6	3.1	1
3.1	3	□	MWE0310MB	9.9	24.6	26.6	60.6	60	0.6	4.0	1
3.2	2	▲	MWE0320SA	7.0	18.6	18.6	55.6	55	0.6	3.2	1
3.2	2	□	MWE0320SB	7.0	18.6	20.6	55.6	55	0.6	4.0	1
3.2	3	▲	MWE0320MA	10.2	24.6	24.6	60.6	60	0.6	3.2	1
3.2	3	□	MWE0320MB	10.2	24.6	26.6	60.6	60	0.6	4.0	1
3.3	2	▲	MWE0330SA	7.2	18.6	18.6	55.6	55	0.6	3.3	1
3.3	2	▲	MWE0330SB	7.2	18.6	20.6	55.6	55	0.6	4.0	1
3.3	3	▲	MWE0330MA	10.5	24.6	24.6	60.6	60	0.6	3.3	1
3.3	3	▲	MWE0330MB	10.5	24.6	26.6	60.6	60	0.6	4.0	1
3.4	2	▲	MWE0340SA	7.4	20.6	20.6	55.6	55	0.6	3.4	1
3.4	2	▲	MWE0340SB	7.4	18.6	20.6	55.6	55	0.6	4.0	1
3.4	3	▲	MWE0340MA	10.8	24.6	24.6	60.6	60	0.6	3.4	1
3.4	3	▲	MWE0340MB	10.8	24.6	26.6	60.6	60	0.6	4.0	1
3.5	2	▲	MWE0350SA	7.6	20.6	20.6	55.6	55	0.6	3.5	1
3.5	2	▲	MWE0350SB	7.6	18.6	20.6	55.6	55	0.6	4.0	1
3.5	3	▲	MWE0350MA	11.1	24.6	24.6	60.6	60	0.6	3.5	1
3.5	3	▲	MWE0350MB	11.1	24.6	26.6	60.6	60	0.6	4.0	1
3.6	2	▲	MWE0360SA	7.9	20.7	20.7	55.7	55	0.7	3.6	1
3.6	2	□	MWE0360SB	7.9	20.7	20.7	55.7	55	0.7	4.0	1
3.6	3	▲	MWE0360MA	11.5	27.7	27.7	60.7	60	0.7	3.6	1
3.6	3	□	MWE0360MB	11.5	27.7	27.7	60.7	60	0.7	4.0	1
3.7	2	▲	MWE0370SA	8.1	20.7	20.7	55.7	55	0.7	3.7	1
3.7	2	▲	MWE0370SB	8.1	20.7	20.7	55.7	55	0.7	4.0	1
3.7	3	▲	MWE0370MA	11.8	27.7	27.7	60.7	60	0.7	3.7	1
3.7	3	▲	MWE0370MB	11.8	27.7	27.7	60.7	60	0.7	4.0	1

DC(mm)	Hole Depth(l/d)	VP15TF	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
3.8	2	▲	MWE0380SA	8.3	22.7	22.7	55.7	55	0.7	3.8	1
3.8	2	▲	MWE0380SB	8.3	20.7	20.7	55.7	55	0.7	4.0	1
3.8	3	▲	MWE0380MA	12.1	27.7	27.7	60.7	60	0.7	3.8	1
3.8	3	▲	MWE0380MB	12.1	27.7	27.7	60.7	60	0.7	4.0	1
3.9	2	▲	MWE0390SA	8.5	22.7	22.7	55.7	55	0.7	3.9	1
3.9	2	▲	MWE0390SB	8.5	20.7	20.7	55.7	55	0.7	4.0	1
3.9	3	▲	MWE0390MA	12.4	27.7	27.7	60.7	60	0.7	3.9	1
3.9	3	▲	MWE0390MB	12.4	27.7	27.7	60.7	60	0.7	4.0	1
4.0	2	▲	MWE0400SA	8.7	22.7	22.7	55.7	55	0.7	4.0	1
4.0	2	▲	MWE0400SB	8.7	20.7	20.7	55.7	55	0.7	4.0	1
4.0	3	▲	MWE0400MA	12.7	27.7	27.7	60.7	60	0.7	4.0	1
4.0	3	▲	MWE0400MB	12.7	27.7	27.7	60.7	60	0.7	4.0	1
4.1	2	▲	MWE0410SA	8.9	22.7	22.7	55.7	55	0.7	4.1	1
4.1	2	□	MWE0410SB	8.9	22.7	24.7	62.7	62	0.7	5.0	1
4.1	3	▲	MWE0410MA	13.0	29.7	29.7	63.7	63	0.7	4.1	1
4.1	3	□	MWE0410MB	13.0	29.7	31.7	68.7	68	0.7	5.0	1
4.2	2	▲	MWE0420SA	9.2	22.8	22.8	55.8	55	0.8	4.2	1
4.2	2	▲	MWE0420SB	9.2	22.8	24.8	62.8	62	0.8	5.0	1
4.2	3	▲	MWE0420MA	13.4	29.8	29.8	63.8	63	0.8	4.2	1
4.2	3	▲	MWE0420MB	13.4	29.8	31.8	68.8	68	0.8	5.0	1
4.3	2	▲	MWE0430SA	9.4	24.8	24.8	58.8	58	0.8	4.3	1
4.3	2	▲	MWE0430SB	9.4	22.8	24.8	62.8	62	0.8	5.0	1
4.3	3	▲	MWE0430MA	13.7	29.8	29.8	63.8	63	0.8	4.3	1
4.3	3	▲	MWE0430MB	13.7	29.8	31.8	68.8	68	0.8	5.0	1
4.4	2	▲	MWE0440SA	9.6	24.8	24.8	58.8	58	0.8	4.4	1
4.4	2	▲	MWE0440SB	9.6	22.8	24.8	62.8	62	0.8	5.0	1
4.4	3	▲	MWE0440MA	14.0	29.8	29.8	63.8	63	0.8	4.4	1
4.4	3	▲	MWE0440MB	14.0	29.8	31.8	68.8	68	0.8	5.0	1
4.5	2	▲	MWE0450SA	9.8	24.8	24.8	58.8	58	0.8	4.5	1
4.5	2	▲	MWE0450SB	9.8	22.8	24.8	62.8	62	0.8	5.0	1
4.5	3	▲	MWE0450MA	14.3	29.8	29.8	63.8	63	0.8	4.5	1
4.5	3	▲	MWE0450MB	14.3	29.8	31.8	68.8	68	0.8	5.0	1

MWE

DC(mm)	Hole Depth(l/d)	VP15TF	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
4.6	2	▲	MWE0460SA	10.0	24.8	24.8	58.8	58	0.8	4.6	1
4.6	2	□	MWE0460SB	10.0	24.8	24.8	62.8	62	0.8	5.0	1
4.6	3	▲	MWE0460MA	14.6	32.8	32.8	68.8	68	0.8	4.6	1
4.6	3	□	MWE0460MB	14.6	32.8	32.8	68.8	68	0.8	5.0	1
4.7	2	▲	MWE0470SA	10.3	24.9	24.9	58.9	58	0.9	4.7	1
4.7	2	□	MWE0470SB	10.3	24.9	24.9	62.9	62	0.9	5.0	1
4.7	3	▲	MWE0470MA	15.0	32.9	32.9	68.9	68	0.9	4.7	1
4.7	3	□	MWE0470MB	15.0	32.9	32.9	68.9	68	0.9	5.0	1
4.8	2	▲	MWE0480SA	10.5	26.9	26.9	62.9	62	0.9	4.8	1
4.8	2	□	MWE0480SB	10.5	24.9	24.9	62.9	62	0.9	5.0	1
4.8	3	▲	MWE0480MA	15.3	32.9	32.9	68.9	68	0.9	4.8	1
4.8	3	□	MWE0480MB	15.3	32.9	32.9	68.9	68	0.9	5.0	1
4.9	2	▲	MWE0490SA	10.7	26.9	26.9	62.9	62	0.9	4.9	1
4.9	2	□	MWE0490SB	10.7	24.9	24.9	62.9	62	0.9	5.0	1
4.9	3	▲	MWE0490MA	15.6	32.9	32.9	68.9	68	0.9	4.9	1
4.9	3	□	MWE0490MB	15.6	32.9	32.9	68.9	68	0.9	5.0	1
5.0	2	▲	MWE0500SA	10.9	26.9	26.9	62.9	62	0.9	5.0	1
5.0	2	▲	MWE0500SB	10.9	24.9	24.9	62.9	62	0.9	5.0	1
5.0	3	▲	MWE0500MA	15.9	32.9	32.9	68.9	68	0.9	5.0	1
5.0	3	▲	MWE0500MB	15.9	32.9	32.9	68.9	68	0.9	5.0	1
5.1	2	▲	MWE0510SA	11.1	26.9	26.9	62.9	62	0.9	5.1	1
5.1	2	▲	MWE0510SB	11.1	26.9	28.9	66.9	66	0.9	6.0	1
5.1	3	▲	MWE0510MA	16.2	34.9	34.9	72.9	72	0.9	5.1	1
5.1	3	▲	MWE0510MB	16.2	34.9	36.9	74.9	74	0.9	6.0	1
5.2	2	▲	MWE0520SA	11.3	26.9	26.9	62.9	62	0.9	5.2	1
5.2	2	▲	MWE0520SB	11.3	26.9	28.9	66.9	66	0.9	6.0	1
5.2	3	▲	MWE0520MA	16.5	34.9	34.9	72.9	72	0.9	5.2	1
5.2	3	▲	MWE0520MB	16.5	34.9	36.9	74.9	74	0.9	6.0	1
5.3	2	▲	MWE0530SA	11.6	27.0	27.0	63.0	62	1.0	5.3	1
5.3	2	□	MWE0530SB	11.6	27.0	29.0	67.0	66	1.0	6.0	1
5.3	3	▲	MWE0530MA	16.9	35.0	35.0	73.0	72	1.0	5.3	1
5.3	3	□	MWE0530MB	16.9	35.0	37.0	75.0	74	1.0	6.0	1
5.4	2	▲	MWE0540SA	11.8	29.0	29.0	67.0	66	1.0	5.4	1
5.4	2	□	MWE0540SB	11.8	27.0	29.0	67.0	66	1.0	6.0	1
5.4	3	▲	MWE0540MA	17.2	35.0	35.0	73.0	72	1.0	5.4	1
5.4	3	□	MWE0540MB	17.2	35.0	37.0	75.0	74	1.0	6.0	1
5.5	2	▲	MWE0550SA	12.0	29.0	29.0	67.0	66	1.0	5.5	1
5.5	2	▲	MWE0550SB	12.0	27.0	29.0	67.0	66	1.0	6.0	1
5.5	3	▲	MWE0550MA	17.5	35.0	35.0	73.0	72	1.0	5.5	1
5.5	3	▲	MWE0550MB	17.5	35.0	37.0	75.0	74	1.0	6.0	1
5.6	2	▲	MWE0560SA	12.2	29.0	29.0	67.0	66	1.0	5.6	1
5.6	2	□	MWE0560SB	12.2	29.0	29.0	67.0	66	1.0	6.0	1
5.6	3	▲	MWE0560MA	17.8	37.0	37.0	75.0	74	1.0	5.6	1
5.6	3	□	MWE0560MB	17.8	37.0	37.0	75.0	74	1.0	6.0	1
5.7	2	▲	MWE0570SA	12.4	29.0	29.0	67.0	66	1.0	5.7	1
5.7	2	□	MWE0570SB	12.4	29.0	29.0	67.0	66	1.0	6.0	1
5.7	3	▲	MWE0570MA	18.1	37.0	37.0	75.0	74	1.0	5.7	1
5.7	3	□	MWE0570MB	18.1	37.0	37.0	75.0	74	1.0	6.0	1
5.8	2	▲	MWE0580SA	12.7	29.1	29.1	67.1	66	1.1	5.8	1
5.8	2	□	MWE0580SB	12.7	29.1	29.1	67.1	66	1.1	6.0	1
5.8	3	▲	MWE0580MA	18.5	37.1	37.1	75.1	74	1.1	5.8	1
5.8	3	□	MWE0580MB	18.5	37.1	37.1	75.1	74	1.1	6.0	1
5.9	2	▲	MWE0590SA	12.9	29.1	29.1	67.1	66	1.1	5.9	1
5.9	2	□	MWE0590SB	12.9	29.1	29.1	67.1	66	1.1	6.0	1
5.9	3	▲	MWE0590MA	18.8	37.1	37.1	75.1	74	1.1	5.9	1
5.9	3	□	MWE0590MB	18.8	37.1	37.1	75.1	74	1.1	6.0	1
6.0	2	▲	MWE0600SA	13.1	29.1	29.1	67.1	66	1.1	6.0	1
6.0	2	▲	MWE0600SB	13.1	29.1	29.1	67.1	66	1.1	6.0	1
6.0	3	▲	MWE0600MA	19.1	42.1	42.1	82.1	81	1.1	6.0	1
6.0	3	▲	MWE0600MB	19.1	37.1	37.1	75.1	74	1.1	6.0	1
6.1	2	▲	MWE0610SA	13.3	32.1	32.1	71.1	70	1.1	6.1	1
6.1	2	▲	MWE0610SB	13.3	32.1	35.1	75.1	74	1.1	7.0	1
6.1	3	▲	MWE0610MA	19.4	42.1	42.1	82.1	81	1.1	6.1	1
6.1	3	▲	MWE0610MB	19.4	42.1	45.1	84.1	83	1.1	7.0	1
6.2	2	▲	MWE0620SA	13.5	32.1	32.1	71.1	70	1.1	6.2	1
6.2	2	▲	MWE0620SB	13.5	32.1	35.1	75.1	74	1.1	7.0	1
6.2	3	▲	MWE0620MA	19.7	42.1	42.1	82.1	81	1.1	6.2	1
6.2	3	▲	MWE0620MB	19.7	42.1	45.1	84.1	83	1.1	7.0	1
6.3	2	▲	MWE0630SA	13.7	32.1	32.1	71.1	70	1.1	6.3	1
6.3	2	□	MWE0630SB	13.7	32.1	35.1	75.1	74	1.1	7.0	1
6.3	3	▲	MWE0630MA	20.0	42.1	42.1	82.1	81	1.1	6.3	1
6.3	3	□	MWE0630MB	20.0	42.1	45.1	84.1	83	1.1	7.0	1
6.4	2	▲	MWE0640SA	14.0	32.2	32.2	71.2	70	1.2	6.4	1
6.4	2	□	MWE0640SB	14.0	32.2	35.2	75.2	74	1.2	7.0	1
6.4	3	▲	MWE0640MA	20.4	42.2	42.2	82.2	81	1.2	6.4	1
6.4	3	□	MWE0640MB	20.4	42.2	45.2	84.2	83	1.2	7.0	1
6.5	2	▲	MWE0650SA	14.2	32.2	32.2	71.2	70	1.2	6.5	1
6.5	2	▲	MWE0650SB	14.2	32.2	35.2	75.2	74	1.2	7.0	1
6.5	3	▲	MWE0650MA	20.7	42.2	42.2	82.2	81	1.2	6.5	1
6.5	3	▲	MWE0650MB	20.7	42.2	45.2	84.2	83	1.2	7.0	1
6.6	2	▲	MWE0660SA	14.4	32.2	32.2	71.2	70	1.2	6.6	1
6.6	2	□	MWE0660SB	14.4	35.2	35.2	75.2	74	1.2	7.0	1
6.6	3	▲	MWE0660MA	21.0	44.2	44.2	84.2	83	1.2	6.6	1
6.6	3	□	MWE0660MB	21.0	44.2	44.2	84.2	83	1.2	7.0	1
6.7	2	▲	MWE0670SA	14.6	32.2	32.2	71.2	70	1.2	6.7	1
6.7	2	▲	MWE0670SB	14.6	35.2	35.2	75.2	74	1.2	7.0	1
6.7	3	▲	MWE0670MA	21.3	44.2	44.2	84.2	83	1.2	6.7	1
6.7	3	▲	MWE0670MB	21.3	44.2	44.2	84.2	83	1.2	7.0	1
6.8	2	▲	MWE0680SA	14.8	35.2	35.2	75.2	74	1.2	6.8	1
6.8	2	▲	MWE0680SB	14.8	35.2	35.2	75.2	74	1.2	7.0	1
6.8	3	▲	MWE0680MA	21.6	44.2	44.2	84.2	83	1.2	6.8	1
6.8	3	▲	MWE0680MB	21.6	44.2	44.2	84.2	83	1.2	7.0	1
6.9	2	▲	MWE0690SA	15.1	35.3	35.3	75.3	74	1.3	6.9	1
6.9	2	▲	MWE0690SB	15.1	35.3	35.3	75.3	74	1.3	7.0	1
6.9	3	▲	MWE0690MA	22.0	44.3	44.3	84.3	83	1.3	6.9	1
6.9	3	▲	MWE0690MB	22.0	44.3	44.3	84.3	83	1.3	7.0	1
7.0	2	▲	MWE0700SA	15.3	35.3	35.3	75.3	74	1.3	7.0	1
7.0	2	▲	MWE0700SB	15.3	35.3	35.3	75.3	74	1.3	7.0	1
7.0	3	▲	MWE0700MA	22.3	44.3	44.3	84.3	83	1.3	7.0	1
7.0	3	▲	MWE0700MB	22.3	44.3	44.3	84.3	83	1.3	7.0	1
7.1	2	▲	MWE0710SA	15.5	35.3	35.3	75.3	74	1.3	7.1	1
7.1	2	□	MWE0710SB	15.5	35.3	38.3	80.3	79	1.3	8.0	1
7.1	3	▲	MWE0710MA	22.6	46.3	46.3	88.3	87	1.3	7.1	1
7.1	3	□	MWE0710MB	22.6	46.3	49.3	91.3	90	1.3	8.0	1
7.2	2	▲	MWE0720SA	15.7	35.3	35.3	75.3	74	1.3	7.2	1
7.2	2	□	MWE0720SB	15.7	35.3	38.3	80.3	79	1.3	8.0	1
7.2	3	▲	MWE0720MA	22.9	46.3	46.3	88.3	87	1.3	7.2	1
7.2	3	□	MWE0720MB	22.9	46.3	49.3	91.3	90	1.3	8.0	1

MWE

DC(mm)	Hole Depth(l/d)	VP15TF	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
7.3	2	▲	MWE0730SA	15.9	35.3	35.3	75.3	74	1.3	7.3	1
7.3	2	□	MWE0730SB	15.9	35.3	38.3	80.3	79	1.3	8.0	1
7.3	3	▲	MWE0730MA	23.2	46.3	46.3	88.3	87	1.3	7.3	1
7.3	3	□	MWE0730MB	23.2	46.3	49.3	91.3	90	1.3	8.0	1
7.4	2	▲	MWE0740SA	16.1	35.3	35.3	75.3	74	1.3	7.4	1
7.4	2	□	MWE0740SB	16.1	35.3	38.3	80.3	79	1.3	8.0	1
7.4	3	▲	MWE0740MA	23.5	46.3	46.3	88.3	87	1.3	7.4	1
7.4	3	□	MWE0740MB	23.5	46.3	49.3	91.3	90	1.3	8.0	1
7.5	2	▲	MWE0750SA	16.4	35.4	35.4	75.4	74	1.4	7.5	1
7.5	2	▲	MWE0750SB	16.4	35.4	38.4	80.4	79	1.4	8.0	1
7.5	3	▲	MWE0750MA	23.9	46.4	46.4	88.4	87	1.4	7.5	1
7.5	3	▲	MWE0750MB	23.9	46.4	49.4	91.4	90	1.4	8.0	1
7.6	2	▲	MWE0760SA	16.6	38.4	38.4	80.4	79	1.4	7.6	1
7.6	2	□	MWE0760SB	16.6	38.4	38.4	80.4	79	1.4	8.0	1
7.6	3	▲	MWE0760MA	24.2	49.4	49.4	91.4	90	1.4	7.6	1
7.6	3	□	MWE0760MB	24.2	49.4	49.4	91.4	90	1.4	8.0	1
7.7	2	▲	MWE0770SA	16.8	38.4	38.4	80.4	79	1.4	7.7	1
7.7	2	▲	MWE0770SB	16.8	38.4	38.4	80.4	79	1.4	8.0	1
7.7	3	▲	MWE0770MA	24.5	49.4	49.4	91.4	90	1.4	7.7	1
7.7	3	▲	MWE0770MB	24.5	49.4	49.4	91.4	90	1.4	8.0	1
7.8	2	▲	MWE0780SA	17.0	38.4	38.4	80.4	79	1.4	7.8	1
7.8	2	▲	MWE0780SB	17.0	38.4	38.4	80.4	79	1.4	8.0	1
7.8	3	▲	MWE0780MA	24.8	49.4	49.4	91.4	90	1.4	7.8	1
7.8	3	▲	MWE0780MB	24.8	49.4	49.4	91.4	90	1.4	8.0	1
7.9	2	▲	MWE0790SA	17.2	38.4	38.4	80.4	79	1.4	7.9	1
7.9	2	▲	MWE0790SB	17.2	38.4	38.4	80.4	79	1.4	8.0	1
7.9	3	▲	MWE0790MA	25.1	49.4	49.4	91.4	90	1.4	7.9	1
7.9	3	▲	MWE0790MB	25.1	49.4	49.4	91.4	90	1.4	8.0	1
8.0	2	▲	MWE0800SA	17.5	38.5	38.5	80.5	79	1.5	8.0	1
8.0	2	▲	MWE0800SB	17.5	38.5	38.5	80.5	79	1.5	8.0	1
8.0	3	▲	MWE0800MA	25.5	49.5	49.5	91.5	90	1.5	8.0	1
8.0	3	▲	MWE0800MB	25.5	49.5	49.5	91.5	90	1.5	8.0	1
8.1	2	▲	MWE0810SA	17.7	38.5	38.5	80.5	79	1.5	8.1	1
8.1	2	□	MWE0810SB	17.7	38.5	41.5	85.5	84	1.5	9.0	1
8.1	3	▲	MWE0810MA	25.8	54.5	54.5	97.5	96	1.5	8.1	1
8.1	3	□	MWE0810MB	25.8	54.5	57.5	99.5	98	1.5	9.0	1
8.2	2	▲	MWE0820SA	17.9	38.5	38.5	80.5	79	1.5	8.2	1
8.2	2	□	MWE0820SB	17.9	38.5	41.5	85.5	84	1.5	9.0	1
8.2	3	▲	MWE0820MA	26.1	54.5	54.5	97.5	96	1.5	8.2	1
8.2	3	□	MWE0820MB	26.1	54.5	57.5	99.5	98	1.5	9.0	1
8.3	2	▲	MWE0830SA	18.1	38.5	38.5	80.5	79	1.5	8.3	1
8.3	2	□	MWE0830SB	18.1	38.5	41.5	85.5	84	1.5	9.0	1
8.3	3	▲	MWE0830MA	26.4	54.5	54.5	97.5	96	1.5	8.3	1
8.3	3	□	MWE0830MB	26.4	54.5	57.5	99.5	98	1.5	9.0	1
8.4	2	▲	MWE0840SA	18.3	38.5	38.5	80.5	79	1.5	8.4	1
8.4	2	▲	MWE0840SB	18.3	38.5	41.5	85.5	84	1.5	9.0	1
8.4	3	▲	MWE0840MA	26.7	54.5	54.5	97.5	96	1.5	8.4	1
8.4	3	▲	MWE0840MB	26.7	54.5	57.5	99.5	98	1.5	9.0	1
8.5	2	▲	MWE0850SA	18.5	38.5	38.5	80.5	79	1.5	8.5	1
8.5	2	▲	MWE0850SB	18.5	38.5	41.5	85.5	84	1.5	9.0	1
8.5	3	▲	MWE0850MA	27.0	54.5	54.5	97.5	96	1.5	8.5	1
8.5	3	▲	MWE0850MB	27.0	54.5	57.5	99.5	98	1.5	9.0	1
8.6	2	▲	MWE0860SA	18.8	41.6	41.6	85.6	84	1.6	8.6	1
8.6	2	▲	MWE0860SB	18.8	41.6	41.6	85.6	84	1.6	9.0	1
8.6	3	▲	MWE0860MA	27.4	56.6	56.6	99.6	98	1.6	8.6	1
8.6	3	▲	MWE0860MB	27.4	56.6	56.6	99.6	98	1.6	9.0	1
8.7	2	▲	MWE0870SA	19.0	41.6	41.6	85.6	84	1.6	8.7	1
8.7	2	□	MWE0870SB	19.0	41.6	41.6	85.6	84	1.6	9.0	1
8.7	3	▲	MWE0870MA	27.7	56.6	56.6	99.6	98	1.6	8.7	1
8.7	3	□	MWE0870MB	27.7	56.6	56.6	99.6	98	1.6	9.0	1
8.8	2	▲	MWE0880SA	19.2	41.6	41.6	85.6	84	1.6	8.8	1
8.8	2	□	MWE0880SB	19.2	41.6	41.6	85.6	84	1.6	9.0	1
8.8	3	▲	MWE0880MA	28.0	56.6	56.6	99.6	98	1.6	8.8	1
8.8	3	□	MWE0880MB	28.0	56.6	56.6	99.6	98	1.6	9.0	1
8.9	2	▲	MWE0890SA	19.4	41.6	41.6	85.6	84	1.6	8.9	1
8.9	2	□	MWE0890SB	19.4	41.6	41.6	85.6	84	1.6	9.0	1
8.9	3	▲	MWE0890MA	28.3	56.6	56.6	99.6	98	1.6	8.9	1
8.9	3	□	MWE0890MB	28.3	56.6	56.6	99.6	98	1.6	9.0	1
9.0	2	▲	MWE0900SA	19.6	41.6	41.6	85.6	84	1.6	9.0	1
9.0	2	▲	MWE0900SB	19.6	41.6	41.6	85.6	84	1.6	9.0	1
9.0	3	▲	MWE0900MA	28.6	56.6	56.6	99.6	98	1.6	9.0	1
9.0	3	▲	MWE0900MB	28.6	56.6	56.6	99.6	98	1.6	9.0	1
9.1	2	▲	MWE0910SA	19.9	41.7	41.7	85.7	84	1.7	9.1	1
9.1	2	□	MWE0910SB	19.9	41.7	44.7	90.7	89	1.7	10.0	1
9.1	3	▲	MWE0910MA	29.0	59.7	59.7	103.7	102	1.7	9.1	1
9.1	3	□	MWE0910MB	29.0	59.7	62.7	106.7	105	1.7	10.0	1
9.2	2	▲	MWE0920SA	20.1	41.7	41.7	85.7	84	1.7	9.2	1
9.2	2	□	MWE0920SB	20.1	41.7	44.7	90.7	89	1.7	10.0	1
9.2	3	▲	MWE0920MA	29.3	59.7	59.7	103.7	102	1.7	9.2	1
9.2	3	□	MWE0920MB	29.3	59.7	62.7	106.7	105	1.7	10.0	1
9.3	2	▲	MWE0930SA	20.3	41.7	41.7	85.7	84	1.7	9.3	1
9.3	2	□	MWE0930SB	20.3	41.7	44.7	90.7	89	1.7	10.0	1
9.3	3	▲	MWE0930MA	29.6	59.7	59.7	103.7	102	1.7	9.3	1
9.3	3	□	MWE0930MB	29.6	59.7	62.7	106.7	105	1.7	10.0	1
9.4	2	▲	MWE0940SA	20.5	41.7	41.7	85.7	84	1.7	9.4	1
9.4	2	▲	MWE0940SB	20.5	41.7	44.7	90.7	89	1.7	10.0	1
9.4	3	▲	MWE0940MA	29.9	59.7	59.7	103.7	102	1.7	9.4	1
9.4	3	▲	MWE0940MB	29.9	59.7	62.7	106.7	105	1.7	10.0	1
9.5	2	▲	MWE0950SA	20.7	41.7	41.7	85.7	84	1.7	9.5	1
9.5	2	▲	MWE0950SB	20.7	41.7	44.7	90.7	89	1.7	10.0	1
9.5	3	▲	MWE0950MA	30.2	59.7	59.7	103.7	102	1.7	9.5	1
9.5	3	▲	MWE0950MB	30.2	59.7	62.7	106.7	105	1.7	10.0	1
9.6	2	▲	MWE0960SA	20.9	44.7	44.7	90.7	89	1.7	9.6	1
9.6	2	▲	MWE0960SB	20.9	44.7	44.7	90.7	89	1.7	10.0	1
9.6	3	▲	MWE0960MA	30.5	61.7	61.7	106.7	105	1.7	9.6	1
9.6	3	▲	MWE0960MB	30.5	61.7	61.7	106.7	105	1.7	10.0	1
9.7	2	▲	MWE0970SA	21.2	44.8	44.8	90.8	89	1.8	9.7	1
9.7	2	□	MWE0970SB	21.2	44.8	44.8	90.8	89	1.8	10.0	1
9.7	3	▲	MWE0970MA	30.9	61.8	61.8	106.8	105	1.8	9.7	1
9.7	3	□	MWE0970MB	30.9	61.8	61.8	106.8	105	1.8	10.0	1
9.8	2	▲	MWE0980SA	21.4	44.8	44.8	90.8	89	1.8	9.8	1
9.8	2	□	MWE0980SB	21.4	44.8	44.8	90.8	89	1.8	10.0	1
9.8	3	▲	MWE0980MA	31.2	61.8	61.8	106.8	105	1.8	9.8	1
9.8	3	□	MWE0980MB	31.2	61.8	61.8	106.8	105	1.8	10.0	1
9.9	2	▲	MWE0990SA	21.6	44.8	44.8	90.8	89	1.8	9.9	1
9.9	2	□	MWE0990SB	21.6	44.8	44.8	90.8	89	1.8	10.0	1
9.9	3	▲	MWE0990MA	31.5	61.8	61.8	106.8	105	1.8	9.9	1
9.9	3	□	MWE0990MB	31.5	61.8	61.8	106.8	105	1.8	10.0	1

MWE

DC(mm)	Hole Depth(l/d)	VP15TF	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
10.0	2	▲	MWE1000SA	21.8	44.8	44.8	90.8	89	1.8	10.0	1
10.0	2	▲	MWE1000SB	21.8	44.8	44.8	90.8	89	1.8	10.0	1
10.0	3	▲	MWE1000MA	31.8	61.8	61.8	106.8	105	1.8	10.0	1
10.0	3	▲	MWE1000MB	31.8	61.8	61.8	106.8	105	1.8	10.0	1
10.1	2	▲	MWE1010SA	22.0	44.8	44.8	90.8	89	1.8	10.1	1
10.1	2	□	MWE1010SB	22.0	44.8	47.8	96.8	95	1.8	11.0	1
10.1	3	▲	MWE1010MA	32.1	67.8	67.8	113.8	112	1.8	10.1	1
10.1	3	□	MWE1010MB	32.1	67.8	70.8	115.8	114	1.8	11.0	1
10.2	2	▲	MWE1020SA	22.3	44.9	44.9	90.9	89	1.9	10.2	1
10.2	2	▲	MWE1020SB	22.3	44.9	47.9	96.9	95	1.9	11.0	1
10.2	3	▲	MWE1020MA	32.5	67.9	67.9	113.9	112	1.9	10.2	1
10.2	3	▲	MWE1020MB	32.5	67.9	70.9	115.9	114	1.9	11.0	1
10.3	2	▲	MWE1030SA	22.5	44.9	44.9	90.9	89	1.9	10.3	1
10.3	2	▲	MWE1030SB	22.5	44.9	47.9	96.9	95	1.9	11.0	1
10.3	3	▲	MWE1030MA	32.8	67.9	67.9	113.9	112	1.9	10.3	1
10.3	3	▲	MWE1030MB	32.8	67.9	70.9	115.9	114	1.9	11.0	1
10.4	2	▲	MWE1040SA	22.7	44.9	44.9	90.9	89	1.9	10.4	1
10.4	2	▲	MWE1040SB	22.7	44.9	47.9	96.9	95	1.9	11.0	1
10.4	3	▲	MWE1040MA	33.1	67.9	67.9	113.9	112	1.9	10.4	1
10.4	3	▲	MWE1040MB	33.1	67.9	70.9	115.9	114	1.9	11.0	1
10.5	2	▲	MWE1050SA	22.9	44.9	44.9	90.9	89	1.9	10.5	1
10.5	2	▲	MWE1050SB	22.9	44.9	47.9	96.9	95	1.9	11.0	1
10.5	3	▲	MWE1050MA	33.4	67.9	67.9	113.9	112	1.9	10.5	1
10.5	3	▲	MWE1050MB	33.4	67.9	70.9	115.9	114	1.9	11.0	1
10.6	2	▲	MWE1060SA	23.1	44.9	44.9	90.9	89	1.9	10.6	1
10.6	2	□	MWE1060SB	23.1	48.9	48.9	96.9	95	1.9	11.0	1
10.6	3	▲	MWE1060MA	33.7	69.9	69.9	115.9	114	1.9	10.6	1
10.6	3	□	MWE1060MB	33.7	69.9	69.9	115.9	114	1.9	11.0	1
10.7	2	▲	MWE1070SA	23.3	48.9	48.9	96.9	95	1.9	10.7	1
10.7	2	□	MWE1070SB	23.3	48.9	48.9	96.9	95	1.9	11.0	1
10.7	3	▲	MWE1070MA	34.0	69.9	69.9	115.9	114	1.9	10.7	1
10.7	3	□	MWE1070MB	34.0	69.9	69.9	115.9	114	1.9	11.0	1
10.8	2	▲	MWE1080SA	23.6	49.0	49.0	97.0	95	2.0	10.8	1
10.8	2	□	MWE1080SB	23.6	49.0	49.0	97.0	95	2.0	11.0	1
10.8	3	▲	MWE1080MA	34.4	70.0	70.0	116.0	114	2.0	10.8	1
10.8	3	□	MWE1080MB	34.4	70.0	70.0	116.0	114	2.0	11.0	1
10.9	2	▲	MWE1090SA	23.8	49.0	49.0	97.0	95	2.0	10.9	1
10.9	2	□	MWE1090SB	23.8	49.0	49.0	97.0	95	2.0	11.0	1
10.9	3	▲	MWE1090MA	34.7	70.0	70.0	116.0	114	2.0	10.9	1
10.9	3	□	MWE1090MB	34.7	70.0	70.0	116.0	114	2.0	11.0	1
11.0	2	▲	MWE1100SA	24.0	49.0	49.0	97.0	95	2.0	11.0	1
11.0	2	▲	MWE1100SB	24.0	49.0	49.0	97.0	95	2.0	11.0	1
11.0	3	▲	MWE1100MA	35.0	70.0	70.0	116.0	114	2.0	11.0	1
11.0	3	▲	MWE1100MB	35.0	70.0	70.0	116.0	114	2.0	11.0	1
11.1	2	▲	MWE1110SA	24.2	49.0	49.0	97.0	95	2.0	11.1	1
11.1	2	□	MWE1110SB	24.2	49.0	52.0	97.0	95	2.0	12.0	1
11.1	3	▲	MWE1110MA	35.3	73.0	73.0	120.0	118	2.0	11.1	1
11.1	3	□	MWE1110MB	35.3	73.0	76.0	123.0	121	2.0	12.0	1
11.2	2	▲	MWE1120SA	24.4	49.0	49.0	97.0	95	2.0	11.2	1
11.2	2	□	MWE1120SB	24.4	49.0	52.0	97.0	95	2.0	12.0	1
11.2	3	▲	MWE1120MA	35.6	73.0	73.0	120.0	118	2.0	11.2	1
11.2	3	□	MWE1120MB	35.6	73.0	76.0	123.0	121	2.0	12.0	1
11.3	2	▲	MWE1130SA	24.7	49.1	49.1	97.1	95	2.1	11.3	1
11.3	2	□	MWE1130SB	24.7	49.1	52.1	97.1	95	2.1	12.0	1
11.3	3	▲	MWE1130MA	36.0	73.1	73.1	120.1	118	2.1	11.3	1
11.3	3	□	MWE1130MB	36.0	73.1	76.1	123.1	121	2.1	12.0	1
11.4	2	▲	MWE1140SA	24.9	49.1	49.1	97.1	95	2.1	11.4	1
11.4	2	□	MWE1140SB	24.9	49.1	52.1	97.1	95	2.1	12.0	1
11.4	3	▲	MWE1140MA	36.3	73.1	73.1	120.1	118	2.1	11.4	1
11.4	3	□	MWE1140MB	36.3	73.1	76.1	123.1	121	2.1	12.0	1
11.5	2	▲	MWE1150SA	25.1	49.1	49.1	97.1	95	2.1	11.5	1
11.5	2	▲	MWE1150SB	25.1	49.1	52.1	97.1	95	2.1	12.0	1
11.5	3	▲	MWE1150MA	36.6	73.1	73.1	120.1	118	2.1	11.5	1
11.5	3	▲	MWE1150MB	36.6	73.1	76.1	123.1	121	2.1	12.0	1
11.6	2	▲	MWE1160SA	25.3	49.1	49.1	97.1	95	2.1	11.6	1
11.6	2	□	MWE1160SB	25.3	49.1	49.1	97.1	95	2.1	12.0	1
11.6	3	▲	MWE1160MA	36.9	75.1	75.1	123.1	121	2.1	11.6	1
11.6	3	□	MWE1160MB	36.9	75.1	75.1	123.1	121	2.1	12.0	1
11.7	2	▲	MWE1170SA	25.5	49.1	49.1	97.1	95	2.1	11.7	1
11.7	2	□	MWE1170SB	25.5	49.1	49.1	97.1	95	2.1	12.0	1
11.7	3	▲	MWE1170MA	37.2	75.1	75.1	123.1	121	2.1	11.7	1
11.7	3	□	MWE1170MB	37.2	75.1	75.1	123.1	121	2.1	12.0	1
11.8	2	▲	MWE1180SA	25.7	49.1	49.1	97.1	95	2.1	11.8	1
11.8	2	□	MWE1180SB	25.7	49.1	49.1	97.1	95	2.1	12.0	1
11.8	3	▲	MWE1180MA	37.5	75.1	75.1	123.1	121	2.1	11.8	1
11.8	3	□	MWE1180MB	37.5	75.1	75.1	123.1	121	2.1	12.0	1
11.9	2	▲	MWE1190SA	26.0	53.2	53.2	104.2	102	2.2	11.9	1
11.9	2	▲	MWE1190SB	26.0	49.2	49.2	97.2	95	2.2	12.0	1
11.9	3	▲	MWE1190MA	37.9	75.2	75.2	123.2	121	2.2	11.9	1
11.9	3	▲	MWE1190MB	37.9	75.2	75.2	123.2	121	2.2	12.0	1
12.0	2	▲	MWE1200SA	26.2	53.2	53.2	104.2	102	2.2	12.0	1
12.0	2	▲	MWE1200SB	26.2	49.2	49.2	97.2	95	2.2	12.0	1
12.0	3	▲	MWE1200MA	38.2	75.2	75.2	123.2	121	2.2	12.0	1
12.0	3	▲	MWE1200MB	38.2	75.2	75.2	123.2	121	2.2	12.0	1
12.1	2	▲	MWE1210SA	26.4	53.2	53.2	104.2	102	2.2	12.1	1
12.1	2	▲	MWE1210SB	26.4	53.2	56.2	104.2	102	2.2	13.0	1
12.1	3	▲	MWE1210MA	38.5	78.2	78.2	137.2	135	2.2	12.1	1
12.1	3	▲	MWE1210MB	38.5	78.2	81.2	139.2	137	2.2	13.0	1
12.2	2	▲	MWE1220SA	26.6	53.2	53.2	104.2	102	2.2	12.2	1
12.2	2	□	MWE1220SB	26.6	53.2	56.2	104.2	102	2.2	13.0	1
12.2	3	▲	MWE1220MA	38.8	78.2	78.2	137.2	135	2.2	12.2	1
12.2	3	□	MWE1220MB	38.8	78.2	81.2	139.2	137	2.2	13.0	1
12.3	2	▲	MWE1230SA	26.8	53.2	53.2	104.2	102	2.2	12.3	1
12.3	2	□	MWE1230SB	26.8	53.2	56.2	104.2	102	2.2	13.0	1
12.3	3	▲	MWE1230MA	39.1	78.2	78.2	137.2	135	2.2	12.3	1
12.3	3	□	MWE1230MB	39.1	78.2	81.2	139.2	137	2.2	13.0	1
12.4	2	▲	MWE1240SA	27.1	53.3	53.3	104.3	102	2.3	12.4	1
12.4	2	□	MWE1240SB	27.1	53.3	56.3	104.3	102	2.3	13.0	1
12.4	3	▲	MWE1240MA	39.5	78.3	78.3	137.3	135	2.3	12.4	1
12.4	3	□	MWE1240MB	39.5	78.3	81.3	139.3	137	2.3	13.0	1
12.5	2	▲	MWE1250SA	27.3	53.3	53.3	104.3	102	2.3	12.5	1
12.5	2	▲	MWE1250SB	27.3	53.3	56.3	104.3	102	2.3	13.0	1
12.5	3	▲	MWE1250MA	39.8	78.3	78.3	137.3	135	2.3	12.5	1
12.5	3	▲	MWE1250MB	39.8	78.3	81.3	139.3	137	2.3	13.0	1
12.6	2	▲	MWE1260SA	27.5	53.3	53.3	104.3	102	2.3	12.6	1
12.6	2	□	MWE1260SB	27.5	53.3	53.3	104.3	102	2.3	13.0	1
12.6	3	▲	MWE1260MA	40.1	80.3	80.3	139.3	137	2.3	12.6	1
12.6	3	□	MWE1260MB	40.1	80.3	80.3	139.3	137	2.3	13.0	1

MWE

DC(mm)	Hole Depth(l/d)	VP15TF	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
12.7	2	▲	MWE1270SA	27.7	53.3	53.3	104.3	102	2.3	12.7	1
12.7	2	□	MWE1270SB	27.7	53.3	53.3	104.3	102	2.3	13.0	1
12.7	3	▲	MWE1270MA	40.4	80.3	80.3	139.3	137	2.3	12.7	1
12.7	3	□	MWE1270MB	40.4	80.3	80.3	139.3	137	2.3	13.0	1
12.8	2	▲	MWE1280SA	27.9	53.3	53.3	104.3	102	2.3	12.8	1
12.8	2	□	MWE1280SB	27.9	53.3	53.3	104.3	102	2.3	13.0	1
12.8	3	▲	MWE1280MA	40.7	80.3	80.3	139.3	137	2.3	12.8	1
12.8	3	□	MWE1280MB	40.7	80.3	80.3	139.3	137	2.3	13.0	1
12.9	2	▲	MWE1290SA	28.1	53.3	53.3	104.3	102	2.3	12.9	1
12.9	2	□	MWE1290SB	28.1	53.3	53.3	104.3	102	2.3	13.0	1
12.9	3	▲	MWE1290MA	41.0	80.3	80.3	139.3	137	2.3	12.9	1
12.9	3	□	MWE1290MB	41.0	80.3	80.3	139.3	137	2.3	13.0	1
13.0	2	▲	MWE1300SA	28.4	53.4	53.4	104.4	102	2.4	13.0	1
13.0	2	▲	MWE1300SB	28.4	53.4	53.4	104.4	102	2.4	13.0	1
13.0	3	▲	MWE1300MA	41.4	80.4	80.4	139.4	137	2.4	13.0	1
13.0	3	▲	MWE1300MB	41.4	80.4	80.4	139.4	137	2.4	13.0	1
13.1	2	▲	MWE1310SA	28.6	53.4	53.4	104.4	102	2.4	13.1	1
13.1	2	□	MWE1310SB	28.6	56.4	59.4	109.4	107	2.4	14.0	1
13.1	3	▲	MWE1310MA	41.7	86.4	86.4	146.4	144	2.4	13.1	1
13.1	3	□	MWE1310MB	41.7	86.4	89.4	149.4	147	2.4	14.0	1
13.2	2	▲	MWE1320SA	28.8	53.4	53.4	104.4	102	2.4	13.2	1
13.2	2	□	MWE1320SB	28.8	56.4	59.4	109.4	107	2.4	14.0	1
13.2	3	▲	MWE1320MA	42.0	86.4	86.4	146.4	144	2.4	13.2	1
13.2	3	□	MWE1320MB	42.0	86.4	89.4	149.4	147	2.4	14.0	1
13.3	2	▲	MWE1330SA	29.0	56.4	56.4	109.4	107	2.4	13.3	1
13.3	2	□	MWE1330SB	29.0	56.4	59.4	109.4	107	2.4	14.0	1
13.3	3	▲	MWE1330MA	42.3	86.4	86.4	146.4	144	2.4	13.3	1
13.3	3	□	MWE1330MB	42.3	86.4	89.4	149.4	147	2.4	14.0	1
13.4	2	▲	MWE1340SA	29.2	56.4	56.4	109.4	107	2.4	13.4	1
13.4	2	□	MWE1340SB	29.2	56.4	59.4	109.4	107	2.4	14.0	1
13.4	3	▲	MWE1340MA	42.6	86.4	86.4	146.4	144	2.4	13.4	1
13.4	3	□	MWE1340MB	42.6	86.4	89.4	149.4	147	2.4	14.0	1
13.5	2	▲	MWE1350SA	29.5	56.5	56.5	109.5	107	2.5	13.5	1
13.5	2	▲	MWE1350SB	29.5	56.5	59.5	109.5	107	2.5	14.0	1
13.5	3	▲	MWE1350MA	43.0	86.5	86.5	146.5	144	2.5	13.5	1
13.5	3	▲	MWE1350MB	43.0	86.5	89.5	149.5	147	2.5	14.0	1
13.6	2	▲	MWE1360SA	29.7	56.5	56.5	109.5	107	2.5	13.6	1
13.6	2	□	MWE1360SB	29.7	56.5	56.5	109.5	107	2.5	14.0	1
13.6	3	▲	MWE1360MA	43.3	88.5	88.5	149.5	147	2.5	13.6	1
13.6	3	□	MWE1360MB	43.3	88.5	88.5	149.5	147	2.5	14.0	1
13.7	2	▲	MWE1370SA	29.9	56.5	56.5	109.5	107	2.5	13.7	1
13.7	2	□	MWE1370SB	29.9	56.5	56.5	109.5	107	2.5	14.0	1
13.7	3	▲	MWE1370MA	43.6	88.5	88.5	149.5	147	2.5	13.7	1
13.7	3	□	MWE1370MB	43.6	88.5	88.5	149.5	147	2.5	14.0	1
13.8	2	▲	MWE1380SA	30.1	56.5	56.5	109.5	107	2.5	13.8	1
13.8	2	□	MWE1380SB	30.1	56.5	56.5	109.5	107	2.5	14.0	1
13.8	3	▲	MWE1380MA	43.9	88.5	88.5	149.5	147	2.5	13.8	1
13.8	3	□	MWE1380MB	43.9	88.5	88.5	149.5	147	2.5	14.0	1
13.9	2	▲	MWE1390SA	30.3	56.5	56.5	109.5	107	2.5	13.9	1
13.9	2	▲	MWE1390SB	30.3	56.5	56.5	109.5	107	2.5	14.0	1
13.9	3	▲	MWE1390MA	44.2	88.5	88.5	149.5	147	2.5	13.9	1
13.9	3	▲	MWE1390MB	44.2	88.5	88.5	149.5	147	2.5	14.0	1
14.0	2	▲	MWE1400SA	30.5	56.5	56.5	109.5	107	2.5	14.0	1
14.0	2	▲	MWE1400SB	30.5	56.5	56.5	109.5	107	2.5	14.0	1
14.0	3	▲	MWE1400MA	44.5	88.5	88.5	149.5	147	2.5	14.0	1
14.0	3	▲	MWE1400MB	44.5	88.5	88.5	149.5	147	2.5	14.0	1
14.1	2	▲	MWE1410SA	30.8	58.6	58.6	113.6	111	2.6	14.1	1
14.1	2	▲	MWE1410SB	30.8	58.6	61.6	113.6	111	2.6	15.0	1
14.1	3	▲	MWE1410MA	44.9	91.6	91.6	153.6	151	2.6	14.1	1
14.1	3	▲	MWE1410MB	44.9	91.6	94.6	155.6	153	2.6	15.0	1
14.2	2	▲	MWE1420SA	31.0	58.6	58.6	113.6	111	2.6	14.2	1
14.2	2	□	MWE1420SB	31.0	58.6	61.6	113.6	111	2.6	15.0	1
14.2	3	▲	MWE1420MA	45.2	91.6	91.6	153.6	151	2.6	14.2	1
14.2	3	□	MWE1420MB	45.2	91.6	94.6	155.6	153	2.6	15.0	1
14.3	2	□	MWE1430SA	31.2	58.6	58.6	113.6	111	2.6	14.3	1
14.3	2	□	MWE1430SB	31.2	58.6	61.6	113.6	111	2.6	15.0	1
14.3	3	▲	MWE1430MA	45.5	91.6	91.6	153.6	151	2.6	14.3	1
14.3	3	□	MWE1430MB	45.5	91.6	94.6	155.6	153	2.6	15.0	1
14.4	2	□	MWE1440SA	31.4	58.6	58.6	113.6	111	2.6	14.4	1
14.4	2	□	MWE1440SB	31.4	58.6	61.6	113.6	111	2.6	15.0	1
14.4	3	▲	MWE1440MA	45.8	91.6	91.6	153.6	151	2.6	14.4	1
14.4	3	□	MWE1440MB	45.8	91.6	94.6	155.6	153	2.6	15.0	1
14.5	2	▲	MWE1450SA	31.6	58.6	58.6	113.6	111	2.6	14.5	1
14.5	2	▲	MWE1450SB	31.6	58.6	61.6	113.6	111	2.6	15.0	1
14.5	3	▲	MWE1450MA	46.1	91.6	91.6	153.6	151	2.6	14.5	1
14.5	3	▲	MWE1450MB	46.1	91.6	94.6	155.6	153	2.6	15.0	1
14.6	2	□	MWE1460SA	31.9	58.7	58.7	113.7	111	2.7	14.6	1
14.6	2	□	MWE1460SB	31.9	58.7	58.7	113.7	111	2.7	15.0	1
14.6	3	▲	MWE1460MA	46.5	93.7	93.7	155.7	153	2.7	14.6	1
14.6	3	□	MWE1460MB	46.5	93.7	93.7	155.7	153	2.7	15.0	1
14.7	2	□	MWE1470SA	32.1	58.7	58.7	113.7	111	2.7	14.7	1
14.7	2	□	MWE1470SB	32.1	58.7	58.7	113.7	111	2.7	15.0	1
14.7	3	▲	MWE1470MA	46.8	93.7	93.7	155.7	153	2.7	14.7	1
14.7	3	□	MWE1470MB	46.8	93.7	93.7	155.7	153	2.7	15.0	1
14.8	2	□	MWE1480SA	32.3	58.7	58.7	113.7	111	2.7	14.8	1
14.8	2	□	MWE1480SB	32.3	58.7	58.7	113.7	111	2.7	15.0	1
14.8	3	▲	MWE1480MA	47.1	93.7	93.7	155.7	153	2.7	14.8	1
14.8	3	□	MWE1480MB	47.1	93.7	93.7	155.7	153	2.7	15.0	1
14.9	2	□	MWE1490SA	32.5	58.7	58.7	113.7	111	2.7	14.9	1
14.9	2	□	MWE1490SB	32.5	58.7	58.7	113.7	111	2.7	15.0	1
14.9	3	▲	MWE1490MA	47.4	93.7	93.7	155.7	153	2.7	14.9	1
14.9	3	□	MWE1490MB	47.4	93.7	93.7	155.7	153	2.7	15.0	1
15.0	2	▲	MWE1500SA	32.7	58.7	58.7	113.7	111	2.7	15.0	1
15.0	2	▲	MWE1500SB	32.7	58.7	58.7	113.7	111	2.7	15.0	1
15.0	3	▲	MWE1500MA	47.7	93.7	93.7	155.7	153	2.7	15.0	1
15.0	3	▲	MWE1500MB	47.7	93.7	93.7	155.7	153	2.7	15.0	1
15.1	2	□	MWE1510SA	32.9	60.7	60.7	117.7	115	2.7	15.1	1
15.1	2	□	MWE1510SB	32.9	60.7	63.7	117.7	115	2.7	16.0	1
15.1	3	▲	MWE1510MA	48.0	96.7	96.7	159.7	157	2.7	15.1	1
15.1	3	□	MWE1510MB	48.0	96.7	99.7	162.7	160	2.7	16.0	1
15.2	2	▲	MWE1520SA	33.2	60.8	60.8	117.8	115	2.8	15.2	1
15.2	2	□	MWE1520SB	33.2	60.8	63.8	117.8	115	2.8	16.0	1
15.2	3	▲	MWE1520MA	48.4	96.8	96.8	159.8	157	2.8	15.2	1
15.2	3	□	MWE1520MB	48.4	96.8	99.8	162.8	160	2.8	16.0	1
15.3	2	□	MWE1530SA	33.4	60.8	60.8	117.8	115	2.8	15.3	1
15.3	2	□	MWE1530SB	33.4	60.8	63.8	117.8	115	2.8	16.0	1
15.3	3	▲	MWE1530MA	48.7	96.8	96.8	159.8	157	2.8	15.3	1
15.3	3	□	MWE1530MB	48.7	96.8	99.8	162.8	160	2.8	16.0	1

MWE

DC(mm)	Hole Depth(l/d)	VP15TF	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
15.4	2	□	MWE1540SA	33.6	60.8	60.8	117.8	115	2.8	15.4	1
15.4	2	▲	MWE1540SB	33.6	60.8	63.8	117.8	115	2.8	16.0	1
15.4	3	▲	MWE1540MA	49.0	96.8	96.8	159.8	157	2.8	15.4	1
15.4	3	▲	MWE1540MB	49.0	96.8	99.8	162.8	160	2.8	16.0	1
15.5	2	▲	MWE1550SA	33.8	60.8	60.8	117.8	115	2.8	15.5	1
15.5	2	▲	MWE1550SB	33.8	60.8	63.8	117.8	115	2.8	16.0	1
15.5	3	▲	MWE1550MA	49.3	96.8	96.8	159.8	157	2.8	15.5	1
15.5	3	▲	MWE1550MB	49.3	96.8	99.8	162.8	160	2.8	16.0	1
15.6	2	□	MWE1560SA	34.0	60.8	60.8	117.8	115	2.8	15.6	1
15.6	2	▲	MWE1560SB	34.0	60.8	60.8	117.8	115	2.8	16.0	1
15.6	3	▲	MWE1560MA	49.6	98.8	98.8	162.8	160	2.8	15.6	1
15.6	3	▲	MWE1560MB	49.6	98.8	98.8	162.8	160	2.8	16.0	1
15.7	2	□	MWE1570SA	34.3	60.9	60.9	117.9	115	2.9	15.7	1
15.7	2	□	MWE1570SB	34.3	60.9	60.9	117.9	115	2.9	16.0	1
15.7	3	▲	MWE1570MA	50.0	98.9	98.9	162.9	160	2.9	15.7	1
15.7	3	□	MWE1570MB	50.0	98.9	98.9	162.9	160	2.9	16.0	1
15.8	2	□	MWE1580SA	34.5	60.9	60.9	117.9	115	2.9	15.8	1
15.8	2	□	MWE1580SB	34.5	60.9	60.9	117.9	115	2.9	16.0	1
15.8	3	▲	MWE1580MA	50.3	98.9	98.9	162.9	160	2.9	15.8	1
15.8	3	□	MWE1580MB	50.3	98.9	98.9	162.9	160	2.9	16.0	1
15.9	2	□	MWE1590SA	34.7	60.9	60.9	117.9	115	2.9	15.9	1
15.9	2	□	MWE1590SB	34.7	60.9	60.9	117.9	115	2.9	16.0	1
15.9	3	▲	MWE1590MA	50.6	98.9	98.9	162.9	160	2.9	15.9	1
15.9	3	□	MWE1590MB	50.6	98.9	98.9	162.9	160	2.9	16.0	1
16.0	2	▲	MWE1600SA	34.9	60.9	60.9	117.9	115	2.9	16.0	1
16.0	2	▲	MWE1600SB	34.9	60.9	60.9	117.9	115	2.9	16.0	1
16.0	3	▲	MWE1600MA	50.9	98.9	98.9	162.9	160	2.9	16.0	1
16.0	3	▲	MWE1600MB	50.9	98.9	98.9	162.9	160	2.9	16.0	1
16.1	2	□	MWE1610SA	35.1	62.9	62.9	121.9	119	2.9	16.1	1
16.1	3	□	MWE1610MA	51.2	104.9	104.9	169.9	167	2.9	16.1	1
16.2	2	▲	MWE1620SA	35.3	62.9	62.9	121.9	119	2.9	16.2	1
16.2	3	□	MWE1620MA	51.5	104.9	104.9	169.9	167	2.9	16.2	1
16.3	2	▲	MWE1630SA	35.6	63.0	63.0	122.0	119	3.0	16.3	1
16.3	3	□	MWE1630MA	51.9	105.0	105.0	170.0	167	3.0	16.3	1
16.4	2	□	MWE1640SA	35.8	63.0	63.0	122.0	119	3.0	16.4	1
16.4	3	□	MWE1640MA	52.2	105.0	105.0	170.0	167	3.0	16.4	1
16.5	2	▲	MWE1650SA	36.0	63.0	63.0	122.0	119	3.0	16.5	1
16.5	3	▲	MWE1650MA	52.5	105.0	105.0	170.0	167	3.0	16.5	1
16.6	2	□	MWE1660SA	36.2	63.0	63.0	122.0	119	3.0	16.6	1
16.6	3	□	MWE1660MA	52.8	105.0	105.0	170.0	167	3.0	16.6	1
16.7	2	□	MWE1670SA	36.4	63.0	63.0	122.0	119	3.0	16.7	1
16.7	3	□	MWE1670MA	53.1	105.0	105.0	170.0	167	3.0	16.7	1
16.8	2	□	MWE1680SA	36.7	63.1	63.1	122.1	119	3.1	16.8	1
16.8	3	□	MWE1680MA	53.5	105.1	105.1	170.1	167	3.1	16.8	1
16.9	2	□	MWE1690SA	36.9	63.1	63.1	122.1	119	3.1	16.9	1
16.9	3	□	MWE1690MA	53.8	105.1	105.1	170.1	167	3.1	16.9	1
17.0	2	▲	MWE1700SA	37.1	63.1	63.1	122.1	119	3.1	17.0	1
17.0	3	▲	MWE1700MA	54.1	105.1	105.1	170.1	167	3.1	17.0	1
17.1	2	□	MWE1710SA	37.3	65.1	65.1	126.1	123	3.1	17.1	1
17.1	3	□	MWE1710MA	54.4	105.1	105.1	170.1	167	3.1	17.1	1
17.2	2	□	MWE1720SA	37.5	65.1	65.1	126.1	123	3.1	17.2	1
17.2	3	□	MWE1720MA	54.7	105.1	105.1	170.1	167	3.1	17.2	1
17.3	2	□	MWE1730SA	37.7	65.1	65.1	126.1	123	3.1	17.3	1
17.3	3	□	MWE1730MA	55.0	105.1	105.1	170.1	167	3.1	17.3	1
17.4	2	□	MWE1740SA	38.0	65.2	65.2	126.2	123	3.2	17.4	1
17.4	3	□	MWE1740MA	55.4	105.2	105.2	170.2	167	3.2	17.4	1
17.5	2	▲	MWE1750SA	38.2	65.2	65.2	126.2	123	3.2	17.5	1
17.5	3	▲	MWE1750MA	55.7	105.2	105.2	170.2	167	3.2	17.5	1
17.6	2	□	MWE1760SA	38.4	65.2	65.2	126.2	123	3.2	17.6	1
17.6	3	□	MWE1760MA	56.0	105.2	105.2	170.2	167	3.2	17.6	1
17.7	2	□	MWE1770SA	38.6	65.2	65.2	126.2	123	3.2	17.7	1
17.7	3	□	MWE1770MA	56.3	105.2	105.2	170.2	167	3.2	17.7	1
17.8	2	▲	MWE1780SA	38.8	65.2	65.2	126.2	123	3.2	17.8	1
17.8	3	□	MWE1780MA	56.6	105.2	105.2	170.2	167	3.2	17.8	1
17.9	2	□	MWE1790SA	39.1	65.3	65.3	126.3	123	3.3	17.9	1
17.9	3	□	MWE1790MA	57.0	105.3	105.3	170.3	167	3.3	17.9	1
18.0	2	▲	MWE1800SA	39.3	65.3	65.3	126.3	123	3.3	18.0	1
18.0	3	▲	MWE1800MA	57.3	105.3	105.3	170.3	167	3.3	18.0	1
18.1	2	□	MWE1810SA	39.5	67.3	67.3	130.3	127	3.3	18.1	1
18.1	3	□	MWE1810MA	57.6	117.3	117.3	182.3	179	3.3	18.1	1
18.2	2	□	MWE1820SA	39.7	67.3	67.3	130.3	127	3.3	18.2	1
18.2	3	□	MWE1820MA	57.9	117.3	117.3	182.3	179	3.3	18.2	1
18.3	2	□	MWE1830SA	39.9	67.3	67.3	130.3	127	3.3	18.3	1
18.3	3	□	MWE1830MA	58.2	117.3	117.3	182.3	179	3.3	18.3	1
18.4	2	□	MWE1840SA	40.1	67.3	67.3	130.3	127	3.3	18.4	1
18.4	3	□	MWE1840MA	58.5	117.3	117.3	182.3	179	3.3	18.4	1
18.5	2	▲	MWE1850SA	40.4	67.4	67.4	130.4	127	3.4	18.5	1
18.5	3	▲	MWE1850MA	58.9	117.4	117.4	182.4	179	3.4	18.5	1
18.6	2	□	MWE1860SA	40.6	67.4	67.4	130.4	127	3.4	18.6	1
18.6	3	□	MWE1860MA	59.2	117.4	117.4	182.4	179	3.4	18.6	1
18.7	2	□	MWE1870SA	40.8	67.4	67.4	130.4	127	3.4	18.7	1
18.7	3	□	MWE1870MA	59.5	117.4	117.4	182.4	179	3.4	18.7	1
18.8	2	□	MWE1880SA	41.0	67.4	67.4	130.4	127	3.4	18.8	1
18.8	3	□	MWE1880MA	59.8	117.4	117.4	182.4	179	3.4	18.8	1
18.9	2	□	MWE1890SA	41.2	67.4	67.4	130.4	127	3.4	18.9	1
18.9	3	□	MWE1890MA	60.1	117.4	117.4	182.4	179	3.4	18.9	1
19.0	2	▲	MWE1900SA	41.5	67.5	67.5	130.5	127	3.5	19.0	1
19.0	3	▲	MWE1900MA	60.5	117.5	117.5	182.5	179	3.5	19.0	1
19.1	2	□	MWE1910SA	41.7	69.5	69.5	134.5	131	3.5	19.1	1
19.1	3	□	MWE1910MA	60.8	117.5	117.5	182.5	179	3.5	19.1	1
19.2	2	□	MWE1920SA	41.9	69.5	69.5	134.5	131	3.5	19.2	1
19.2	3	□	MWE1920MA	61.1	117.5	117.5	182.5	179	3.5	19.2	1
19.3	2	□	MWE1930SA	42.1	69.5	69.5	134.5	131	3.5	19.3	1
19.3	3	□	MWE1930MA	61.4	117.5	117.5	182.5	179	3.5	19.3	1
19.4	2	□	MWE1940SA	42.3	69.5	69.5	134.5	131	3.5	19.4	1
19.4	3	□	MWE1940MA	61.7	117.5	117.5	182.5	179	3.5	19.4	1
19.5	2	▲	MWE1950SA	42.5	69.5	69.5	134.5	131	3.5	19.5	1
19.5	3	▲	MWE1950MA	62.0	117.5	117.5	182.5	179	3.5	19.5	1
19.6	2	□	MWE1960SA	42.8	69.6	69.6	134.6	131	3.6	19.6	1
19.6	3	□	MWE1960MA	62.4	117.6	117.6	182.6	179	3.6	19.6	1
19.7	2	□	MWE1970SA	43.0	69.6	69.6	134.6	131	3.6	19.7	1
19.7	3	□	MWE1970MA	62.7	117.6	117.6	182.6	179	3.6	19.7	1
19.8	2	□	MWE1980SA	43.2	69.6	69.6	134.6	131	3.6	19.8	1
19.8	3	□	MWE1980MA	63.0	117.6	117.6	182.6	179	3.6	19.8	1
19.9	2	□	MWE1990SA	43.4	69.6	69.6	134.6	131	3.6	19.9	1
19.9	3	□	MWE1990MA	63.3	117.6	117.6	182.6	179	3.6	19.9	1
20.0	2	▲	MWE2000SA	43.6	69.6	69.6	134.6	131	3.6	20.0	1
20.0	3	▲	MWE2000MA	63.6	117.6	117.6	182.6	179	3.6	20.0	1

MWE

Recommended cutting condition

Work material	Mild Steel(≦180HB) AISI 1010 etc		Carbon steel, Alloy steel(180—280HB) AISI 1045, AISI 4140 etc		Carbon steel, Alloy steel(280—350HB) AISI 4340 etc	
Dia. DC (mm)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)
3.0	6400	0.1(0.06—0.13)	5900	0.1(0.06—0.13)	5400	0.09(0.06—0.12)
4.0	5500	0.12(0.08—0.16)	5100	0.12(0.08—0.16)	4700	0.11(0.07—0.14)
5.0	4400	0.15(0.10—0.20)	4100	0.15(0.10—0.20)	3800	0.14(0.09—0.18)
6.3	4000	0.2(0.13—0.26)	3700	0.2(0.13—0.26)	3500	0.18(0.11—0.24)
8.0	3300	0.23(0.18—0.28)	3100	0.23(0.18—0.28)	2900	0.21(0.16—0.25)
10.0	2800	0.27(0.22—0.32)	2700	0.27(0.22—0.32)	2500	0.23(0.19—0.27)
12.0	2500	0.31(0.28—0.34)	2300	0.31(0.28—0.34)	2200	0.26(0.23—0.29)
16.0	1900	0.33(0.28—0.38)	1700	0.33(0.28—0.38)	1600	0.29(0.24—0.33)
20.0	1500	0.35(0.30—0.40)	1400	0.35(0.30—0.40)	1300	0.3(0.26—0.34)

Work material	Austenitic Stainless Steel(≦200HB) AISI 304,AISI 316 etc		Gray Cast Iron(≦350MPa) No 45 B etc		Ductile Cast Iron(≦450MPa) 60-40-8 etc	
Dia. DC (mm)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)
3.0	1900	0.07(0.05—0.08)	6900	0.1(0.06—0.13)	6400	0.1(0.06—0.13)
4.0	1500	0.08(0.06—0.10)	5500	0.12(0.08—0.16)	5100	0.12(0.08—0.16)
5.0	1200	0.1(0.07—0.13)	4400	0.15(0.10—0.20)	4100	0.15(0.10—0.20)
6.3	1200	0.13(0.09—0.17)	3700	0.2(0.13—0.26)	3500	0.2(0.13—0.26)
8.0	900	0.14(0.10—0.18)	2900	0.25(0.18—0.31)	2700	0.23(0.18—0.28)
10.0	700	0.16(0.12—0.19)	2300	0.29(0.22—0.35)	2200	0.27(0.22—0.32)
12.0	600	0.18(0.15—0.20)	2100	0.33(0.28—0.37)	1900	0.31(0.28—0.34)
16.0	400	0.19(0.15—0.23)	1500	0.35(0.28—0.42)	1400	0.33(0.28—0.38)
20.0	300	0.2(0.15—0.24)	1300	0.37(0.30—0.44)	1200	0.35(0.30—0.40)

Work material	Aluminium Alloy(Si<5%) A6061, A7075		Heat resistant alloys Inconel718		Hardened Steel(40—55HRC) AISI H13, L6 etc	
Dia. DC (mm)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)
3.0	7900	0.1(0.06—0.13)	1900	0.07(0.05—0.09)	1900	0.07(0.05—0.09)
4.0	6300	0.12(0.08—0.16)	1500	0.09(0.06—0.11)	1500	0.09(0.06—0.11)
5.0	5000	0.15(0.10—0.20)	1200	0.11(0.08—0.14)	1200	0.11(0.08—0.14)
6.3	4500	0.2(0.13—0.26)	1200	0.14(0.09—0.19)	1200	0.14(0.09—0.19)
8.0	3500	0.23(0.18—0.28)	900	0.14(0.11—0.17)	900	0.14(0.11—0.17)
10.0	2800	0.27(0.22—0.32)	700	0.16(0.12—0.19)	700	0.16(0.12—0.19)
12.0	2600	0.31(0.28—0.34)	600	0.16(0.13—0.18)	600	0.16(0.13—0.18)
16.0	1900	0.33(0.28—0.38)	400	0.18(0.14—0.21)	400	0.18(0.14—0.21)
20.0	1700	0.35(0.30—0.40)	400	0.19(0.15—0.22)	400	0.19(0.15—0.22)

Memo

MQS

WSTAR Drill Series

Solid Carbide Drill for Steel and Cast Iron

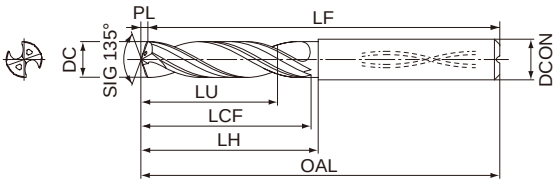
Product Information

UWC DP3 135° SIG X Thinning

Work Material

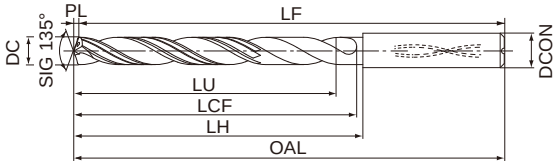
P K

TECHNICAL DATA >> 1997 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 1623 DRILLS SELECTION CHART >> 1624



Type1

	DC=3	3<DC≦6	6<DC≦10	10<DC≦18	18<DC≦20
	0 −0.012	0 −0.012	0 −0.015	0 −0.018	0 −0.021
h6	0 −0.006	0 −0.008	0 −0.009	0 −0.011	0 −0.013



Type2

Stock status indication:●: Inventory maintained in Japan.▲: This item to be discontinued within two years.□: Non stock, produced to order only.

Internal Coolant Unit（mm）

DC(mm)	Hole Depth(l/d)	DP3020	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
3.0	3	●	MQS0300X3DB	9.6	21.6	23.6	70.6	70	0.6	3	1
3.0	5	●	MQS0300X5DB	15.6	28.6	31.6	78.6	78	0.6	3	1
3.0	8	●	MQS0300X8DB	24.6	35.6	35.6	81.6	81	0.6	3	1
3.1	3	●	MQS0310X3DB	9.9	21.6	23.6	70.6	70	0.6	4	1
3.1	5	●	MQS0310X5DB	16.1	28.6	31.6	78.6	78	0.6	4	1
3.2	3	●	MQS0320X3DB	10.3	21.7	23.7	70.7	70	0.7	4	1
3.2	5	●	MQS0320X5DB	16.7	28.7	31.7	78.7	78	0.7	4	1
3.3	3	●	MQS0330X3DB	10.6	21.7	23.7	70.7	70	0.7	4	1
3.3	5	●	MQS0330X5DB	17.2	28.7	31.7	78.7	78	0.7	4	1
3.4	3	●	MQS0340X3DB	10.9	21.7	23.7	70.7	70	0.7	4	1
3.4	5	●	MQS0340X5DB	17.7	28.7	31.7	78.7	78	0.7	4	1
3.5	3	●	MQS0350X3DB	11.2	21.7	23.7	70.7	70	0.7	4	1
3.5	5	●	MQS0350X5DB	18.2	28.7	31.7	78.7	78	0.7	4	1
3.5	8	●	MQS0350X8DB	28.7	41.7	41.7	87.7	87	0.7	4	1
3.6	3	●	MQS0360X3DB	11.5	22.7	23.7	70.7	70	0.7	4	1
3.6	5	●	MQS0360X5DB	18.7	30.7	31.7	78.7	78	0.7	4	1
3.7	3	●	MQS0370X3DB	11.9	22.8	23.8	70.8	70	0.8	4	1
3.7	5	●	MQS0370X5DB	19.3	30.8	31.8	78.8	78	0.8	4	1
3.8	3	●	MQS0380X3DB	12.2	22.8	23.8	70.8	70	0.8	4	1
3.8	5	●	MQS0380X5DB	19.8	30.8	31.8	78.8	78	0.8	4	1
3.9	3	●	MQS0390X3DB	12.5	22.8	23.8	70.8	70	0.8	4	1
3.9	5	●	MQS0390X5DB	20.3	30.8	31.8	78.8	78	0.8	4	1
4.0	3	●	MQS0400X3DB	12.8	22.8	23.8	70.8	70	0.8	4	1
4.0	5	●	MQS0400X5DB	20.8	30.8	31.8	78.8	78	0.8	4	1
4.0	8	●	MQS0400X8DB	32.8	46.8	46.8	92.8	92	0.8	4	1

DC(mm)	Hole Depth(l/d)	DP3020	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
4.1	3	●	MQS0410X3DB	13.1	24.8	26.8	73.8	73	0.8	5	1
4.1	5	●	MQS0410X5DB	21.3	33.8	35.8	82.8	82	0.8	5	1
4.2	3	●	MQS0420X3DB	13.5	24.9	26.9	73.9	73	0.9	5	1
4.2	5	●	MQS0420X5DB	21.9	33.9	35.9	82.9	82	0.9	5	1
4.3	3	●	MQS0430X3DB	13.8	24.9	26.9	73.9	73	0.9	5	1
4.3	5	●	MQS0430X5DB	22.4	33.9	35.9	82.9	82	0.9	5	1
4.4	3	●	MQS0440X3DB	14.1	24.9	26.9	73.9	73	0.9	5	1
4.4	5	●	MQS0440X5DB	22.9	33.9	35.9	82.9	82	0.9	5	1
4.5	3	●	MQS0450X3DB	14.4	24.9	26.9	73.9	73	0.9	5	1
4.5	5	●	MQS0450X5DB	23.4	33.9	35.9	82.9	82	0.9	5	1
4.5	8	●	MQS0450X8DB	36.9	52.9	52.9	100.9	100	0.9	5	1
4.6	3	●	MQS0460X3DB	14.8	26.0	29.0	76.0	75	1.0	5	1
4.6	5	●	MQS0460X5DB	24.0	36.0	39.0	86.0	85	1.0	5	1
4.7	3	●	MQS0470X3DB	15.1	26.0	29.0	76.0	75	1.0	5	1
4.7	5	●	MQS0470X5DB	24.5	36.0	39.0	86.0	85	1.0	5	1
4.8	3	●	MQS0480X3DB	15.4	26.0	29.0	76.0	75	1.0	5	1
4.8	5	●	MQS0480X5DB	25.0	36.0	39.0	86.0	85	1.0	5	1
4.9	3	●	MQS0490X3DB	15.7	26.0	29.0	76.0	75	1.0	5	1
4.9	5	●	MQS0490X5DB	25.5	36.0	39.0	86.0	85	1.0	5	1
5.0	3	●	MQS0500X3DB	16.0	26.0	29.0	76.0	75	1.0	5	1
5.0	5	●	MQS0500X5DB	26.0	36.0	39.0	86.0	85	1.0	5	1
5.0	8	●	MQS0500X8DB	41.0	58.0	58.0	106.0	105	1.0	5	1
5.1	3	●	MQS0510X3DB	16.4	29.1	31.1	82.1	81	1.1	6	1
5.1	5	●	MQS0510X5DB	26.6	40.1	43.1	90.1	89	1.1	6	1
5.2	3	●	MQS0520X3DB	16.7	29.1	31.1	82.1	81	1.1	6	1

MQS

DC(mm)	Hole Depth(l/d)	DP3020	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
5.2	5	●	MQS0520X5DB	27.1	40.1	43.1	90.1	89	1.1	6	1
5.3	3	●	MQS0530X3DB	17.0	29.1	31.1	82.1	81	1.1	6	1
5.3	5	●	MQS0530X5DB	27.6	40.1	43.1	90.1	89	1.1	6	1
5.4	3	●	MQS0540X3DB	17.3	29.1	31.1	82.1	81	1.1	6	1
5.4	5	●	MQS0540X5DB	28.1	40.1	43.1	90.1	89	1.1	6	1
5.5	3	●	MQS0550X3DB	17.6	29.1	31.1	82.1	81	1.1	6	1
5.5	5	●	MQS0550X5DB	28.6	40.1	43.1	90.1	89	1.1	6	1
5.5	8	●	MQS0550X8DB	45.1	62.1	67.1	119.1	118	1.1	6	1
5.6	3	●	MQS0560X3DB	18.0	31.2	31.2	82.2	81	1.2	6	1
5.6	5	●	MQS0560X5DB	29.2	43.2	43.2	90.2	89	1.2	6	1
5.7	3	●	MQS0570X3DB	18.3	31.2	31.2	82.2	81	1.2	6	1
5.7	5	●	MQS0570X5DB	29.7	43.2	43.2	90.2	89	1.2	6	1
5.8	3	●	MQS0580X3DB	18.6	31.2	31.2	82.2	81	1.2	6	1
5.8	5	●	MQS0580X5DB	30.2	43.2	43.2	90.2	89	1.2	6	1
5.9	3	●	MQS0590X3DB	18.9	31.2	31.2	82.2	81	1.2	6	1
5.9	5	●	MQS0590X5DB	30.7	43.2	43.2	90.2	89	1.2	6	1
6.0	3	●	MQS0600X3DB	19.2	31.2	31.2	82.2	81	1.2	6	1
6.0	5	●	MQS0600X5DB	31.2	43.2	43.2	90.2	89	1.2	6	1
6.0	8	●	MQS0600X8DB	49.2	67.2	67.2	119.2	118	1.2	6	1
6.1	3	●	MQS0610X3DB	19.6	34.3	36.3	87.3	86	1.3	7	1
6.1	5	●	MQS0610X5DB	31.8	47.3	49.3	96.3	95	1.3	7	1
6.2	3	●	MQS0620X3DB	19.9	34.3	36.3	87.3	86	1.3	7	1
6.2	5	●	MQS0620X5DB	32.3	47.3	49.3	96.3	95	1.3	7	1
6.3	3	●	MQS0630X3DB	20.2	34.3	36.3	87.3	86	1.3	7	1
6.3	5	●	MQS0630X5DB	32.8	47.3	49.3	96.3	95	1.3	7	1
6.4	3	●	MQS0640X3DB	20.5	34.3	36.3	87.3	86	1.3	7	1
6.4	5	●	MQS0640X5DB	33.3	47.3	49.3	96.3	95	1.3	7	1
6.5	3	●	MQS0650X3DB	20.8	34.3	36.3	87.3	86	1.3	7	1
6.5	5	●	MQS0650X5DB	33.8	47.3	49.3	96.3	95	1.3	7	1
6.5	8	●	MQS0650X8DB	53.3	73.3	78.3	131.3	130	1.3	7	1
6.6	3	●	MQS0660X3DB	21.2	36.4	38.4	91.4	90	1.4	7	1
6.6	5	●	MQS0660X5DB	34.4	50.4	52.4	99.4	98	1.4	7	1
6.7	3	●	MQS0670X3DB	21.5	36.4	38.4	91.4	90	1.4	7	1
6.7	5	●	MQS0670X5DB	34.9	50.4	52.4	99.4	98	1.4	7	1
6.8	3	●	MQS0680X3DB	21.8	36.4	38.4	91.4	90	1.4	7	1
6.8	5	●	MQS0680X5DB	35.4	50.4	52.4	99.4	98	1.4	7	1
6.9	3	●	MQS0690X3DB	22.1	36.4	38.4	91.4	90	1.4	7	1
6.9	5	●	MQS0690X5DB	35.9	50.4	52.4	99.4	98	1.4	7	1
7.0	3	●	MQS0700X3DB	22.4	36.4	38.4	91.4	90	1.4	7	1
7.0	5	●	MQS0700X5DB	36.4	50.4	52.4	99.4	98	1.4	7	1
7.0	8	●	MQS0700X8DB	57.4	78.4	78.4	131.4	130	1.4	7	1
7.1	3	●	MQS0710X3DB	22.8	39.5	40.5	91.5	90	1.5	8	1
7.1	5	●	MQS0710X5DB	37.0	54.5	57.5	104.5	103	1.5	8	1
7.2	3	●	MQS0720X3DB	23.1	39.5	40.5	91.5	90	1.5	8	1
7.2	5	●	MQS0720X5DB	37.5	54.5	57.5	104.5	103	1.5	8	1
7.3	3	●	MQS0730X3DB	23.4	39.5	40.5	91.5	90	1.5	8	1
7.3	5	●	MQS0730X5DB	38.0	54.5	57.5	104.5	103	1.5	8	1
7.4	3	●	MQS0740X3DB	23.7	39.5	40.5	91.5	90	1.5	8	1
7.4	5	●	MQS0740X5DB	38.5	54.5	57.5	104.5	103	1.5	8	1
7.5	3	●	MQS0750X3DB	24.1	39.6	40.6	91.6	90	1.6	8	1
7.5	5	●	MQS0750X5DB	39.1	54.6	57.6	104.6	103	1.6	8	1
7.5	8	●	MQS0750X8DB	61.6	84.6	89.6	143.6	142	1.6	8	2
7.6	3	●	MQS0760X3DB	24.4	41.6	41.6	91.6	90	1.6	8	1
7.6	5	●	MQS0760X5DB	39.6	57.6	57.6	104.6	103	1.6	8	1
7.7	3	●	MQS0770X3DB	24.7	41.6	41.6	91.6	90	1.6	8	1
7.7	5	●	MQS0770X5DB	40.1	57.6	57.6	104.6	103	1.6	8	1
7.8	3	●	MQS0780X3DB	25.0	41.6	41.6	91.6	90	1.6	8	1
7.8	5	●	MQS0780X5DB	40.6	57.6	57.6	104.6	103	1.6	8	1
7.9	3	●	MQS0790X3DB	25.3	41.6	41.6	91.6	90	1.6	8	1
7.9	5	●	MQS0790X5DB	41.1	57.6	57.6	104.6	103	1.6	8	1
8.0	3	●	MQS0800X3DB	25.7	41.7	41.7	91.7	90	1.7	8	1
8.0	5	●	MQS0800X5DB	41.7	57.7	57.7	104.7	103	1.7	8	1
8.0	8	●	MQS0800X8DB	65.7	89.7	89.7	143.7	142	1.7	8	2
8.1	3	●	MQS0810X3DB	26.0	44.7	46.7	97.7	96	1.7	9	1
8.1	5	●	MQS0810X5DB	42.2	61.7	63.7	114.7	113	1.7	9	1
8.2	3	●	MQS0820X3DB	26.3	44.7	46.7	97.7	96	1.7	9	1
8.2	5	●	MQS0820X5DB	42.7	61.7	63.7	114.7	113	1.7	9	1
8.3	3	●	MQS0830X3DB	26.6	44.7	46.7	97.7	96	1.7	9	1
8.3	5	●	MQS0830X5DB	43.2	61.7	63.7	114.7	113	1.7	9	1
8.4	3	●	MQS0840X3DB	26.9	44.7	46.7	97.7	96	1.7	9	1
8.4	5	●	MQS0840X5DB	43.7	61.7	63.7	114.7	113	1.7	9	1
8.5	3	●	MQS0850X3DB	27.3	44.8	46.8	97.8	96	1.8	9	1
8.5	5	●	MQS0850X5DB	44.3	61.8	63.8	114.8	113	1.8	9	1
8.5	8	●	MQS0850X8DB	69.8	95.8	100.8	155.8	154	1.8	9	2
8.6	3	●	MQS0860X3DB	27.6	46.8	48.8	102.8	101	1.8	9	1
8.6	5	●	MQS0860X5DB	44.8	64.8	66.8	117.8	116	1.8	9	1
8.7	3	●	MQS0870X3DB	27.9	46.8	48.8	102.8	101	1.8	9	1
8.7	5	●	MQS0870X5DB	45.3	64.8	66.8	117.8	116	1.8	9	1
8.8	3	●	MQS0880X3DB	28.2	46.8	48.8	102.8	101	1.8	9	1
8.8	5	●	MQS0880X5DB	45.8	64.8	66.8	117.8	116	1.8	9	1
8.9	3	●	MQS0890X3DB	28.5	46.8	48.8	102.8	101	1.8	9	1
8.9	5	●	MQS0890X5DB	46.3	64.8	66.8	117.8	116	1.8	9	1
9.0	3	●	MQS0900X3DB	28.9	46.9	48.9	102.9	101	1.9	9	1
9.0	5	●	MQS0900X5DB	46.9	64.9	66.9	117.9	116	1.9	9	1
9.0	8	●	MQS0900X8DB	73.9	100.9	100.9	155.9	154	1.9	9	2
9.1	3	●	MQS0910X3DB	29.2	49.9	51.9	102.9	101	1.9	10	1
9.1	5	●	MQS0910X5DB	47.4	68.9	71.9	122.9	121	1.9	10	1
9.2	3	●	MQS0920X3DB	29.5	49.9	51.9	102.9	101	1.9	10	1
9.2	5	●	MQS0920X5DB	47.9	68.9	71.9	122.9	121	1.9	10	1
9.3	3	●	MQS0930X3DB	29.8	49.9	51.9	102.9	101	1.9	10	1
9.3	5	●	MQS0930X5DB	48.4	68.9	71.9	122.9	121	1.9	10	1
9.4	3	●	MQS0940X3DB	30.1	49.9	51.9	102.9	101	1.9	10	1
9.4	5	●	MQS0940X5DB	48.9	68.9	71.9	122.9	121	1.9	10	1
9.5	3	●	MQS0950X3DB	30.5	50.0	52.0	103.0	101	2.0	10	1
9.5	5	●	MQS0950X5DB	49.5	69.0	72.0	123.0	121	2.0	10	1
9.5	8	●	MQS0950X8DB	78.0	107.0	112.0	168.0	166	2.0	10	2
9.6	3	●	MQS0960X3DB	30.8	52.0	52.0	103.0	101	2.0	10	1
9.6	5	●	MQS0960X5DB	50.0	72.0	72.0	123.0	121	2.0	10	1
9.7	3	●	MQS0970X3DB	31.1	52.0	52.0	103.0	101	2.0	10	1
9.7	5	●	MQS0970X5DB	50.5	72.0	72.0	123.0	121	2.0	10	1
9.8	3	●	MQS0980X3DB	31.4	52.0	52.0	103.0	101	2.0	10	1
9.8	5	●	MQS0980X5DB	51.0	72.0	72.0	123.0	121	2.0	10	1
9.9	3	●	MQS0990X3DB	31.8	52.1	52.1	103.1	101	2.1	10	1
9.9	5	●	MQS0990X5DB	51.6	72.1	72.1	123.1	121	2.1	10	1
10.0	3	●	MQS1000X3DB	32.1	52.1	52.1	103.1	101	2.1	10	1
10.0	5	●	MQS1000X5DB	52.1	72.1	72.1	123.1	121	2.1	10	1
10.0	8	●	MQS1000X8DB	82.1	112.1	112.1	168.1	166	2.1	10	2
10.1	3	●	MQS1010X3DB	32.4	55.1	57.1	113.1	111	2.1	11	1

MQS

DC(mm)	Hole Depth(l/d)	DP3020	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
10.1	5	●	MQS1010X5DB	52.6	76.1	80.1	136.1	134	2.1	11	1
10.2	3	●	MQS1020X3DB	32.7	55.1	57.1	113.1	111	2.1	11	1
10.2	5	●	MQS1020X5DB	53.1	76.1	80.1	136.1	134	2.1	11	1
10.3	3	●	MQS1030X3DB	33.0	55.1	57.1	113.1	111	2.1	11	1
10.3	5	●	MQS1030X5DB	53.6	76.1	80.1	136.1	134	2.1	11	1
10.4	3	●	MQS1040X3DB	33.4	55.2	57.2	113.2	111	2.2	11	1
10.4	5	●	MQS1040X5DB	54.2	76.2	80.2	136.2	134	2.2	11	1
10.5	3	●	MQS1050X3DB	33.7	55.2	57.2	113.2	111	2.2	11	1
10.5	5	●	MQS1050X5DB	54.7	76.2	80.2	136.2	134	2.2	11	1
10.5	8	●	MQS1050X8DB	86.2	118.2	123.2	184.2	182	2.2	11	2
10.6	3	●	MQS1060X3DB	34.0	57.2	58.2	118.2	116	2.2	11	1
10.6	5	●	MQS1060X5DB	55.2	79.2	80.2	136.2	134	2.2	11	1
10.7	3	●	MQS1070X3DB	34.3	57.2	58.2	118.2	116	2.2	11	1
10.7	5	●	MQS1070X5DB	55.7	79.2	80.2	136.2	134	2.2	11	1
10.8	3	●	MQS1080X3DB	34.6	57.2	58.2	118.2	116	2.2	11	1
10.8	5	●	MQS1080X5DB	56.2	79.2	80.2	136.2	134	2.2	11	1
10.9	3	●	MQS1090X3DB	35.0	57.3	58.3	118.3	116	2.3	11	1
10.9	5	●	MQS1090X5DB	56.8	79.3	80.3	136.3	134	2.3	11	1
11.0	3	●	MQS1100X3DB	35.3	57.3	58.3	118.3	116	2.3	11	1
11.0	5	●	MQS1100X5DB	57.3	79.3	80.3	136.3	134	2.3	11	1
11.0	8	●	MQS1100X8DB	90.3	123.3	123.3	184.3	182	2.3	11	2
11.1	3	●	MQS1110X3DB	35.6	60.3	62.3	118.3	116	2.3	12	1
11.1	5	●	MQS1110X5DB	57.8	83.3	86.3	142.3	140	2.3	12	1
11.2	3	●	MQS1120X3DB	35.9	60.3	62.3	118.3	116	2.3	12	1
11.2	5	●	MQS1120X5DB	58.3	83.3	86.3	142.3	140	2.3	12	1
11.3	3	●	MQS1130X3DB	36.2	60.3	62.3	118.3	116	2.3	12	1
11.3	5	●	MQS1130X5DB	58.8	83.3	86.3	142.3	140	2.3	12	1
11.4	3	●	MQS1140X3DB	36.6	60.4	62.4	118.4	116	2.4	12	1
11.4	5	●	MQS1140X5DB	59.4	83.4	86.4	142.4	140	2.4	12	1
11.5	3	●	MQS1150X3DB	36.9	60.4	62.4	118.4	116	2.4	12	1
11.5	5	●	MQS1150X5DB	59.9	83.4	86.4	142.4	140	2.4	12	1
11.5	8	●	MQS1150X8DB	94.4	129.4	134.4	196.4	194	2.4	12	2
11.6	3	●	MQS1160X3DB	37.2	62.4	62.4	118.4	116	2.4	12	1
11.6	5	●	MQS1160X5DB	60.4	86.4	86.4	142.4	140	2.4	12	1
11.7	3	●	MQS1170X3DB	37.5	62.4	62.4	118.4	116	2.4	12	1
11.7	5	●	MQS1170X5DB	60.9	86.4	86.4	142.4	140	2.4	12	1
11.8	3	●	MQS1180X3DB	37.8	62.4	62.4	118.4	116	2.4	12	1
11.8	5	●	MQS1180X5DB	61.4	86.4	86.4	142.4	140	2.4	12	1
11.9	3	●	MQS1190X3DB	38.2	62.5	62.5	118.5	116	2.5	12	1
11.9	5	●	MQS1190X5DB	62.0	86.5	86.5	142.5	140	2.5	12	1
12.0	3	●	MQS1200X3DB	38.5	62.5	62.5	118.5	116	2.5	12	1
12.0	5	●	MQS1200X5DB	62.5	86.5	86.5	142.5	140	2.5	12	1
12.0	8	●	MQS1200X8DB	98.5	134.5	134.5	196.5	194	2.5	12	2
12.1	3	●	MQS1210X3DB	38.8	65.5	68.5	124.5	122	2.5	13	1
12.1	5	●	MQS1210X5DB	63.0	90.5	94.5	150.5	148	2.5	13	1
12.2	3	●	MQS1220X3DB	39.1	65.5	68.5	124.5	122	2.5	13	1
12.2	5	●	MQS1220X5DB	63.5	90.5	94.5	150.5	148	2.5	13	1
12.3	3	●	MQS1230X3DB	39.4	65.5	68.5	124.5	122	2.5	13	1
12.3	5	●	MQS1230X5DB	64.0	90.5	94.5	150.5	148	2.5	13	1
12.4	3	●	MQS1240X3DB	39.8	65.6	68.6	124.6	122	2.6	13	1
12.4	5	●	MQS1240X5DB	64.6	90.6	94.6	150.6	148	2.6	13	1
12.5	3	●	MQS1250X3DB	40.1	65.6	68.6	124.6	122	2.6	13	1
12.5	5	●	MQS1250X5DB	65.1	90.6	94.6	150.6	148	2.6	13	1
12.5	8	●	MQS1250X8DB	102.6	140.6	145.6	208.6	206	2.6	13	2
12.6	3	●	MQS1260X3DB	40.4	67.6	68.6	124.6	122	2.6	13	1
12.6	5	●	MQS1260X5DB	65.6	93.6	94.6	150.6	148	2.6	13	1
12.7	3	●	MQS1270X3DB	40.7	67.6	68.6	124.6	122	2.6	13	1
12.7	5	●	MQS1270X5DB	66.1	93.6	94.6	150.6	148	2.6	13	1
12.8	3	●	MQS1280X3DB	41.1	67.7	68.7	124.7	122	2.7	13	1
12.8	5	●	MQS1280X5DB	66.7	93.7	94.7	150.7	148	2.7	13	1
12.9	3	●	MQS1290X3DB	41.4	67.7	68.7	124.7	122	2.7	13	1
12.9	5	●	MQS1290X5DB	67.2	93.7	94.7	150.7	148	2.7	13	1
13.0	3	●	MQS1300X3DB	41.7	67.7	68.7	124.7	122	2.7	13	1
13.0	5	●	MQS1300X5DB	67.7	93.7	94.7	150.7	148	2.7	13	1
13.0	8	●	MQS1300X8DB	106.7	145.7	145.7	208.7	206	2.7	13	2
13.1	3	●	MQS1310X3DB	42.0	70.7	72.7	128.7	126	2.7	14	1
13.1	5	●	MQS1310X5DB	68.2	97.7	100.7	156.7	154	2.7	14	1
13.2	3	●	MQS1320X3DB	42.3	70.7	72.7	128.7	126	2.7	14	1
13.2	5	●	MQS1320X5DB	68.7	97.7	100.7	156.7	154	2.7	14	1
13.3	3	●	MQS1330X3DB	42.7	70.8	72.8	128.8	126	2.8	14	1
13.3	5	●	MQS1330X5DB	69.3	97.8	100.8	156.8	154	2.8	14	1
13.4	3	●	MQS1340X3DB	43.0	70.8	72.8	128.8	126	2.8	14	1
13.4	5	●	MQS1340X5DB	69.8	97.8	100.8	156.8	154	2.8	14	1
13.5	3	●	MQS1350X3DB	43.3	70.8	72.8	128.8	126	2.8	14	1
13.5	5	●	MQS1350X5DB	70.3	97.8	100.8	156.8	154	2.8	14	1
13.5	8	●	MQS1350X8DB	110.8	151.8	156.8	220.8	218	2.8	14	2
13.6	3	●	MQS1360X3DB	43.6	72.8	72.8	128.8	126	2.8	14	1
13.6	5	●	MQS1360X5DB	70.8	100.8	100.8	156.8	154	2.8	14	1
13.7	3	●	MQS1370X3DB	43.9	72.8	72.8	128.8	126	2.8	14	1
13.7	5	●	MQS1370X5DB	71.3	100.8	100.8	156.8	154	2.8	14	1
13.8	3	●	MQS1380X3DB	44.3	72.9	72.9	128.9	126	2.9	14	1
13.8	5	●	MQS1380X5DB	71.9	100.9	100.9	156.9	154	2.9	14	1
13.9	3	●	MQS1390X3DB	44.6	72.9	72.9	128.9	126	2.9	14	1
13.9	5	●	MQS1390X5DB	72.4	100.9	100.9	156.9	154	2.9	14	1
14.0	3	●	MQS1400X3DB	44.9	72.9	72.9	128.9	126	2.9	14	1
14.0	5	●	MQS1400X5DB	72.9	100.9	100.9	156.9	154	2.9	14	1
14.0	8	●	MQS1400X8DB	114.9	156.9	156.9	220.9	218	2.9	14	2
14.1	3	●	MQS1410X3DB	45.2	75.9	78.9	137.9	135	2.9	15	1
14.1	5	●	MQS1410X5DB	73.4	104.9	108.9	167.9	165	2.9	15	1
14.2	3	●	MQS1420X3DB	45.5	75.9	78.9	137.9	135	2.9	15	1
14.2	5	●	MQS1420X5DB	73.9	104.9	108.9	167.9	165	2.9	15	1
14.3	3	●	MQS1430X3DB	45.9	76.0	79.0	138.0	135	3.0	15	1
14.3	5	●	MQS1430X5DB	74.5	105.0	109.0	168.0	165	3.0	15	1
14.4	3	●	MQS1440X3DB	46.2	76.0	79.0	138.0	135	3.0	15	1
14.4	5	●	MQS1440X5DB	75.0	105.0	109.0	168.0	165	3.0	15	1
14.5	3	●	MQS1450X3DB	46.5	76.0	79.0	138.0	135	3.0	15	1
14.5	5	●	MQS1450X5DB	75.5	105.0	109.0	168.0	165	3.0	15	1
14.5	8	●	MQS1450X8DB	119.0	163.0	168.0	228.0	225	3.0	15	2
14.6	3	●	MQS1460X3DB	46.8	78.0	79.0	138.0	135	3.0	15	1
14.6	5	●	MQS1460X5DB	76.0	108.0	109.0	168.0	165	3.0	15	1
14.7	3	●	MQS1470X3DB	47.1	78.0	79.0	138.0	135	3.0	15	1
14.7	5	●	MQS1470X5DB	76.5	108.0	109.0	168.0	165	3.0	15	1
14.8	3	●	MQS1480X3DB	47.5	78.1	79.1	138.1	135	3.1	15	1
14.8	5	●	MQS1480X5DB	77.1	108.1	109.1	168.1	165	3.1	15	1
14.9	3	●	MQS1490X3DB	47.8	78.1	79.1	138.1	135	3.1	15	1
14.9	5	●	MQS1490X5DB	77.6	108.1	109.1	168.1	165	3.1	15	1
15.0	3	●	MQS1500X3DB	48.1	78.1	79.1	138.1	135	3.1	15	1
15.0	5	●	MQS1500X5DB	78.1	108.1	109.1	168.1	165	3.1	15	1

MQS

DC(mm)	Hole Depth(l/d)	DP3020	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
15.0	8	●	MQS1500X8DB	123.1	168.1	168.1	228.1	225	3.1	15	2
15.1	3	●	MQS1510X3DB	48.4	81.1	83.1	142.1	139	3.1	16	1
15.1	5	●	MQS1510X5DB	78.6	112.1	115.1	174.1	171	3.1	16	1
15.2	3	●	MQS1520X3DB	48.7	81.1	83.1	142.1	139	3.1	16	1
15.2	5	●	MQS1520X5DB	79.1	112.1	115.1	174.1	171	3.1	16	1
15.3	3	●	MQS1530X3DB	49.1	81.2	83.2	142.2	139	3.2	16	1
15.3	5	●	MQS1530X5DB	79.7	112.2	115.2	174.2	171	3.2	16	1
15.4	3	●	MQS1540X3DB	49.4	81.2	83.2	142.2	139	3.2	16	1
15.4	5	●	MQS1540X5DB	80.2	112.2	115.2	174.2	171	3.2	16	1
15.5	3	●	MQS1550X3DB	49.7	81.2	83.2	142.2	139	3.2	16	1
15.5	5	●	MQS1550X5DB	80.7	112.2	115.2	174.2	171	3.2	16	1
15.5	8	●	MQS1550X8DB	127.2	174.2	184.2	244.2	241	3.2	16	2
15.6	3	●	MQS1560X3DB	50.0	83.2	83.2	142.2	139	3.2	16	1
15.6	5	●	MQS1560X5DB	81.2	115.2	115.2	174.2	171	3.2	16	1
15.7	3	●	MQS1570X3DB	50.4	83.3	83.3	142.3	139	3.3	16	1
15.7	5	●	MQS1570X5DB	81.8	115.3	115.3	174.3	171	3.3	16	1
15.8	3	●	MQS1580X3DB	50.7	83.3	83.3	142.3	139	3.3	16	1
15.8	5	●	MQS1580X5DB	82.3	115.3	115.3	174.3	171	3.3	16	1
15.9	3	●	MQS1590X3DB	51.0	83.3	83.3	142.3	139	3.3	16	1
15.9	5	●	MQS1590X5DB	82.8	115.3	115.3	174.3	171	3.3	16	1
16.0	3	●	MQS1600X3DB	51.3	83.3	83.3	142.3	139	3.3	16	1
16.0	5	●	MQS1600X5DB	83.3	115.3	115.3	174.3	171	3.3	16	1
16.0	8	●	MQS1600X8DB	131.3	179.3	184.3	244.3	241	3.3	16	2
16.1	3	□	MQS1610X3DB	51.6	86.3	89.3	148.3	145	3.3	17	1
16.1	5	□	MQS1610X5DB	83.8	119.3	123.3	182.3	179	3.3	17	1
16.2	3	□	MQS1620X3DB	52.0	86.4	89.4	148.4	145	3.4	17	1
16.2	5	□	MQS1620X5DB	84.4	119.4	123.4	182.4	179	3.4	17	1
16.3	3	□	MQS1630X3DB	52.3	86.4	89.4	148.4	145	3.4	17	1
16.3	5	□	MQS1630X5DB	84.9	119.4	123.4	182.4	179	3.4	17	1
16.4	3	□	MQS1640X3DB	52.6	86.4	89.4	148.4	145	3.4	17	1
16.4	5	□	MQS1640X5DB	85.4	119.4	123.4	182.4	179	3.4	17	1
16.5	3	●	MQS1650X3DB	52.9	86.4	89.4	148.4	145	3.4	17	1
16.5	5	●	MQS1650X5DB	85.9	119.4	123.4	182.4	179	3.4	17	1
16.6	3	□	MQS1660X3DB	53.2	88.4	89.4	148.4	145	3.4	17	1
16.6	5	□	MQS1660X5DB	86.4	122.4	123.4	182.4	179	3.4	17	1
16.7	3	□	MQS1670X3DB	53.6	88.5	89.5	148.5	145	3.5	17	1
16.7	5	□	MQS1670X5DB	87.0	122.5	123.5	182.5	179	3.5	17	1
16.8	3	□	MQS1680X3DB	53.9	88.5	89.5	148.5	145	3.5	17	1
16.8	5	□	MQS1680X5DB	87.5	122.5	123.5	182.5	179	3.5	17	1
16.9	3	□	MQS1690X3DB	54.2	88.5	89.5	148.5	145	3.5	17	1
16.9	5	□	MQS1690X5DB	88.0	122.5	123.5	182.5	179	3.5	17	1
17.0	3	●	MQS1700X3DB	54.5	88.5	89.5	148.5	145	3.5	17	1
17.0	5	●	MQS1700X5DB	88.5	122.5	123.5	182.5	179	3.5	17	1
17.1	3	□	MQS1710X3DB	54.8	91.5	93.5	152.5	149	3.5	18	1
17.1	5	□	MQS1710X5DB	89.0	126.5	129.5	188.5	185	3.5	18	1
17.2	3	□	MQS1720X3DB	55.2	91.6	93.6	152.6	149	3.6	18	1
17.2	5	□	MQS1720X5DB	89.6	126.6	129.6	188.6	185	3.6	18	1
17.3	3	□	MQS1730X3DB	55.5	91.6	93.6	152.6	149	3.6	18	1
17.3	5	□	MQS1730X5DB	90.1	126.6	129.6	188.6	185	3.6	18	1
17.4	3	□	MQS1740X3DB	55.8	91.6	93.6	152.6	149	3.6	18	1
17.4	5	□	MQS1740X5DB	90.6	126.6	129.6	188.6	185	3.6	18	1
17.5	3	●	MQS1750X3DB	56.1	91.6	93.6	152.6	149	3.6	18	1
17.5	5	●	MQS1750X5DB	91.1	126.6	129.6	188.6	185	3.6	18	1
17.6	3	□	MQS1760X3DB	56.4	93.6	93.6	152.6	149	3.6	18	1
17.6	5	□	MQS1760X5DB	91.6	129.6	129.6	188.6	185	3.6	18	1
17.7	3	□	MQS1770X3DB	56.8	93.7	93.7	152.7	149	3.7	18	1
17.7	5	□	MQS1770X5DB	92.2	129.7	129.7	188.7	185	3.7	18	1
17.8	3	□	MQS1780X3DB	57.1	93.7	93.7	152.7	149	3.7	18	1
17.8	5	□	MQS1780X5DB	92.7	129.7	129.7	188.7	185	3.7	18	1
17.9	3	□	MQS1790X3DB	57.4	93.7	93.7	152.7	149	3.7	18	1
17.9	5	□	MQS1790X5DB	93.2	129.7	129.7	188.7	185	3.7	18	1
18.0	3	●	MQS1800X3DB	57.7	93.7	93.7	152.7	149	3.7	18	1
18.0	5	●	MQS1800X5DB	93.7	129.7	129.7	188.7	185	3.7	18	1
18.1	3	□	MQS1810X3DB	58.0	96.7	99.7	160.7	157	3.7	19	1
18.1	5	□	MQS1810X5DB	94.2	133.7	137.7	198.7	195	3.7	19	1
18.2	3	□	MQS1820X3DB	58.4	96.8	99.8	160.8	157	3.8	19	1
18.2	5	□	MQS1820X5DB	94.8	133.8	137.8	198.8	195	3.8	19	1
18.3	3	□	MQS1830X3DB	58.7	96.8	99.8	160.8	157	3.8	19	1
18.3	5	□	MQS1830X5DB	95.3	133.8	137.8	198.8	195	3.8	19	1
18.4	3	□	MQS1840X3DB	59.0	96.8	99.8	160.8	157	3.8	19	1
18.4	5	□	MQS1840X5DB	95.8	133.8	137.8	198.8	195	3.8	19	1
18.5	3	●	MQS1850X3DB	59.3	96.8	99.8	160.8	157	3.8	19	1
18.5	5	●	MQS1850X5DB	96.3	133.8	137.8	198.8	195	3.8	19	1
18.6	3	□	MQS1860X3DB	59.7	98.9	99.9	160.9	157	3.9	19	1
18.6	5	□	MQS1860X5DB	96.9	136.9	137.9	198.9	195	3.9	19	1
18.7	3	□	MQS1870X3DB	60.0	98.9	99.9	160.9	157	3.9	19	1
18.7	5	□	MQS1870X5DB	97.4	136.9	137.9	198.9	195	3.9	19	1
18.8	3	□	MQS1880X3DB	60.3	98.9	99.9	160.9	157	3.9	19	1
18.8	5	□	MQS1880X5DB	97.9	136.9	137.9	198.9	195	3.9	19	1
18.9	3	□	MQS1890X3DB	60.6	98.9	99.9	160.9	157	3.9	19	1
18.9	5	□	MQS1890X5DB	98.4	136.9	137.9	198.9	195	3.9	19	1
19.0	3	●	MQS1900X3DB	60.9	98.9	99.9	160.9	157	3.9	19	1
19.0	5	●	MQS1900X5DB	98.9	136.9	137.9	198.9	195	3.9	19	1
19.1	3	□	MQS1910X3DB	61.3	102.0	104.0	165.0	161	4.0	20	1
19.1	5	□	MQS1910X5DB	99.5	141.0	144.0	205.0	201	4.0	20	1
19.2	3	□	MQS1920X3DB	61.6	102.0	104.0	165.0	161	4.0	20	1
19.2	5	□	MQS1920X5DB	100.0	141.0	144.0	205.0	201	4.0	20	1
19.3	3	□	MQS1930X3DB	61.9	102.0	104.0	165.0	161	4.0	20	1
19.3	5	□	MQS1930X5DB	100.5	141.0	144.0	205.0	201	4.0	20	1
19.4	3	□	MQS1940X3DB	62.2	102.0	104.0	165.0	161	4.0	20	1
19.4	5	□	MQS1940X5DB	101.0	141.0	144.0	205.0	201	4.0	20	1
19.5	3	●	MQS1950X3DB	62.5	102.0	104.0	165.0	161	4.0	20	1
19.5	5	●	MQS1950X5DB	101.5	141.0	144.0	205.0	201	4.0	20	1
19.6	3	□	MQS1960X3DB	62.9	104.1	104.1	165.1	161	4.1	20	1
19.6	5	□	MQS1960X5DB	102.1	144.1	144.1	205.1	201	4.1	20	1
19.7	3	□	MQS1970X3DB	63.2	104.1	104.1	165.1	161	4.1	20	1
19.7	5	□	MQS1970X5DB	102.6	144.1	144.1	205.1	201	4.1	20	1
19.8	3	□	MQS1980X3DB	63.5	104.1	104.1	165.1	161	4.1	20	1
19.8	5	□	MQS1980X5DB	103.1	144.1	144.1	205.1	201	4.1	20	1
19.9	3	□	MQS1990X3DB	63.8	104.1	104.1	165.1	161	4.1	20	1
19.9	5	□	MQS1990X5DB	103.6	144.1	144.1	205.1	201	4.1	20	1
20.0	3	●	MQS2000X3DB	64.1	104.1	104.1	165.1	161	4.1	20	1
20.0	5	●	MQS2000X5DB	104.1	144.1	144.1	205.1	201	4.1	20	1

MQS

Recommended Cutting Condition

·Internal Coolant

Work material	Mild Steel(≦180HB) AISI 1010 etc				Carbon steel, Alloy steel (180—280HB) AISI 1045, AISI 4140 etc			
Dia. DC (mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Feed rate (mm/min)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Feed rate (mm/min)
3.2	130	12900	0.15(0.10—0.20)	1935	100	9900	0.15(0.10—0.20)	1485
4.0	130	10300	0.2(0.15—0.25)	2060	100	7900	0.2(0.15—0.25)	1580
5.0	130	8200	0.2(0.15—0.25)	1640	100	6300	0.2(0.15—0.25)	1260
6.3	140	7000	0.25(0.20—0.30)	1750	130	6500	0.25(0.20—0.30)	1625
8.0	140	5500	0.25(0.20—0.30)	1375	130	5100	0.25(0.20—0.30)	1275
10.0	140	4400	0.27(0.22—0.32)	1185	130	4100	0.27(0.22—0.32)	1105
12.0	160	4200	0.3(0.26—0.35)	1260	140	3700	0.3(0.26—0.35)	1110
16.0	180	3500	0.33(0.27—0.38)	1155	150	2900	0.33(0.27—0.38)	955
20.0	180	2800	0.35(0.30—0.40)	980	150	2300	0.35(0.30—0.40)	805

Work material	Carbon steel, Alloy steel (280—350HB) AISI 4340 etc				Gray Cast Iron(<350MPa) No 45 B etc			
Dia. DC (mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Feed rate (mm/min)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Feed rate (mm/min)
3.2	70	6900	0.1(0.06—0.15)	690	110	10900	0.28(0.15—0.35)	3050
4.0	80	6300	0.11(0.07—0.15)	690	110	8700	0.28(0.15—0.35)	2435
5.0	80	5000	0.14(0.09—0.18)	700	110	7000	0.3(0.15—0.40)	2100
6.3	90	4500	0.18(0.11—0.24)	810	120	6000	0.33(0.20—0.45)	1980
8.0	100	3900	0.21(0.16—0.25)	815	120	4700	0.35(0.20—0.45)	1645
10.0	110	3500	0.23(0.19—0.27)	805	130	4100	0.4(0.22—0.45)	1640
12.0	120	3100	0.26(0.22—0.30)	805	150	3900	0.45(0.26—0.50)	1755
16.0	130	2500	0.28(0.23—0.33)	700	160	3100	0.5(0.28—0.60)	1550
20.0	130	2000	0.3(0.26—0.35)	600	160	2500	0.5(0.30—0.60)	1250

Work material	Ductile Cast Iron(<450MPa) 60-40-8 etc				Ductile Cast Iron(<800MPa) 100-70-03 etc			
Dia. DC (mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Feed rate (mm/min)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Feed rate (mm/min)
3.2	90	8900	0.25(0.15—0.32)	2225	75	7400	0.1(0.06—0.15)	740
4.0	90	7100	0.25(0.15—0.32)	1775	75	5900	0.1(0.06—0.15)	590
5.0	90	5700	0.25(0.15—0.32)	1425	75	4700	0.1(0.06—0.15)	470
6.3	100	5000	0.3(0.20—0.38)	1500	85	4200	0.15(0.10—0.20)	630
8.0	100	3900	0.3(0.20—0.38)	1170	85	3300	0.2(0.10—0.25)	660
10.0	100	3100	0.3(0.22—0.38)	930	85	2700	0.2(0.10—0.25)	540
12.0	110	2900	0.35(0.26—0.40)	1015	95	2500	0.25(0.20—0.30)	625
16.0	120	2300	0.35(0.28—0.40)	805	110	2100	0.25(0.20—0.30)	525
20.0	120	1900	0.35(0.30—0.40)	665	110	1700	0.3(0.20—0.35)	510

- Spindle through & high pressure coolant system is recommended to make stable holes.
- Emulsion type of water coolant is recommended.
- Please reduce the revolution when using non-water-soluble cutting fluid.

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Work material	Mild Steel(≦180HB) AISI 1010 etc				Carbon steel, Alloy steel (180—280HB) AISI 1045, AISI 4140 etc			
Dia. DC (mm)	Cutting Speed (m/min)	Revolution (min-1)	Feed rate (Min.—Max.) (mm/rev)	Feed rate (mm/min)	Cutting Speed (m/min)	Revolution (min-1)	Feed rate (Min.—Max.) (mm/rev)	Feed rate (mm/min)
3.2	100	9900	0.15(0.10—0.20)	1485	80	7900	0.15(0.10—0.20)	1185
4.0	100	7900	0.2(0.15—0.25)	1580	80	6300	0.2(0.15—0.25)	1260
5.0	100	6300	0.2(0.15—0.25)	1260	80	5000	0.2(0.15—0.25)	1000
6.3	110	5500	0.25(0.20—0.30)	1375	100	5000	0.25(0.20—0.30)	1250
8.0	110	4300	0.25(0.20—0.30)	1075	100	3900	0.25(0.20—0.30)	975
10.0	110	3500	0.27(0.22—0.32)	945	100	3100	0.27(0.22—0.32)	835
12.0	130	3400	0.3(0.26—0.35)	1020	110	2900	0.3(0.26—0.35)	870
16.0	140	2700	0.33(0.27—0.38)	890	120	2300	0.33(0.27—0.38)	755
20.0	140	2200	0.35(0.30—0.40)	770	120	1900	0.35(0.30—0.40)	665

Work material	Carbon steel, Alloy steel (280—350HB) AISI 4340 etc				Gray Cast Iron(<350MPa) No 45 B etc			
Dia. DC (mm)	Cutting Speed (m/min)	Revolution (min-1)	Feed rate (Min.—Max.) (mm/rev)	Feed rate (mm/min)	Cutting Speed (m/min)	Revolution (min-1)	Feed rate (Min.—Max.) (mm/rev)	Feed rate (mm/min)
3.2	60	5900	0.1(0.06—0.15)	590	90	8900	0.28(0.15—0.35)	2490
4.0	60	4700	0.11(0.07—0.15)	515	90	7100	0.28(0.15—0.35)	1985
5.0	60	3800	0.14(0.09—0.18)	530	90	5700	0.3(0.15—0.40)	1710
6.3	60	3000	0.18(0.11—0.24)	540	100	5000	0.33(0.20—0.45)	1650
8.0	60	2300	0.21(0.16—0.25)	480	100	3900	0.35(0.20—0.45)	1365
10.0	60	1900	0.23(0.19—0.27)	435	100	3100	0.4(0.22—0.45)	1240
12.0	80	2100	0.26(0.22—0.30)	545	120	3100	0.45(0.26—0.50)	1395
16.0	80	1500	0.28(0.23—0.33)	420	130	2500	0.5(0.28—0.60)	1250
20.0	80	1200	0.3(0.26—0.35)	360	130	2000	0.5(0.30—0.60)	1000

Work material	Ductile Cast Iron(<450MPa) 60-40-8 etc				Ductile Cast Iron(<800MPa) 100-70-03 etc			
Dia. DC (mm)	Cutting Speed (m/min)	Revolution (min-1)	Feed rate (Min.—Max.) (mm/rev)	Feed rate (mm/min)	Cutting Speed (m/min)	Revolution (min-1)	Feed rate (Min.—Max.) (mm/rev)	Feed rate (mm/min)
3.2	70	6900	0.25(0.15—0.32)	1725	60	5900	0.1(0.06—0.15)	590
4.0	70	5500	0.25(0.15—0.32)	1375	60	4700	0.1(0.06—0.15)	470
5.0	70	4400	0.25(0.15—0.32)	1100	60	3800	0.1(0.06—0.15)	380
6.3	80	4000	0.3(0.20—0.38)	1200	70	3500	0.15(0.10—0.20)	525
8.0	80	3100	0.3(0.20—0.38)	930	70	2700	0.2(0.10—0.25)	540
10.0	80	2500	0.3(0.22—0.38)	750	70	2200	0.2(0.10—0.25)	440
12.0	90	2300	0.35(0.26—0.40)	805	80	2100	0.25(0.20—0.30)	525
16.0	100	1900	0.35(0.28—0.40)	665	90	1700	0.25(0.20—0.30)	425
20.0	100	1500	0.35(0.30—0.40)	525	90	1400	0.3(0.20—0.35)	420

MMS

WSTAR Drill Series

Solid Carbide Drill for Stainless Steel

Product Information

UWC DP7 140° SIG X Thinning

Work Material

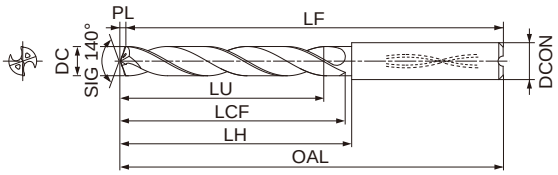
M

TECHNICAL DATA >> 1997

ISO13399 Property >> 1966

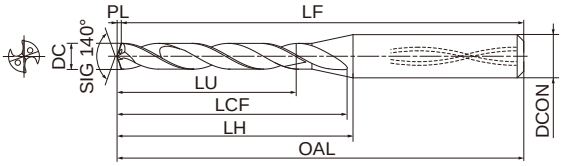
SYMBOL DESCRIPTIONS >> 1623

DRILLS SELECTION CHART >> 1624



Type1

	DC=3	3<DC≦6	6<DC≦10	10<DC≦18	18<DC≦20
	0 −0.014	0 −0.018	0 −0.022	0 −0.027	0 −0.033
h6	—	0 −0.008	0 −0.009	0 −0.011	0 −0.013



Type2

Stock status indication:●: Inventory maintained in Japan.▲: This item to be discontinued within two years.□: Non stock, produced to order only.

(Note) MMS drills are suitable for use with shrink fit holders.

Internal Coolant　　Unit（mm）

DC(mm)	Hole Depth(l/d)	DP7020	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
3.0	3	●	MMS0300X3DB	9.5	21.5	23.5	70.5	70	0.5	6	2
3.0	5	●	MMS0300X5DB	15.5	28.5	31.5	78.5	78	0.5	6	2
3.1	3	●	MMS0310X3DB	9.9	21.6	23.6	70.6	70	0.6	6	2
3.1	5	●	MMS0310X5DB	16.1	28.6	31.6	78.6	78	0.6	6	2
3.2	3	●	MMS0320X3DB	10.2	21.6	23.6	70.6	70	0.6	6	2
3.2	5	●	MMS0320X5DB	16.6	28.6	31.6	78.6	78	0.6	6	2
3.3	3	●	MMS0330X3DB	10.5	21.6	23.6	70.6	70	0.6	6	2
3.3	5	●	MMS0330X5DB	17.1	28.6	31.6	78.6	78	0.6	6	2
3.4	3	●	MMS0340X3DB	10.8	21.6	23.6	70.6	70	0.6	6	2
3.4	5	●	MMS0340X5DB	17.6	28.6	31.6	78.6	78	0.6	6	2
3.5	3	●	MMS0350X3DB	11.1	21.6	23.6	70.6	70	0.6	6	2
3.5	5	●	MMS0350X5DB	18.1	28.6	31.6	78.6	78	0.6	6	2
3.6	3	●	MMS0360X3DB	11.5	22.7	23.7	70.7	70	0.7	6	2
3.6	5	●	MMS0360X5DB	18.7	30.7	31.7	78.7	78	0.7	6	2
3.7	3	●	MMS0370X3DB	11.8	22.7	23.7	70.7	70	0.7	6	2
3.7	5	●	MMS0370X5DB	19.2	30.7	31.7	78.7	78	0.7	6	2
3.8	3	●	MMS0380X3DB	12.1	22.7	23.7	70.7	70	0.7	6	2
3.8	5	●	MMS0380X5DB	19.7	30.7	31.7	78.7	78	0.7	6	2
3.9	3	●	MMS0390X3DB	12.4	22.7	23.7	70.7	70	0.7	6	2
3.9	5	●	MMS0390X5DB	20.2	30.7	31.7	78.7	78	0.7	6	2
4.0	3	●	MMS0400X3DB	12.7	22.7	23.7	70.7	70	0.7	6	2
4.0	5	●	MMS0400X5DB	20.7	30.7	31.7	78.7	78	0.7	6	2
4.1	3	●	MMS0410X3DB	13.0	24.7	26.7	73.7	73	0.7	6	2
4.1	5	●	MMS0410X5DB	21.2	33.7	35.7	82.7	82	0.7	6	2
4.2	3	●	MMS0420X3DB	13.4	24.8	26.8	73.8	73	0.8	6	2
4.2	5	●	MMS0420X5DB	21.8	33.8	35.8	82.8	82	0.8	6	2
4.3	3	●	MMS0430X3DB	13.7	24.8	26.8	73.8	73	0.8	6	2
4.3	5	●	MMS0430X5DB	22.3	33.8	35.8	82.8	82	0.8	6	2
4.4	3	●	MMS0440X3DB	14.0	24.8	26.8	73.8	73	0.8	6	2
4.4	5	●	MMS0440X5DB	22.8	33.8	35.8	82.8	82	0.8	6	2
4.5	3	●	MMS0450X3DB	14.3	24.8	26.8	73.8	73	0.8	6	2
4.5	5	●	MMS0450X5DB	23.3	33.8	35.8	82.8	82	0.8	6	2
4.6	3	●	MMS0460X3DB	14.6	25.8	28.8	75.8	75	0.8	6	1
4.6	5	●	MMS0460X5DB	23.8	35.8	38.8	85.8	85	0.8	6	1
4.7	3	●	MMS0470X3DB	15.0	25.9	28.9	75.9	75	0.9	6	1
4.7	5	●	MMS0470X5DB	24.4	35.9	38.9	85.9	85	0.9	6	1
4.8	3	●	MMS0480X3DB	15.3	25.9	28.9	75.9	75	0.9	6	1
4.8	5	●	MMS0480X5DB	24.9	35.9	38.9	85.9	85	0.9	6	1
4.9	3	●	MMS0490X3DB	15.6	25.9	28.9	75.9	75	0.9	6	1
4.9	5	●	MMS0490X5DB	25.4	35.9	38.9	85.9	85	0.9	6	1
5.0	3	●	MMS0500X3DB	15.9	25.9	28.9	75.9	75	0.9	6	1
5.0	5	●	MMS0500X5DB	25.9	35.9	38.9	85.9	85	0.9	6	1
5.1	3	●	MMS0510X3DB	16.2	28.9	30.9	81.9	81	0.9	6	1
5.1	5	●	MMS0510X5DB	26.4	39.9	42.9	89.9	89	0.9	6	1
5.2	3	●	MMS0520X3DB	16.5	28.9	30.9	81.9	81	0.9	6	1
5.2	5	●	MMS0520X5DB	26.9	39.9	42.9	89.9	89	0.9	6	1

MMS

DC(mm)	Hole Depth(l/d)	DP7020	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
5.3	3	●	MMS0530X3DB	16.9	29.0	31.0	82.0	81	1.0	6	1
5.3	5	●	MMS0530X5DB	27.5	40.0	43.0	90.0	89	1.0	6	1
5.4	3	●	MMS0540X3DB	17.2	29.0	31.0	82.0	81	1.0	6	1
5.4	5	●	MMS0540X5DB	28.0	40.0	43.0	90.0	89	1.0	6	1
5.5	3	●	MMS0550X3DB	17.5	29.0	31.0	82.0	81	1.0	6	1
5.5	5	●	MMS0550X5DB	28.5	40.0	43.0	90.0	89	1.0	6	1
5.6	3	●	MMS0560X3DB	17.8	31.0	31.0	82.0	81	1.0	6	1
5.6	5	●	MMS0560X5DB	29.0	43.0	43.0	90.0	89	1.0	6	1
5.7	3	●	MMS0570X3DB	18.1	31.0	31.0	82.0	81	1.0	6	1
5.7	5	●	MMS0570X5DB	29.5	43.0	43.0	90.0	89	1.0	6	1
5.8	3	●	MMS0580X3DB	18.5	31.1	31.1	82.1	81	1.1	6	1
5.8	5	●	MMS0580X5DB	30.1	43.1	43.1	90.1	89	1.1	6	1
5.9	3	●	MMS0590X3DB	18.8	31.1	31.1	82.1	81	1.1	6	1
5.9	5	●	MMS0590X5DB	30.6	43.1	43.1	90.1	89	1.1	6	1
6.0	3	●	MMS0600X3DB	19.1	31.1	31.1	82.1	81	1.1	6	1
6.0	5	●	MMS0600X5DB	31.1	43.1	43.1	90.1	89	1.1	6	1
6.1	3	●	MMS0610X3DB	19.4	34.1	36.1	87.1	86	1.1	8	1
6.1	5	●	MMS0610X5DB	31.6	47.1	49.1	96.1	95	1.1	8	1
6.2	3	●	MMS0620X3DB	19.7	34.1	36.1	87.1	86	1.1	8	1
6.2	5	●	MMS0620X5DB	32.1	47.1	49.1	96.1	95	1.1	8	1
6.3	3	●	MMS0630X3DB	20.0	34.1	36.1	87.1	86	1.1	8	1
6.3	5	●	MMS0630X5DB	32.6	47.1	49.1	96.1	95	1.1	8	1
6.4	3	●	MMS0640X3DB	20.4	34.2	36.2	87.2	86	1.2	8	1
6.4	5	●	MMS0640X5DB	33.2	47.2	49.2	96.2	95	1.2	8	1
6.5	3	●	MMS0650X3DB	20.7	34.2	36.2	87.2	86	1.2	8	1
6.5	5	●	MMS0650X5DB	33.7	47.2	49.2	96.2	95	1.2	8	1
6.6	3	●	MMS0660X3DB	21.0	36.2	38.2	91.2	90	1.2	8	1
6.6	5	●	MMS0660X5DB	34.2	50.2	52.2	99.2	98	1.2	8	1
6.7	3	●	MMS0670X3DB	21.3	36.2	38.2	91.2	90	1.2	8	1
6.7	5	●	MMS0670X5DB	34.7	50.2	52.2	99.2	98	1.2	8	1
6.8	3	●	MMS0680X3DB	21.6	36.2	38.2	91.2	90	1.2	8	1
6.8	5	●	MMS0680X5DB	35.2	50.2	52.2	99.2	98	1.2	8	1
6.9	3	●	MMS0690X3DB	22.0	36.3	38.3	91.3	90	1.3	8	1
6.9	5	●	MMS0690X5DB	35.8	50.3	52.3	99.3	98	1.3	8	1
7.0	3	●	MMS0700X3DB	22.3	36.3	38.3	91.3	90	1.3	8	1
7.0	5	●	MMS0700X5DB	36.3	50.3	52.3	99.3	98	1.3	8	1
7.1	3	●	MMS0710X3DB	22.6	39.3	40.3	91.3	90	1.3	8	1
7.1	5	●	MMS0710X5DB	36.8	54.3	57.3	104.3	103	1.3	8	1
7.2	3	●	MMS0720X3DB	22.9	39.3	40.3	91.3	90	1.3	8	1
7.2	5	●	MMS0720X5DB	37.3	54.3	57.3	104.3	103	1.3	8	1
7.3	3	●	MMS0730X3DB	23.2	39.3	40.3	91.3	90	1.3	8	1
7.3	5	●	MMS0730X5DB	37.8	54.3	57.3	104.3	103	1.3	8	1
7.4	3	●	MMS0740X3DB	23.5	39.3	40.3	91.3	90	1.3	8	1
7.4	5	●	MMS0740X5DB	38.3	54.3	57.3	104.3	103	1.3	8	1
7.5	3	●	MMS0750X3DB	23.9	39.4	40.4	91.4	90	1.4	8	1
7.5	5	●	MMS0750X5DB	38.9	54.4	57.4	104.4	103	1.4	8	1
7.6	3	●	MMS0760X3DB	24.2	41.4	41.4	91.4	90	1.4	8	1
7.6	5	●	MMS0760X5DB	39.4	57.4	57.4	104.4	103	1.4	8	1
7.7	3	●	MMS0770X3DB	24.5	41.4	41.4	91.4	90	1.4	8	1
7.7	5	●	MMS0770X5DB	39.9	57.4	57.4	104.4	103	1.4	8	1
7.8	3	●	MMS0780X3DB	24.8	41.4	41.4	91.4	90	1.4	8	1
7.8	5	●	MMS0780X5DB	40.4	57.4	57.4	104.4	103	1.4	8	1
7.9	3	●	MMS0790X3DB	25.1	41.4	41.4	91.4	90	1.4	8	1
7.9	5	●	MMS0790X5DB	40.9	57.4	57.4	104.4	103	1.4	8	1
8.0	3	●	MMS0800X3DB	25.5	41.5	41.5	91.5	90	1.5	8	1
8.0	5	●	MMS0800X5DB	41.5	57.5	57.5	104.5	103	1.5	8	1
8.1	3	●	MMS0810X3DB	25.8	44.5	46.5	97.5	96	1.5	10	1
8.1	5	●	MMS0810X5DB	42.0	61.5	63.5	114.5	113	1.5	10	1
8.2	3	●	MMS0820X3DB	26.1	44.5	46.5	97.5	96	1.5	10	1
8.2	5	●	MMS0820X5DB	42.5	61.5	63.5	114.5	113	1.5	10	1
8.3	3	●	MMS0830X3DB	26.4	44.5	46.5	97.5	96	1.5	10	1
8.3	5	●	MMS0830X5DB	43.0	61.5	63.5	114.5	113	1.5	10	1
8.4	3	●	MMS0840X3DB	26.7	44.5	46.5	97.5	96	1.5	10	1
8.4	5	●	MMS0840X5DB	43.5	61.5	63.5	114.5	113	1.5	10	1
8.5	3	●	MMS0850X3DB	27.0	44.5	46.5	97.5	96	1.5	10	1
8.5	5	●	MMS0850X5DB	44.0	61.5	63.5	114.5	113	1.5	10	1
8.6	3	●	MMS0860X3DB	27.4	46.6	48.6	102.6	101	1.6	10	1
8.6	5	●	MMS0860X5DB	44.6	64.6	66.6	117.6	116	1.6	10	1
8.7	3	●	MMS0870X3DB	27.7	46.6	48.6	102.6	101	1.6	10	1
8.7	5	●	MMS0870X5DB	45.1	64.6	66.6	117.6	116	1.6	10	1
8.8	3	●	MMS0880X3DB	28.0	46.6	48.6	102.6	101	1.6	10	1
8.8	5	●	MMS0880X5DB	45.6	64.6	66.6	117.6	116	1.6	10	1
8.9	3	●	MMS0890X3DB	28.3	46.6	48.6	102.6	101	1.6	10	1
8.9	5	●	MMS0890X5DB	46.1	64.6	66.6	117.6	116	1.6	10	1
9.0	3	●	MMS0900X3DB	28.6	46.6	48.6	102.6	101	1.6	10	1
9.0	5	●	MMS0900X5DB	46.6	64.6	66.6	117.6	116	1.6	10	1
9.1	3	●	MMS0910X3DB	29.0	49.7	51.7	102.7	101	1.7	10	1
9.1	5	●	MMS0910X5DB	47.2	68.7	71.7	122.7	121	1.7	10	1
9.2	3	●	MMS0920X3DB	29.3	49.7	51.7	102.7	101	1.7	10	1
9.2	5	●	MMS0920X5DB	47.7	68.7	71.7	122.7	121	1.7	10	1
9.3	3	●	MMS0930X3DB	29.6	49.7	51.7	102.7	101	1.7	10	1
9.3	5	●	MMS0930X5DB	48.2	68.7	71.7	122.7	121	1.7	10	1
9.4	3	●	MMS0940X3DB	29.9	49.7	51.7	102.7	101	1.7	10	1
9.4	5	●	MMS0940X5DB	48.7	68.7	71.7	122.7	121	1.7	10	1
9.5	3	●	MMS0950X3DB	30.2	49.7	51.7	102.7	101	1.7	10	1
9.5	5	●	MMS0950X5DB	49.2	68.7	71.7	122.7	121	1.7	10	1
9.6	3	●	MMS0960X3DB	30.5	51.7	51.7	102.7	101	1.7	10	1
9.6	5	●	MMS0960X5DB	49.7	71.7	71.7	122.7	121	1.7	10	1
9.7	3	●	MMS0970X3DB	30.9	51.8	51.8	102.8	101	1.8	10	1
9.7	5	●	MMS0970X5DB	50.3	71.8	71.8	122.8	121	1.8	10	1
9.8	3	●	MMS0980X3DB	31.2	51.8	51.8	102.8	101	1.8	10	1
9.8	5	●	MMS0980X5DB	50.8	71.8	71.8	122.8	121	1.8	10	1
9.9	3	●	MMS0990X3DB	31.5	51.8	51.8	102.8	101	1.8	10	1
9.9	5	●	MMS0990X5DB	51.3	71.8	71.8	122.8	121	1.8	10	1
10.0	3	●	MMS1000X3DB	31.8	51.8	51.8	102.8	101	1.8	10	1
10.0	5	●	MMS1000X5DB	51.8	71.8	71.8	122.8	121	1.8	10	1
10.1	3	●	MMS1010X3DB	32.1	54.8	56.8	112.8	111	1.8	12	1
10.1	5	●	MMS1010X5DB	52.3	75.8	79.8	135.8	134	1.8	12	1
10.2	3	●	MMS1020X3DB	32.5	54.9	56.9	112.9	111	1.9	12	1
10.2	5	●	MMS1020X5DB	52.9	75.9	79.9	135.9	134	1.9	12	1
10.3	3	●	MMS1030X3DB	32.8	54.9	56.9	112.9	111	1.9	12	1
10.3	5	●	MMS1030X5DB	53.4	75.9	79.9	135.9	134	1.9	12	1
10.4	3	●	MMS1040X3DB	33.1	54.9	56.9	112.9	111	1.9	12	1
10.4	5	●	MMS1040X5DB	53.9	75.9	79.9	135.9	134	1.9	12	1
10.5	3	●	MMS1050X3DB	33.4	54.9	56.9	112.9	111	1.9	12	1
10.5	5	●	MMS1050X5DB	54.4	75.9	79.9	135.9	134	1.9	12	1
10.6	3	●	MMS1060X3DB	33.7	56.9	57.9	117.9	116	1.9	12	1
10.6	5	●	MMS1060X5DB	54.9	78.9	79.9	135.9	134	1.9	12	1

MMS

DC(mm)	Hole Depth(l/d)	DP7020	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
10.7	3	●	MMS1070X3DB	34.0	56.9	57.9	117.9	116	1.9	12	1
10.7	5	●	MMS1070X5DB	55.4	78.9	79.9	135.9	134	1.9	12	1
10.8	3	●	MMS1080X3DB	34.4	57.0	58.0	118.0	116	2.0	12	1
10.8	5	●	MMS1080X5DB	56.0	79.0	80.0	136.0	134	2.0	12	1
10.9	3	●	MMS1090X3DB	34.7	57.0	58.0	118.0	116	2.0	12	1
10.9	5	●	MMS1090X5DB	56.5	79.0	80.0	136.0	134	2.0	12	1
11.0	3	●	MMS1100X3DB	35.0	57.0	58.0	118.0	116	2.0	12	1
11.0	5	●	MMS1100X5DB	57.0	79.0	80.0	136.0	134	2.0	12	1
11.1	3	●	MMS1110X3DB	35.3	60.0	62.0	118.0	116	2.0	12	1
11.1	5	●	MMS1110X5DB	57.5	83.0	86.0	142.0	140	2.0	12	1
11.2	3	●	MMS1120X3DB	35.6	60.0	62.0	118.0	116	2.0	12	1
11.2	5	●	MMS1120X5DB	58.0	83.0	86.0	142.0	140	2.0	12	1
11.3	3	●	MMS1130X3DB	36.0	60.1	62.1	118.1	116	2.1	12	1
11.3	5	●	MMS1130X5DB	58.6	83.1	86.1	142.1	140	2.1	12	1
11.4	3	●	MMS1140X3DB	36.3	60.1	62.1	118.1	116	2.1	12	1
11.4	5	●	MMS1140X5DB	59.1	83.1	86.1	142.1	140	2.1	12	1
11.5	3	●	MMS1150X3DB	36.6	60.1	62.1	118.1	116	2.1	12	1
11.5	5	●	MMS1150X5DB	59.6	83.1	86.1	142.1	140	2.1	12	1
11.6	3	●	MMS1160X3DB	36.9	62.1	62.1	118.1	116	2.1	12	1
11.6	5	●	MMS1160X5DB	60.1	86.1	86.1	142.1	140	2.1	12	1
11.7	3	●	MMS1170X3DB	37.2	62.1	62.1	118.1	116	2.1	12	1
11.7	5	●	MMS1170X5DB	60.6	86.1	86.1	142.1	140	2.1	12	1
11.8	3	●	MMS1180X3DB	37.5	62.1	62.1	118.1	116	2.1	12	1
11.8	5	●	MMS1180X5DB	61.1	86.1	86.1	142.1	140	2.1	12	1
11.9	3	●	MMS1190X3DB	37.9	62.2	62.2	118.2	116	2.2	12	1
11.9	5	●	MMS1190X5DB	61.7	86.2	86.2	142.2	140	2.2	12	1
12.0	3	●	MMS1200X3DB	38.2	62.2	62.2	118.2	116	2.2	12	1
12.0	5	●	MMS1200X5DB	62.2	86.2	86.2	142.2	140	2.2	12	1
12.1	3	●	MMS1210X3DB	38.5	65.2	68.2	124.2	122	2.2	14	1
12.1	5	●	MMS1210X5DB	62.7	90.2	94.2	150.2	148	2.2	14	1
12.2	3	●	MMS1220X3DB	38.8	65.2	68.2	124.2	122	2.2	14	1
12.2	5	●	MMS1220X5DB	63.2	90.2	94.2	150.2	148	2.2	14	1
12.3	3	●	MMS1230X3DB	39.1	65.2	68.2	124.2	122	2.2	14	1
12.3	5	●	MMS1230X5DB	63.7	90.2	94.2	150.2	148	2.2	14	1
12.4	3	●	MMS1240X3DB	39.5	65.3	68.3	124.3	122	2.3	14	1
12.4	5	●	MMS1240X5DB	64.3	90.3	94.3	150.3	148	2.3	14	1
12.5	3	●	MMS1250X3DB	39.8	65.3	68.3	124.3	122	2.3	14	1
12.5	5	●	MMS1250X5DB	64.8	90.3	94.3	150.3	148	2.3	14	1
12.6	3	●	MMS1260X3DB	40.1	67.3	68.3	124.3	122	2.3	14	1
12.6	5	●	MMS1260X5DB	65.3	93.3	94.3	150.3	148	2.3	14	1
12.7	3	●	MMS1270X3DB	40.4	67.3	68.3	124.3	122	2.3	14	1
12.7	5	●	MMS1270X5DB	65.8	93.3	94.3	150.3	148	2.3	14	1
12.8	3	●	MMS1280X3DB	40.7	67.3	68.3	124.3	122	2.3	14	1
12.8	5	●	MMS1280X5DB	66.3	93.3	94.3	150.3	148	2.3	14	1
12.9	3	●	MMS1290X3DB	41.0	67.3	68.3	124.3	122	2.3	14	1
12.9	5	●	MMS1290X5DB	66.8	93.3	94.3	150.3	148	2.3	14	1
13.0	3	●	MMS1300X3DB	41.4	67.4	68.4	124.4	122	2.4	14	1
13.0	5	●	MMS1300X5DB	67.4	93.4	94.4	150.4	148	2.4	14	1
13.1	3	●	MMS1310X3DB	41.7	70.4	72.4	128.4	126	2.4	14	1
13.1	5	●	MMS1310X5DB	67.9	97.4	100.4	156.4	154	2.4	14	1
13.2	3	●	MMS1320X3DB	42.0	70.4	72.4	128.4	126	2.4	14	1
13.2	5	●	MMS1320X5DB	68.4	97.4	100.4	156.4	154	2.4	14	1
13.3	3	●	MMS1330X3DB	42.3	70.4	72.4	128.4	126	2.4	14	1
13.3	5	●	MMS1330X5DB	68.9	97.4	100.4	156.4	154	2.4	14	1
13.4	3	●	MMS1340X3DB	42.6	70.4	72.4	128.4	126	2.4	14	1
13.4	5	●	MMS1340X5DB	69.4	97.4	100.4	156.4	154	2.4	14	1
13.5	3	●	MMS1350X3DB	43.0	70.5	72.5	128.5	126	2.5	14	1
13.5	5	●	MMS1350X5DB	70.0	97.5	100.5	156.5	154	2.5	14	1
13.6	3	●	MMS1360X3DB	43.3	72.5	72.5	128.5	126	2.5	14	1
13.6	5	●	MMS1360X5DB	70.5	100.5	100.5	156.5	154	2.5	14	1
13.7	3	●	MMS1370X3DB	43.6	72.5	72.5	128.5	126	2.5	14	1
13.7	5	●	MMS1370X5DB	71.0	100.5	100.5	156.5	154	2.5	14	1
13.8	3	●	MMS1380X3DB	43.9	72.5	72.5	128.5	126	2.5	14	1
13.8	5	●	MMS1380X5DB	71.5	100.5	100.5	156.5	154	2.5	14	1
13.9	3	●	MMS1390X3DB	44.2	72.5	72.5	128.5	126	2.5	14	1
13.9	5	●	MMS1390X5DB	72.0	100.5	100.5	156.5	154	2.5	14	1
14.0	3	●	MMS1400X3DB	44.5	72.5	72.5	128.5	126	2.5	14	1
14.0	5	●	MMS1400X5DB	72.5	100.5	100.5	156.5	154	2.5	14	1
14.1	3	●	MMS1410X3DB	44.9	75.6	78.6	137.6	135	2.6	16	1
14.1	5	●	MMS1410X5DB	73.1	104.6	108.6	167.6	165	2.6	16	1
14.2	3	●	MMS1420X3DB	45.2	75.6	78.6	137.6	135	2.6	16	1
14.2	5	●	MMS1420X5DB	73.6	104.6	108.6	167.6	165	2.6	16	1
14.3	3	●	MMS1430X3DB	45.5	75.6	78.6	137.6	135	2.6	16	1
14.3	5	●	MMS1430X5DB	74.1	104.6	108.6	167.6	165	2.6	16	1
14.4	3	●	MMS1440X3DB	45.8	75.6	78.6	137.6	135	2.6	16	1
14.4	5	●	MMS1440X5DB	74.6	104.6	108.6	167.6	165	2.6	16	1
14.5	3	●	MMS1450X3DB	46.1	75.6	78.6	137.6	135	2.6	16	1
14.5	5	●	MMS1450X5DB	75.1	104.6	108.6	167.6	165	2.6	16	1
14.6	3	●	MMS1460X3DB	46.5	77.7	78.7	137.7	135	2.7	16	1
14.6	5	●	MMS1460X5DB	75.7	107.7	108.7	167.7	165	2.7	16	1
14.7	3	●	MMS1470X3DB	46.8	77.7	78.7	137.7	135	2.7	16	1
14.7	5	●	MMS1470X5DB	76.2	107.7	108.7	167.7	165	2.7	16	1
14.8	3	●	MMS1480X3DB	47.1	77.7	78.7	137.7	135	2.7	16	1
14.8	5	●	MMS1480X5DB	76.7	107.7	108.7	167.7	165	2.7	16	1
14.9	3	●	MMS1490X3DB	47.4	77.7	78.7	137.7	135	2.7	16	1
14.9	5	●	MMS1490X5DB	77.2	107.7	108.7	167.7	165	2.7	16	1
15.0	3	●	MMS1500X3DB	47.7	77.7	78.7	137.7	135	2.7	16	1
15.0	5	●	MMS1500X5DB	77.7	107.7	108.7	167.7	165	2.7	16	1
15.1	3	●	MMS1510X3DB	48.0	80.7	82.7	141.7	139	2.7	16	1
15.1	5	●	MMS1510X5DB	78.2	111.7	114.7	173.7	171	2.7	16	1
15.2	3	●	MMS1520X3DB	48.4	80.8	82.8	141.8	139	2.8	16	1
15.2	5	●	MMS1520X5DB	78.8	111.8	114.8	173.8	171	2.8	16	1
15.3	3	●	MMS1530X3DB	48.7	80.8	82.8	141.8	139	2.8	16	1
15.3	5	●	MMS1530X5DB	79.3	111.8	114.8	173.8	171	2.8	16	1
15.4	3	●	MMS1540X3DB	49.0	80.8	82.8	141.8	139	2.8	16	1
15.4	5	●	MMS1540X5DB	79.8	111.8	114.8	173.8	171	2.8	16	1
15.5	3	●	MMS1550X3DB	49.3	80.8	82.8	141.8	139	2.8	16	1
15.5	5	●	MMS1550X5DB	80.3	111.8	114.8	173.8	171	2.8	16	1
15.6	3	●	MMS1560X3DB	49.6	82.8	82.8	141.8	139	2.8	16	1
15.6	5	●	MMS1560X5DB	80.8	114.8	114.8	173.8	171	2.8	16	1
15.7	3	●	MMS1570X3DB	50.0	82.9	82.9	141.9	139	2.9	16	1
15.7	5	●	MMS1570X5DB	81.4	114.9	114.9	173.9	171	2.9	16	1
15.8	3	●	MMS1580X3DB	50.3	82.9	82.9	141.9	139	2.9	16	1
15.8	5	●	MMS1580X5DB	81.9	114.9	114.9	173.9	171	2.9	16	1
15.9	3	●	MMS1590X3DB	50.6	82.9	82.9	141.9	139	2.9	16	1
15.9	5	●	MMS1590X5DB	82.4	114.9	114.9	173.9	171	2.9	16	1
16.0	3	●	MMS1600X3DB	50.9	82.9	82.9	141.9	139	2.9	16	1
16.0	5	●	MMS1600X5DB	82.9	114.9	114.9	173.9	171	2.9	16	1

MMS

DC(mm)	Hole Depth(l/d)	DP7020	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
16.1	3	□	MMS1610X3DB	51.2	85.9	88.9	147.9	145	2.9	18	1
16.1	5	□	MMS1610X5DB	83.4	118.9	122.9	181.9	179	2.9	18	1
16.2	3	□	MMS1620X3DB	51.5	85.9	88.9	147.9	145	2.9	18	1
16.2	5	□	MMS1620X5DB	83.9	118.9	122.9	181.9	179	2.9	18	1
16.3	3	□	MMS1630X3DB	51.9	86.0	89.0	148.0	145	3.0	18	1
16.3	5	□	MMS1630X5DB	84.5	119.0	123.0	182.0	179	3.0	18	1
16.4	3	□	MMS1640X3DB	52.2	86.0	89.0	148.0	145	3.0	18	1
16.4	5	□	MMS1640X5DB	85.0	119.0	123.0	182.0	179	3.0	18	1
16.5	3	●	MMS1650X3DB	52.5	86.0	89.0	148.0	145	3.0	18	1
16.5	5	●	MMS1650X5DB	85.5	119.0	123.0	182.0	179	3.0	18	1
16.6	3	□	MMS1660X3DB	52.8	88.0	89.0	148.0	145	3.0	18	1
16.6	5	□	MMS1660X5DB	86.0	122.0	123.0	182.0	179	3.0	18	1
16.7	3	□	MMS1670X3DB	53.1	88.0	89.0	148.0	145	3.0	18	1
16.7	5	□	MMS1670X5DB	86.5	122.0	123.0	182.0	179	3.0	18	1
16.8	3	□	MMS1680X3DB	53.5	88.1	89.1	148.1	145	3.1	18	1
16.8	5	□	MMS1680X5DB	87.1	122.1	123.1	182.1	179	3.1	18	1
16.9	3	□	MMS1690X3DB	53.8	88.1	89.1	148.1	145	3.1	18	1
16.9	5	□	MMS1690X5DB	87.6	122.1	123.1	182.1	179	3.1	18	1
17.0	3	●	MMS1700X3DB	54.1	88.1	89.1	148.1	145	3.1	18	1
17.0	5	●	MMS1700X5DB	88.1	122.1	123.1	182.1	179	3.1	18	1
17.1	3	□	MMS1710X3DB	54.4	91.1	93.1	152.1	149	3.1	18	1
17.1	5	□	MMS1710X5DB	88.6	126.1	129.1	188.1	185	3.1	18	1
17.2	3	□	MMS1720X3DB	54.7	91.1	93.1	152.1	149	3.1	18	1
17.2	5	□	MMS1720X5DB	89.1	126.1	129.1	188.1	185	3.1	18	1
17.3	3	□	MMS1730X3DB	55.0	91.1	93.1	152.1	149	3.1	18	1
17.3	5	□	MMS1730X5DB	89.6	126.1	129.1	188.1	185	3.1	18	1
17.4	3	□	MMS1740X3DB	55.4	91.2	93.2	152.2	149	3.2	18	1
17.4	5	□	MMS1740X5DB	90.2	126.2	129.2	188.2	185	3.2	18	1
17.5	3	●	MMS1750X3DB	55.7	91.2	93.2	152.2	149	3.2	18	1
17.5	5	●	MMS1750X5DB	90.7	126.2	129.2	188.2	185	3.2	18	1
17.6	3	□	MMS1760X3DB	56.0	93.2	93.2	152.2	149	3.2	18	1
17.6	5	□	MMS1760X5DB	91.2	129.2	129.2	188.2	185	3.2	18	1
17.7	3	□	MMS1770X3DB	56.3	93.2	93.2	152.2	149	3.2	18	1
17.7	5	□	MMS1770X5DB	91.7	129.2	129.2	188.2	185	3.2	18	1
17.8	3	□	MMS1780X3DB	56.6	93.2	93.2	152.2	149	3.2	18	1
17.8	5	□	MMS1780X5DB	92.2	129.2	129.2	188.2	185	3.2	18	1
17.9	3	□	MMS1790X3DB	57.0	93.3	93.3	152.3	149	3.3	18	1
17.9	5	□	MMS1790X5DB	92.8	129.3	129.3	188.3	185	3.3	18	1
18.0	3	●	MMS1800X3DB	57.3	93.3	93.3	152.3	149	3.3	18	1
18.0	5	●	MMS1800X5DB	93.3	129.3	129.3	188.3	185	3.3	18	1

DC(mm)	Hole Depth(l/d)	DP7020	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
18.1	3	□	MMS1810X3DB	57.6	96.3	99.3	160.3	157	3.3	20	1
18.1	5	□	MMS1810X5DB	93.8	133.3	137.3	198.3	195	3.3	20	1
18.2	3	□	MMS1820X3DB	57.9	96.3	99.3	160.3	157	3.3	20	1
18.2	5	□	MMS1820X5DB	94.3	133.3	137.3	198.3	195	3.3	20	1
18.3	3	□	MMS1830X3DB	58.2	96.3	99.3	160.3	157	3.3	20	1
18.3	5	□	MMS1830X5DB	94.8	133.3	137.3	198.3	195	3.3	20	1
18.4	3	□	MMS1840X3DB	58.5	96.3	99.3	160.3	157	3.3	20	1
18.4	5	□	MMS1840X5DB	95.3	133.3	137.3	198.3	195	3.3	20	1
18.5	3	●	MMS1850X3DB	58.9	96.4	99.4	160.4	157	3.4	20	1
18.5	5	●	MMS1850X5DB	95.9	133.4	137.4	198.4	195	3.4	20	1
18.6	3	□	MMS1860X3DB	59.2	98.4	99.4	160.4	157	3.4	20	1
18.6	5	□	MMS1860X5DB	96.4	136.4	137.4	198.4	195	3.4	20	1
18.7	3	□	MMS1870X3DB	59.5	98.4	99.4	160.4	157	3.4	20	1
18.7	5	□	MMS1870X5DB	96.9	136.4	137.4	198.4	195	3.4	20	1
18.8	3	□	MMS1880X3DB	59.8	98.4	99.4	160.4	157	3.4	20	1
18.8	5	□	MMS1880X5DB	97.4	136.4	137.4	198.4	195	3.4	20	1
18.9	3	□	MMS1890X3DB	60.1	98.4	99.4	160.4	157	3.4	20	1
18.9	5	□	MMS1890X5DB	97.9	136.4	137.4	198.4	195	3.4	20	1
19.0	3	●	MMS1900X3DB	60.5	98.5	99.5	160.5	157	3.5	20	1
19.0	5	●	MMS1900X5DB	98.5	136.5	137.5	198.5	195	3.5	20	1
19.1	3	□	MMS1910X3DB	60.8	101.5	103.5	164.5	161	3.5	20	1
19.1	5	□	MMS1910X5DB	99.0	140.5	143.5	204.5	201	3.5	20	1
19.2	3	□	MMS1920X3DB	61.1	101.5	103.5	164.5	161	3.5	20	1
19.2	5	□	MMS1920X5DB	99.5	140.5	143.5	204.5	201	3.5	20	1
19.3	3	□	MMS1930X3DB	61.4	101.5	103.5	164.5	161	3.5	20	1
19.3	5	□	MMS1930X5DB	100.0	140.5	143.5	204.5	201	3.5	20	1
19.4	3	□	MMS1940X3DB	61.7	101.5	103.5	164.5	161	3.5	20	1
19.4	5	□	MMS1940X5DB	100.5	140.5	143.5	204.5	201	3.5	20	1
19.5	3	●	MMS1950X3DB	62.0	101.5	103.5	164.5	161	3.5	20	1
19.5	5	●	MMS1950X5DB	101.0	140.5	143.5	204.5	201	3.5	20	1
19.6	3	□	MMS1960X3DB	62.4	103.6	103.6	164.6	161	3.6	20	1
19.6	5	□	MMS1960X5DB	101.6	143.6	143.6	204.6	201	3.6	20	1
19.7	3	□	MMS1970X3DB	62.7	103.6	103.6	164.6	161	3.6	20	1
19.7	5	□	MMS1970X5DB	102.1	143.6	143.6	204.6	201	3.6	20	1
19.8	3	□	MMS1980X3DB	63.0	103.6	103.6	164.6	161	3.6	20	1
19.8	5	□	MMS1980X5DB	102.6	143.6	143.6	204.6	201	3.6	20	1
19.9	3	□	MMS1990X3DB	63.3	103.6	103.6	164.6	161	3.6	20	1
19.9	5	□	MMS1990X5DB	103.1	143.6	143.6	204.6	201	3.6	20	1
20.0	3	●	MMS2000X3DB	63.6	103.6	103.6	164.6	161	3.6	20	1
20.0	5	●	MMS2000X5DB	103.6	143.6	143.6	204.6	201	3.6	20	1

MMS

Recommended cutting condition

Work material	Austenitic Stainless Steel(≦200HB) AISI 304,AISI 316 etc				Austenitic Stainless Steel(>200HB) AISI 304LN, AISI 316LN etc			
Dia. DC (mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Feed rate (mm/min)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Feed rate (mm/min)
3.2	80	7900	0.13(0.08—0.18)	1025	60	5900	0.1(0.05—0.15)	590
4.0	80	6300	0.15(0.10—0.20)	945	60	4700	0.12(0.08—0.18)	560
5.0	80	5000	0.15(0.10—0.20)	750	60	3800	0.12(0.08—0.18)	455
6.3	80	4000	0.17(0.12—0.22)	680	60	3000	0.15(0.1—0.2)	450
8.0	80	3100	0.19(0.14—0.24)	585	60	2300	0.17(0.12—0.22)	390
10.0	60	1900	0.2(0.15—0.25)	380	50	1500	0.18(0.13—0.23)	270
12.0	60	1500	0.21(0.16—0.26)	315	50	1300	0.19(0.14—0.24)	245
16.0	60	1100	0.22(0.17—0.27)	240	50	900	0.2(0.15—0.25)	180
20.0	60	900	0.23(0.18—0.28)	205	50	700	0.21(0.16—0.26)	145

Work material	Duplex Steel(≦280HB) AISI 329 etc				Ferritic, Precipitation hardening stainless steel(≦200HB) AISI 410, AISI 430 etc			
Dia. DC (mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Feed rate (mm/min)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Feed rate (mm/min)
3.2	50	4900	0.1(0.05—0.15)	490	80	7900	0.13(0.08—0.18)	1025
4.0	50	3900	0.12(0.08—0.18)	465	80	6300	0.15(0.10—0.20)	945
5.0	50	3100	0.12(0.08—0.18)	370	80	5000	0.15(0.10—0.20)	750
6.3	50	2500	0.15(0.1—0.2)	375	80	4000	0.17(0.12—0.22)	680
8.0	50	1900	0.17(0.12—0.22)	320	80	3100	0.19(0.14—0.24)	585
10.0	40	1200	0.18(0.13—0.23)	215	60	1900	0.2(0.15—0.25)	380
12.0	40	1000	0.19(0.14—0.24)	190	60	1500	0.21(0.16—0.26)	315
16.0	40	700	0.2(0.15—0.25)	140	60	1100	0.22(0.17—0.27)	240
20.0	40	600	0.21(0.16—0.26)	125	60	900	0.23(0.18—0.28)	205

Work material	Ferritic, Precipitation hardening stainless steel(>200HB) AISI 431, AISI 420 etc				Precipitation hardening stainless steel(<450HB) ASTM 630, ASTM 631 etc			
Dia. DC (mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Feed rate (mm/min)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Feed rate (mm/min)
3.2	60	5900	0.1(0.05—0.15)	590	50	4900	0.1(0.05—0.15)	490
4.0	60	4700	0.12(0.08—0.18)	560	50	3900	0.12(0.08—0.18)	465
5.0	60	3800	0.12(0.08—0.18)	455	50	3100	0.12(0.08—0.18)	370
6.3	60	3000	0.15(0.1—0.2)	450	50	2500	0.15(0.1—0.2)	375
8.0	60	2300	0.17(0.12—0.22)	390	50	1900	0.17(0.12—0.22)	320
10.0	50	1500	0.18(0.13—0.23)	270	40	1200	0.18(0.13—0.23)	215
12.0	50	1300	0.19(0.14—0.24)	245	40	1000	0.19(0.14—0.24)	190
16.0	50	900	0.2(0.15—0.25)	180	40	700	0.2(0.15—0.25)	140
20.0	50	700	0.21(0.16—0.26)	145	40	600	0.21(0.16—0.26)	125

- For stable machining, internal coolant supply with high pressure is recommended.
- Emulsion type of water coolant is recommended.
- Recommended cutting conditions are for machining under the conditions of favourable machining environment and coolant. Please lower the cutting conditions if there is a problem in the rigidity of machine and workpiece, and coolant property or discharge amount.
- When looking at the coating the color can vary depending on the direction of viewing. This does not have any effect on the performance of the drill.

MMS

Stainless Steel Cross Reference List

Material		Japan	Germany		USA
		JIS	W-no.	DIN	AISI/SAE
Ferritic, Precipitation hardening stainless steel	≤200HB	SUS416	1.4005	X12CrS3	416
		SUS410	1.4006	X10Cr13	410
		SUS430	1.4016	X6Cr17	430
		SUS434	1.4113	X6CrMo17	434
		SUS430LX	1.4510	X6CrTi17	430Ti
		—	1.4512	X6CrTi12	409
	>200HB	SUS420J1	1.4021	X20Cr13	420
		SUS431	1.4057	X20CrNi17-2	431
		SUS420J2	1.4028	X30Cr13	420
		SUS440C	1.4125	X10CrMo17	440C
Precipitation hardening stainless steel	<450HB	SUS630	1.4542	X5CrNiCuNb16 4	630 (17-4PH)
		—	1.4545	—	S15500 (15-5PH)
		SUS631	1.4568	X7CrNiAl17 7	631 (17-7PH)
Austenitic Stainless Steel	≤200HB	SUS304	1.4301	X5CrNi18 10	304
		SUS305	1.4303	X5CrNi8-12	305
		SUS303	1.4305	X12CrNiS18-9	303
		SUS304L	1.4307	X2CrNi19-11	304L
		SUS316	1.4401	X5CrNiMo17 12 2	316
	>200HB	SUS304LN	1.4311	X2CrNiN18 10	304LN
		SUS316L	1.4404	X2CrNiMo17 12 2	316L
		SUS316LN	1.4406	X2CrNiMoN17 12 2	316LN
		SUS316L	1.4435	X2CrNiMo18 14 3	—
		SUS317L	1.4438	X2CrNiMo18 15 4	317L
		—	1.4529	X1NiCrMoCuN25 20 7	N08926
		SUS321	1.4541	X6CrNiTi18-10	321
		SUS347	1.4550	X6CrNiNb18-10	347
		SUS316Ti	1.4571	X6CrNiMoTi17 12 2	316Ti
Duplex Steel	≤280HB	—	1.4362	X2CrNiN23 4	—
		SCS14A	1.4410	X2CrNiMoN25 7 4	S32750
		SUS329J1	1.4460	X3CrNiMoN27 5 2	329
		SUS329J3L	1.4462	X2CrNiMoN22 5 3	S31803

MNS

WSTAR Drill Series

Solid Carbide Drill For Aluminium Alloys

Product Information

UWC 140° SIG X Thinning

Work Material

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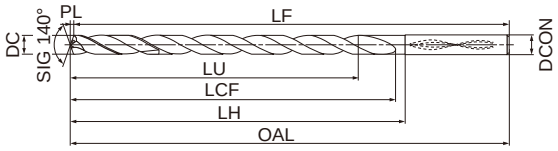
TECHNICAL DATA >> 1997 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 1623 DRILLS SELECTION CHART >> 1624



Type1

	DC=3	3<DC≦6	6<DC≦10	10<DC≦14
	0 −0.014	0 −0.018	0 −0.022	0 −0.027
h6	0 −0.006	0 −0.008	0 −0.009	0 −0.011

- MNS drills are suitable for use with shrink fit holders.
- 4.5 or smaller diameter drills are designed with 2 colant holes.

Stock status indication:●: Inventory maintained in Japan.▲: This item to be discontinued within two years.□: Non stock, produced to order only.

Internal Coolant Unit（mm）

DC(mm)	Hole Depth(l/d)	TF15	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
3.0	5	●	MNS0300LB	15.5	33.5	33.5	81.5	81	0.5	3	1
3.0	10	●	MNS0300X10DB	30.5	39.5	42.5	90.5	90	0.5	3	1
3.0	20	●	MNS0300X20DB	60.5	69.5	72.5	120.5	120	0.5	3	1
3.0	30	●	MNS0300X30DB	90.5	99.5	102.5	150.5	150	0.5	3	1
3.1	5	●	MNS0310LB	16.1	39.6	39.6	87.6	87	0.6	4	1
3.1	10	□	MNS0310X10DB	31.6	46.6	49.6	97.6	97	0.6	4	1
3.1	20	□	MNS0310X20DB	62.6	81.6	84.6	132.6	132	0.6	4	1
3.1	30	□	MNS0310X30DB	93.6	116.6	119.6	167.6	167	0.6	4	1
3.2	5	●	MNS0320LB	16.6	39.6	39.6	87.6	87	0.6	4	1
3.2	10	●	MNS0320X10DB	32.6	46.6	49.6	97.6	97	0.6	4	1
3.2	20	●	MNS0320X20DB	64.6	81.6	84.6	132.6	132	0.6	4	1
3.2	30	●	MNS0320X30DB	96.6	116.6	119.6	167.6	167	0.6	4	1
3.3	5	●	MNS0330LB	17.1	39.6	39.6	87.6	87	0.6	4	1
3.3	10	□	MNS0330X10DB	33.6	46.6	49.6	97.6	97	0.6	4	1
3.3	20	□	MNS0330X20DB	66.6	81.6	84.6	132.6	132	0.6	4	1
3.3	30	□	MNS0330X30DB	99.6	116.6	119.6	167.6	167	0.6	4	1
3.4	5	●	MNS0340LB	17.6	39.6	39.6	87.6	87	0.6	4	1
3.4	10	●	MNS0340X10DB	34.6	46.6	49.6	97.6	97	0.6	4	1
3.4	20	●	MNS0340X20DB	68.6	81.6	84.6	132.6	132	0.6	4	1
3.4	30	●	MNS0340X30DB	102.6	116.6	119.6	167.6	167	0.6	4	1
3.5	5	●	MNS0350LB	18.1	39.6	39.6	87.6	87	0.6	4	1
3.5	10	□	MNS0350X10DB	35.6	46.6	49.6	97.6	97	0.6	4	1
3.5	20	□	MNS0350X20DB	70.6	81.6	84.6	132.6	132	0.6	4	1
3.5	30	□	MNS0350X30DB	105.6	116.6	119.6	167.6	167	0.6	4	1
3.6	5	●	MNS0360LB	18.7	44.7	44.7	92.7	92	0.7	4	1
3.6	10	●	MNS0360X10DB	36.7	52.7	55.7	103.7	103	0.7	4	1
3.6	20	●	MNS0360X20DB	72.7	92.7	95.7	143.7	143	0.7	4	1
3.6	30	●	MNS0360X30DB	108.7	132.7	135.7	183.7	183	0.7	4	1
3.7	5	●	MNS0370LB	19.2	44.7	44.7	92.7	92	0.7	4	1
3.7	10	□	MNS0370X10DB	37.7	52.7	55.7	103.7	103	0.7	4	1
3.7	20	□	MNS0370X20DB	74.7	92.7	95.7	143.7	143	0.7	4	1
3.7	30	□	MNS0370X30DB	111.7	132.7	135.7	183.7	183	0.7	4	1
3.8	5	●	MNS0380LB	19.7	44.7	44.7	92.7	92	0.7	4	1
3.8	10	□	MNS0380X10DB	38.7	52.7	55.7	103.7	103	0.7	4	1
3.8	20	□	MNS0380X20DB	76.7	92.7	95.7	143.7	143	0.7	4	1
3.8	30	□	MNS0380X30DB	114.7	132.7	135.7	183.7	183	0.7	4	1
3.9	5	●	MNS0390LB	20.2	44.7	44.7	92.7	92	0.7	4	1
3.9	10	●	MNS0390X10DB	39.7	52.7	55.7	103.7	103	0.7	4	1
3.9	20	●	MNS0390X20DB	78.7	92.7	95.7	143.7	143	0.7	4	1
3.9	30	●	MNS0390X30DB	117.7	132.7	135.7	183.7	183	0.7	4	1
4.0	5	●	MNS0400LB	20.7	44.7	44.7	92.7	92	0.7	4	1
4.0	10	●	MNS0400X10DB	40.7	52.7	55.7	103.7	103	0.7	4	1
4.0	20	●	MNS0400X20DB	80.7	92.7	95.7	143.7	143	0.7	4	1
4.0	30	●	MNS0400X30DB	120.7	132.7	135.7	183.7	183	0.7	4	1
4.1	5	●	MNS0410LB	21.2	50.7	50.7	100.7	100	0.7	5	1
4.1	10	□	MNS0410X10DB	41.7	59.7	62.7	112.7	112	0.7	5	1
4.1	20	□	MNS0410X20DB	82.7	104.7	107.7	157.7	157	0.7	5	1
4.1	30	□	MNS0410X30DB	123.7	149.7	152.7	202.7	202	0.7	5	1
4.2	5	●	MNS0420LB	21.8	50.8	50.8	100.8	100	0.8	5	1
4.2	10	□	MNS0420X10DB	42.8	59.8	62.8	112.8	112	0.8	5	1
4.2	20	□	MNS0420X20DB	84.8	104.8	107.8	157.8	157	0.8	5	1
4.2	30	□	MNS0420X30DB	126.8	149.8	152.8	202.8	202	0.8	5	1
4.3	5	●	MNS0430LB	22.3	50.8	50.8	100.8	100	0.8	5	1
4.3	10	□	MNS0430X10DB	43.8	59.8	62.8	112.8	112	0.8	5	1
4.3	20	□	MNS0430X20DB	86.8	104.8	107.8	157.8	157	0.8	5	1
4.3	30	□	MNS0430X30DB	129.8	149.8	152.8	202.8	202	0.8	5	1
4.4	5	●	MNS0440LB	22.8	50.8	50.8	100.8	100	0.8	5	1
4.4	10	□	MNS0440X10DB	44.8	59.8	62.8	112.8	112	0.8	5	1
4.4	20	□	MNS0440X20DB	88.8	104.8	107.8	157.8	157	0.8	5	1
4.4	30	□	MNS0440X30DB	132.8	149.8	152.8	202.8	202	0.8	5	1

MNS

DC(mm)	Hole Depth(l/d)	TF15	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
4.5	5	●	MNS0450LB	23.3	50.8	50.8	100.8	100	0.8	5	1
4.5	10	□	MNS0450X10DB	45.8	59.8	62.8	112.8	112	0.8	5	1
4.5	20	□	MNS0450X20DB	90.8	104.8	107.8	157.8	157	0.8	5	1
4.5	30	□	MNS0450X30DB	135.8	149.8	152.8	202.8	202	0.8	5	1
4.6	5	●	MNS0460LB	23.8	55.8	55.8	105.8	105	0.8	5	1
4.6	10	□	MNS0460X10DB	46.8	65.8	68.8	118.8	118	0.8	5	1
4.6	20	□	MNS0460X20DB	92.8	115.8	118.8	168.8	168	0.8	5	1
4.6	30	□	MNS0460X30DB	138.8	165.8	168.8	218.8	218	0.8	5	1
4.7	5	●	MNS0470LB	24.4	55.9	55.9	105.9	105	0.9	5	1
4.7	10	□	MNS0470X10DB	47.9	65.9	68.9	118.9	118	0.9	5	1
4.7	20	□	MNS0470X20DB	94.9	115.9	118.9	168.9	168	0.9	5	1
4.7	30	□	MNS0470X30DB	141.9	165.9	168.9	218.9	218	0.9	5	1
4.8	5	●	MNS0480LB	24.9	55.9	55.9	105.9	105	0.9	5	1
4.8	10	□	MNS0480X10DB	48.9	65.9	68.9	118.9	118	0.9	5	1
4.8	20	□	MNS0480X20DB	96.9	115.9	118.9	168.9	168	0.9	5	1
4.8	30	□	MNS0480X30DB	144.9	165.9	168.9	218.9	218	0.9	5	1
4.9	5	●	MNS0490LB	25.4	55.9	55.9	105.9	105	0.9	5	1
4.9	10	●	MNS0490X10DB	49.9	65.9	68.9	118.9	118	0.9	5	1
4.9	20	●	MNS0490X20DB	98.9	115.9	118.9	168.9	168	0.9	5	1
4.9	30	●	MNS0490X30DB	147.9	165.9	168.9	218.9	218	0.9	5	1
5.0	5	●	MNS0500LB	25.9	44.9	44.9	100.9	100	0.9	6	1
5.0	10	●	MNS0500X10DB	50.9	65.9	68.9	118.9	118	0.9	5	1
5.0	20	●	MNS0500X20DB	100.9	115.9	118.9	168.9	168	0.9	5	1
5.0	30	●	MNS0500X30DB	150.9	165.9	168.9	218.9	218	0.9	5	1
5.1	5	●	MNS0510LB	26.4	44.9	44.9	100.9	100	0.9	6	1
5.1	10	●	MNS0510X10DB	51.9	72.9	75.9	127.9	127	0.9	6	1
5.1	20	●	MNS0510X20DB	102.9	127.9	130.9	182.9	182	0.9	6	1
5.1	30	●	MNS0510X30DB	153.9	182.9	185.9	237.9	237	0.9	6	1
5.2	5	●	MNS0520LB	26.9	44.9	44.9	100.9	100	0.9	6	1
5.2	10	□	MNS0520X10DB	52.9	72.9	75.9	127.9	127	0.9	6	1
5.2	20	□	MNS0520X20DB	104.9	127.9	130.9	182.9	182	0.9	6	1
5.2	30	□	MNS0520X30DB	156.9	182.9	185.9	237.9	237	0.9	6	1
5.3	5	●	MNS0530LB	27.5	45.0	45.0	101.0	100	1.0	6	1
5.3	10	□	MNS0530X10DB	54.0	73.0	76.0	128.0	127	1.0	6	1
5.3	20	□	MNS0530X20DB	107.0	128.0	131.0	183.0	182	1.0	6	1
5.3	30	□	MNS0530X30DB	160.0	183.0	186.0	238.0	237	1.0	6	1
5.4	5	●	MNS0540LB	28.0	45.0	45.0	101.0	100	1.0	6	1
5.4	10	□	MNS0540X10DB	55.0	73.0	76.0	128.0	127	1.0	6	1
5.4	20	□	MNS0540X20DB	109.0	128.0	131.0	183.0	182	1.0	6	1
5.4	30	□	MNS0540X30DB	163.0	183.0	186.0	238.0	237	1.0	6	1
5.5	5	●	MNS0550LB	28.5	45.0	45.0	101.0	100	1.0	6	1
5.5	10	●	MNS0550X10DB	56.0	73.0	76.0	128.0	127	1.0	6	1
5.5	20	●	MNS0550X20DB	111.0	128.0	131.0	183.0	182	1.0	6	1
5.5	30	●	MNS0550X30DB	166.0	183.0	186.0	238.0	237	1.0	6	1
5.6	5	●	MNS0560LB	29.0	49.0	49.0	101.0	100	1.0	6	1
5.6	10	□	MNS0560X10DB	57.0	79.0	82.0	134.0	133	1.0	6	1
5.6	20	□	MNS0560X20DB	113.0	139.0	142.0	194.0	193	1.0	6	1
5.6	30	□	MNS0560X30DB	169.0	199.0	202.0	254.0	253	1.0	6	1
5.7	5	●	MNS0570LB	29.5	49.0	49.0	101.0	100	1.0	6	1
5.7	10	□	MNS0570X10DB	58.0	79.0	82.0	134.0	133	1.0	6	1
5.7	20	□	MNS0570X20DB	115.0	139.0	142.0	194.0	193	1.0	6	1
5.7	30	□	MNS0570X30DB	172.0	199.0	202.0	254.0	253	1.0	6	1
5.8	5	●	MNS0580LB	30.1	49.1	49.1	101.1	100	1.1	6	1
5.8	10	□	MNS0580X10DB	59.1	79.1	82.1	134.1	133	1.1	6	1
5.8	20	□	MNS0580X20DB	117.1	139.1	142.1	194.1	193	1.1	6	1
5.8	30	□	MNS0580X30DB	175.1	199.1	202.1	254.1	253	1.1	6	1
5.9	5	●	MNS0590LB	30.6	49.1	49.1	101.1	100	1.1	6	1
5.9	10	□	MNS0590X10DB	60.1	79.1	82.1	134.1	133	1.1	6	1
5.9	20	□	MNS0590X20DB	119.1	139.1	142.1	194.1	193	1.1	6	1
5.9	30	□	MNS0590X30DB	178.1	199.1	202.1	254.1	253	1.1	6	1
6.0	5	●	MNS0600LB	31.1	49.1	49.1	101.1	100	1.1	6	1
6.0	10	●	MNS0600X10DB	61.1	79.1	82.1	134.1	133	1.1	6	1
6.0	20	●	MNS0600X20DB	121.1	139.1	142.1	194.1	193	1.1	6	1
6.0	30	●	MNS0600X30DB	181.1	199.1	202.1	254.1	253	1.1	6	1
6.1	5	●	MNS0610LB	31.6	53.1	53.1	110.1	109	1.1	7	1
6.1	10	●	MNS0610X10DB	62.1	86.1	89.1	142.1	141	1.1	7	1
6.1	20	●	MNS0610X20DB	123.1	151.1	154.1	207.1	206	1.1	7	1
6.1	30	●	MNS0610X30DB	184.1	216.1	219.1	272.1	271	1.1	7	1
6.2	5	●	MNS0620LB	32.1	53.1	53.1	110.1	109	1.1	7	1
6.2	10	□	MNS0620X10DB	63.1	86.1	89.1	142.1	141	1.1	7	1
6.2	20	□	MNS0620X20DB	125.1	151.1	154.1	207.1	206	1.1	7	1
6.2	30	□	MNS0620X30DB	187.1	216.1	219.1	272.1	271	1.1	7	1
6.3	5	●	MNS0630LB	32.6	53.1	53.1	110.1	109	1.1	7	1
6.3	10	□	MNS0630X10DB	64.1	86.1	89.1	142.1	141	1.1	7	1
6.3	20	□	MNS0630X20DB	127.1	151.1	154.1	207.1	206	1.1	7	1
6.3	30	□	MNS0630X30DB	190.1	216.1	219.1	272.1	271	1.1	7	1
6.4	5	●	MNS0640LB	33.2	53.2	53.2	110.2	109	1.2	7	1
6.4	10	□	MNS0640X10DB	65.2	86.2	89.2	142.2	141	1.2	7	1
6.4	20	□	MNS0640X20DB	129.2	151.2	154.2	207.2	206	1.2	7	1
6.4	30	□	MNS0640X30DB	193.2	216.2	219.2	272.2	271	1.2	7	1
6.5	5	●	MNS0650LB	33.7	53.2	53.2	110.2	109	1.2	7	1
6.5	10	●	MNS0650X10DB	66.2	86.2	89.2	142.2	141	1.2	7	1
6.5	20	●	MNS0650X20DB	131.2	151.2	154.2	207.2	206	1.2	7	1
6.5	30	●	MNS0650X30DB	196.2	216.2	219.2	272.2	271	1.2	7	1
6.6	5	●	MNS0660LB	34.2	57.2	57.2	110.2	109	1.2	7	1
6.6	10	□	MNS0660X10DB	67.2	92.2	95.2	148.2	147	1.2	7	1
6.6	20	□	MNS0660X20DB	133.2	162.2	165.2	218.2	217	1.2	7	1
6.6	30	□	MNS0660X30DB	199.2	232.2	235.2	288.2	287	1.2	7	1
6.7	5	●	MNS0670LB	34.7	57.2	57.2	110.2	109	1.2	7	1
6.7	10	●	MNS0670X10DB	68.2	92.2	95.2	148.2	147	1.2	7	1
6.7	20	●	MNS0670X20DB	135.2	162.2	165.2	218.2	217	1.2	7	1
6.7	30	●	MNS0670X30DB	202.2	232.2	235.2	288.2	287	1.2	7	1
6.8	5	●	MNS0680LB	35.2	57.2	57.2	110.2	109	1.2	7	1
6.8	10	□	MNS0680X10DB	69.2	92.2	95.2	148.2	147	1.2	7	1
6.8	20	□	MNS0680X20DB	137.2	162.2	165.2	218.2	217	1.2	7	1
6.8	30	□	MNS0680X30DB	205.2	232.2	235.2	288.2	287	1.2	7	1
6.9	5	●	MNS0690LB	35.8	57.3	57.3	110.3	109	1.3	7	1
6.9	10	□	MNS0690X10DB	70.3	92.3	95.3	148.3	147	1.3	7	1
6.9	20	□	MNS0690X20DB	139.3	162.3	165.3	218.3	217	1.3	7	1
6.9	30	□	MNS0690X30DB	208.3	232.3	235.3	288.3	287	1.3	7	1
7.0	5	●	MNS0700LB	36.3	57.3	57.3	110.3	109	1.3	7	1
7.0	10	●	MNS0700X10DB	71.3	92.3	95.3	148.3	147	1.3	7	1
7.0	20	●	MNS0700X20DB	141.3	162.3	165.3	218.3	217	1.3	7	1
7.0	30	●	MNS0700X30DB	211.3	232.3	235.3	288.3	287	1.3	7	1
7.1	5	●	MNS0710LB	36.8	61.3	65.3	119.3	118	1.3	8	1
7.1	10	□	MNS0710X10DB	72.3	99.3	102.3	156.3	155	1.3	8	1
7.1	20	□	MNS0710X20DB	143.3	174.3	177.3	231.3	230	1.3	8	1
7.1	30	□	MNS0710X30DB	214.3	249.3	252.3	306.3	305	1.3	8	1

MNS

DC(mm)	Hole Depth(l/d)	TF15	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
7.2	5	●	MNS0720LB	37.3	61.3	65.3	119.3	118	1.3	8	1
7.2	10	●	MNS0720X10DB	73.3	99.3	102.3	156.3	155	1.3	8	1
7.2	20	●	MNS0720X20DB	145.3	174.3	177.3	231.3	230	1.3	8	1
7.2	30	●	MNS0720X30DB	217.3	249.3	252.3	306.3	305	1.3	8	1
7.3	5	●	MNS0730LB	37.8	61.3	65.3	119.3	118	1.3	8	1
7.3	10	□	MNS0730X10DB	74.3	99.3	102.3	156.3	155	1.3	8	1
7.3	20	□	MNS0730X20DB	147.3	174.3	177.3	231.3	230	1.3	8	1
7.3	30	□	MNS0730X30DB	220.3	249.3	252.3	306.3	305	1.3	8	1
7.4	5	●	MNS0740LB	38.3	61.3	65.3	119.3	118	1.3	8	1
7.4	10	□	MNS0740X10DB	75.3	99.3	102.3	156.3	155	1.3	8	1
7.4	20	□	MNS0740X20DB	149.3	174.3	177.3	231.3	230	1.3	8	1
7.4	30	□	MNS0740X30DB	223.3	249.3	252.3	306.3	305	1.3	8	1
7.5	5	●	MNS0750LB	38.9	61.4	65.4	119.4	118	1.4	8	1
7.5	10	□	MNS0750X10DB	76.4	99.4	102.4	156.4	155	1.4	8	1
7.5	20	□	MNS0750X20DB	151.4	174.4	177.4	231.4	230	1.4	8	1
7.5	30	□	MNS0750X30DB	226.4	249.4	252.4	306.4	305	1.4	8	1
7.6	5	●	MNS0760LB	39.4	65.4	65.4	119.4	118	1.4	8	1
7.6	10	□	MNS0760X10DB	77.4	105.4	108.4	162.4	161	1.4	8	1
7.6	20	□	MNS0760X20DB	153.4	185.4	188.4	242.4	241	1.4	8	1
7.6	30	□	MNS0760X30DB	229.4	265.4	268.4	322.4	321	1.4	8	1
7.7	5	●	MNS0770LB	39.9	65.4	65.4	119.4	118	1.4	8	1
7.7	10	□	MNS0770X10DB	78.4	105.4	108.4	162.4	161	1.4	8	1
7.7	20	□	MNS0770X20DB	155.4	185.4	188.4	242.4	241	1.4	8	1
7.7	30	□	MNS0770X30DB	232.4	265.4	268.4	322.4	321	1.4	8	1
7.8	5	●	MNS0780LB	40.4	65.4	65.4	119.4	118	1.4	8	1
7.8	10	●	MNS0780X10DB	79.4	105.4	108.4	162.4	161	1.4	8	1
7.8	20	●	MNS0780X20DB	157.4	185.4	188.4	242.4	241	1.4	8	1
7.8	30	●	MNS0780X30DB	235.4	265.4	268.4	322.4	321	1.4	8	1
7.9	5	●	MNS0790LB	40.9	65.4	65.4	119.4	118	1.4	8	1
7.9	10	□	MNS0790X10DB	80.4	105.4	108.4	162.4	161	1.4	8	1
7.9	20	□	MNS0790X20DB	159.4	185.4	188.4	242.4	241	1.4	8	1
7.9	30	□	MNS0790X30DB	238.4	265.4	268.4	322.4	321	1.4	8	1
8.0	5	●	MNS0800LB	41.5	65.5	65.5	119.5	118	1.5	8	1
8.0	10	●	MNS0800X10DB	81.5	105.5	108.5	162.5	161	1.5	8	1
8.0	20	●	MNS0800X20DB	161.5	185.5	188.5	242.5	241	1.5	8	1
8.0	30	●	MNS0800X30DB	241.5	265.5	268.5	322.5	321	1.5	8	1
8.1	5	●	MNS0810LB	42.0	69.5	73.5	128.5	127	1.5	9	1
8.1	10	□	MNS0810X10DB	82.5	112.5	115.5	170.5	169	1.5	9	1
8.1	20	□	MNS0810X20DB	163.5	197.5	200.5	255.5	254	1.5	9	1
8.1	30	□	MNS0810X30DB	244.5	282.5	285.5	340.5	339	1.5	9	1
8.2	5	●	MNS0820LB	42.5	69.5	73.5	128.5	127	1.5	9	1
8.2	10	□	MNS0820X10DB	83.5	112.5	115.5	170.5	169	1.5	9	1
8.2	20	□	MNS0820X20DB	165.5	197.5	200.5	255.5	254	1.5	9	1
8.2	30	□	MNS0820X30DB	247.5	282.5	285.5	340.5	339	1.5	9	1
8.3	5	●	MNS0830LB	43.0	69.5	73.5	128.5	127	1.5	9	1
8.3	10	□	MNS0830X10DB	84.5	112.5	115.5	170.5	169	1.5	9	1
8.3	20	□	MNS0830X20DB	167.5	197.5	200.5	255.5	254	1.5	9	1
8.3	30	□	MNS0830X30DB	250.5	282.5	285.5	340.5	339	1.5	9	1
8.4	5	●	MNS0840LB	43.5	69.5	73.5	128.5	127	1.5	9	1
8.4	10	□	MNS0840X10DB	85.5	112.5	115.5	170.5	169	1.5	9	1
8.4	20	□	MNS0840X20DB	169.5	197.5	200.5	255.5	254	1.5	9	1
8.4	30	□	MNS0840X30DB	253.5	282.5	285.5	340.5	339	1.5	9	1
8.5	5	●	MNS0850LB	44.0	69.5	73.5	128.5	127	1.5	9	1
8.5	10	□	MNS0850X10DB	86.5	112.5	115.5	170.5	169	1.5	9	1
8.5	20	□	MNS0850X20DB	171.5	197.5	200.5	255.5	254	1.5	9	1
8.5	30	□	MNS0850X30DB	256.5	282.5	285.5	340.5	339	1.5	9	1
8.6	5	●	MNS0860LB	44.6	73.6	73.6	128.6	127	1.6	9	1
8.6	10	□	MNS0860X10DB	87.6	118.6	121.6	176.6	175	1.6	9	1
8.6	20	□	MNS0860X20DB	173.6	208.6	211.6	266.6	265	1.6	9	1
8.6	30	□	MNS0860X30DB	259.6	298.6	301.6	356.6	355	1.6	9	1
8.7	5	●	MNS0870LB	45.1	73.6	73.6	128.6	127	1.6	9	1
8.7	10	□	MNS0870X10DB	88.6	118.6	121.6	176.6	175	1.6	9	1
8.7	20	□	MNS0870X20DB	175.6	208.6	211.6	266.6	265	1.6	9	1
8.7	30	□	MNS0870X30DB	262.6	298.6	301.6	356.6	355	1.6	9	1
8.8	5	●	MNS0880LB	45.6	73.6	73.6	128.6	127	1.6	9	1
8.8	10	□	MNS0880X10DB	89.6	118.6	121.6	176.6	175	1.6	9	1
8.8	20	□	MNS0880X20DB	177.6	208.6	211.6	266.6	265	1.6	9	1
8.8	30	□	MNS0880X30DB	265.6	298.6	301.6	356.6	355	1.6	9	1
8.9	5	●	MNS0890LB	46.1	73.6	73.6	128.6	127	1.6	9	1
8.9	10	□	MNS0890X10DB	90.6	118.6	121.6	176.6	175	1.6	9	1
8.9	20	□	MNS0890X20DB	179.6	208.6	211.6	266.6	265	1.6	9	1
8.9	30	□	MNS0890X30DB	268.6	298.6	301.6	356.6	355	1.6	9	1
9.0	5	●	MNS0900LB	46.6	73.6	73.6	128.6	127	1.6	9	1
9.0	10	●	MNS0900X10DB	91.6	118.6	121.6	176.6	175	1.6	9	1
9.0	20	●	MNS0900X20DB	181.6	208.6	211.6	266.6	265	1.6	9	1
9.0	30	●	MNS0900X30DB	271.6	298.6	301.6	356.6	355	1.6	9	1
9.1	5	●	MNS0910LB	47.2	77.7	81.7	137.7	136	1.7	10	1
9.1	10	□	MNS0910X10DB	92.7	125.7	128.7	183.7	182	1.7	10	1
9.1	20	□	MNS0910X20DB	183.7	220.7	223.7	278.7	277	1.7	10	1
9.1	30	□	MNS0910X30DB	274.7	315.7	318.7	373.7	372	1.7	10	1
9.2	5	●	MNS0920LB	47.7	77.7	81.7	137.7	136	1.7	10	1
9.2	10	□	MNS0920X10DB	93.7	125.7	128.7	183.7	182	1.7	10	1
9.2	20	□	MNS0920X20DB	185.7	220.7	223.7	278.7	277	1.7	10	1
9.2	30	□	MNS0920X30DB	277.7	315.7	318.7	373.7	372	1.7	10	1
9.3	5	●	MNS0930LB	48.2	77.7	81.7	137.7	136	1.7	10	1
9.3	10	□	MNS0930X10DB	94.7	125.7	128.7	183.7	182	1.7	10	1
9.3	20	□	MNS0930X20DB	187.7	220.7	223.7	278.7	277	1.7	10	1
9.3	30	□	MNS0930X30DB	280.7	315.7	318.7	373.7	372	1.7	10	1
9.4	5	●	MNS0940LB	48.7	77.7	81.7	137.7	136	1.7	10	1
9.4	10	□	MNS0940X10DB	95.7	125.7	128.7	183.7	182	1.7	10	1
9.4	20	□	MNS0940X20DB	189.7	220.7	223.7	278.7	277	1.7	10	1
9.4	30	□	MNS0940X30DB	283.7	315.7	318.7	373.7	372	1.7	10	1
9.5	5	●	MNS0950LB	49.2	77.7	81.7	137.7	136	1.7	10	1
9.5	10	□	MNS0950X10DB	96.7	125.7	128.7	183.7	182	1.7	10	1
9.5	20	□	MNS0950X20DB	191.7	220.7	223.7	278.7	277	1.7	10	1
9.5	30	□	MNS0950X30DB	286.7	315.7	318.7	373.7	372	1.7	10	1
9.6	5	●	MNS0960LB	49.7	81.7	81.7	137.7	136	1.7	10	1
9.6	10	□	MNS0960X10DB	97.7	131.7	134.7	189.7	188	1.7	10	1
9.6	20	□	MNS0960X20DB	193.7	231.7	234.7	289.7	288	1.7	10	1
9.6	30	□	MNS0960X30DB	289.7	331.7	334.7	389.7	388	1.7	10	1
9.7	5	●	MNS0970LB	50.3	81.8	81.8	137.8	136	1.8	10	1
9.7	10	□	MNS0970X10DB	98.8	131.8	134.8	189.8	188	1.8	10	1
9.7	20	□	MNS0970X20DB	195.8	231.8	234.8	289.8	288	1.8	10	1
9.7	30	□	MNS0970X30DB	292.8	331.8	334.8	389.8	388	1.8	10	1
9.8	5	●	MNS0980LB	50.8	81.8	81.8	137.8	136	1.8	10	1
9.8	10	●	MNS0980X10DB	99.8	131.8	134.8	189.8	188	1.8	10	1
9.8	20	●	MNS0980X20DB	197.8	231.8	234.8	289.8	288	1.8	10	1
9.8	30	●	MNS0980X30DB	295.8	331.8	334.8	389.8	388	1.8	10	1

MNS

DC(mm)	Hole Depth(l/d)	TF15	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
9.9	5	●	MNS0990LB	51.3	81.8	81.8	137.8	136	1.8	10	1
9.9	10	□	MNS0990X10DB	100.8	131.8	134.8	189.8	188	1.8	10	1
9.9	20	□	MNS0990X20DB	199.8	231.8	234.8	289.8	288	1.8	10	1
9.9	30	□	MNS0990X30DB	298.8	331.8	334.8	389.8	388	1.8	10	1
10.0	5	●	MNS1000LB	51.8	81.8	81.8	137.8	136	1.8	10	1
10.0	10	●	MNS1000X10DB	101.8	131.8	134.8	189.8	188	1.8	10	1
10.0	20	●	MNS1000X20DB	201.8	231.8	234.8	289.8	288	1.8	10	1
10.0	30	●	MNS1000X30DB	301.8	331.8	334.8	389.8	388	1.8	10	1
10.1	5	●	MNS1010LB	52.3	85.8	89.8	150.8	149	1.8	11	1
10.1	10	□	MNS1010X10DB	102.8	138.8	141.8	202.8	201	1.8	11	1
10.1	20	□	MNS1010X20DB	203.8	243.8	246.8	307.8	306	1.8	11	1
10.2	5	●	MNS1020LB	52.9	85.9	89.9	150.9	149	1.9	11	1
10.2	10	□	MNS1020X10DB	103.9	138.9	141.9	202.9	201	1.9	11	1
10.2	20	□	MNS1020X20DB	205.9	243.9	246.9	307.9	306	1.9	11	1
10.3	5	●	MNS1030LB	53.4	85.9	89.9	150.9	149	1.9	11	1
10.3	10	□	MNS1030X10DB	104.9	138.9	141.9	202.9	201	1.9	11	1
10.3	20	□	MNS1030X20DB	207.9	243.9	246.9	307.9	306	1.9	11	1
10.4	5	●	MNS1040LB	53.9	85.9	89.9	150.9	149	1.9	11	1
10.4	10	□	MNS1040X10DB	105.9	138.9	141.9	202.9	201	1.9	11	1
10.4	20	□	MNS1040X20DB	209.9	243.9	246.9	307.9	306	1.9	11	1
10.5	5	●	MNS1050LB	54.4	85.9	89.9	150.9	149	1.9	11	1
10.5	10	●	MNS1050X10DB	106.9	138.9	141.9	202.9	201	1.9	11	1
10.5	20	●	MNS1050X20DB	211.9	243.9	246.9	307.9	306	1.9	11	1
10.6	5	●	MNS1060LB	54.9	89.9	89.9	150.9	149	1.9	11	1
10.6	10	□	MNS1060X10DB	107.9	144.9	147.9	208.9	207	1.9	11	1
10.6	20	□	MNS1060X20DB	213.9	254.9	257.9	318.9	317	1.9	11	1
10.7	5	●	MNS1070LB	55.4	89.9	89.9	150.9	149	1.9	11	1
10.7	10	□	MNS1070X10DB	108.9	144.9	147.9	208.9	207	1.9	11	1
10.7	20	□	MNS1070X20DB	215.9	254.9	257.9	318.9	317	1.9	11	1
10.8	5	●	MNS1080LB	56.0	90.0	90.0	151.0	149	2.0	11	1
10.8	10	□	MNS1080X10DB	110.0	145.0	148.0	209.0	207	2.0	11	1
10.8	20	□	MNS1080X20DB	218.0	255.0	258.0	319.0	317	2.0	11	1
10.9	5	●	MNS1090LB	56.5	90.0	90.0	151.0	149	2.0	11	1
10.9	10	□	MNS1090X10DB	111.0	145.0	148.0	209.0	207	2.0	11	1
10.9	20	□	MNS1090X20DB	220.0	255.0	258.0	319.0	317	2.0	11	1
11.0	5	●	MNS1100LB	57.0	90.0	90.0	151.0	149	2.0	11	1
11.0	10	●	MNS1100X10DB	112.0	145.0	148.0	209.0	207	2.0	11	1
11.0	20	●	MNS1100X20DB	222.0	255.0	258.0	319.0	317	2.0	11	1
11.1	5	●	MNS1110LB	57.5	94.0	98.0	160.0	158	2.0	12	1
11.1	10	□	MNS1110X10DB	113.0	152.0	155.0	217.0	215	2.0	12	1
11.1	20	□	MNS1110X20DB	224.0	267.0	270.0	332.0	330	2.0	12	1
11.2	5	●	MNS1120LB	58.0	94.0	98.0	160.0	158	2.0	12	1
11.2	10	□	MNS1120X10DB	114.0	152.0	155.0	217.0	215	2.0	12	1
11.2	20	□	MNS1120X20DB	226.0	267.0	270.0	332.0	330	2.0	12	1
11.3	5	●	MNS1130LB	58.6	94.1	98.1	160.1	158	2.1	12	1
11.3	10	□	MNS1130X10DB	115.1	152.1	155.1	217.1	215	2.1	12	1
11.3	20	□	MNS1130X20DB	228.1	267.1	270.1	332.1	330	2.1	12	1
11.4	5	●	MNS1140LB	59.1	94.1	98.1	160.1	158	2.1	12	1
11.4	10	□	MNS1140X10DB	116.1	152.1	155.1	217.1	215	2.1	12	1
11.4	20	□	MNS1140X20DB	230.1	267.1	270.1	332.1	330	2.1	12	1
11.5	5	●	MNS1150LB	59.6	94.1	98.1	160.1	158	2.1	12	1
11.5	10	□	MNS1150X10DB	117.1	152.1	155.1	217.1	215	2.1	12	1
11.5	20	□	MNS1150X20DB	232.1	267.1	270.1	332.1	330	2.1	12	1
11.6	5	●	MNS1160LB	60.1	98.1	98.1	160.1	158	2.1	12	1
11.6	10	□	MNS1160X10DB	118.1	158.1	161.1	223.1	221	2.1	12	1
11.6	20	□	MNS1160X20DB	234.1	278.1	281.1	343.1	341	2.1	12	1
11.7	5	●	MNS1170LB	60.6	98.1	98.1	160.1	158	2.1	12	1
11.7	10	□	MNS1170X10DB	119.1	158.1	161.1	223.1	221	2.1	12	1
11.7	20	□	MNS1170X20DB	236.1	278.1	281.1	343.1	341	2.1	12	1
11.8	5	●	MNS1180LB	61.1	98.1	98.1	160.1	158	2.1	12	1
11.8	10	□	MNS1180X10DB	120.1	158.1	161.1	223.1	221	2.1	12	1
11.8	20	□	MNS1180X20DB	238.1	278.1	281.1	343.1	341	2.1	12	1
11.9	5	●	MNS1190LB	61.7	98.2	98.2	160.2	158	2.2	12	1
11.9	10	□	MNS1190X10DB	121.2	158.2	161.2	223.2	221	2.2	12	1
11.9	20	□	MNS1190X20DB	240.2	278.2	281.2	343.2	341	2.2	12	1
12.0	5	●	MNS1200LB	62.2	98.2	98.2	160.2	158	2.2	12	1
12.0	10	●	MNS1200X10DB	122.2	158.2	161.2	223.2	221	2.2	12	1
12.0	20	●	MNS1200X20DB	242.2	278.2	281.2	343.2	341	2.2	12	1
12.1	5	●	MNS1210LB	62.7	102.2	106.2	169.2	167	2.2	13	1
12.1	10	□	MNS1210X10DB	123.2	165.2	168.2	231.2	229	2.2	13	1
12.1	20	□	MNS1210X20DB	244.2	290.2	293.2	356.2	354	2.2	13	1
12.2	5	●	MNS1220LB	63.2	102.2	106.2	169.2	167	2.2	13	1
12.2	10	□	MNS1220X10DB	124.2	165.2	168.2	231.2	229	2.2	13	1
12.2	20	□	MNS1220X20DB	246.2	290.2	293.2	356.2	354	2.2	13	1
12.3	5	●	MNS1230LB	63.7	102.2	106.2	169.2	167	2.2	13	1
12.3	10	□	MNS1230X10DB	125.2	165.2	168.2	231.2	229	2.2	13	1
12.3	20	□	MNS1230X20DB	248.2	290.2	293.2	356.2	354	2.2	13	1
12.4	5	●	MNS1240LB	64.3	102.3	106.3	169.3	167	2.3	13	1
12.4	10	□	MNS1240X10DB	126.3	165.3	168.3	231.3	229	2.3	13	1
12.4	20	□	MNS1240X20DB	250.3	290.3	293.3	356.3	354	2.3	13	1
12.5	5	●	MNS1250LB	64.8	102.3	106.3	169.3	167	2.3	13	1
12.5	10	□	MNS1250X10DB	127.3	165.3	168.3	231.3	229	2.3	13	1
12.5	20	□	MNS1250X20DB	252.3	290.3	293.3	356.3	354	2.3	13	1
12.6	5	●	MNS1260LB	65.3	106.3	106.3	169.3	167	2.3	13	1
12.6	10	□	MNS1260X10DB	128.3	171.3	174.3	237.3	235	2.3	13	1
12.6	20	□	MNS1260X20DB	254.3	301.3	304.3	367.3	365	2.3	13	1
12.7	5	●	MNS1270LB	65.8	106.3	106.3	169.3	167	2.3	13	1
12.7	10	□	MNS1270X10DB	129.3	171.3	174.3	237.3	235	2.3	13	1
12.7	20	□	MNS1270X20DB	256.3	301.3	304.3	367.3	365	2.3	13	1
12.8	5	●	MNS1280LB	66.3	106.3	106.3	169.3	167	2.3	13	1
12.8	10	□	MNS1280X10DB	130.3	171.3	174.3	237.3	235	2.3	13	1
12.8	20	□	MNS1280X20DB	258.3	301.3	304.3	367.3	365	2.3	13	1
12.9	5	●	MNS1290LB	66.8	106.3	106.3	169.3	167	2.3	13	1
12.9	10	□	MNS1290X10DB	131.3	171.3	174.3	237.3	235	2.3	13	1
12.9	20	□	MNS1290X20DB	260.3	301.3	304.3	367.3	365	2.3	13	1
13.0	5	●	MNS1300LB	67.4	106.4	106.4	169.4	167	2.4	13	1
13.0	10	●	MNS1300X10DB	132.4	171.4	174.4	237.4	235	2.4	13	1
13.0	20	●	MNS1300X20DB	262.4	301.4	304.4	367.4	365	2.4	13	1
13.1	5	●	MNS1310LB	67.9	110.4	114.4	178.4	176	2.4	14	1
13.1	10	□	MNS1310X10DB	133.4	178.4	181.4	245.4	243	2.4	14	1
13.1	20	□	MNS1310X20DB	264.4	313.4	316.4	380.4	378	2.4	14	1
13.2	5	●	MNS1320LB	68.4	110.4	114.4	178.4	176	2.4	14	1
13.2	10	□	MNS1320X10DB	134.4	178.4	181.4	245.4	243	2.4	14	1
13.2	20	□	MNS1320X20DB	266.4	313.4	316.4	380.4	378	2.4	14	1
13.3	5	●	MNS1330LB	68.9	110.4	114.4	178.4	176	2.4	14	1
13.3	10	□	MNS1330X10DB	135.4	178.4	181.4	245.4	243	2.4	14	1
13.3	20	□	MNS1330X20DB	268.4	313.4	316.4	380.4	378	2.4	14	1
13.4	5	●	MNS1340LB	69.4	110.4	114.4	178.4	176	2.4	14	1

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DC(mm)	Hole Depth(l/d)	TF15	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
13.4	10	□	**MNS1340X10DB**	136.4	178.4	181.4	245.4	243	2.4	14	1
13.4	20	□	**MNS1340X20DB**	270.4	313.4	316.4	380.4	378	2.4	14	1
13.5	5	●	**MNS1350LB**	70.0	110.5	114.5	178.5	176	2.5	14	1
13.5	10	□	**MNS1350X10DB**	137.5	178.5	181.5	245.5	243	2.5	14	1
13.5	20	□	**MNS1350X20DB**	272.5	313.5	316.5	380.5	378	2.5	14	1
13.6	5	●	**MNS1360LB**	70.5	114.5	114.5	178.5	176	2.5	14	1
13.6	10	□	**MNS1360X10DB**	138.5	184.5	187.5	251.5	249	2.5	14	1
13.6	20	□	**MNS1360X20DB**	274.5	324.5	327.5	391.5	389	2.5	14	1
13.7	5	●	**MNS1370LB**	71.0	114.5	114.5	178.5	176	2.5	14	1
13.7	10	□	**MNS1370X10DB**	139.5	184.5	187.5	251.5	249	2.5	14	1

DC(mm)	Hole Depth(l/d)	TF15	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
13.7	20	□	**MNS1370X20DB**	276.5	324.5	327.5	391.5	389	2.5	14	1
13.8	5	●	**MNS1380LB**	71.5	114.5	114.5	178.5	176	2.5	14	1
13.8	10	□	**MNS1380X10DB**	140.5	184.5	187.5	251.5	249	2.5	14	1
13.8	20	□	**MNS1380X20DB**	278.5	324.5	327.5	391.5	389	2.5	14	1
13.9	5	●	**MNS1390LB**	72.0	114.5	114.5	178.5	176	2.5	14	1
13.9	10	□	**MNS1390X10DB**	141.5	184.5	187.5	251.5	249	2.5	14	1
13.9	20	□	**MNS1390X20DB**	280.5	324.5	327.5	391.5	389	2.5	14	1
14.0	5	●	**MNS1400LB**	72.5	114.5	114.5	178.5	176	2.5	14	1
14.0	10	●	**MNS1400X10DB**	142.5	184.5	187.5	251.5	249	2.5	14	1
14.0	20	●	**MNS1400X20DB**	282.5	324.5	327.5	391.5	389	2.5	14	1

MNS

Recommended Cutting Condition

·LB Type Drill

Work material	Aluminium Alloy(Si<5%) A6061, A7075		Aluminium Alloy(5%<Si<10%) ASTM 333.0 etc		Aluminium Alloy(Si>10%) ASTM 383.0, ASTM A390.0 etc	
Dia. DC (mm)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)
3.2	11900	0.1(0.11—0.16)	11900	0.15(0.16—0.21)	11900	0.15(0.16—0.21)
4.0	9500	0.15(0.13—0.20)	9500	0.2(0.20—0.27)	9500	0.2(0.20—0.27)
5.0	7600	0.2(0.17—0.25)	7600	0.25(0.25—0.33)	7600	0.25(0.25—0.33)
6.3	7500	0.25(0.21—0.32)	7500	0.35(0.32—0.42)	7500	0.35(0.32—0.42)
8.0	5900	0.3(0.27—0.40)	5900	0.45(0.40—0.53)	5900	0.45(0.40—0.53)
10.0	4700	0.4(0.33—0.50)	4700	0.55(0.50—0.67)	4700	0.55(0.50—0.67)
12.0	5300	0.5(0.40—0.60)	5300	0.7(0.60—0.80)	5300	0.7(0.60—0.80)
14.0	4500	0.5(0.40—0.60)	4500	0.7(0.60—0.80)	4500	0.7(0.60—0.80)

- When using the drill with a length over l/d 10, it is necessary to use a prep holes as a guide. (If no prep-hole is used then drill breakage can occur.)
- For pilot hole drilling, Mitsubishi Materials MNS-LB, MAE-MB or MAS-MB drill is recommended.

·DB Type Drill

Work material	Aluminium Alloy(Si<5%) A6061, A7075		Aluminium Alloy(5%<Si<10%) ASTM 333.0 etc		Aluminium Alloy(Si>10%) ASTM 383.0, ASTM A390.0 etc	
Dia. DC (mm)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)
3.2	8900	0.1(0.11—0.16)	8900	0.15(0.16—0.21)	8900	0.15(0.16—0.21)
4.0	7100	0.15(0.13—0.20)	7100	0.2(0.20—0.27)	7100	0.2(0.20—0.27)
5.0	5700	0.2(0.17—0.25)	5700	0.25(0.25—0.33)	5700	0.25(0.25—0.33)
6.3	6000	0.25(0.21—0.32)	6000	0.35(0.32—0.42)	6000	0.35(0.32—0.42)
8.0	4700	0.3(0.27—0.40)	4700	0.45(0.40—0.53)	4700	0.45(0.40—0.53)
10.0	3800	0.4(0.33—0.50)	3800	0.55(0.50—0.67)	3800	0.55(0.50—0.67)
12.0	4200	0.5(0.40—0.60)	4200	0.7(0.60—0.80)	4200	0.7(0.60—0.80)
14.0	3600	0.5(0.40—0.60)	3600	0.7(0.60—0.80)	3600	0.7(0.60—0.80)

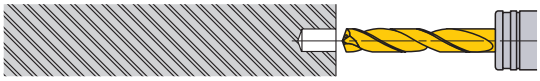
- When using the drill with a length over l/d 10, it is necessary to use a prep holes as a guide. (If no prep-hole is used then drill breakage can occur.)
- For pilot hole drilling, Mitsubishi Materials MNS-LB, MAE-MB or MAS-MB drill is recommended.

MNS

OPERATIONAL GUIDANCE FOR MNS...DB DRILLS

FLAT FACE DRILLING ●Drilling a blind hole

1. Drilling a pilot hole

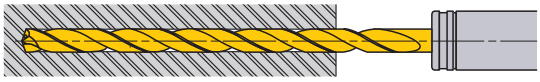


①Use a drill with a larger (flatter) point angle than the super long type. Mitsubishi type MNS-LB, MAE-MB or MAS-MB drill is recommended.
②Ensure a high precision hole is drilled for the guide.
③Drill depth : Approx 1DC.
(Adjust the pilot hole depth according to the length of the long type drill.)

2. Initial cutting with the long type drill

①Penetrate the guide hole at low revolution. (Cutting speed 20—30m/min, feed rate 0.2—0.3mm/rev)
②Stop the long type drill 1—3mm short of the guide hole bottom.

3. Drill the deep hole



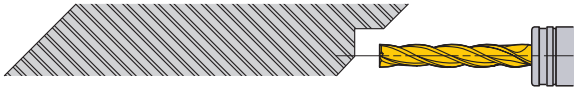
①Start cutting at the recommended speed and feed with a non-peck (continuous feed) cycle.

4. Drill retraction

①After drilling, lower the cutting revolution about 1—2mm short of the hole end. (Cutting speed of around 20—30m/min)
②Retract the drill to the pilot hole depth starting point at a feed rate of 3000mm/min.
③Finally, clear the hole at a cutting speed of 20—30m/min and feed rate of 0.2—0.3mm/rev.

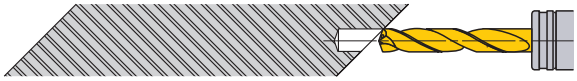
INTERRUPED DRILLING ●Drilling and breaking through on irregular faces or angles

1. Spot facing



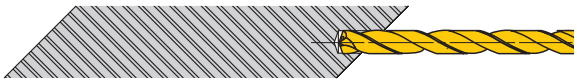
①Machine a flat or the irregular face by using an end mill or slot drill capable of spot facing. Make the spot face diameter the same size as the required deep hole diameter.

2. Drilling a pilot hole



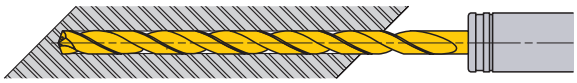
①Use a drill with a larger (flatter) point angle than the super long type. Mitsubishi type MNS-LB, MAE-MB or MAS-MB drill is recommended.
②Ensure a high precision hole is drilled for the guide.
③Drill depth : Approx 1DC.
(Adjust the pilot hole depth according to the length of the long type drill.)

3. Initial cutting with the long type drill



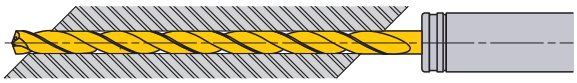
①Penetrate the guide hole at a low revolution. (Cutting speed 20—30m/min, feed rate 0.2—0.3mm/rev)
②Stop the long type drill 1—3mm short of the guide hole bottom.

4. Drill the deep hole



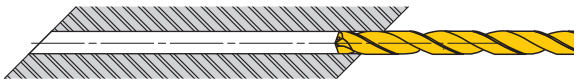
①Start cutting at the recommended speed and feed with a non-peck (continuous feed) cycle.

5. Breaking through



①When breaking through, the cutting edge can be damaged.
②A feed rate of 0.05—0.1mm/rev is recommended.

6. Drill retraction



①Finally clear the hole at a cutting speed of 20—30m/min and feed rate of 0.2—0.3mm/rev.
②Retract the drill to the pilot hole depth starting point at a feed rate of 3000mm/min.

Memo

MHS

WSTAR Drill Series

SOLID CARBIDE DRILLS FOR DIE & MOULD MACHINING

Product Information

UWC VP 135° SIG 140° SIG 140° SIG 142° SIG X Thinning

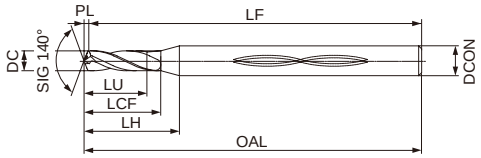
DC<3, 5≦ULD-R≦30 | DC<3, ULDR<3 | DC≧3, 5≦ULD-R≦30 | DC<3, ULDR<5

TECHNICAL DATA >> 1997 ISO13399 Property >> 1966

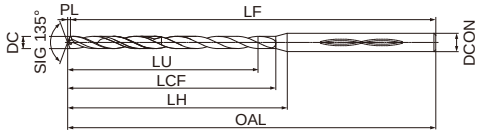
Work Material

P M S H

SYMBOL DESCRIPTIONS >> 1623 DRILLS SELECTION CHART >> 1624

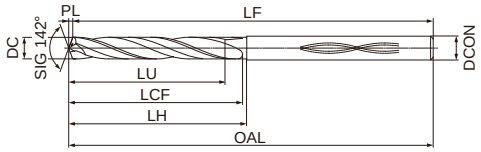


Type1

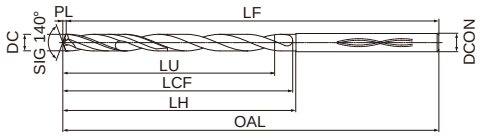


Type2

	DC≦3	3<DC≦6	6<DC≦10	10<DC≦12
	+ 0.010 −0.002	+ 0.010 −0.002	+ 0.010 −0.005	+ 0.010 −0.008
h6	0 −0.006	0 −0.008	0 −0.009	0 −0.011



Type3



Type4

Stock status indication:●: Inventory maintained in Japan.▲: This item to be discontinued within two years.□: Non stock, produced to order only.

Internal Coolant Unit（mm）

DC(mm)	Hole Depth(l/d)	VP15TF	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
0.95	3	●	MHS0095L006B	3.0	6.2	10.0	60.2	60	0.17	3	1
0.95	6	●	MHS0095L009B	5.9	9.2	13.0	60.2	60	0.17	3	2
0.95	13	●	MHS0095L015B	12.5	15.2	19.0	60.2	60	0.17	3	2
0.95	23	●	MHS0095L025B	22.0	25.2	29.0	60.2	60	0.17	3	2
0.95	30	●	MHS0095L035B	28.7	35.2	39.0	80.2	80	0.17	3	2
1.00	3	●	MHS0100L006B	3.2	6.2	9.9	60.2	60	0.2	3	1
1.00	6	●	MHS0100L009B	6.2	9.2	12.9	60.2	60	0.2	3	2
1.00	12	●	MHS0100L015B	12.2	15.2	18.9	60.2	60	0.2	3	2
1.00	22	●	MHS0100L025B	22.2	25.2	28.9	60.2	60	0.2	3	2
1.00	30	●	MHS0100L035B	30.2	35.2	38.9	80.2	80	0.2	3	2
1.10	2	●	MHS0110L006B	2.4	6.2	9.7	60.2	60	0.2	3	1

DC(mm)	Hole Depth(l/d)	VP15TF	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
1.10	5	●	MHS0110L009B	5.7	9.2	12.7	60.2	60	0.2	3	2
1.10	11	●	MHS0110L015B	12.3	15.2	18.7	60.2	60	0.2	3	2
1.10	20	●	MHS0110L025B	22.2	25.2	28.7	60.2	60	0.2	3	2
1.10	29	●	MHS0110L035B	32.1	35.2	38.7	80.2	80	0.2	3	2
1.20	2	●	MHS0120L006B	2.6	6.2	9.6	60.2	60	0.2	3	1
1.20	5	●	MHS0120L009B	6.2	9.2	12.6	60.2	60	0.2	3	2
1.20	10	●	MHS0120L015B	12.2	15.2	18.6	60.2	60	0.2	3	2
1.20	18	●	MHS0120L025B	21.8	25.2	28.6	60.2	60	0.2	3	2
1.20	26	●	MHS0120L035B	31.4	35.2	38.6	80.2	80	0.2	3	2
1.30	2	●	MHS0130L007B	2.8	7.2	10.4	60.2	60	0.2	3	1
1.30	5	●	MHS0130L011B	6.8	11.3	14.5	60.3	60	0.3	3	2

MHS

DC(mm)	Hole Depth(l/d)	VP15TF	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
1.30	12	●	MHS0130L020B	15.9	20.3	23.5	60.3	60	0.3	3	2
1.30	20	●	MHS0130L030B	26.3	30.3	33.5	80.3	80	0.3	3	2
1.30	30	●	MHS0130L045B	39.3	45.3	48.5	80.3	80	0.3	3	2
1.40	2	●	MHS0140L007B	3.1	7.3	10.3	60.3	60	0.3	3	1
1.40	5	●	MHS0140L011B	7.3	11.3	14.3	60.3	60	0.3	3	2
1.40	11	●	MHS0140L020B	15.7	20.3	23.3	60.3	60	0.3	3	2
1.40	18	●	MHS0140L030B	25.5	30.3	33.3	80.3	80	0.3	3	2
1.40	29	●	MHS0140L045B	40.9	45.3	48.3	80.3	80	0.3	3	2
1.45	3	●	MHS0145L008B	4.7	8.3	11.2	60.3	60	0.3	3	1
1.45	6	●	MHS0145L013B	9.0	13.3	16.2	60.3	60	0.3	3	2
1.45	11	●	MHS0145L020B	16.3	20.3	23.2	60.3	60	0.3	3	2
1.45	21	●	MHS0145L035B	30.8	35.3	38.2	80.3	80	0.3	3	2
1.45	30	●	MHS0145L055B	43.8	55.3	58.2	100.3	100	0.3	3	2
1.50	2	●	MHS0150L008B	3.3	8.3	11.1	60.3	60	0.3	3	1
1.50	6	●	MHS0150L013B	9.3	13.3	16.1	60.3	60	0.3	3	2
1.50	10	●	MHS0150L020B	15.3	20.3	23.1	60.3	60	0.3	3	2
1.50	20	●	MHS0150L035B	30.3	35.3	38.1	80.3	80	0.3	3	2
1.50	30	●	MHS0150L055B	45.3	55.3	58.1	100.3	100	0.3	3	2
1.60	2	●	MHS0160L008B	3.5	8.3	10.9	60.3	60	0.3	3	1
1.60	5	●	MHS0160L013B	8.3	13.3	15.9	60.3	60	0.3	3	2
1.60	10	●	MHS0160L020B	16.3	20.3	22.9	60.3	60	0.3	3	2
1.60	19	●	MHS0160L035B	30.7	35.3	37.9	80.3	80	0.3	3	2
1.60	30	●	MHS0160L055B	48.3	55.3	57.9	100.3	100	0.3	3	2
1.70	2	●	MHS0170L008B	3.7	8.3	10.7	60.3	60	0.3	3	1
1.70	5	●	MHS0170L013B	8.9	13.4	15.8	60.4	60	0.4	3	2
1.70	9	●	MHS0170L020B	15.7	20.4	22.8	60.4	60	0.4	3	2
1.70	18	●	MHS0170L035B	31.0	35.4	37.8	80.4	80	0.4	3	2
1.70	29	●	MHS0170L055B	49.7	55.4	57.8	100.4	100	0.4	3	2
1.80	3	●	MHS0180L010B	5.7	10.3	12.5	60.3	60	0.3	3	1
1.80	5	●	MHS0180L015B	9.4	15.4	17.6	60.4	60	0.4	3	2
1.80	11	●	MHS0180L025B	20.2	25.4	27.6	60.4	60	0.4	3	2
1.80	22	●	MHS0180L045B	40.0	45.4	47.6	80.4	80	0.4	3	2
1.80	30	●	MHS0180L065B	54.4	65.4	67.6	100.4	100	0.4	3	2
1.90	2	●	MHS0190L010B	4.1	10.3	12.4	60.3	60	0.3	3	1
1.90	5	●	MHS0190L015B	9.9	15.4	17.5	60.4	60	0.4	3	2
1.90	10	●	MHS0190L025B	19.4	25.4	27.5	60.4	60	0.4	3	2
1.90	21	●	MHS0190L045B	40.3	45.4	47.5	80.4	80	0.4	3	2
1.90	30	●	MHS0190L065B	57.4	65.4	67.5	100.4	100	0.4	3	2
1.95	2	●	MHS0195L010B	4.3	10.4	12.4	60.4	60	0.4	3	1
1.95	5	●	MHS0195L015B	10.2	15.4	17.4	60.4	60	0.4	3	2
1.95	10	●	MHS0195L025B	19.9	25.4	27.4	60.4	60	0.4	3	2
1.95	20	●	MHS0195L045B	39.4	45.4	47.4	80.4	80	0.4	3	2
1.95	30	●	MHS0195L065B	58.9	65.4	67.4	100.4	100	0.4	3	2
2.00	2	●	MHS0200L010B	4.4	10.4	12.3	60.4	60	0.4	3	1
2.00	5	●	MHS0200L015B	10.4	15.4	17.3	60.4	60	0.4	3	2
2.00	9	●	MHS0200L025B	18.4	25.4	27.3	60.4	60	0.4	3	2
2.00	20	●	MHS0200L045B	40.4	45.4	47.3	80.4	80	0.4	3	2
2.00	30	●	MHS0200L065B	60.4	65.4	67.3	100.4	100	0.4	3	2
2.10	3	●	MHS0210L012B	6.7	12.4	14.1	60.4	60	0.4	3	1
2.10	7	●	MHS0210L020B	15.1	20.4	22.1	60.4	60	0.4	3	2
2.10	11	●	MHS0210L030B	23.5	30.4	32.1	80.4	80	0.4	3	2
2.10	23	●	MHS0210L055B	48.7	55.4	57.1	100.4	100	0.4	3	2
2.10	30	●	MHS0210L075B	63.4	75.4	77.1	120.4	120	0.4	3	2
2.20	2	●	MHS0220L012B	4.8	12.4	13.9	60.4	60	0.4	3	1
2.20	6	●	MHS0220L020B	13.7	20.5	22.0	60.5	60	0.5	3	2
2.20	11	●	MHS0220L030B	24.7	30.5	32.0	80.5	80	0.5	3	2
2.20	22	●	MHS0220L055B	48.9	55.5	57.0	100.5	100	0.5	3	2
2.20	30	●	MHS0220L075B	66.5	75.5	77.0	120.5	120	0.5	3	2
2.30	2	●	MHS0230L012B	5.0	12.4	13.7	60.4	60	0.4	3	1
2.30	6	●	MHS0230L020B	14.3	20.5	21.8	60.5	60	0.5	3	2
2.30	10	●	MHS0230L030B	23.5	30.5	31.8	80.5	80	0.5	3	2
2.30	21	●	MHS0230L055B	48.8	55.5	56.8	100.5	100	0.5	3	2
2.30	30	●	MHS0230L075B	69.5	75.5	76.8	120.5	120	0.5	3	2
2.40	2	●	MHS0240L012B	5.2	12.4	13.5	60.4	60	0.4	3	1
2.40	5	●	MHS0240L020B	12.5	20.5	21.6	60.5	60	0.5	3	2
2.40	9	●	MHS0240L030B	22.1	30.5	31.6	80.5	80	0.5	3	2
2.40	20	●	MHS0240L055B	48.5	55.5	56.6	100.5	100	0.5	3	2
2.40	28	●	MHS0240L075B	67.7	75.5	76.6	120.5	120	0.5	3	2
2.45	2	●	MHS0245L013B	5.3	13.4	14.4	70.4	70	0.4	4	1
2.45	5	●	MHS0245L020B	12.8	20.5	21.5	70.5	70	0.5	4	2
2.45	11	●	MHS0245L035B	27.5	35.5	36.5	90.5	90	0.5	4	2
2.45	24	●	MHS0245L065B	59.3	65.5	66.5	110.5	110	0.5	4	2
2.45	30	●	MHS0245L090B	74.0	90.5	91.5	140.5	140	0.5	4	2
2.50	2	●	MHS0250L013B	5.5	13.5	16.3	70.5	70	0.5	4	1
2.50	5	●	MHS0250L020B	13.0	20.5	23.3	70.5	70	0.5	4	2
2.50	11	●	MHS0250L035B	28.0	35.5	38.3	90.5	90	0.5	4	2
2.50	23	●	MHS0250L065B	58.0	65.5	68.3	110.5	110	0.5	4	2
2.50	30	●	MHS0250L090B	75.5	90.5	93.3	140.5	140	0.5	4	2
2.60	2	●	MHS0260L013B	5.7	13.5	16.1	70.5	70	0.5	4	1
2.60	5	●	MHS0260L020B	13.5	20.5	23.1	70.5	70	0.5	4	2
2.60	10	●	MHS0260L035B	26.5	35.5	38.1	90.5	90	0.5	4	2
2.60	22	●	MHS0260L065B	57.7	65.5	68.1	110.5	110	0.5	4	2
2.60	30	●	MHS0260L090B	78.5	90.5	93.1	140.5	140	0.5	4	2
2.70	2	●	MHS0270L013B	5.9	13.5	15.9	70.5	70	0.5	4	1
2.70	4	●	MHS0270L020B	11.4	20.6	23.0	70.6	70	0.6	4	2
2.70	10	●	MHS0270L035B	27.6	35.6	38.0	90.6	90	0.6	4	2
2.70	21	●	MHS0270L065B	57.3	65.6	68.0	110.6	110	0.6	4	2
2.70	30	●	MHS0270L090B	81.6	90.6	93.0	140.6	140	0.6	4	2
2.80	2	●	MHS0280L014B	6.1	14.5	16.7	70.5	70	0.5	4	1
2.80	4	●	MHS0280L020B	11.8	20.6	22.8	70.6	70	0.6	4	2
2.80	9	●	MHS0280L035B	25.8	35.6	37.8	90.6	90	0.6	4	2
2.80	20	●	MHS0280L065B	56.6	65.6	67.8	110.6	110	0.6	4	2
2.80	29	●	MHS0280L090B	81.8	90.6	92.8	140.6	140	0.6	4	2
2.90	2	●	MHS0290L014B	6.3	14.5	16.6	70.5	70	0.5	4	1
2.90	4	●	MHS0290L020B	12.2	20.6	22.7	70.6	70	0.6	4	2
2.90	9	●	MHS0290L035B	26.7	35.6	37.7	90.6	90	0.6	4	2
2.90	19	●	MHS0290L065B	55.7	65.6	67.7	110.6	110	0.6	4	2
2.90	28	●	MHS0290L090B	81.8	90.6	92.7	140.6	140	0.6	4	2
2.95	2	●	MHS0295L014B	6.4	14.5	16.5	70.5	70	0.5	4	1
2.95	4	●	MHS0295L020B	12.4	20.6	22.6	70.6	70	0.6	4	2
2.95	9	●	MHS0295L035B	27.2	35.6	37.6	90.6	90	0.6	4	2
2.95	19	●	MHS0295L065B	56.7	65.6	67.6	110.6	110	0.6	4	2
2.95	28	●	MHS0295L090B	83.2	90.6	92.6	140.6	140	0.6	4	2
3.0	4	●	MHS0300L020B	12.5	19.5	20.5	70.5	70	0.5	4	3
3.0	10	●	MHS0300L040B	30.5	39.5	40.5	90.5	90	0.5	4	4
3.0	17	●	MHS0300L060B	51.5	59.5	60.5	110.5	110	0.5	4	4
3.0	27	●	MHS0300L090B	81.5	89.5	90.5	140.5	140	0.5	4	4
3.1	4	□	MHS0310L020B	12.9	20.0	20.5	70.5	70	0.5	4	3

MHS

DC(mm)	Hole Depth(l/d)	VP15TF	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
3.1	10	□	MHS0310L040B	31.6	40.1	40.6	90.6	90	0.6	4	4
3.1	17	□	MHS0310L060B	53.3	60.1	60.6	110.6	110	0.6	4	4
3.1	26	□	MHS0310L090B	81.2	90.1	90.6	140.6	140	0.6	4	4
3.2	4	□	MHS0320L020B	13.4	20.1	20.6	70.6	70	0.6	4	3
3.2	10	□	MHS0320L040B	32.6	40.1	40.6	90.6	90	0.6	4	4
3.2	16	□	MHS0320L060B	51.8	60.1	60.6	110.6	110	0.6	4	4
3.2	25	□	MHS0320L090B	80.6	90.1	90.6	140.6	140	0.6	4	4
3.3	3	□	MHS0330L020B	10.5	20.1	20.6	70.6	70	0.6	4	3
3.3	9	□	MHS0330L040B	30.3	40.1	40.6	90.6	90	0.6	4	4
3.3	16	□	MHS0330L060B	53.4	60.1	60.6	110.6	110	0.6	4	4
3.3	25	□	MHS0330L090B	83.1	90.1	90.6	140.6	140	0.6	4	4
3.4	3	□	MHS0340L020B	10.8	20.1	20.6	70.6	70	0.6	4	3
3.4	9	□	MHS0340L040B	31.2	40.1	40.6	90.6	90	0.6	4	4
3.4	15	□	MHS0340L060B	51.6	60.1	60.6	110.6	110	0.6	4	4
3.4	24	□	MHS0340L090B	82.2	90.1	90.6	140.6	140	0.6	4	4
3.5	3	●	MHS0350L020B	11.1	20.1	20.6	70.6	70	0.6	4	3
3.5	9	●	MHS0350L040B	32.1	40.1	40.6	90.6	90	0.6	4	4
3.5	14	●	MHS0350L060B	49.6	60.1	60.6	110.6	110	0.6	4	4
3.5	23	●	MHS0350L090B	81.1	90.1	90.6	140.6	140	0.6	4	4
3.6	3	□	MHS0360L020B	11.4	20.6	20.6	70.6	70	0.6	4	3
3.6	9	□	MHS0360L040B	33.1	40.7	40.7	90.7	90	0.7	4	4
3.6	14	□	MHS0360L060B	51.1	60.7	60.7	110.7	110	0.7	4	4
3.6	22	□	MHS0360L090B	79.9	90.7	90.7	140.7	140	0.7	4	4
3.6	30	□	MHS0360L120B	108.7	120.7	120.7	170.7	170	0.7	4	4
3.7	3	□	MHS0370L020B	11.7	20.6	20.6	70.6	70	0.6	4	3
3.7	8	□	MHS0370L040B	30.3	40.7	40.7	90.7	90	0.7	4	4
3.7	14	□	MHS0370L060B	52.5	60.7	60.7	110.7	110	0.7	4	4
3.7	22	□	MHS0370L090B	82.1	90.7	90.7	140.7	140	0.7	4	4
3.7	30	□	MHS0370L120B	111.7	120.7	120.7	170.7	170	0.7	4	4
3.8	3	●	MHS0380L020B	12.1	20.7	20.7	70.7	70	0.7	4	3
3.8	8	●	MHS0380L040B	31.1	40.7	40.7	90.7	90	0.7	4	4
3.8	13	●	MHS0380L060B	50.1	60.7	60.7	110.7	110	0.7	4	4
3.8	21	●	MHS0380L090B	80.5	90.7	90.7	140.7	140	0.7	4	4
3.8	29	●	MHS0380L120B	110.9	120.7	120.7	170.7	170	0.7	4	4
3.9	3	□	MHS0390L020B	12.4	20.7	20.7	70.7	70	0.7	4	3
3.9	8	□	MHS0390L040B	31.9	40.7	40.7	90.7	90	0.7	4	4
3.9	13	□	MHS0390L060B	51.4	60.7	60.7	110.7	110	0.7	4	4
3.9	21	□	MHS0390L090B	82.6	90.7	90.7	140.7	140	0.7	4	4
3.9	28	□	MHS0390L120B	109.9	120.7	120.7	170.7	170	0.7	4	4
4.0	2	●	MHS0400L020B	8.7	20.7	20.7	70.7	70	0.7	4	3
4.0	7	●	MHS0400L040B	28.7	40.7	40.7	90.7	90	0.7	4	4
4.0	12	●	MHS0400L060B	48.7	60.7	60.7	110.7	110	0.7	4	4
4.0	20	●	MHS0400L090B	80.7	90.7	90.7	140.7	140	0.7	4	4
4.0	27	●	MHS0400L120B	108.7	120.7	120.7	170.7	170	0.7	4	4
4.1	2	□	MHS0410L020B	8.9	19.2	20.7	70.7	70	0.7	6	3
4.1	7	□	MHS0410L040B	29.4	39.2	40.7	90.7	90	0.7	6	4
4.1	12	□	MHS0410L060B	49.9	59.2	60.7	110.7	110	0.7	6	4
4.1	19	□	MHS0410L090B	78.6	89.2	90.7	140.7	140	0.7	6	4
4.1	26	□	MHS0410L120B	107.3	119.2	120.7	170.7	170	0.7	6	4
4.2	2	□	MHS0420L020B	9.1	19.2	20.7	70.7	70	0.7	6	3
4.2	7	□	MHS0420L040B	30.2	39.3	40.8	90.8	90	0.8	6	4
4.2	11	□	MHS0420L060B	47.0	59.3	60.8	110.8	110	0.8	6	4
4.2	19	□	MHS0420L090B	80.6	89.3	90.8	140.8	140	0.8	6	4
4.2	26	□	MHS0420L120B	110.0	119.3	120.8	170.8	170	0.8	6	4
4.3	2	□	MHS0430L020B	9.3	19.2	20.7	70.7	70	0.7	6	3
4.3	6	□	MHS0430L040B	26.6	39.3	40.8	90.8	90	0.8	6	4
4.3	11	□	MHS0430L060B	48.1	59.3	60.8	110.8	110	0.8	6	4
4.3	18	□	MHS0430L090B	78.2	89.3	90.8	140.8	140	0.8	6	4
4.3	25	□	MHS0430L120B	108.3	119.3	120.8	170.8	170	0.8	6	4
4.4	2	□	MHS0440L020B	9.6	19.3	20.8	70.8	70	0.8	6	3
4.4	6	□	MHS0440L040B	27.2	39.3	40.8	90.8	90	0.8	6	4
4.4	11	□	MHS0440L060B	49.2	59.3	60.8	110.8	110	0.8	6	4
4.4	18	□	MHS0440L090B	80.0	89.3	90.8	140.8	140	0.8	6	4
4.4	24	□	MHS0440L120B	106.4	119.3	120.8	170.8	170	0.8	6	4
4.5	2	●	MHS0450L020B	9.8	19.3	20.8	70.8	70	0.8	6	3
4.5	6	●	MHS0450L040B	27.8	39.3	40.8	90.8	90	0.8	6	4
4.5	10	●	MHS0450L060B	45.8	59.3	60.8	110.8	110	0.8	6	4
4.5	17	●	MHS0450L090B	77.3	89.3	90.8	140.8	140	0.8	6	4
4.5	24	●	MHS0450L120B	108.8	119.3	120.8	170.8	170	0.8	6	4
4.6	2	□	MHS0460L020B	10.0	19.8	20.8	70.8	70	0.8	6	3
4.6	6	□	MHS0460L040B	28.4	39.8	40.8	90.8	90	0.8	6	4
4.6	10	□	MHS0460L060B	46.8	59.8	60.8	110.8	110	0.8	6	4
4.6	17	□	MHS0460L090B	79.0	89.8	90.8	140.8	140	0.8	6	4
4.6	23	□	MHS0460L120B	106.6	119.8	120.8	170.8	170	0.8	6	4
4.6	30	□	MHS0460L150B	138.8	149.8	150.8	200.8	200	0.8	6	4
4.7	2	□	MHS0470L020B	10.2	19.8	20.8	70.8	70	0.8	6	3
4.7	6	□	MHS0470L040B	29.1	39.9	40.9	90.9	90	0.9	6	4
4.7	10	□	MHS0470L060B	47.9	59.9	60.9	110.9	110	0.9	6	4
4.7	16	□	MHS0470L090B	76.1	89.9	90.9	140.9	140	0.9	6	4
4.7	23	□	MHS0470L120B	109.0	119.9	120.9	170.9	170	0.9	6	4
4.7	29	□	MHS0470L150B	137.2	149.9	150.9	200.9	200	0.9	6	4
4.8	1	●	MHS0480L020B	5.6	19.8	20.8	70.8	70	0.8	6	3
4.8	6	●	MHS0480L040B	29.7	39.9	40.9	90.9	90	0.9	6	4
4.8	10	●	MHS0480L060B	48.9	59.9	60.9	110.9	110	0.9	6	4
4.8	16	●	MHS0480L090B	77.7	89.9	90.9	140.9	140	0.9	6	4
4.8	22	●	MHS0480L120B	106.5	119.9	120.9	170.9	170	0.9	6	4
4.8	29	●	MHS0480L150B	140.1	149.9	150.9	200.9	200	0.9	6	4
4.9	1	□	MHS0490L020B	5.7	19.8	20.8	70.8	70	0.8	6	3
4.9	5	□	MHS0490L040B	25.4	39.9	40.9	90.9	90	0.9	6	4
4.9	10	□	MHS0490L060B	49.9	59.9	60.9	110.9	110	0.9	6	4
4.9	16	□	MHS0490L090B	79.3	89.9	90.9	140.9	140	0.9	6	4
4.9	22	□	MHS0490L120B	108.7	119.9	120.9	170.9	170	0.9	6	4
4.9	28	□	MHS0490L150B	138.1	149.9	150.9	200.9	200	0.9	6	4
5.0	1	●	MHS0500L020B	5.9	19.9	20.9	70.9	70	0.9	6	3
5.0	5	●	MHS0500L040B	25.9	39.9	40.9	90.9	90	0.9	6	4
5.0	9	●	MHS0500L060B	45.9	59.9	60.9	110.9	110	0.9	6	4
5.0	15	●	MHS0500L090B	75.9	89.9	90.9	140.9	140	0.9	6	4
5.0	21	●	MHS0500L120B	105.9	119.9	120.9	170.9	170	0.9	6	4
5.0	27	●	MHS0500L150B	135.9	149.9	150.9	200.9	200	0.9	6	4
5.1	3	□	MHS0510L030B	16.2	30.4	30.9	80.9	80	0.9	6	3
5.1	9	□	MHS0510L060B	46.8	60.4	60.9	110.9	110	0.9	6	4
5.1	15	□	MHS0510L090B	77.4	90.4	90.9	140.9	140	0.9	6	4
5.1	21	□	MHS0510L120B	108.0	120.4	120.9	170.9	170	0.9	6	4
5.1	27	□	MHS0510L150B	138.6	150.4	150.9	200.9	200	0.9	6	4
5.2	3	□	MHS0520L030B	16.5	30.4	30.9	80.9	80	0.9	6	3
5.2	9	□	MHS0520L060B	47.7	60.4	60.9	110.9	110	0.9	6	4
5.2	15	□	MHS0520L090B	78.9	90.4	90.9	140.9	140	0.9	6	4
5.2	20	□	MHS0520L120B	104.9	120.4	120.9	170.9	170	0.9	6	4

MHS

DC(mm)	Hole Depth(l/d)	VP15TF	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
5.2	26	□	MHS0520L150B	136.1	150.4	150.9	200.9	200	0.9	6	4
5.3	3	□	MHS0530L030B	16.8	30.4	30.9	80.9	80	0.9	6	3
5.3	9	□	MHS0530L060B	48.7	60.5	61.0	111.0	110	1.0	6	4
5.3	14	□	MHS0530L090B	75.2	90.5	91.0	141.0	140	1.0	6	4
5.3	20	□	MHS0530L120B	107.0	120.5	121.0	171.0	170	1.0	6	4
5.3	26	□	MHS0530L150B	138.8	150.5	151.0	201.0	200	1.0	6	4
5.4	3	□	MHS0540L030B	17.1	30.4	30.9	80.9	80	0.9	6	3
5.4	9	□	MHS0540L060B	49.6	60.5	61.0	111.0	110	1.0	6	4
5.4	14	□	MHS0540L090B	76.6	90.5	91.0	141.0	140	1.0	6	4
5.4	20	□	MHS0540L120B	109.0	120.5	121.0	171.0	170	1.0	6	4
5.4	25	□	MHS0540L150B	136.0	150.5	151.0	201.0	200	1.0	6	4
5.5	3	●	MHS0550L030B	17.4	30.4	30.9	80.9	80	0.9	6	3
5.5	8	●	MHS0550L060B	45.0	60.5	61.0	111.0	110	1.0	6	4
5.5	14	●	MHS0550L090B	78.0	90.5	91.0	141.0	140	1.0	6	4
5.5	19	●	MHS0550L120B	105.5	120.5	121.0	171.0	170	1.0	6	4
5.5	25	●	MHS0550L150B	138.5	150.5	151.0	201.0	200	1.0	6	4
5.6	3	□	MHS0560L030B	17.8	31.0	31.0	81.0	80	1.0	6	3
5.6	8	□	MHS0560L060B	45.8	61.0	61.0	111.0	110	1.0	6	4
5.6	14	□	MHS0560L090B	79.4	91.0	91.0	141.0	140	1.0	6	4
5.6	19	□	MHS0560L120B	107.4	121.0	121.0	171.0	170	1.0	6	4
5.6	24	□	MHS0560L150B	135.4	151.0	151.0	201.0	200	1.0	6	4
5.7	3	□	MHS0570L030B	18.1	31.0	31.0	81.0	80	1.0	6	3
5.7	8	□	MHS0570L060B	46.6	61.0	61.0	111.0	110	1.0	6	4
5.7	13	□	MHS0570L090B	75.1	91.0	91.0	141.0	140	1.0	6	4
5.7	19	□	MHS0570L120B	109.3	121.0	121.0	171.0	170	1.0	6	4
5.7	24	□	MHS0570L150B	137.8	151.0	151.0	201.0	200	1.0	6	4
5.8	3	●	MHS0580L030B	18.4	31.0	31.0	81.0	80	1.0	6	3
5.8	8	●	MHS0580L060B	47.5	61.1	61.1	111.1	110	1.1	6	4
5.8	13	●	MHS0580L090B	76.5	91.1	91.1	141.1	140	1.1	6	4
5.8	18	●	MHS0580L120B	105.5	121.1	121.1	171.1	170	1.1	6	4
5.8	23	●	MHS0580L150B	134.5	151.1	151.1	201.1	200	1.1	6	4
5.9	3	□	MHS0590L030B	18.7	31.0	31.0	81.0	80	1.0	6	3
5.9	8	□	MHS0590L060B	48.3	61.1	61.1	111.1	110	1.1	6	4
5.9	13	□	MHS0590L090B	77.8	91.1	91.1	141.1	140	1.1	6	4
5.9	18	□	MHS0590L120B	107.3	121.1	121.1	171.1	170	1.1	6	4
5.9	23	□	MHS0590L150B	136.8	151.1	151.1	201.1	200	1.1	6	4
6.0	2	●	MHS0600L030B	13.0	31.0	31.0	81.0	80	1.0	6	3
6.0	7	●	MHS0600L060B	43.1	61.1	61.1	111.1	110	1.1	6	4
6.0	12	●	MHS0600L090B	73.1	91.1	91.1	141.1	140	1.1	6	4
6.0	17	●	MHS0600L120B	103.1	121.1	121.1	171.1	170	1.1	6	4
6.0	22	●	MHS0600L150B	133.1	151.1	151.1	201.1	200	1.1	6	4
6.1	2	□	MHS0610L030B	13.3	29.6	31.1	81.1	80	1.1	8	3
6.1	7	□	MHS0610L060B	43.8	59.6	61.1	111.1	110	1.1	8	4
6.1	12	□	MHS0610L090B	74.3	89.6	91.1	141.1	140	1.1	8	4
6.1	17	□	MHS0610L120B	104.8	119.6	121.1	171.1	170	1.1	8	4
6.1	22	□	MHS0610L150B	135.3	149.6	151.1	201.1	200	1.1	8	4
6.2	2	□	MHS0620L030B	13.5	29.6	31.1	81.1	80	1.1	8	3
6.2	7	□	MHS0620L060B	44.5	59.6	61.1	111.1	110	1.1	8	4
6.2	12	□	MHS0620L090B	75.5	89.6	91.1	141.1	140	1.1	8	4
6.2	17	□	MHS0620L120B	106.5	119.6	121.1	171.1	170	1.1	8	4
6.2	21	□	MHS0620L150B	131.3	149.6	151.1	201.1	200	1.1	8	4
6.3	2	□	MHS0630L030B	13.7	29.6	31.1	81.1	80	1.1	8	3
6.3	7	□	MHS0630L060B	45.2	59.6	61.1	111.1	110	1.1	8	4
6.3	12	□	MHS0630L090B	76.7	89.6	91.1	141.1	140	1.1	8	4
6.3	16	□	MHS0630L120B	101.9	119.6	121.1	171.1	170	1.1	8	4
6.3	21	□	MHS0630L150B	133.4	149.6	151.1	201.1	200	1.1	8	4
6.4	2	□	MHS0640L030B	13.9	29.6	31.1	81.1	80	1.1	8	3
6.4	7	□	MHS0640L060B	46.0	59.7	61.2	111.2	110	1.2	8	4
6.4	11	□	MHS0640L090B	71.6	89.7	91.2	141.2	140	1.2	8	4
6.4	16	□	MHS0640L120B	103.6	119.7	121.2	171.2	170	1.2	8	4
6.4	21	□	MHS0640L150B	135.6	149.7	151.2	201.2	200	1.2	8	4
6.5	2	●	MHS0650L030B	14.1	29.6	31.1	81.1	80	1.1	8	3
6.5	6	●	MHS0650L060B	40.2	59.7	61.2	111.2	110	1.2	8	4
6.5	11	●	MHS0650L090B	72.7	89.7	91.2	141.2	140	1.2	8	4
6.5	16	●	MHS0650L120B	105.2	119.7	121.2	171.2	170	1.2	8	4
6.5	20	●	MHS0650L150B	131.2	149.7	151.2	201.2	200	1.2	8	4
6.6	2	□	MHS0660L030B	14.3	30.1	31.1	81.1	80	1.1	8	3
6.6	6	□	MHS0660L060B	40.8	60.2	61.2	111.2	110	1.2	8	4
6.6	11	□	MHS0660L090B	73.8	90.2	91.2	141.2	140	1.2	8	4
6.6	16	□	MHS0660L120B	106.8	120.2	121.2	171.2	170	1.2	8	4
6.6	20	□	MHS0660L150B	133.2	150.2	151.2	201.2	200	1.2	8	4
6.6	28	□	MHS0660L200B	186.0	200.2	201.2	251.2	250	1.2	8	4
6.7	2	□	MHS0670L030B	14.6	30.2	31.2	81.2	80	1.2	8	3
6.7	6	□	MHS0670L060B	41.4	60.2	61.2	111.2	110	1.2	8	4
6.7	11	□	MHS0670L090B	74.9	90.2	91.2	141.2	140	1.2	8	4
6.7	15	□	MHS0670L120B	101.7	120.2	121.2	171.2	170	1.2	8	4
6.7	20	□	MHS0670L150B	135.2	150.2	151.2	201.2	200	1.2	8	4
6.7	27	□	MHS0670L200B	182.1	200.2	201.2	251.2	250	1.2	8	4
6.8	2	●	MHS0680L030B	14.8	30.2	31.2	81.2	80	1.2	8	3
6.8	6	●	MHS0680L060B	42.0	60.2	61.2	111.2	110	1.2	8	4
6.8	11	●	MHS0680L090B	76.0	90.2	91.2	141.2	140	1.2	8	4
6.8	15	●	MHS0680L120B	103.2	120.2	121.2	171.2	170	1.2	8	4
6.8	19	●	MHS0680L150B	130.4	150.2	151.2	201.2	200	1.2	8	4
6.8	27	●	MHS0680L200B	184.8	200.2	201.2	251.2	250	1.2	8	4
6.9	2	□	MHS0690L030B	15.0	30.2	31.2	81.2	80	1.2	8	3
6.9	6	□	MHS0690L060B	42.7	60.3	61.3	111.3	110	1.3	8	4
6.9	10	□	MHS0690L090B	70.3	90.3	91.3	141.3	140	1.3	8	4
6.9	15	□	MHS0690L120B	104.8	120.3	121.3	171.3	170	1.3	8	4
6.9	19	□	MHS0690L150B	132.4	150.3	151.3	201.3	200	1.3	8	4
6.9	26	□	MHS0690L200B	180.7	200.3	201.3	251.3	250	1.3	8	4
7.0	2	●	MHS0700L030B	15.2	30.2	31.2	81.2	80	1.2	8	3
7.0	6	●	MHS0700L060B	43.3	60.3	61.3	111.3	110	1.3	8	4
7.0	10	●	MHS0700L090B	71.3	90.3	91.3	141.3	140	1.3	8	4
7.0	14	●	MHS0700L120B	99.3	120.3	121.3	171.3	170	1.3	8	4
7.0	19	●	MHS0700L150B	134.3	150.3	151.3	201.3	200	1.3	8	4
7.0	26	●	MHS0700L200B	183.3	200.3	201.3	251.3	250	1.3	8	4
7.1	2	□	MHS0710L030B	15.4	30.7	31.2	81.2	80	1.2	8	3
7.1	6	□	MHS0710L060B	43.9	60.8	61.3	111.3	110	1.3	8	4
7.1	10	□	MHS0710L090B	72.3	90.8	91.3	141.3	140	1.3	8	4
7.1	14	□	MHS0710L120B	100.7	120.8	121.3	171.3	170	1.3	8	4
7.1	19	□	MHS0710L150B	136.2	150.8	151.3	201.3	200	1.3	8	4
7.1	26	□	MHS0710L200B	185.9	200.8	201.3	251.3	250	1.3	8	4
7.2	2	□	MHS0720L030B	15.6	30.7	31.2	81.2	80	1.2	8	3
7.2	6	□	MHS0720L060B	44.5	60.8	61.3	111.3	110	1.3	8	4
7.2	10	□	MHS0720L090B	73.3	90.8	91.3	141.3	140	1.3	8	4
7.2	14	□	MHS0720L120B	102.1	120.8	121.3	171.3	170	1.3	8	4
7.2	18	□	MHS0720L150B	130.9	150.8	151.3	201.3	200	1.3	8	4
7.2	25	□	MHS0720L200B	181.3	200.8	201.3	251.3	250	1.3	8	4

MHS

DC(mm)	Hole Depth(l/d)	VP15TF	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
7.3	2	□	MHS0730L030B	15.9	30.8	31.3	81.3	80	1.3	8	3
7.3	6	□	MHS0730L060B	45.1	60.8	61.3	111.3	110	1.3	8	4
7.3	10	□	MHS0730L090B	74.3	90.8	91.3	141.3	140	1.3	8	4
7.3	14	□	MHS0730L120B	103.5	120.8	121.3	171.3	170	1.3	8	4
7.3	18	□	MHS0730L150B	132.7	150.8	151.3	201.3	200	1.3	8	4
7.3	25	□	MHS0730L200B	183.8	200.8	201.3	251.3	250	1.3	8	4
7.4	1	□	MHS0740L030B	8.7	30.8	31.3	81.3	80	1.3	8	3
7.4	6	□	MHS0740L060B	45.7	60.8	61.3	111.3	110	1.3	8	4
7.4	10	□	MHS0740L090B	75.3	90.8	91.3	141.3	140	1.3	8	4
7.4	14	□	MHS0740L120B	104.9	120.8	121.3	171.3	170	1.3	8	4
7.4	18	□	MHS0740L150B	134.5	150.8	151.3	201.3	200	1.3	8	4
7.4	24	□	MHS0740L200B	178.9	200.8	201.3	251.3	250	1.3	8	4
7.5	1	●	MHS0750L030B	8.8	30.8	31.3	81.3	80	1.3	8	3
7.5	5	●	MHS0750L060B	38.9	60.9	61.4	111.4	110	1.4	8	4
7.5	9	●	MHS0750L090B	68.9	90.9	91.4	141.4	140	1.4	8	4
7.5	13	●	MHS0750L120B	98.9	120.9	121.4	171.4	170	1.4	8	4
7.5	17	●	MHS0750L150B	128.9	150.9	151.4	201.4	200	1.4	8	4
7.5	24	●	MHS0750L200B	181.4	200.9	201.4	251.4	250	1.4	8	4
7.6	1	□	MHS0760L030B	8.9	31.3	31.3	81.3	80	1.3	8	3
7.6	5	□	MHS0760L060B	39.4	61.4	61.4	111.4	110	1.4	8	4
7.6	9	□	MHS0760L090B	69.8	91.4	91.4	141.4	140	1.4	8	4
7.6	13	□	MHS0760L120B	100.2	121.4	121.4	171.4	170	1.4	8	4
7.6	17	□	MHS0760L150B	130.6	151.4	151.4	201.4	200	1.4	8	4
7.6	24	□	MHS0760L200B	183.8	201.4	201.4	251.4	250	1.4	8	4
7.6	30	□	MHS0760L250B	229.4	251.4	251.4	301.4	300	1.4	8	4
7.7	1	□	MHS0770L030B	9.0	31.3	31.3	81.3	80	1.3	8	3
7.7	5	□	MHS0770L060B	39.9	61.4	61.4	111.4	110	1.4	8	4
7.7	9	□	MHS0770L090B	70.7	91.4	91.4	141.4	140	1.4	8	4
7.7	13	□	MHS0770L120B	101.5	121.4	121.4	171.4	170	1.4	8	4
7.7	17	□	MHS0770L150B	132.3	151.4	151.4	201.4	200	1.4	8	4
7.7	23	□	MHS0770L200B	178.5	201.4	201.4	251.4	250	1.4	8	4
7.7	30	□	MHS0770L250B	232.4	251.4	251.4	301.4	300	1.4	8	4
7.8	1	●	MHS0780L030B	9.1	31.3	31.3	81.3	80	1.3	8	3
7.8	5	●	MHS0780L060B	40.4	61.4	61.4	111.4	110	1.4	8	4
7.8	9	●	MHS0780L090B	71.6	91.4	91.4	141.4	140	1.4	8	4
7.8	13	●	MHS0780L120B	102.8	121.4	121.4	171.4	170	1.4	8	4
7.8	17	●	MHS0780L150B	134.0	151.4	151.4	201.4	200	1.4	8	4
7.8	23	●	MHS0780L200B	180.8	201.4	201.4	251.4	250	1.4	8	4
7.8	30	●	MHS0780L250B	235.4	251.4	251.4	301.4	300	1.4	8	4
7.9	1	□	MHS0790L030B	9.3	31.4	31.4	81.4	80	1.4	8	3
7.9	5	□	MHS0790L060B	40.9	61.4	61.4	111.4	110	1.4	8	4
7.9	9	□	MHS0790L090B	72.5	91.4	91.4	141.4	140	1.4	8	4
7.9	13	□	MHS0790L120B	104.1	121.4	121.4	171.4	170	1.4	8	4
7.9	16	□	MHS0790L150B	127.8	151.4	151.4	201.4	200	1.4	8	4
7.9	23	□	MHS0790L200B	183.1	201.4	201.4	251.4	250	1.4	8	4
7.9	29	□	MHS0790L250B	230.5	251.4	251.4	301.4	300	1.4	8	4
8.0	1	●	MHS0800L030B	9.4	31.4	31.4	81.4	80	1.4	8	3
8.0	5	●	MHS0800L060B	41.5	61.5	61.5	111.5	110	1.5	8	4
8.0	9	●	MHS0800L090B	73.5	91.5	91.5	141.5	140	1.5	8	4
8.0	12	●	MHS0800L120B	97.5	121.5	121.5	171.5	170	1.5	8	4
8.0	16	●	MHS0800L150B	129.5	151.5	151.5	201.5	200	1.5	8	4
8.0	22	●	MHS0800L200B	177.5	201.5	201.5	251.5	250	1.5	8	4
8.0	29	●	MHS0800L250B	233.5	251.5	251.5	301.5	300	1.5	8	4
8.1	2	□	MHS0810L040B	17.6	39.9	41.4	101.4	100	1.4	10	3
8.1	8	□	MHS0810L090B	66.3	90.0	91.5	151.5	150	1.5	10	4
8.1	12	□	MHS0810L120B	98.7	120.0	121.5	181.5	180	1.5	10	4
8.1	16	□	MHS0810L150B	131.1	150.0	151.5	211.5	210	1.5	10	4
8.1	22	□	MHS0810L200B	179.7	200.0	201.5	261.5	260	1.5	10	4
8.1	28	□	MHS0810L250B	228.3	250.0	251.5	311.5	310	1.5	10	4
8.2	2	□	MHS0820L040B	17.8	39.9	41.4	101.4	100	1.4	10	3
8.2	8	□	MHS0820L090B	67.1	90.0	91.5	151.5	150	1.5	10	4
8.2	12	□	MHS0820L120B	99.9	120.0	121.5	181.5	180	1.5	10	4
8.2	16	□	MHS0820L150B	132.7	150.0	151.5	211.5	210	1.5	10	4
8.2	22	□	MHS0820L200B	181.9	200.0	201.5	261.5	260	1.5	10	4
8.2	28	□	MHS0820L250B	231.1	250.0	251.5	311.5	310	1.5	10	4
8.3	2	□	MHS0830L040B	18.0	39.9	41.4	101.4	100	1.4	10	3
8.3	8	□	MHS0830L090B	67.9	90.0	91.5	151.5	150	1.5	10	4
8.3	12	□	MHS0830L120B	101.1	120.0	121.5	181.5	180	1.5	10	4
8.3	15	□	MHS0830L150B	126.0	150.0	151.5	211.5	210	1.5	10	4
8.3	21	□	MHS0830L200B	175.8	200.0	201.5	261.5	260	1.5	10	4
8.3	27	□	MHS0830L250B	225.6	250.0	251.5	311.5	310	1.5	10	4
8.4	2	□	MHS0840L040B	18.2	39.9	41.4	101.4	100	1.4	10	3
8.4	8	□	MHS0840L090B	68.7	90.0	91.5	151.5	150	1.5	10	4
8.4	12	□	MHS0840L120B	102.3	120.0	121.5	181.5	180	1.5	10	4
8.4	15	□	MHS0840L150B	127.5	150.0	151.5	211.5	210	1.5	10	4
8.4	21	□	MHS0840L200B	177.9	200.0	201.5	261.5	260	1.5	10	4
8.4	27	□	MHS0840L250B	228.3	250.0	251.5	311.5	310	1.5	10	4
8.5	2	●	MHS0850L040B	18.5	40.0	41.5	101.5	100	1.5	10	3
8.5	8	●	MHS0850L090B	69.5	90.0	91.5	151.5	150	1.5	10	4
8.5	11	●	MHS0850L120B	95.0	120.0	121.5	181.5	180	1.5	10	4
8.5	15	●	MHS0850L150B	129.0	150.0	151.5	211.5	210	1.5	10	4
8.5	21	●	MHS0850L200B	180.0	200.0	201.5	261.5	260	1.5	10	4
8.5	27	●	MHS0850L250B	231.0	250.0	251.5	311.5	310	1.5	10	4
8.6	2	□	MHS0860L040B	18.7	40.5	41.5	101.5	100	1.5	10	3
8.6	8	□	MHS0860L090B	70.4	90.6	91.6	151.6	150	1.6	10	4
8.6	11	□	MHS0860L120B	96.2	120.6	121.6	181.6	180	1.6	10	4
8.6	15	□	MHS0860L150B	130.6	150.6	151.6	211.6	210	1.6	10	4
8.6	21	□	MHS0860L200B	182.2	200.6	201.6	261.6	260	1.6	10	4
8.6	26	□	MHS0860L250B	225.2	250.6	251.6	311.6	310	1.6	10	4
8.7	2	□	MHS0870L040B	18.9	40.5	41.5	101.5	100	1.5	10	3
8.7	8	□	MHS0870L090B	71.2	90.6	91.6	151.6	150	1.6	10	4
8.7	11	□	MHS0870L120B	97.3	120.6	121.6	181.6	180	1.6	10	4
8.7	15	□	MHS0870L150B	132.1	150.6	151.6	211.6	210	1.6	10	4
8.7	20	□	MHS0870L200B	175.6	200.6	201.6	261.6	260	1.6	10	4
8.7	26	□	MHS0870L250B	227.8	250.6	251.6	311.6	310	1.6	10	4
8.8	2	●	MHS0880L040B	19.1	40.5	41.5	101.5	100	1.5	10	3
8.8	8	●	MHS0880L090B	72.0	90.6	91.6	151.6	150	1.6	10	4
8.8	11	●	MHS0880L120B	98.4	120.6	121.6	181.6	180	1.6	10	4
8.8	14	●	MHS0880L150B	124.8	150.6	151.6	211.6	210	1.6	10	4
8.8	20	●	MHS0880L200B	177.6	200.6	201.6	261.6	260	1.6	10	4
8.8	26	●	MHS0880L250B	230.4	250.6	251.6	311.6	310	1.6	10	4
8.9	2	□	MHS0890L040B	19.3	40.5	41.5	101.5	100	1.5	10	3
8.9	7	□	MHS0890L090B	63.9	90.6	91.6	151.6	150	1.6	10	4
8.9	11	□	MHS0890L120B	99.5	120.6	121.6	181.6	180	1.6	10	4
8.9	14	□	MHS0890L150B	126.2	150.6	151.6	211.6	210	1.6	10	4
8.9	20	□	MHS0890L200B	179.6	200.6	201.6	261.6	260	1.6	10	4
8.9	25	□	MHS0890L250B	224.1	250.6	251.6	311.6	310	1.6	10	4
9.0	2	●	MHS0900L040B	19.5	40.5	41.5	101.5	100	1.5	10	3

MHS

DC(mm)	Hole Depth(l/d)	VP15TF	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
9.0	7	●	MHS0900L090B	64.6	90.6	91.6	151.6	150	1.6	10	4
9.0	11	●	MHS0900L120B	100.6	120.6	121.6	181.6	180	1.6	10	4
9.0	14	●	MHS0900L150B	127.6	150.6	151.6	211.6	210	1.6	10	4
9.0	20	●	MHS0900L200B	181.6	200.6	201.6	261.6	260	1.6	10	4
9.0	25	●	MHS0900L250B	226.6	250.6	251.6	311.6	310	1.6	10	4
9.1	2	□	MHS0910L040B	19.8	41.1	41.6	101.6	100	1.6	10	3
9.1	7	□	MHS0910L090B	65.4	91.2	91.7	151.7	150	1.7	10	4
9.1	11	□	MHS0910L120B	101.8	121.2	121.7	181.7	180	1.7	10	4
9.1	14	□	MHS0910L150B	129.1	151.2	151.7	211.7	210	1.7	10	4
9.1	19	□	MHS0910L200B	174.6	201.2	201.7	261.7	260	1.7	10	4
9.1	25	□	MHS0910L250B	229.2	251.2	251.7	311.7	310	1.7	10	4
9.1	30	□	MHS0910L300B	274.7	301.2	301.7	361.7	360	1.7	10	4
9.2	2	□	MHS0920L040B	20.0	41.1	41.6	101.6	100	1.6	10	3
9.2	7	□	MHS0920L090B	66.1	91.2	91.7	151.7	150	1.7	10	4
9.2	10	□	MHS0920L120B	93.7	121.2	121.7	181.7	180	1.7	10	4
9.2	14	□	MHS0920L150B	130.5	151.2	151.7	211.7	210	1.7	10	4
9.2	19	□	MHS0920L200B	176.5	201.2	201.7	261.7	260	1.7	10	4
9.2	25	□	MHS0920L250B	231.7	251.2	251.7	311.7	310	1.7	10	4
9.2	30	□	MHS0920L300B	277.7	301.2	301.7	361.7	360	1.7	10	4
9.3	2	□	MHS0930L040B	20.2	41.1	41.6	101.6	100	1.6	10	3
9.3	7	□	MHS0930L090B	66.8	91.2	91.7	151.7	150	1.7	10	4
9.3	10	□	MHS0930L120B	94.7	121.2	121.7	181.7	180	1.7	10	4
9.3	14	□	MHS0930L150B	131.9	151.2	151.7	211.7	210	1.7	10	4
9.3	19	□	MHS0930L200B	178.4	201.2	201.7	261.7	260	1.7	10	4
9.3	24	□	MHS0930L250B	224.9	251.2	251.7	311.7	310	1.7	10	4
9.3	30	□	MHS0930L300B	280.7	301.2	301.7	361.7	360	1.7	10	4
9.4	2	□	MHS0940L040B	20.4	41.1	41.6	101.6	100	1.6	10	3
9.4	7	□	MHS0940L090B	67.5	91.2	91.7	151.7	150	1.7	10	4
9.4	10	□	MHS0940L120B	95.7	121.2	121.7	181.7	180	1.7	10	4
9.4	13	□	MHS0940L150B	123.9	151.2	151.7	211.7	210	1.7	10	4
9.4	19	□	MHS0940L200B	180.3	201.2	201.7	261.7	260	1.7	10	4
9.4	24	□	MHS0940L250B	227.3	251.2	251.7	311.7	310	1.7	10	4
9.4	29	□	MHS0940L300B	274.3	301.2	301.7	361.7	360	1.7	10	4
9.5	2	●	MHS0950L040B	20.6	41.1	41.6	101.6	100	1.6	10	3
9.5	7	●	MHS0950L090B	68.2	91.2	91.7	151.7	150	1.7	10	4
9.5	10	●	MHS0950L120B	96.7	121.2	121.7	181.7	180	1.7	10	4
9.5	13	●	MHS0950L150B	125.2	151.2	151.7	211.7	210	1.7	10	4
9.5	18	●	MHS0950L200B	172.7	201.2	201.7	261.7	260	1.7	10	4
9.5	24	●	MHS0950L250B	229.7	251.2	251.7	311.7	310	1.7	10	4
9.5	29	●	MHS0950L300B	277.2	301.2	301.7	361.7	360	1.7	10	4
9.6	2	□	MHS0960L040B	20.9	41.7	41.7	101.7	100	1.7	10	3
9.6	7	□	MHS0960L090B	68.9	91.7	91.7	151.7	150	1.7	10	4
9.6	10	□	MHS0960L120B	97.7	121.7	121.7	181.7	180	1.7	10	4
9.6	13	□	MHS0960L150B	126.5	151.7	151.7	211.7	210	1.7	10	4
9.6	18	□	MHS0960L200B	174.5	201.7	201.7	261.7	260	1.7	10	4
9.6	24	□	MHS0960L250B	232.1	251.7	251.7	311.7	310	1.7	10	4
9.6	29	□	MHS0960L300B	280.1	301.7	301.7	361.7	360	1.7	10	4
9.7	2	□	MHS0970L040B	21.1	41.7	41.7	101.7	100	1.7	10	3
9.7	7	□	MHS0970L090B	69.7	91.8	91.8	151.8	150	1.8	10	4
9.7	10	□	MHS0970L120B	98.8	121.8	121.8	181.8	180	1.8	10	4
9.7	13	□	MHS0970L150B	127.9	151.8	151.8	211.8	210	1.8	10	4
9.7	18	□	MHS0970L200B	176.4	201.8	201.8	261.8	260	1.8	10	4
9.7	23	□	MHS0970L250B	224.9	251.8	251.8	311.8	310	1.8	10	4
9.7	28	□	MHS0970L300B	273.4	301.8	301.8	361.8	360	1.8	10	4

DC(mm)	Hole Depth(l/d)	VP15TF	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
9.8	2	●	MHS0980L040B	21.3	41.7	41.7	101.7	100	1.7	10	3
9.8	7	●	MHS0980L090B	70.4	91.8	91.8	151.8	150	1.8	10	4
9.8	10	●	MHS0980L120B	99.8	121.8	121.8	181.8	180	1.8	10	4
9.8	13	●	MHS0980L150B	129.2	151.8	151.8	211.8	210	1.8	10	4
9.8	18	●	MHS0980L200B	178.2	201.8	201.8	261.8	260	1.8	10	4
9.8	23	●	MHS0980L250B	227.2	251.8	251.8	311.8	310	1.8	10	4
9.8	28	●	MHS0980L300B	276.2	301.8	301.8	361.8	360	1.8	10	4
9.9	2	□	MHS0990L040B	21.5	41.7	41.7	101.7	100	1.7	10	3
9.9	7	□	MHS0990L090B	71.1	91.8	91.8	151.8	150	1.8	10	4
9.9	10	□	MHS0990L120B	100.8	121.8	121.8	181.8	180	1.8	10	4
9.9	13	□	MHS0990L150B	130.5	151.8	151.8	211.8	210	1.8	10	4
9.9	18	□	MHS0990L200B	180.0	201.8	201.8	261.8	260	1.8	10	4
9.9	23	□	MHS0990L250B	229.5	251.8	251.8	311.8	310	1.8	10	4
9.9	28	□	MHS0990L300B	279.0	301.8	301.8	361.8	360	1.8	10	4
10.0	1	●	MHS1000L040B	11.7	41.7	41.7	101.7	100	1.7	10	3
10.0	6	●	MHS1000L090B	61.8	91.8	91.8	151.8	150	1.8	10	4
10.0	9	●	MHS1000L120B	91.8	121.8	121.8	181.8	180	1.8	10	4
10.0	12	●	MHS1000L150B	121.8	151.8	151.8	211.8	210	1.8	10	4
10.0	17	●	MHS1000L200B	171.8	201.8	201.8	261.8	260	1.8	10	4
10.0	22	●	MHS1000L250B	221.8	251.8	251.8	311.8	310	1.8	10	4
10.0	27	●	MHS1000L300B	271.8	301.8	301.8	361.8	360	1.8	10	4
10.1	1	□	MHS1010L040B	11.8	40.2	41.7	101.7	100	1.7	12	3
10.1	6	□	MHS1010L090B	62.4	90.3	91.8	151.8	150	1.8	12	4
10.1	9	□	MHS1010L120B	92.7	120.3	121.8	181.8	180	1.8	12	4
10.1	12	□	MHS1010L150B	123.0	150.3	151.8	211.8	210	1.8	12	4
10.1	17	□	MHS1010L200B	173.5	200.3	201.8	261.8	260	1.8	12	4
10.1	22	□	MHS1010L250B	224.0	250.3	251.8	311.8	310	1.8	12	4
10.1	27	□	MHS1010L300B	274.5	300.3	301.8	361.8	360	1.8	12	4
10.2	1	□	MHS1020L040B	12.0	40.3	41.8	101.8	100	1.8	12	3
10.2	6	□	MHS1020L090B	63.1	90.4	91.9	151.9	150	1.9	12	4
10.2	9	□	MHS1020L120B	93.7	120.4	121.9	181.9	180	1.9	12	4
10.2	12	□	MHS1020L150B	124.3	150.4	151.9	211.9	210	1.9	12	4
10.2	17	□	MHS1020L200B	175.3	200.4	201.9	261.9	260	1.9	12	4
10.2	22	□	MHS1020L250B	226.3	250.4	251.9	311.9	310	1.9	12	4
10.2	27	□	MHS1020L300B	277.3	300.4	301.9	361.9	360	1.9	12	4
10.3	1	□	MHS1030L040B	12.1	40.3	41.8	101.8	100	1.8	12	3
10.3	6	□	MHS1030L090B	63.7	90.4	91.9	151.9	150	1.9	12	4
10.3	9	□	MHS1030L120B	94.6	120.4	121.9	181.9	180	1.9	12	4
10.3	12	□	MHS1030L150B	125.5	150.4	151.9	211.9	210	1.9	12	4
10.3	17	□	MHS1030L200B	177.0	200.4	201.9	261.9	260	1.9	12	4
10.3	22	□	MHS1030L250B	228.5	250.4	251.9	311.9	310	1.9	12	4
10.3	26	□	MHS1030L300B	269.7	300.4	301.9	361.9	360	1.9	12	4
10.4	1	□	MHS1040L040B	12.2	40.3	41.8	101.8	100	1.8	12	3
10.4	6	□	MHS1040L090B	64.3	90.4	91.9	151.9	150	1.9	12	4
10.4	9	□	MHS1040L120B	95.5	120.4	121.9	181.9	180	1.9	12	4
10.4	12	□	MHS1040L150B	126.7	150.4	151.9	211.9	210	1.9	12	4
10.4	17	□	MHS1040L200B	178.7	200.4	201.9	261.9	260	1.9	12	4
10.4	21	□	MHS1040L250B	220.3	250.4	251.9	311.9	310	1.9	12	4
10.4	26	□	MHS1040L300B	272.3	300.4	301.9	361.9	360	1.9	12	4
10.5	1	●	MHS1050L040B	12.3	40.3	41.8	101.8	100	1.8	12	3
10.5	6	●	MHS1050L090B	64.9	90.4	91.9	151.9	150	1.9	12	4
10.5	9	●	MHS1050L120B	96.4	120.4	121.9	181.9	180	1.9	12	4
10.5	12	●	MHS1050L150B	127.9	150.4	151.9	211.9	210	1.9	12	4
10.5	16	●	MHS1050L200B	169.9	200.4	201.9	261.9	260	1.9	12	4

MHS

DC(mm)	Hole Depth(l/d)	VP15TF	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
10.5	21	●	MHS1050L250B	222.4	250.4	251.9	311.9	310	1.9	12	4
10.5	26	●	MHS1050L300B	274.9	300.4	301.9	361.9	360	1.9	12	4
10.6	1	□	MHS1060L040B	12.4	40.8	41.8	101.8	100	1.8	12	3
10.6	6	□	MHS1060L090B	65.5	90.9	91.9	151.9	150	1.9	12	4
10.6	9	□	MHS1060L120B	97.3	120.9	121.9	181.9	180	1.9	12	4
10.6	12	□	MHS1060L150B	129.1	150.9	151.9	211.9	210	1.9	12	4
10.6	16	□	MHS1060L200B	171.5	200.9	201.9	261.9	260	1.9	12	4
10.6	21	□	MHS1060L250B	224.5	250.9	251.9	311.9	310	1.9	12	4
10.6	26	□	MHS1060L300B	277.5	300.9	301.9	361.9	360	1.9	12	4
10.7	1	□	MHS1070L040B	12.5	40.8	41.8	101.8	100	1.8	12	3
10.7	6	□	MHS1070L090B	66.1	90.9	91.9	151.9	150	1.9	12	4
10.7	9	□	MHS1070L120B	98.2	120.9	121.9	181.9	180	1.9	12	4
10.7	11	□	MHS1070L150B	119.6	150.9	151.9	211.9	210	1.9	12	4
10.7	16	□	MHS1070L200B	173.1	200.9	201.9	261.9	260	1.9	12	4
10.7	21	□	MHS1070L250B	226.6	250.9	251.9	311.9	310	1.9	12	4
10.7	25	□	MHS1070L300B	269.4	300.9	301.9	361.9	360	1.9	12	4
10.8	1	●	MHS1080L040B	12.7	40.9	41.9	101.9	100	1.9	12	3
10.8	6	●	MHS1080L090B	66.8	91.0	92.0	152.0	150	2.0	12	4
10.8	9	●	MHS1080L120B	99.2	121.0	122.0	182.0	180	2.0	12	4
10.8	11	●	MHS1080L150B	120.8	151.0	152.0	212.0	210	2.0	12	4
10.8	16	●	MHS1080L200B	174.8	201.0	202.0	262.0	260	2.0	12	4
10.8	21	●	MHS1080L250B	228.8	251.0	252.0	312.0	310	2.0	12	4
10.8	25	●	MHS1080L300B	272.0	301.0	302.0	362.0	360	2.0	12	4
10.9	1	□	MHS1090L040B	12.8	40.9	41.9	101.9	100	1.9	12	3
10.9	6	□	MHS1090L090B	67.4	91.0	92.0	152.0	150	2.0	12	4
10.9	8	□	MHS1090L120B	89.2	121.0	122.0	182.0	180	2.0	12	4
10.9	11	□	MHS1090L150B	121.9	151.0	152.0	212.0	210	2.0	12	4
10.9	16	□	MHS1090L200B	176.4	201.0	202.0	262.0	260	2.0	12	4
10.9	20	□	MHS1090L250B	220.0	251.0	252.0	312.0	310	2.0	12	4
10.9	25	□	MHS1090L300B	274.5	301.0	302.0	362.0	360	2.0	12	4
11.0	1	●	MHS1100L040B	12.9	40.9	41.9	101.9	100	1.9	12	3
11.0	6	●	MHS1100L090B	68.0	91.0	92.0	152.0	150	2.0	12	4
11.0	8	●	MHS1100L120B	90.0	121.0	122.0	182.0	180	2.0	12	4
11.0	11	●	MHS1100L150B	123.0	151.0	152.0	212.0	210	2.0	12	4
11.0	16	●	MHS1100L200B	178.0	201.0	202.0	262.0	260	2.0	12	4
11.0	20	●	MHS1100L250B	222.0	251.0	252.0	312.0	310	2.0	12	4
11.0	25	●	MHS1100L300B	277.0	301.0	302.0	362.0	360	2.0	12	4
11.1	1	□	MHS1110L040B	13.0	41.4	41.9	101.9	100	1.9	12	3
11.1	6	□	MHS1110L090B	68.6	91.5	92.0	152.0	150	2.0	12	4
11.1	8	□	MHS1110L120B	90.8	121.5	122.0	182.0	180	2.0	12	4
11.1	11	□	MHS1110L150B	124.1	151.5	152.0	212.0	210	2.0	12	4
11.1	15	□	MHS1110L200B	168.5	201.5	202.0	262.0	260	2.0	12	4
11.1	20	□	MHS1110L250B	224.0	251.5	252.0	312.0	310	2.0	12	4
11.1	24	□	MHS1110L300B	268.4	301.5	302.0	362.0	360	2.0	12	4
11.2	1	□	MHS1120L040B	13.1	41.4	41.9	101.9	100	1.9	12	3
11.2	5	□	MHS1120L090B	58.0	91.5	92.0	152.0	150	2.0	12	4
11.2	8	□	MHS1120L120B	91.6	121.5	122.0	182.0	180	2.0	12	4
11.2	11	□	MHS1120L150B	125.2	151.5	152.0	212.0	210	2.0	12	4
11.2	15	□	MHS1120L200B	170.0	201.5	202.0	262.0	260	2.0	12	4
11.2	20	□	MHS1120L250B	226.0	251.5	252.0	312.0	310	2.0	12	4
11.2	24	□	MHS1120L300B	270.8	301.5	302.0	362.0	360	2.0	12	4
11.3	1	□	MHS1130L040B	13.2	41.4	41.9	101.9	100	1.9	12	3
11.3	5	□	MHS1130L090B	58.6	91.6	92.1	152.1	150	2.1	12	4
11.3	8	□	MHS1130L120B	92.5	121.6	122.1	182.1	180	2.1	12	4
11.3	11	□	MHS1130L150B	126.4	151.6	152.1	212.1	210	2.1	12	4
11.3	15	□	MHS1130L200B	171.6	201.6	202.1	262.1	260	2.1	12	4
11.3	20	□	MHS1130L250B	228.1	251.6	252.1	312.1	310	2.1	12	4
11.3	24	□	MHS1130L300B	273.3	301.6	302.1	362.1	360	2.1	12	4
11.4	1	□	MHS1140L040B	13.4	41.5	42.0	102.0	100	2.0	12	3
11.4	5	□	MHS1140L090B	59.1	91.6	92.1	152.1	150	2.1	12	4
11.4	8	□	MHS1140L120B	93.3	121.6	122.1	182.1	180	2.1	12	4
11.4	11	□	MHS1140L150B	127.5	151.6	152.1	212.1	210	2.1	12	4
11.4	15	□	MHS1140L200B	173.1	201.6	202.1	262.1	260	2.1	12	4
11.4	19	□	MHS1140L250B	218.7	251.6	252.1	312.1	310	2.1	12	4
11.4	24	□	MHS1140L300B	275.7	301.6	302.1	362.1	360	2.1	12	4
11.5	1	●	MHS1150L040B	13.5	41.5	42.0	102.0	100	2.0	12	3
11.5	5	●	MHS1150L090B	59.6	91.6	92.1	152.1	150	2.1	12	4
11.5	8	●	MHS1150L120B	94.1	121.6	122.1	182.1	180	2.1	12	4
11.5	10	●	MHS1150L150B	117.1	151.6	152.1	212.1	210	2.1	12	4
11.5	15	●	MHS1150L200B	174.6	201.6	202.1	262.1	260	2.1	12	4
11.5	19	●	MHS1150L250B	220.6	251.6	252.1	312.1	310	2.1	12	4
11.5	24	●	MHS1150L300B	278.1	301.6	302.1	362.1	360	2.1	12	4
11.6	1	□	MHS1160L040B	13.6	42.0	42.0	102.0	100	2.0	12	3
11.6	5	□	MHS1160L090B	60.1	92.1	92.1	152.1	150	2.1	12	4
11.6	8	□	MHS1160L120B	94.9	122.1	122.1	182.1	180	2.1	12	4
11.6	10	□	MHS1160L150B	118.1	152.1	152.1	212.1	210	2.1	12	4
11.6	15	□	MHS1160L200B	176.1	202.1	202.1	262.1	260	2.1	12	4
11.6	19	□	MHS1160L250B	222.5	252.1	252.1	312.1	310	2.1	12	4
11.6	23	□	MHS1160L300B	268.9	302.1	302.1	362.1	360	2.1	12	4
11.7	1	□	MHS1170L040B	13.7	42.0	42.0	102.0	100	2.0	12	3
11.7	5	□	MHS1170L090B	60.6	92.1	92.1	152.1	150	2.1	12	4
11.7	8	□	MHS1170L120B	95.7	122.1	122.1	182.1	180	2.1	12	4
11.7	10	□	MHS1170L150B	119.1	152.1	152.1	212.1	210	2.1	12	4
11.7	15	□	MHS1170L200B	177.6	202.1	202.1	262.1	260	2.1	12	4
11.7	19	□	MHS1170L250B	224.4	252.1	252.1	312.1	310	2.1	12	4
11.7	23	□	MHS1170L300B	271.2	302.1	302.1	362.1	360	2.1	12	4
11.8	1	●	MHS1180L040B	13.8	42.0	42.0	102.0	100	2.0	12	3
11.8	5	●	MHS1180L090B	61.1	92.1	92.1	152.1	150	2.1	12	4
11.8	8	●	MHS1180L120B	96.5	122.1	122.1	182.1	180	2.1	12	4
11.8	10	●	MHS1180L150B	120.1	152.1	152.1	212.1	210	2.1	12	4
11.8	14	●	MHS1180L200B	167.3	202.1	202.1	262.1	260	2.1	12	4
11.8	19	●	MHS1180L250B	226.3	252.1	252.1	312.1	310	2.1	12	4
11.8	23	●	MHS1180L300B	273.5	302.1	302.1	362.1	360	2.1	12	4
11.9	1	□	MHS1190L040B	13.9	42.0	42.0	102.0	100	2.0	12	3
11.9	5	□	MHS1190L090B	61.7	92.2	92.2	152.2	150	2.2	12	4
11.9	8	□	MHS1190L120B	97.4	122.2	122.2	182.2	180	2.2	12	4
11.9	10	□	MHS1190L150B	121.2	152.2	152.2	212.2	210	2.2	12	4
11.9	14	□	MHS1190L200B	168.8	202.2	202.2	262.2	260	2.2	12	4
11.9	19	□	MHS1190L250B	228.3	252.2	252.2	312.2	310	2.2	12	4
11.9	23	□	MHS1190L300B	275.9	302.2	302.2	362.2	360	2.2	12	4
12.0	1	●	MHS1200L040B	14.1	42.1	42.1	102.1	100	2.1	12	3
12.0	5	●	MHS1200L090B	62.2	92.2	92.2	152.2	150	2.2	12	4
12.0	7	●	MHS1200L120B	86.2	122.2	122.2	182.2	180	2.2	12	4
12.0	10	●	MHS1200L150B	122.2	152.2	152.2	212.2	210	2.2	12	4
12.0	14	●	MHS1200L200B	170.2	202.2	202.2	262.2	260	2.2	12	4
12.0	18	●	MHS1200L250B	218.2	252.2	252.2	312.2	310	2.2	12	4
12.0	22	●	MHS1200L300B	266.2	302.2	302.2	362.2	360	2.2	12	4

MHS

Recommended cutting condition

Work material	Mild Steel(≦180HB), Carbon steel, Alloy steel(180—280HB) AISI 1010, AISI 1045, AISI 4140 etc				Ferritic and Martensitic Stainless Steel (>200HB) AISI 431, AISI 420 etc			
Dia. DC (mm)	Cutting Speed (m/min)	Revolution (min-1)	Feed rate (Min.—Max.) (mm/rev)	Feed rate (mm/min)	Cutting Speed (m/min)	Revolution (min-1)	Feed rate (Min.—Max.) (mm/rev)	Feed rate (mm/min)
1.0	40	12700	0.030(0.020—0.040)	380	20	6400	0.030(0.020—0.040)	190
1.2	50	13300	0.035(0.025—0.050)	465	30	8000	0.035(0.025—0.050)	280
1.6	60	11900	0.050(0.030—0.065)	595	40	8000	0.050(0.030—0.065)	400
2.0	70	11100	0.060(0.040—0.080)	665	50	8000	0.060(0.040—0.080)	480
2.5	80	10200	0.075(0.050—0.100)	765	60	7600	0.075(0.050—0.100)	570
3.2	80	8000	0.100(0.070—0.130)	800	60	6000	0.100(0.070—0.130)	600
4.0	80	6400	0.100(0.090—0.110)	640	60	4800	0.090(0.080—0.090)	430
5.0	80	5100	0.130(0.110—0.140)	665	60	3800	0.110(0.100—0.120)	420
6.3	80	4000	0.160(0.140—0.180)	640	60	3000	0.140(0.130—0.150)	420
8.0	80	3200	0.200(0.180—0.230)	640	60	2400	0.170(0.160—0.190)	410
10.0	80	2600	0.250(0.220—0.280)	650	60	1900	0.220(0.200—0.230)	420
12.0	80	2100	0.300(0.270—0.340)	630	60	1600	0.260(0.240—0.280)	415

Work material	Pre-hardened steel(35—45HRC), Alloy tool steel(<350) AISI P21, AISI P20, ASTM H13, AISI L6 etc				Hardened Steel(40—55HRC), Precipitation hardening stainless steel(<450HB) AISI 431, AISI 420, ASTM 630, ASTM 631 etc			
Dia. DC (mm)	Cutting Speed (m/min)	Revolution (min-1)	Feed rate (Min.—Max.) (mm/rev)	Feed rate (mm/min)	Cutting Speed (m/min)	Revolution (min-1)	Feed rate (Min.—Max.) (mm/rev)	Feed rate (mm/min)
1.0	20	6400	0.025(0.020—0.030)	160	40	12700	0.020(0.015—0.025)	255
1.2	30	8000	0.030(0.020—0.035)	240	40	10600	0.025(0.020—0.030)	265
1.6	40	8000	0.040(0.030—0.045)	320	50	10000	0.035(0.025—0.040)	350
2.0	50	8000	0.045(0.035—0.060)	360	50	8000	0.040(0.030—0.050)	320
2.5	60	7600	0.060(0.045—0.075)	455	60	7600	0.050(0.040—0.065)	380
3.2	60	6000	0.080(0.060—0.090)	480	60	6000	0.060(0.050—0.080)	360
4.0	60	4800	0.080(0.070—0.100)	385	60	4800	0.080(0.060—0.100)	385
5.0	60	3800	0.110(0.090—0.130)	420	60	3800	0.100(0.080—0.130)	380
6.3	60	3000	0.130(0.110—0.160)	390	60	3000	0.110(0.090—0.130)	330
8.0	60	2400	0.170(0.140—0.200)	410	60	2400	0.140(0.120—0.160)	335
10.0	60	1900	0.210(0.170—0.250)	400	60	1900	0.170(0.140—0.200)	325
12.0	60	1600	0.250(0.210—0.300)	400	60	1600	0.210(0.170—0.240)	335

Work material	Hardened Steel(40—55HRC), Heat resistant alloys AISI H13, L6, Inconel718			
Dia. DC (mm)	Cutting Speed (m/min)	Revolution (min-1)	Feed rate (Min.—Max.) (mm/rev)	Feed rate (mm/min)
1.0	10	3200	0.015(0.015—0.020)	50
1.2	10	2700	0.020(0.015—0.025)	55
1.6	10	2000	0.025(0.020—0.030)	50
2.0	20	3200	0.035(0.025—0.040)	110
2.5	20	2600	0.040(0.030—0.050)	105
3.2	20	2000	0.050(0.040—0.070)	100
4.0	30	2400	0.070(0.050—0.080)	170
5.0	30	1900	0.080(0.060—0.100)	150
6.3	30	1500	0.090(0.080—0.110)	135
8.0	40	1600	0.120(0.100—0.130)	190
10.0	40	1300	0.150(0.130—0.170)	195
12.0	40	1100	0.180(0.150—0.200)	200

MHS

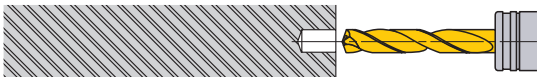
- When using the drill with a length over l/d 10, it is necessary to use a prep holes as a guide.(If no prephole is used then drill breakage can occur)
- Setting of the diameter tolerance differs from general-purpose drills. MHS shortest flute drills are recommended for prep hole machining.
- MHS drills are suitable for use with shrink fit holders.
- Use the shortest type in the respective diameter as a pilot drill.

MHS

OPERATIONAL GUIDANCE FOR THE MHS LONG TYPE DRILL (L/D≥10)

FLAT FACE DRILLING ●Drilling a blind hole

1. Drilling a pilot hole

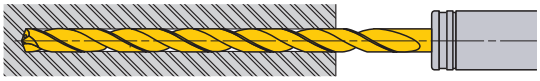


①Use a drill with a larger (flatter) point angle than the super long type. Use the shortest flute possible.
②Ensure a high precision hole is drilled for the guide.
③Drill depth : Approx 1DC.
(Adjust the pilot hole depth according to the length of the long type drill.)

2. Initial cutting with the long type drill

①Penetrate the guide hole at low revolution. (Revolution 1000min^{-1}, feed rate 0.2—0.3mm/rev)
②Stop the long type drill 1—3mm short of the guide hole bottom.

3. Drill the deep hole



①Start cutting at the recommended speed and feed with a non-peck (continuous feed) cycle.

4. Drill retraction

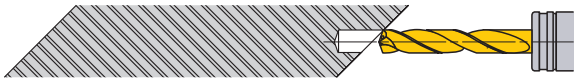
①After drilling, lower the cutting revolution about 0.5—1mm short of the hole end. (Revolution of around 1000min^{-1})
②Retract the drill to the pilot hole depth starting point at a feed rate of 3000mm/min.
③Finally, clear the hole at a cutting speed of 20—30m/min and feed rate of 0.2—0.3mm/rev.

INTERRUPED DRILLING ●Drilling and breaking through on irregular faces or angles

1. Spot facing

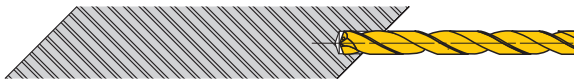
①Machine a flat or the irregular face by using an end mill or slot drill capable of spot facing. Make the spot face diameter the same size as the required deep hole diameter.

2. Drilling a pilot hole



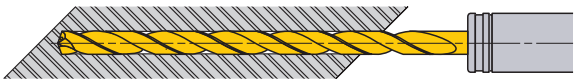
①Use a drill with a larger (flatter) point angle than the super long type. Use the shortest flute possible.
②Ensure a high precision hole is drilled for the guide.
③Drill depth : Approx 1DC.
(Adjust the pilot hole depth according to the length of the long type drill.)

3. Initial cutting with the long type drill



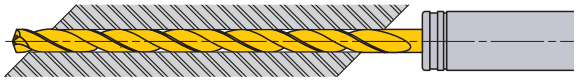
①Penetrate the guide hole at a low revolution. (Revolution 1000min^{-1}, feed rate 0.2—0.3mm/rev)
②Stop the long type drill 0.5—1mm short of the guide hole bottom.

4. Drill the deep hole



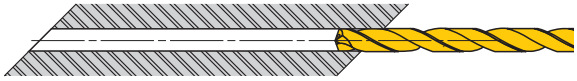
①Start cutting at the recommended speed and feed with a non-peck (continuous feed) cycle.

5. Breaking through



①When breaking through, the cutting edge can be damaged.
②Lower the feed rate when penetrating.

6. Drill retraction



①Finally clear the hole at a cutting speed of 20—30m/min and feed rate of 0.2—0.3mm/rev.
②Retract the drill to the pilot hole depth starting point at a feed rate of 3000mm/min.

MSE

MIRACLE MINI STAR DRILLS

Small diameter drills

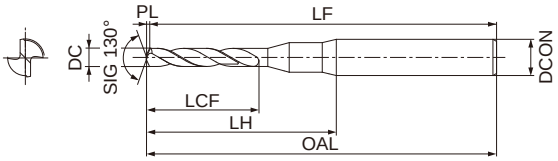
Product Information

UWC VP 130° SIG X Thinning

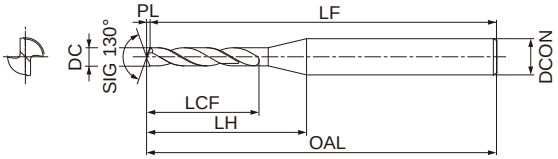
Work Material

P M K N S H

TECHNICAL DATA >> 1997 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 1623 DRILLS SELECTION CHART >> 1624



Type1



Type2

	0 −0.005
h6	0 −0.006

MSE drills are suitable for use with shrink fit holders.

Stock status indication:●: Inventory maintained in Japan.▲: This item to be discontinued within two years.□: Non stock, produced to order only.

External Coolant Unit（mm）

DC(mm)	VP20MF	VP15TF	Order Number	LCF	LH	OAL	LF	PL	DCON	Type
0.10	●		MSE0010SB	1.2	9.7	38.0	38	0.02	3	1
0.11	●		MSE0011SB	1.2	9.7	38.0	38	0.03	3	1
0.12	●		MSE0012SB	1.4	9.7	38.0	38	0.03	3	1
0.13	●		MSE0013SB	1.4	9.7	38.0	38	0.03	3	1
0.14	●		MSE0014SB	2.0	9.7	38.0	38	0.03	3	1
0.15	●		MSE0015SB	2.0	9.7	38.0	38	0.03	3	1
0.16	●		MSE0016SB	2.0	9.7	38.0	38	0.04	3	1
0.17	●		MSE0017SB	2.0	9.7	38.0	38	0.04	3	1
0.18	●		MSE0018SB	2.0	9.7	38.0	38	0.04	3	1
0.19	●		MSE0019SB	2.0	9.7	38.0	38	0.04	3	1
0.20	●		MSE0020SB	2.6	9.8	38.1	38	0.05	3	1
0.21	●		MSE0021SB	2.6	9.8	38.1	38	0.05	3	1
0.22	●		MSE0022SB	2.6	9.8	38.1	38	0.05	3	1
0.23	●		MSE0023SB	2.6	9.8	38.1	38	0.05	3	1
0.24	●		MSE0024SB	3.1	9.8	38.1	38	0.06	3	1
0.25	●		MSE0025SB	3.1	9.8	38.1	38	0.06	3	1
0.26	●		MSE0026SB	3.1	9.8	38.1	38	0.06	3	1
0.27	●		MSE0027SB	3.1	9.8	38.1	38	0.06	3	1
0.28	●		MSE0028SB	3.1	9.8	38.1	38	0.07	3	1
0.29	●		MSE0029SB	3.1	9.8	38.1	38	0.07	3	1
0.30		●	MSE0030SB	5.1	10.3	38.1	38	0.07	3	2
0.31		●	MSE0031SB	5.1	10.3	38.1	38	0.07	3	2

DC(mm)	VP20MF	VP15TF	Order Number	LCF	LH	OAL	LF	PL	DCON	Type
0.32		●	MSE0032SB	5.1	10.3	38.1	38	0.07	3	2
0.33		●	MSE0033SB	5.1	10.3	38.1	38	0.08	3	2
0.34		●	MSE0034SB	6.1	11.3	38.1	38	0.08	3	2
0.35		●	MSE0035SB	6.1	11.2	38.1	38	0.08	3	2
0.36		●	MSE0036SB	6.1	11.2	38.1	38	0.08	3	2
0.37		●	MSE0037SB	6.1	11.2	38.1	38	0.09	3	2
0.38		●	MSE0038SB	6.1	11.2	38.1	38	0.09	3	2
0.39		●	MSE0039SB	6.1	11.2	38.1	38	0.09	3	2
0.40		●	MSE0040SB	7.1	12.2	38.1	38	0.09	3	2
0.41		●	MSE0041SB	7.1	12.1	38.1	38	0.10	3	2
0.42		●	MSE0042SB	7.1	12.1	38.1	38	0.10	3	2
0.43		●	MSE0043SB	7.1	12.1	38.1	38	0.10	3	2
0.44		●	MSE0044SB	7.1	12.1	38.1	38	0.10	3	2
0.45		●	MSE0045SB	7.1	12.1	38.1	38	0.10	3	2
0.46		●	MSE0046SB	7.1	12.0	38.1	38	0.11	3	2
0.47		●	MSE0047SB	7.1	12.0	38.1	38	0.11	3	2
0.48		●	MSE0048SB	7.1	12.0	38.1	38	0.11	3	2
0.49		●	MSE0049SB	7.1	12.0	38.1	38	0.11	3	2
0.50		●	MSE0050SB	7.1	12.0	38.1	38	0.12	3	2
0.51		●	MSE0051SB	7.1	11.9	38.1	38	0.12	3	2
0.52		●	MSE0052SB	7.1	11.9	38.1	38	0.12	3	2
0.53		●	MSE0053SB	7.1	11.9	38.1	38	0.12	3	2

MSE

DC(mm)	VP20MF	VP15TF	Order Number	LCF	LH	OAL	LF	PL	DCON	Type
0.54		●	**MSE0054SB**	7.1	11.9	38.1	38	0.13	3	2
0.55		●	**MSE0055SB**	7.1	11.9	38.1	38	0.13	3	2
0.56		●	**MSE0056SB**	7.1	11.9	38.1	38	0.13	3	2
0.57		●	**MSE0057SB**	7.1	11.8	38.1	38	0.13	3	2
0.58		●	**MSE0058SB**	7.1	11.8	38.1	38	0.14	3	2
0.59		●	**MSE0059SB**	7.1	11.8	38.1	38	0.14	3	2
0.60		●	**MSE0060SB**	7.1	11.8	38.1	38	0.14	3	2
0.61		●	**MSE0061SB**	7.1	11.8	38.1	38	0.14	3	2
0.62		●	**MSE0062SB**	7.1	11.7	38.1	38	0.14	3	2
0.63		●	**MSE0063SB**	7.2	11.8	38.2	38	0.15	3	2
0.64		●	**MSE0064SB**	7.2	11.8	38.2	38	0.15	3	2
0.65		●	**MSE0065SB**	7.2	11.8	38.2	38	0.15	3	2
0.66		●	**MSE0066SB**	7.2	11.8	38.2	38	0.15	3	2
0.67		●	**MSE0067SB**	7.2	11.7	38.2	38	0.16	3	2
0.68		●	**MSE0068SB**	7.2	11.7	38.2	38	0.16	3	2
0.69		●	**MSE0069SB**	7.2	11.7	38.2	38	0.16	3	2
0.70		●	**MSE0070SB**	8.2	12.7	38.2	38	0.16	3	2
0.71		●	**MSE0071SB**	8.2	12.7	38.2	38	0.17	3	2
0.72		●	**MSE0072SB**	8.2	12.7	38.2	38	0.17	3	2
0.73		●	**MSE0073SB**	8.2	12.6	38.2	38	0.17	3	2
0.74		●	**MSE0074SB**	8.2	12.6	38.2	38	0.17	3	2
0.75		●	**MSE0075SB**	8.2	12.6	38.2	38	0.17	3	2
0.76		●	**MSE0076SB**	8.2	12.6	38.2	38	0.18	3	2

DC(mm)	VP20MF	VP15TF	Order Number	LCF	LH	OAL	LF	PL	DCON	Type
0.77		●	**MSE0077SB**	8.2	12.6	38.2	38	0.18	3	2
0.78		●	**MSE0078SB**	8.2	12.5	38.2	38	0.18	3	2
0.79		●	**MSE0079SB**	8.2	12.5	38.2	38	0.18	3	2
0.80		●	**MSE0080SB**	10.2	14.5	38.2	38	0.19	3	2
0.81		●	**MSE0081SB**	10.2	14.5	38.2	38	0.19	3	2
0.82		●	**MSE0082SB**	10.2	14.5	38.2	38	0.19	3	2
0.83		●	**MSE0083SB**	10.2	14.5	38.2	38	0.19	3	2
0.84		●	**MSE0084SB**	10.2	14.4	38.2	38	0.20	3	2
0.85		●	**MSE0085SB**	10.2	14.4	38.2	38	0.20	3	2
0.86		●	**MSE0086SB**	10.2	14.4	38.2	38	0.20	3	2
0.87		●	**MSE0087SB**	10.2	14.4	38.2	38	0.20	3	2
0.88		●	**MSE0088SB**	10.2	14.4	38.2	38	0.21	3	2
0.89		●	**MSE0089SB**	10.2	14.3	38.2	38	0.21	3	2
0.90		●	**MSE0090SB**	10.2	14.3	38.2	38	0.21	3	2
0.91		●	**MSE0091SB**	10.2	14.3	38.2	38	0.21	3	2
0.92		●	**MSE0092SB**	10.2	14.3	38.2	38	0.21	3	2
0.93		●	**MSE0093SB**	10.2	14.3	38.2	38	0.22	3	2
0.94		●	**MSE0094SB**	10.2	14.2	38.2	38	0.22	3	2
0.95		●	**MSE0095SB**	10.2	14.2	38.2	38	0.22	3	2
0.96		●	**MSE0096SB**	10.2	14.2	38.2	38	0.22	3	2
0.97		●	**MSE0097SB**	10.2	14.2	38.2	38	0.23	3	2
0.98		●	**MSE0098SB**	10.2	14.2	38.2	38	0.23	3	2
0.99		●	**MSE0099SB**	10.2	14.2	38.2	38	0.23	3	2

MSE

Recommended cutting condition

Work material	Mild Steel(≦180HB) AISI 1010 etc					Carbon steel, Alloy steel(180—280HB) AISI 1045, AISI 4140 etc				
Dia. DC (mm)	Cutting Speed (m/min)	Revolution (min-1)	Feed rate (Min.—Max.) (mm/rev)	Step (mm)	Feed rate (mm/min)	Cutting Speed (m/min)	Revolution (min-1)	Feed rate (Min.—Max.) (mm/rev)	Step (mm)	Feed rate (mm/min)
0.1	6	20000	0.002(0.001—0.003)	0.02	40	6	20000	0.002(0.001—0.003)	0.02	40
0.12	8	20000	0.002(0.001—0.003)	0.02	40	8	20000	0.002(0.001—0.003)	0.02	40
0.16	10	20000	0.002(0.001—0.003)	0.02	40	10	20000	0.002(0.001—0.003)	0.02	40
0.2	13	20000	0.003(0.002—0.004)	0.04	60	13	20000	0.003(0.002—0.004)	0.04	60
0.25	16	20000	0.003(0.002—0.004)	0.04	60	16	20000	0.003(0.002—0.004)	0.04	60
0.32	20	20000	0.004(0.003—0.005)	0.05	80	20	20000	0.004(0.003—0.005)	0.05	80
0.4	25	20000	0.004(0.003—0.005)	0.05	80	25	20000	0.004(0.003—0.005)	0.05	80
0.5	31	20000	0.006(0.005—0.007)	0.1	120	31	20000	0.006(0.005—0.007)	0.1	120
0.63	40	20000	0.008(0.006—0.01)	0.1	160	40	20000	0.008(0.006—0.01)	0.1	160
0.8	50	20000	0.02(0.015—0.025)	0.3	400	50	20000	0.015(0.012—0.018)	0.3	300
0.99	62	20000	0.04(0.03—0.05)	0.3	800	62	20000	0.02(0.015—0.025)	0.3	400

Work material	Carbon steel, Alloy steel(280—350HB) AISI 4340 etc					Pre-Hardened Steel(35—45HRC) AISI P21, AISI P20 etc				
Dia. DC (mm)	Cutting Speed (m/min)	Revolution (min-1)	Feed rate (Min.—Max.) (mm/rev)	Step (mm)	Feed rate (mm/min)	Cutting Speed (m/min)	Revolution (min-1)	Feed rate (Min.—Max.) (mm/rev)	Step (mm)	Feed rate (mm/min)
0.1	6	20000	0.002(0.001—0.003)	0.02	40	6	20000	0.002(0.001—0.003)	0.02	40
0.12	8	20000	0.002(0.001—0.003)	0.02	40	8	20000	0.002(0.001—0.003)	0.02	40
0.16	10	20000	0.002(0.001—0.003)	0.02	40	10	20000	0.002(0.001—0.003)	0.02	40
0.2	13	20000	0.003(0.002—0.004)	0.04	60	13	20000	0.003(0.002—0.004)	0.04	60
0.25	16	20000	0.003(0.002—0.004)	0.04	60	16	20000	0.003(0.002—0.004)	0.04	60
0.32	20	20000	0.004(0.003—0.005)	0.05	80	20	20000	0.004(0.003—0.005)	0.05	80
0.4	25	20000	0.004(0.003—0.005)	0.05	80	25	20000	0.004(0.003—0.005)	0.05	80
0.5	31	20000	0.006(0.005—0.007)	0.1	120	31	20000	0.006(0.005—0.007)	0.1	120
0.63	40	20000	0.008(0.006—0.01)	0.1	160	40	20000	0.008(0.006—0.01)	0.1	160
0.8	50	20000	0.015(0.012—0.018)	0.3	300	50	20000	0.015(0.012—0.018)	0.3	300
0.99	62	20000	0.02(0.015—0.025)	0.3	400	62	20000	0.02(0.015—0.025)	0.3	400

Work material	Austenitic Stainless Steel(≦200HB) AISI 304,AISI 316 etc					Gray Cast Iron(≦350MPa) No 45 B etc				
Dia. DC (mm)	Cutting Speed (m/min)	Revolution (min-1)	Feed rate (Min.—Max.) (mm/rev)	Step (mm)	Feed rate (mm/min)	Cutting Speed (m/min)	Revolution (min-1)	Feed rate (Min.—Max.) (mm/rev)	Step (mm)	Feed rate (mm/min)
0.1	6	20000	0.002(0.001—0.003)	0.02	40	6	20000	0.002(0.001—0.003)	0.02	40
0.12	8	20000	0.002(0.001—0.003)	0.02	40	8	20000	0.002(0.001—0.003)	0.02	40
0.16	10	20000	0.002(0.001—0.003)	0.02	40	10	20000	0.002(0.001—0.003)	0.02	40
0.2	11	18000	0.003(0.002—0.004)	0.04	54	13	20000	0.003(0.002—0.004)	0.04	60
0.25	14	18000	0.003(0.002—0.004)	0.04	54	16	20000	0.003(0.002—0.004)	0.04	60
0.32	15	15000	0.004(0.003—0.005)	0.05	60	20	20000	0.004(0.003—0.005)	0.05	80
0.4	19	15000	0.004(0.003—0.005)	0.05	60	25	20000	0.004(0.003—0.005)	0.05	80
0.5	16	10000	0.006(0.005—0.007)	0.1	60	31	20000	0.006(0.005—0.007)	0.1	120
0.63	20	10000	0.008(0.006—0.01)	0.1	80	40	20000	0.008(0.006—0.01)	0.1	160
0.8	15	6000	0.015(0.012—0.018)	0.2	90	50	20000	0.02(0.015—0.025)	0.3	400
0.99	19	6000	0.02(0.015—0.025)	0.2	120	62	20000	0.04(0.03—0.05)	0.3	800

MSE

Work material	Aluminium Alloy(Si<5%) A6061, A7075					Heat resistant alloys Inconel718				
Dia. DC (mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Step (mm)	Feed rate (mm/min)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Step (mm)	Feed rate (mm/min)
0.1	6	20000	0.002(0.001—0.003)	0.05	40	2	7000	0.001(0.0005—0.001)	0.02	7
0.12	8	20000	0.003(0.002—0.004)	0.05	60	3	7000	0.001(0.0005—0.001)	0.02	7
0.16	10	20000	0.004(0.003—0.005)	0.05	80	4	7000	0.001(0.0005—0.001)	0.02	7
0.2	13	20000	0.006(0.005—0.007)	0.1	120	3	5000	0.002(0.001—0.002)	0.04	10
0.25	16	20000	0.008(0.006—0.01)	0.1	160	4	5000	0.002(0.001—0.002)	0.04	10
0.32	20	20000	0.01(0.008—0.012)	0.3	200	4	4000	0.002(0.001—0.002)	0.05	8
0.4	25	20000	0.02(0.015—0.025)	0.3	400	5	4000	0.002(0.001—0.002)	0.05	8
0.5	31	20000	0.03(0.025—0.035)	0.5	600	5	3000	0.003(0.001—0.003)	0.1	9
0.63	40	20000	0.04(0.035—0.045)	0.5	800	6	3000	0.004(0.002—0.004)	0.1	12
0.8	50	20000	0.05(0.045—0.055)	0.8	1000	5	1800	0.006(0.004—0.006)	0.2	10.8
0.99	62	20000	0.06(0.055—0.065)	0.8	1200	6	1800	0.01(0.008—0.01)	0.2	18

- When drilling holes up to ø0.3mm, the use of a spot drill is recommended.(Order number : MSP0300SB, Cutting conditions : See next page.)
- Change cutting conditions depending on your machine and workpiece rigidity.
- When machining holes over 5DC, reduce the step stated above.
- The use of water-soluble fluid(diluted by 20 times)is recommended for drilling under the cutting conditions above. Lower the revolutions if you use oil fluid or mist.

MSP

SPOT DRILL

Product Information

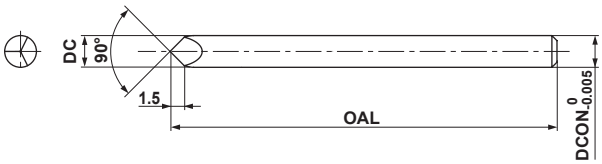
UWC VP 90° SIG

Work Material

P M K N S H

TECHNICAL DATA >> 1997 ISO13399 Property >> 1966

SYMBOL DESCRIPTIONS >> 1623 DRILLS SELECTION CHART >> 1624



Order Number	Grade	Stock	Dimensions (mm)			Diameter Range (mm)
			DC	OAL	DCON	
MSP0300SB	**VP15TF**	●	3	38	3	**0.1–3.0**

● : Inventory maintained in Japan.

RECOMMENDED CUTTING CONDITIONS

Hole Size Range (mm)	Revolution (min^{-1})	Feed rate (Min.–Max.) (mm/rev)	Table Feed (mm/min)
0.1–3.0	10000	0.0005 (0.00025–0.001)	5

Memo

VCSSS

MIRACLE DRILLS

3mm shank series

Product Information

UWC VC 120° SIG 130° SIG X Thinning

DC≧0.7 DC≦0.6

Work Material

P M K N S H

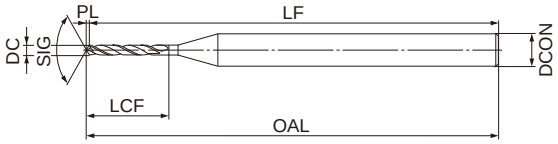
TECHNICAL DATA >> 1997

ISO13399 Property >> 1966

SYMBOL DESCRIPTIONS >> 1623

DRILLS SELECTION CHART >> 1624

	DC≦2.4
	0 −0.014
h7	0 −0.010



Type1

Stock status indication:●: Inventory maintained in Japan.▲: This item to be discontinued within two years.□: Non stock, produced to order only.

Unit: mm

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
VCSSSD0030	0.3	3.1	38.1	38	0.07	3	●	1
VCSSSD0040	0.4	4.1	38.1	38	0.09	3	●	1
VCSSSD0050	0.5	4.1	38.1	38	0.12	3	●	1
VCSSSD0060	0.6	5.1	38.1	38	0.14	3	●	1
VCSSSD0070	0.7	5.2	38.2	38	0.20	3	●	1
VCSSSD0080	0.8	6.2	38.2	38	0.23	3	●	1
VCSSSD0090	0.9	6.3	38.3	38	0.26	3	●	1
VCSSSD0100	1.0	8.3	38.3	38	0.3	3	●	1
VCSSSD0110	1.1	8.3	38.3	38	0.3	3	●	1
VCSSSD0120	1.2	8.4	38.4	38	0.4	3	●	1
VCSSSD0130	1.3	8.4	38.4	38	0.4	3	●	1

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
VCSSSD0140	1.4	8.4	38.4	38	0.4	3	●	1
VCSSSD0150	1.5	10.4	45.4	45	0.4	3	●	1
VCSSSD0160	1.6	10.5	45.5	45	0.5	3	●	1
VCSSSD0170	1.7	10.5	45.5	45	0.5	3	●	1
VCSSSD0180	1.8	10.5	45.5	45	0.5	3	●	1
VCSSSD0190	1.9	10.6	45.6	45	0.6	3	●	1
VCSSSD0200	2.0	12.6	45.6	45	0.6	3	●	1
VCSSSD0210	2.1	12.6	45.6	45	0.6	3	●	1
VCSSSD0220	2.2	12.6	45.6	45	0.6	3	●	1
VCSSSD0230	2.3	12.7	45.7	45	0.7	3	●	1
VCSSSD0240	2.4	12.7	45.7	45	0.7	3	●	1

VCSSS

Recommended cutting condition

Work material	Heat-treated steel AISI H13, AISI 4140 etc. (40—50HRC)			Hardened steel AISI H13, AISI 420 etc. (50—55HRC)			Hardened steel AISI D2, Powder high-speed steel etc. (55—60HRC)		
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/rev)	Step feed (mm)	Revolution (min^{-1})	Feed rate (mm/rev)	Step feed (mm)	Revolution (min^{-1})	Feed rate (mm/rev)	Step feed (mm)
0.3	21000	0.005	0.03	16000	0.005	0.03	11000	0.005	0.03
0.5	13000	0.005	0.05	9600	0.005	0.05	6400	0.005	0.05
0.8	8000	0.008	0.08	6000	0.008	0.08	4000	0.008	0.08
1.0	6400	0.01	0.10	4800	0.01	0.10	3200	0.01	0.10
1.2	5300	0.01	0.15	4000	0.01	0.15	2700	0.01	0.10
1.5	4200	0.02	0.20	3200	0.01	0.20	2100	0.01	0.20
1.8	3500	0.03	0.25	2700	0.01	0.25	1800	0.01	0.20
2.0	3200	0.04	0.30	2400	0.02	0.30	1600	0.02	0.30
2.2	2900	0.04	0.40	2200	0.02	0.40	1400	0.02	0.30
2.4	2700	0.05	0.50	2000	0.02	0.50	1300	0.02	0.30

- Please use a machine with a high accuracy spindle.
- A collet chuck is recommended to maintain shank condition.
- Use emulsion as a cutting fluid.

VCHSM

MIRACLE DRILLS

Medium, For hardened material

Product Information

UWC VC 120° SIG 140° 130° SIG X Thinning

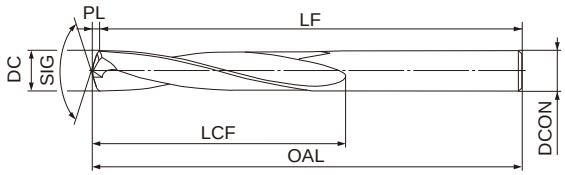
DC≧6 DC<6

TECHNICAL DATA >> 1997 ISO13399 Property >> 1966

Work Material

S H

SYMBOL DESCRIPTIONS >> 1623 DRILLS SELECTION CHART >> 1624



Type1

	DC≦3	3<DC≦6	6<DC≦10	10<DC≦16
	0 −0.014	0 −0.018	0 −0.022	0 −0.027
h6	0 −0.009	0 −0.012	0 −0.015	0 −0.018

Stock status indication:●: Inventory maintained in Japan.▲: This item to be discontinued within two years.□: Non stock, produced to order only.

Unit: mm

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
VCHSMD0250	2.5	20.6	55.6	55	0.6	2.5	●	1
VCHSMD0260	2.6	20.6	55.6	55	0.6	2.6	●	1
VCHSMD0270	2.7	20.6	55.6	55	0.6	2.7	●	1
VCHSMD0280	2.8	21.7	60.7	60	0.7	2.8	●	1
VCHSMD0290	2.9	21.7	60.7	60	0.7	2.9	●	1
VCHSMD0300	3.0	21.7	60.7	60	0.7	3.0	●	1
VCHSMD0310	3.1	24.7	60.7	60	0.7	3.1	●	1
VCHSMD0320	3.2	24.7	60.7	60	0.7	3.2	●	1
VCHSMD0330	3.3	24.8	60.8	60	0.8	3.3	●	1
VCHSMD0340	3.4	24.8	60.8	60	0.8	3.4	●	1
VCHSMD0350	3.5	24.8	60.8	60	0.8	3.5	●	1
VCHSMD0360	3.6	27.8	60.8	60	0.8	3.6	●	1
VCHSMD0370	3.7	27.9	60.9	60	0.9	3.7	●	1
VCHSMD0380	3.8	27.9	60.9	60	0.9	3.8	●	1
VCHSMD0390	3.9	27.9	60.9	60	0.9	3.9	●	1
VCHSMD0400	4.0	27.9	60.9	60	0.9	4.0	●	1
VCHSMD0410	4.1	30.0	64.0	63	1.0	4.1	●	1
VCHSMD0420	4.2	30.0	64.0	63	1.0	4.2	●	1
VCHSMD0430	4.3	30.0	64.0	63	1.0	4.3	●	1
VCHSMD0440	4.4	30.0	64.0	63	1.0	4.4	●	1
VCHSMD0450	4.5	30.0	64.0	63	1.0	4.5	●	1
VCHSMD0460	4.6	33.1	69.1	68	1.1	4.6	●	1
VCHSMD0470	4.7	33.1	69.1	68	1.1	4.7	●	1
VCHSMD0480	4.8	33.1	69.1	68	1.1	4.8	●	1
VCHSMD0490	4.9	33.1	69.1	68	1.1	4.9	●	1
VCHSMD0500	5.0	33.2	69.2	68	1.2	5.0	●	1
VCHSMD0510	5.1	35.2	73.2	72	1.2	5.1	●	1
VCHSMD0520	5.2	35.2	73.2	72	1.2	5.2	●	1
VCHSMD0530	5.3	35.2	73.2	72	1.2	5.3	●	1
VCHSMD0540	5.4	35.3	73.3	72	1.3	5.4	●	1

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
VCHSMD0550	5.5	35.3	73.3	72	1.3	5.5	●	1
VCHSMD0560	5.6	37.3	75.3	74	1.3	5.6	●	1
VCHSMD0570	5.7	37.3	75.3	74	1.3	5.7	●	1
VCHSMD0580	5.8	37.4	75.4	74	1.4	5.8	●	1
VCHSMD0590	5.9	37.4	75.4	74	1.4	5.9	●	1
VCHSMD0600	6.0	42.2	82.2	81	1.2	6.0	●	1
VCHSMD0650	6.5	42.3	82.3	81	1.3	6.5	●	1
VCHSMD0690	6.9	44.4	84.4	83	1.4	6.9	●	1
VCHSMD0700	7.0	44.4	84.4	83	1.4	7.0	●	1
VCHSMD0750	7.5	46.5	88.5	87	1.5	7.5	●	1
VCHSMD0800	8.0	49.6	91.6	90	1.6	8.0	●	1
VCHSMD0850	8.5	54.7	97.7	96	1.7	8.5	●	1
VCHSMD0860	8.6	56.7	99.7	98	1.7	8.6	●	1
VCHSMD0900	9.0	56.8	99.8	98	1.8	9.0	●	1
VCHSMD0950	9.5	59.9	103.9	102	1.9	9.5	●	1
VCHSMD1000	10.0	62.0	107.0	105	2.0	10.0	●	1
VCHSMD1040	10.4	68.1	114.1	112	2.1	10.4	●	1
VCHSMD1050	10.5	68.1	114.1	112	2.1	10.5	●	1
VCHSMD1100	11.0	70.2	116.2	114	2.2	11.0	●	1
VCHSMD1150	11.5	73.3	120.3	118	2.3	11.5	●	1
VCHSMD1200	12.0	75.4	123.4	121	2.4	12.0	●	1
VCHSMD1250	12.5	78.5	137.5	135	2.5	12.5	●	1
VCHSMD1300	13.0	80.6	139.6	137	2.6	13.0	●	1
VCHSMD1350	13.5	86.7	146.7	144	2.7	13.5	●	1
VCHSMD1400	14.0	88.8	149.8	147	2.8	14.0	●	1
VCHSMD1450	14.5	91.9	153.9	151	2.9	14.5	●	1
VCHSMD1500	15.0	94.0	156.0	153	3.0	15.0	●	1
VCHSMD1550	15.5	97.2	160.2	157	3.2	15.5	●	1
VCHSMD1600	16.0	99.3	163.3	160	3.3	16.0	●	1

VCHSM

Recommended cutting condition

Work material	Hardened steel AISI H13, AISI 420 etc. (50—55HRC)		Hardened steel AISI D2, Powder high-speed steel etc. (55—60HRC)	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)
2.5	1900	0.06	1300	0.04
3.0	1600	0.06	1100	0.04
4.0	1200	0.06	800	0.04
5.0	1000	0.06	600	0.04
6.0	800	0.06	530	0.04
8.0	600	0.07	400	0.05
10.0	480	0.07	320	0.05
12.0	400	0.07	270	0.05
14.0	340	0.07	230	0.05
16.0	300	0.07	200	0.05

- Use rigid machines.
- A collet chuck is recommended to maintain shank condition.
- Use emulsion as a cutting fluid.
- Recommended depth of drilling is 3DC(DC:drill diameter) under these cutting conditions.

MZE/MZS

ZET1 DRILLS

General-purpose drills

Product Information

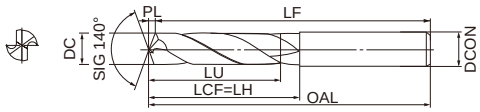
UWC VP 140° SIG X Thinning

Work Material

P M K N S

TECHNICAL DATA >> 1997 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 1623 DRILLS SELECTION CHART >> 1624

MZE



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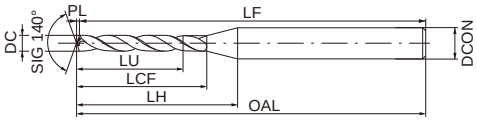
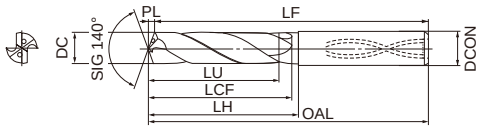


Type2

MZS



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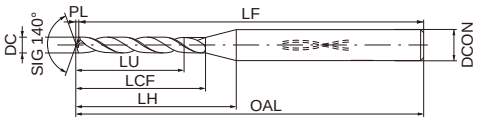


Type4

	—	DC<2	2≦DC≦3	3<DC≦6	6<DC≦10	10<DC≦18	18<DC≦20
		0 −0.014	0 −0.014	0 −0.018	0 −0.022	0 −0.027	0 −0.033
h6,h8	MZE	-	0 −0.014	0 −0.018	0 −0.022	0 −0.027	0 −0.033
h6	MZS	-	0 −0.006	0 −0.008	0 −0.009	0 −0.011	0 −0.013

MZS drills are suitable for use with shrink fit holders.

Stock status indication:●: Inventory maintained in Japan.▲: This item to be discontinued within two years.□: Non stock, produced to order only.

Unit: mm

DC(mm)	Hole Depth(l/d)	VP15TF	Coolant (Int./Ext.)	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
1.0	2	●	N	**MZE0100SB**	2.2	6.2	8.2	55.2	55	0.2	2.0	2
1.1	2	●	N	**MZE0110SB**	2.4	7.2	9.2	55.2	55	0.2	2.0	2
1.2	2	●	N	**MZE0120SB**	2.6	8.2	9.2	55.2	55	0.2	2.0	2
1.3	2	●	N	**MZE0130SB**	2.8	8.2	9.2	55.2	55	0.2	2.0	2
1.4	2	●	N	**MZE0140SB**	3.1	9.3	10.3	55.3	55	0.3	2.0	2
1.5	2	●	N	**MZE0150SB**	3.3	9.3	10.3	55.3	55	0.3	2.0	2
1.6	2	●	N	**MZE0160SB**	3.5	10.3	10.3	55.3	55	0.3	2.0	1
1.7	2	●	N	**MZE0170SB**	3.7	10.3	10.3	55.3	55	0.3	2.0	1
1.8	2	●	N	**MZE0180SB**	3.9	11.3	11.3	55.3	55	0.3	2.0	1

DC(mm)	Hole Depth(l/d)	VP15TF	Coolant (Int./Ext.)	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
1.9	2	●	N	**MZE0190SB**	4.1	11.3	11.3	55.3	55	0.3	2.0	1
2.0	2	●	N	**MZE0200SA**	4.4	12.4	12.4	55.4	55	0.4	2.0	1
2.0	3	●	N	**MZE0200MA**	6.4	16.4	16.4	55.4	55	0.4	2.0	1
2.1	2	●	N	**MZE0210SA**	4.6	12.4	12.4	55.4	55	0.4	2.1	1
2.1	3	●	N	**MZE0210MA**	6.7	16.4	16.4	55.4	55	0.4	2.1	1
2.2	2	●	N	**MZE0220SA**	4.8	13.4	13.4	55.4	55	0.4	2.2	1
2.2	3	●	N	**MZE0220MA**	7.0	18.4	18.4	55.4	55	0.4	2.2	1
2.3	2	●	N	**MZE0230SA**	5.0	13.4	13.4	55.4	55	0.4	2.3	1
2.3	3	●	N	**MZE0230MA**	7.3	18.4	18.4	55.4	55	0.4	2.3	1

MZE/MZS

DC(mm)	Hole Depth(l/d)	VP15TF	Coolant (Int./Ext.)	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
2.4	2	●	N	MZE0240SA	5.2	16.4	16.4	55.4	55	0.4	2.4	1
2.4	3	●	N	MZE0240MA	7.6	20.4	20.4	55.4	55	0.4	2.4	1
2.5	2	●	N	MZE0250SA	5.5	16.5	16.5	55.5	55	0.5	2.5	1
2.5	3	●	N	MZE0250MA	8.0	20.5	20.5	55.5	55	0.5	2.5	1
2.6	2	●	N	MZE0260SA	5.7	16.5	16.5	55.5	55	0.5	2.6	1
2.6	3	●	N	MZE0260MA	8.3	20.5	20.5	55.5	55	0.5	2.6	1
2.7	2	●	N	MZE0270SA	5.9	16.5	16.5	55.5	55	0.5	2.7	1
2.7	3	●	N	MZE0270MA	8.6	20.5	20.5	55.5	55	0.5	2.7	1
2.8	2	●	N	MZE0280SA	6.1	16.5	16.5	55.5	55	0.5	2.8	1
2.8	3	●	N	MZE0280MA	8.9	21.5	21.5	60.5	60	0.5	2.8	1
2.9	2	●	N	MZE0290SA	6.3	16.5	16.5	55.5	55	0.5	2.9	1
2.9	3	●	N	MZE0290MA	9.2	21.5	21.5	60.5	60	0.5	2.9	1
3.0	2	●	N	MZE0300SA	6.5	16.5	16.5	55.5	55	0.5	3.0	1
3.0	3	●	N	MZE0300MA	9.5	21.5	21.5	60.5	60	0.5	3.0	1
3.1	2	●	N	MZE0310SA	6.8	18.6	18.6	55.6	55	0.6	3.1	1
3.1	3	●	N	MZE0310MA	9.9	24.6	24.6	60.6	60	0.6	3.1	1
3.2	2	●	N	MZE0320SA	7.0	18.6	18.6	55.6	55	0.6	3.2	1
3.2	3	●	N	MZE0320MA	10.2	24.6	24.6	60.6	60	0.6	3.2	1
3.3	2	●	N	MZE0330SA	7.2	18.6	18.6	55.6	55	0.6	3.3	1
3.3	3	●	N	MZE0330MA	10.5	24.6	24.6	60.6	60	0.6	3.3	1
3.4	2	●	N	MZE0340SA	7.4	20.6	20.6	55.6	55	0.6	3.4	1
3.4	3	●	N	MZE0340MA	10.8	24.6	24.6	60.6	60	0.6	3.4	1
3.5	2	●	N	MZE0350SA	7.6	20.6	20.6	55.6	55	0.6	3.5	1
3.5	3	●	N	MZE0350MA	11.1	24.6	24.6	60.6	60	0.6	3.5	1
3.6	2	●	N	MZE0360SA	7.9	20.7	20.7	55.7	55	0.7	3.6	1
3.6	3	●	N	MZE0360MA	11.5	27.7	27.7	60.7	60	0.7	3.6	1
3.7	2	●	N	MZE0370SA	8.1	20.7	20.7	55.7	55	0.7	3.7	1
3.7	3	●	N	MZE0370MA	11.8	27.7	27.7	60.7	60	0.7	3.7	1
3.8	2	●	N	MZE0380SA	8.3	22.7	22.7	55.7	55	0.7	3.8	1
3.8	3	●	N	MZE0380MA	12.1	27.7	27.7	60.7	60	0.7	3.8	1
3.9	2	●	N	MZE0390SA	8.5	22.7	22.7	55.7	55	0.7	3.9	1
3.9	3	●	N	MZE0390MA	12.4	27.7	27.7	60.7	60	0.7	3.9	1
4.0	2	●	N	MZE0400SA	8.7	22.7	22.7	55.7	55	0.7	4.0	1
4.0	3	●	N	MZE0400MA	12.7	27.7	27.7	60.7	60	0.7	4.0	1
4.1	2	●	N	MZE0410SA	8.9	22.7	22.7	55.7	55	0.7	4.1	1
4.1	3	●	N	MZE0410MA	13.0	29.7	29.7	63.7	63	0.7	4.1	1
4.2	2	●	N	MZE0420SA	9.2	22.8	22.8	55.8	55	0.8	4.2	1
4.2	3	●	N	MZE0420MA	13.4	29.8	29.8	63.8	63	0.8	4.2	1
4.3	2	●	N	MZE0430SA	9.4	24.8	24.8	58.8	58	0.8	4.3	1
4.3	3	●	N	MZE0430MA	13.7	29.8	29.8	63.8	63	0.8	4.3	1
4.4	2	●	N	MZE0440SA	9.6	24.8	24.8	58.8	58	0.8	4.4	1
4.4	3	●	N	MZE0440MA	14.0	29.8	29.8	63.8	63	0.8	4.4	1
4.5	2	●	N	MZE0450SA	9.8	24.8	24.8	58.8	58	0.8	4.5	1
4.5	3	●	N	MZE0450MA	14.3	29.8	29.8	63.8	63	0.8	4.5	1
4.6	2	●	N	MZE0460SA	10.0	24.8	24.8	58.8	58	0.8	4.6	1
4.6	3	●	N	MZE0460MA	14.6	32.8	32.8	68.8	68	0.8	4.6	1
4.7	2	●	N	MZE0470SA	10.3	24.9	24.9	58.9	58	0.9	4.7	1
4.7	3	●	N	MZE0470MA	15.0	32.9	32.9	68.9	68	0.9	4.7	1
4.8	2	●	N	MZE0480SA	10.5	26.9	26.9	62.9	62	0.9	4.8	1
4.8	3	●	N	MZE0480MA	15.3	32.9	32.9	68.9	68	0.9	4.8	1
4.9	2	●	N	MZE0490SA	10.7	26.9	26.9	62.9	62	0.9	4.9	1
4.9	3	●	N	MZE0490MA	15.6	32.9	32.9	68.9	68	0.9	4.9	1
5.0	2	●	N	MZE0500SA	10.9	26.9	26.9	62.9	62	0.9	5.0	1
5.0	3	●	N	MZE0500MA	15.9	32.9	32.9	68.9	68	0.9	5.0	1

DC(mm)	Hole Depth(l/d)	VP15TF	Coolant (Int./Ext.)	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
5.1	2	●	N	MZE0510SA	11.1	26.9	26.9	62.9	62	0.9	5.1	1
5.1	3	●	N	MZE0510MA	16.2	34.9	34.9	72.9	72	0.9	5.1	1
5.2	2	●	N	MZE0520SA	11.3	26.9	26.9	62.9	62	0.9	5.2	1
5.2	3	●	N	MZE0520MA	16.5	34.9	34.9	72.9	72	0.9	5.2	1
5.3	2	●	N	MZE0530SA	11.6	27.0	27.0	63.0	62	1.0	5.3	1
5.3	3	●	N	MZE0530MA	16.9	35.0	35.0	73.0	72	1.0	5.3	1
5.4	2	●	N	MZE0540SA	11.8	29.0	29.0	67.0	66	1.0	5.4	1
5.4	3	●	N	MZE0540MA	17.2	35.0	35.0	73.0	72	1.0	5.4	1
5.5	2	●	N	MZE0550SA	12.0	29.0	29.0	67.0	66	1.0	5.5	1
5.5	3	●	N	MZE0550MA	17.5	35.0	35.0	73.0	72	1.0	5.5	1
5.6	2	●	N	MZE0560SA	12.2	29.0	29.0	67.0	66	1.0	5.6	1
5.6	3	●	N	MZE0560MA	17.8	37.0	37.0	75.0	74	1.0	5.6	1
5.7	2	●	N	MZE0570SA	12.4	29.0	29.0	67.0	66	1.0	5.7	1
5.7	3	●	N	MZE0570MA	18.1	37.0	37.0	75.0	74	1.0	5.7	1
5.8	2	●	N	MZE0580SA	12.7	29.1	29.1	67.1	66	1.1	5.8	1
5.8	3	●	N	MZE0580MA	18.5	37.1	37.1	75.1	74	1.1	5.8	1
5.9	2	●	N	MZE0590SA	12.9	29.1	29.1	67.1	66	1.1	5.9	1
5.9	3	●	N	MZE0590MA	18.8	37.1	37.1	75.1	74	1.1	5.9	1
6.0	2	●	N	MZE0600SA	13.1	29.1	29.1	67.1	66	1.1	6.0	1
6.0	3	●	N	MZE0600MA	19.1	42.1	42.1	82.1	81	1.1	6.0	1
6.1	2	●	N	MZE0610SA	13.3	32.1	32.1	71.1	70	1.1	6.1	1
6.1	3	●	N	MZE0610MA	19.4	42.1	42.1	82.1	81	1.1	6.1	1
6.2	2	●	N	MZE0620SA	13.5	32.1	32.1	71.1	70	1.1	6.2	1
6.2	3	●	N	MZE0620MA	19.7	42.1	42.1	82.1	81	1.1	6.2	1
6.3	2	●	N	MZE0630SA	13.7	32.1	32.1	71.1	70	1.1	6.3	1
6.3	3	●	N	MZE0630MA	20.0	42.1	42.1	82.1	81	1.1	6.3	1
6.4	2	●	N	MZE0640SA	14.0	32.2	32.2	71.2	70	1.2	6.4	1
6.4	3	●	N	MZE0640MA	20.4	42.2	42.2	82.2	81	1.2	6.4	1
6.5	2	●	N	MZE0650SA	14.2	32.2	32.2	71.2	70	1.2	6.5	1
6.5	3	●	N	MZE0650MA	20.7	42.2	42.2	82.2	81	1.2	6.5	1
6.6	2	●	N	MZE0660SA	14.4	32.2	32.2	71.2	70	1.2	6.6	1
6.6	3	●	N	MZE0660MA	21.0	44.2	44.2	84.2	83	1.2	6.6	1
6.7	2	●	N	MZE0670SA	14.6	32.2	32.2	71.2	70	1.2	6.7	1
6.7	3	●	N	MZE0670MA	21.3	44.2	44.2	84.2	83	1.2	6.7	1
6.8	2	●	N	MZE0680SA	14.8	35.2	35.2	75.2	74	1.2	6.8	1
6.8	3	●	N	MZE0680MA	21.6	44.2	44.2	84.2	83	1.2	6.8	1
6.9	2	●	N	MZE0690SA	15.1	35.3	35.3	75.3	74	1.3	6.9	1
6.9	3	●	N	MZE0690MA	22.0	44.3	44.3	84.3	83	1.3	6.9	1
7.0	2	●	N	MZE0700SA	15.3	35.3	35.3	75.3	74	1.3	7.0	1
7.0	3	●	N	MZE0700MA	22.3	44.3	44.3	84.3	83	1.3	7.0	1
7.1	2	●	N	MZE0710SA	15.5	35.3	35.3	75.3	74	1.3	7.1	1
7.1	3	●	N	MZE0710MA	22.6	46.3	46.3	88.3	87	1.3	7.1	1
7.2	2	●	N	MZE0720SA	15.7	35.3	35.3	75.3	74	1.3	7.2	1
7.2	3	●	N	MZE0720MA	22.9	46.3	46.3	88.3	87	1.3	7.2	1
7.3	2	●	N	MZE0730SA	15.9	35.3	35.3	75.3	74	1.3	7.3	1
7.3	3	●	N	MZE0730MA	23.2	46.3	46.3	88.3	87	1.3	7.3	1
7.4	2	●	N	MZE0740SA	16.1	35.3	35.3	75.3	74	1.3	7.4	1
7.4	3	●	N	MZE0740MA	23.5	46.3	46.3	88.3	87	1.3	7.4	1
7.5	2	●	N	MZE0750SA	16.4	35.4	35.4	75.4	74	1.4	7.5	1
7.5	3	●	N	MZE0750MA	23.9	46.4	46.4	88.4	87	1.4	7.5	1
7.6	2	●	N	MZE0760SA	16.6	38.4	38.4	80.4	79	1.4	7.6	1
7.6	3	●	N	MZE0760MA	24.2	49.4	49.4	91.4	90	1.4	7.6	1
7.7	2	●	N	MZE0770SA	16.8	38.4	38.4	80.4	79	1.4	7.7	1
7.7	3	●	N	MZE0770MA	24.5	49.4	49.4	91.4	90	1.4	7.7	1

MZE/MZS

DC(mm)	Hole Depth(l/d)	VP15TF	Coolant (Int./Ext.)	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
7.8	2	●	N	MZE0780SA	17.0	38.4	38.4	80.4	79	1.4	7.8	1
7.8	3	●	N	MZE0780MA	24.8	49.4	49.4	91.4	90	1.4	7.8	1
7.9	2	●	N	MZE0790SA	17.2	38.4	38.4	80.4	79	1.4	7.9	1
7.9	3	●	N	MZE0790MA	25.1	49.4	49.4	91.4	90	1.4	7.9	1
8.0	2	●	N	MZE0800SA	17.5	38.5	38.5	80.5	79	1.5	8.0	1
8.0	3	●	N	MZE0800MA	25.5	49.5	49.5	91.5	90	1.5	8.0	1
8.1	2	●	N	MZE0810SA	17.7	38.5	38.5	80.5	79	1.5	8.1	1
8.1	3	●	N	MZE0810MA	25.8	54.5	54.5	97.5	96	1.5	8.1	1
8.2	2	●	N	MZE0820SA	17.9	38.5	38.5	80.5	79	1.5	8.2	1
8.2	3	●	N	MZE0820MA	26.1	54.5	54.5	97.5	96	1.5	8.2	1
8.3	2	●	N	MZE0830SA	18.1	38.5	38.5	80.5	79	1.5	8.3	1
8.3	3	●	N	MZE0830MA	26.4	54.5	54.5	97.5	96	1.5	8.3	1
8.4	2	●	N	MZE0840SA	18.3	38.5	38.5	80.5	79	1.5	8.4	1
8.4	3	●	N	MZE0840MA	26.7	54.5	54.5	97.5	96	1.5	8.4	1
8.5	2	●	N	MZE0850SA	18.5	38.5	38.5	80.5	79	1.5	8.5	1
8.5	3	●	N	MZE0850MA	27.0	54.5	54.5	97.5	96	1.5	8.5	1
8.6	2	●	N	MZE0860SA	18.8	41.6	41.6	85.6	84	1.6	8.6	1
8.6	3	●	N	MZE0860MA	27.4	56.6	56.6	99.6	98	1.6	8.6	1
8.7	2	●	N	MZE0870SA	19.0	41.6	41.6	85.6	84	1.6	8.7	1
8.7	3	●	N	MZE0870MA	27.7	56.6	56.6	99.6	98	1.6	8.7	1
8.8	2	●	N	MZE0880SA	19.2	41.6	41.6	85.6	84	1.6	8.8	1
8.8	3	●	N	MZE0880MA	28.0	56.6	56.6	99.6	98	1.6	8.8	1
8.9	2	●	N	MZE0890SA	19.4	41.6	41.6	85.6	84	1.6	8.9	1
8.9	3	●	N	MZE0890MA	28.3	56.6	56.6	99.6	98	1.6	8.9	1
9.0	2	●	N	MZE0900SA	19.6	41.6	41.6	85.6	84	1.6	9.0	1
9.0	3	●	N	MZE0900MA	28.6	56.6	56.6	99.6	98	1.6	9.0	1
9.1	2	●	N	MZE0910SA	19.9	41.7	41.7	85.7	84	1.7	9.1	1
9.1	3	●	N	MZE0910MA	29.0	59.7	59.7	103.7	102	1.7	9.1	1
9.2	2	●	N	MZE0920SA	20.1	41.7	41.7	85.7	84	1.7	9.2	1
9.2	3	●	N	MZE0920MA	29.3	59.7	59.7	103.7	102	1.7	9.2	1
9.3	2	●	N	MZE0930SA	20.3	41.7	41.7	85.7	84	1.7	9.3	1
9.3	3	●	N	MZE0930MA	29.6	59.7	59.7	103.7	102	1.7	9.3	1
9.4	2	●	N	MZE0940SA	20.5	41.7	41.7	85.7	84	1.7	9.4	1
9.4	3	●	N	MZE0940MA	29.9	59.7	59.7	103.7	102	1.7	9.4	1
9.5	2	●	N	MZE0950SA	20.7	41.7	41.7	85.7	84	1.7	9.5	1
9.5	3	●	N	MZE0950MA	30.2	59.7	59.7	103.7	102	1.7	9.5	1
9.6	2	●	N	MZE0960SA	20.9	44.7	44.7	90.7	89	1.7	9.6	1
9.6	3	●	N	MZE0960MA	30.5	61.7	61.7	106.7	105	1.7	9.6	1
9.7	2	●	N	MZE0970SA	21.2	44.8	44.8	90.8	89	1.8	9.7	1
9.7	3	●	N	MZE0970MA	30.9	61.8	61.8	106.8	105	1.8	9.7	1
9.8	2	●	N	MZE0980SA	21.4	44.8	44.8	90.8	89	1.8	9.8	1
9.8	3	●	N	MZE0980MA	31.2	61.8	61.8	106.8	105	1.8	9.8	1
9.9	2	●	N	MZE0990SA	21.6	44.8	44.8	90.8	89	1.8	9.9	1
9.9	3	●	N	MZE0990MA	31.5	61.8	61.8	106.8	105	1.8	9.9	1
10.0	2	●	N	MZE1000SA	21.8	44.8	44.8	90.8	89	1.8	10.0	1
10.0	3	●	N	MZE1000MA	31.8	61.8	61.8	106.8	105	1.8	10.0	1
10.1	2	●	N	MZE1010SA	22.0	44.8	44.8	90.8	89	1.8	10.1	1
10.1	3	●	N	MZE1010MA	32.1	67.8	67.8	113.8	112	1.8	10.1	1
10.2	2	●	N	MZE1020SA	22.3	44.9	44.9	90.9	89	1.9	10.2	1
10.2	3	●	N	MZE1020MA	32.5	67.9	67.9	113.9	112	1.9	10.2	1
10.3	2	●	N	MZE1030SA	22.5	44.9	44.9	90.9	89	1.9	10.3	1
10.3	3	●	N	MZE1030MA	32.8	67.9	67.9	113.9	112	1.9	10.3	1
10.4	2	●	N	MZE1040SA	22.7	44.9	44.9	90.9	89	1.9	10.4	1
10.4	3	●	N	MZE1040MA	33.1	67.9	67.9	113.9	112	1.9	10.4	1
10.5	2	●	N	MZE1050SA	22.9	44.9	44.9	90.9	89	1.9	10.5	1
10.5	3	●	N	MZE1050MA	33.4	67.9	67.9	113.9	112	1.9	10.5	1
10.6	2	●	N	MZE1060SA	23.1	44.9	44.9	90.9	89	1.9	10.6	1
10.6	3	●	N	MZE1060MA	33.7	69.9	69.9	115.9	114	1.9	10.6	1
10.7	2	●	N	MZE1070SA	23.3	48.9	48.9	96.9	95	1.9	10.7	1
10.7	3	●	N	MZE1070MA	34.0	69.9	69.9	115.9	114	1.9	10.7	1
10.8	2	●	N	MZE1080SA	23.6	49.0	49.0	97.0	95	2.0	10.8	1
10.8	3	●	N	MZE1080MA	34.4	70.0	70.0	116.0	114	2.0	10.8	1
10.9	2	●	N	MZE1090SA	23.8	49.0	49.0	97.0	95	2.0	10.9	1
10.9	3	●	N	MZE1090MA	34.7	70.0	70.0	116.0	114	2.0	10.9	1
11.0	2	●	N	MZE1100SA	24.0	49.0	49.0	97.0	95	2.0	11.0	1
11.0	3	●	N	MZE1100MA	35.0	70.0	70.0	116.0	114	2.0	11.0	1
11.1	2	●	N	MZE1110SA	24.2	49.0	49.0	97.0	95	2.0	11.1	1
11.1	3	●	N	MZE1110MA	35.3	73.0	73.0	120.0	118	2.0	11.1	1
11.2	2	●	N	MZE1120SA	24.4	49.0	49.0	97.0	95	2.0	11.2	1
11.2	3	●	N	MZE1120MA	35.6	73.0	73.0	120.0	118	2.0	11.2	1
11.3	2	●	N	MZE1130SA	24.7	49.1	49.1	97.1	95	2.1	11.3	1
11.3	3	●	N	MZE1130MA	36.0	73.1	73.1	120.1	118	2.1	11.3	1
11.4	2	●	N	MZE1140SA	24.9	49.1	49.1	97.1	95	2.1	11.4	1
11.4	3	●	N	MZE1140MA	36.3	73.1	73.1	120.1	118	2.1	11.4	1
11.5	2	●	N	MZE1150SA	25.1	49.1	49.1	97.1	95	2.1	11.5	1
11.5	3	●	N	MZE1150MA	36.6	73.1	73.1	120.1	118	2.1	11.5	1
11.6	2	●	N	MZE1160SA	25.3	49.1	49.1	97.1	95	2.1	11.6	1
11.6	3	●	N	MZE1160MA	36.9	75.1	75.1	123.1	121	2.1	11.6	1
11.7	2	●	N	MZE1170SA	25.5	49.1	49.1	97.1	95	2.1	11.7	1
11.7	3	●	N	MZE1170MA	37.2	75.1	75.1	123.1	121	2.1	11.7	1
11.8	2	●	N	MZE1180SA	25.7	49.1	49.1	97.1	95	2.1	11.8	1
11.8	3	●	N	MZE1180MA	37.5	75.1	75.1	123.1	121	2.1	11.8	1
11.9	2	●	N	MZE1190SA	26.0	53.2	53.2	104.2	102	2.2	11.9	1
11.9	3	●	N	MZE1190MA	37.9	75.2	75.2	123.2	121	2.2	11.9	1
12.0	2	●	N	MZE1200SA	26.2	53.2	53.2	104.2	102	2.2	12.0	1
12.0	3	●	N	MZE1200MA	38.2	75.2	75.2	123.2	121	2.2	12.0	1
12.1	2	●	N	MZE1210SA	26.4	53.2	53.2	104.2	102	2.2	12.1	1
12.1	3	●	N	MZE1210MA	38.5	78.2	78.2	137.2	135	2.2	12.1	1
12.2	2	●	N	MZE1220SA	26.6	53.2	53.2	104.2	102	2.2	12.2	1
12.2	3	●	N	MZE1220MA	38.8	78.2	78.2	137.2	135	2.2	12.2	1
12.3	2	●	N	MZE1230SA	26.8	53.2	53.2	104.2	102	2.2	12.3	1
12.3	3	●	N	MZE1230MA	39.1	78.2	78.2	137.2	135	2.2	12.3	1
12.4	2	●	N	MZE1240SA	27.1	53.3	53.3	104.3	102	2.3	12.4	1
12.4	3	●	N	MZE1240MA	39.5	78.3	78.3	137.3	135	2.3	12.4	1
12.5	2	●	N	MZE1250SA	27.3	53.3	53.3	104.3	102	2.3	12.5	1
12.5	3	●	N	MZE1250MA	39.8	78.3	78.3	137.3	135	2.3	12.5	1
12.6	2	●	N	MZE1260SA	27.5	53.3	53.3	104.3	102	2.3	12.6	1
12.6	3	●	N	MZE1260MA	40.1	80.3	80.3	139.3	137	2.3	12.6	1
12.7	2	●	N	MZE1270SA	27.7	53.3	53.3	104.3	102	2.3	12.7	1
12.7	3	●	N	MZE1270MA	40.4	80.3	80.3	139.3	137	2.3	12.7	1
12.8	2	●	N	MZE1280SA	27.9	53.3	53.3	104.3	102	2.3	12.8	1
12.8	3	●	N	MZE1280MA	40.7	80.3	80.3	139.3	137	2.3	12.8	1
12.9	2	●	N	MZE1290SA	28.1	53.3	53.3	104.3	102	2.3	12.9	1
12.9	3	●	N	MZE1290MA	41.0	80.3	80.3	139.3	137	2.3	12.9	1
13.0	2	●	N	MZE1300SA	28.4	53.4	53.4	104.4	102	2.4	13.0	1
13.0	3	●	N	MZE1300MA	41.4	80.4	80.4	139.4	137	2.4	13.0	1
13.1	2	●	N	MZE1310SA	28.6	53.4	53.4	104.4	102	2.4	13.1	1
13.1	3	●	N	MZE1310MA	41.7	86.4	86.4	146.4	144	2.4	13.1	1

MZE/MZS

DC(mm)	Hole Depth(l/d)	VP15TF	Coolant (Int./Ext.)	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
13.2	2	●	N	MZE1320SA	28.8	53.4	53.4	104.4	102	2.4	13.2	1
13.2	3	●	N	MZE1320MA	42.0	86.4	86.4	146.4	144	2.4	13.2	1
13.3	2	●	N	MZE1330SA	29.0	56.4	56.4	109.4	107	2.4	13.3	1
13.3	3	●	N	MZE1330MA	42.3	86.4	86.4	146.4	144	2.4	13.3	1
13.4	2	●	N	MZE1340SA	29.2	56.4	56.4	109.4	107	2.4	13.4	1
13.4	3	●	N	MZE1340MA	42.6	86.4	86.4	146.4	144	2.4	13.4	1
13.5	2	●	N	MZE1350SA	29.5	56.5	56.5	109.5	107	2.5	13.5	1
13.5	3	●	N	MZE1350MA	43.0	86.5	86.5	146.5	144	2.5	13.5	1
13.6	2	●	N	MZE1360SA	29.7	56.5	56.5	109.5	107	2.5	13.6	1
13.6	3	●	N	MZE1360MA	43.3	88.5	88.5	149.5	147	2.5	13.6	1
13.7	2	●	N	MZE1370SA	29.9	56.5	56.5	109.5	107	2.5	13.7	1
13.7	3	●	N	MZE1370MA	43.6	88.5	88.5	149.5	147	2.5	13.7	1
13.8	2	●	N	MZE1380SA	30.1	56.5	56.5	109.5	107	2.5	13.8	1
13.8	3	●	N	MZE1380MA	43.9	88.5	88.5	149.5	147	2.5	13.8	1
13.9	2	●	N	MZE1390SA	30.3	56.5	56.5	109.5	107	2.5	13.9	1
13.9	3	●	N	MZE1390MA	44.2	88.5	88.5	149.5	147	2.5	13.9	1
14.0	2	●	N	MZE1400SA	30.5	56.5	56.5	109.5	107	2.5	14.0	1
14.0	3	●	N	MZE1400MA	44.5	88.5	88.5	149.5	147	2.5	14.0	1
14.1	2	●	N	MZE1410SA	30.8	58.6	58.6	113.6	111	2.6	14.1	1
14.1	3	●	N	MZE1410MA	44.9	91.6	91.6	153.6	151	2.6	14.1	1
14.2	2	●	N	MZE1420SA	31.0	58.6	58.6	113.6	111	2.6	14.2	1
14.2	3	●	N	MZE1420MA	45.2	91.6	91.6	153.6	151	2.6	14.2	1
14.3	2	□	N	MZE1430SA	31.2	58.6	58.6	113.6	111	2.6	14.3	1
14.3	3	●	N	MZE1430MA	45.5	91.6	91.6	153.6	151	2.6	14.3	1
14.4	2	□	N	MZE1440SA	31.4	58.6	58.6	113.6	111	2.6	14.4	1
14.4	3	●	N	MZE1440MA	45.8	91.6	91.6	153.6	151	2.6	14.4	1
14.5	2	●	N	MZE1450SA	31.6	58.6	58.6	113.6	111	2.6	14.5	1
14.5	3	●	N	MZE1450MA	46.1	91.6	91.6	153.6	151	2.6	14.5	1
14.6	2	□	N	MZE1460SA	31.9	58.7	58.7	113.7	111	2.7	14.6	1
14.6	3	●	N	MZE1460MA	46.5	93.7	93.7	155.7	153	2.7	14.6	1
14.7	2	□	N	MZE1470SA	32.1	58.7	58.7	113.7	111	2.7	14.7	1
14.7	3	●	N	MZE1470MA	46.8	93.7	93.7	155.7	153	2.7	14.7	1
14.8	2	□	N	MZE1480SA	32.3	58.7	58.7	113.7	111	2.7	14.8	1
14.8	3	●	N	MZE1480MA	47.1	93.7	93.7	155.7	153	2.7	14.8	1
14.9	2	□	N	MZE1490SA	32.5	58.7	58.7	113.7	111	2.7	14.9	1
14.9	3	●	N	MZE1490MA	47.4	93.7	93.7	155.7	153	2.7	14.9	1
15.0	2	●	N	MZE1500SA	32.7	58.7	58.7	113.7	111	2.7	15.0	1
15.0	3	●	N	MZE1500MA	47.7	93.7	93.7	155.7	153	2.7	15.0	1
15.1	2	□	N	MZE1510SA	32.9	60.7	60.7	117.7	115	2.7	15.1	1
15.1	3	●	N	MZE1510MA	48.0	96.7	96.7	159.7	157	2.7	15.1	1
15.2	2	●	N	MZE1520SA	33.2	60.8	60.8	117.8	115	2.8	15.2	1
15.2	3	●	N	MZE1520MA	48.4	96.8	96.8	159.8	157	2.8	15.2	1
15.3	2	□	N	MZE1530SA	33.4	60.8	60.8	117.8	115	2.8	15.3	1
15.3	3	●	N	MZE1530MA	48.7	96.8	96.8	159.8	157	2.8	15.3	1
15.4	2	□	N	MZE1540SA	33.6	60.8	60.8	117.8	115	2.8	15.4	1
15.4	3	●	N	MZE1540MA	49.0	96.8	96.8	159.8	157	2.8	15.4	1
15.5	2	●	N	MZE1550SA	33.8	60.8	60.8	117.8	115	2.8	15.5	1
15.5	3	●	N	MZE1550MA	49.3	96.8	96.8	159.8	157	2.8	15.5	1
15.6	2	□	N	MZE1560SA	34.0	60.8	60.8	117.8	115	2.8	15.6	1
15.6	3	●	N	MZE1560MA	49.6	98.8	98.8	162.8	160	2.8	15.6	1
15.7	2	□	N	MZE1570SA	34.3	60.9	60.9	117.9	115	2.9	15.7	1
15.7	3	●	N	MZE1570MA	50.0	98.9	98.9	162.9	160	2.9	15.7	1
15.8	2	□	N	MZE1580SA	34.5	60.9	60.9	117.9	115	2.9	15.8	1
15.8	3	●	N	MZE1580MA	50.3	98.9	98.9	162.9	160	2.9	15.8	1
15.9	2	□	N	MZE1590SA	34.7	60.9	60.9	117.9	115	2.9	15.9	1
15.9	3	●	N	MZE1590MA	50.6	98.9	98.9	162.9	160	2.9	15.9	1
16.0	2	●	N	MZE1600SA	34.9	60.9	60.9	117.9	115	2.9	16.0	1
16.0	3	●	N	MZE1600MA	50.9	98.9	98.9	162.9	160	2.9	16.0	1
16.1	2	□	N	MZE1610SA	35.1	62.9	62.9	121.9	119	2.9	16.1	1
16.1	3	□	N	MZE1610MA	51.2	104.9	104.9	169.9	167	2.9	16.1	1
16.2	2	●	N	MZE1620SA	35.3	62.9	62.9	121.9	119	2.9	16.2	1
16.2	3	□	N	MZE1620MA	51.5	104.9	104.9	169.9	167	2.9	16.2	1
16.3	2	●	N	MZE1630SA	35.6	63.0	63.0	122.0	119	3.0	16.3	1
16.3	3	□	N	MZE1630MA	51.9	105.0	105.0	170.0	167	3.0	16.3	1
16.4	2	□	N	MZE1640SA	35.8	63.0	63.0	122.0	119	3.0	16.4	1
16.4	3	□	N	MZE1640MA	52.2	105.0	105.0	170.0	167	3.0	16.4	1
16.5	2	●	N	MZE1650SA	36.0	63.0	63.0	122.0	119	3.0	16.5	1
16.5	3	●	N	MZE1650MA	52.5	105.0	105.0	170.0	167	3.0	16.5	1
16.6	2	□	N	MZE1660SA	36.2	63.0	63.0	122.0	119	3.0	16.6	1
16.6	3	□	N	MZE1660MA	52.8	105.0	105.0	170.0	167	3.0	16.6	1
16.7	2	□	N	MZE1670SA	36.4	63.0	63.0	122.0	119	3.0	16.7	1
16.7	3	□	N	MZE1670MA	53.1	105.0	105.0	170.0	167	3.0	16.7	1
16.8	2	□	N	MZE1680SA	36.7	63.1	63.1	122.1	119	3.1	16.8	1
16.8	3	□	N	MZE1680MA	53.5	105.1	105.1	170.1	167	3.1	16.8	1
16.9	2	□	N	MZE1690SA	36.9	63.1	63.1	122.1	119	3.1	16.9	1
16.9	3	□	N	MZE1690MA	53.8	105.1	105.1	170.1	167	3.1	16.9	1
17.0	2	●	N	MZE1700SA	37.1	63.1	63.1	122.1	119	3.1	17.0	1
17.0	3	●	N	MZE1700MA	54.1	105.1	105.1	170.1	167	3.1	17.0	1
17.1	2	□	N	MZE1710SA	37.3	65.1	65.1	126.1	123	3.1	17.1	1
17.1	3	□	N	MZE1710MA	54.4	105.1	105.1	170.1	167	3.1	17.1	1
17.2	2	□	N	MZE1720SA	37.5	65.1	65.1	126.1	123	3.1	17.2	1
17.2	3	□	N	MZE1720MA	54.7	105.1	105.1	170.1	167	3.1	17.2	1
17.3	2	□	N	MZE1730SA	37.7	65.1	65.1	126.1	123	3.1	17.3	1
17.3	3	□	N	MZE1730MA	55.0	105.1	105.1	170.1	167	3.1	17.3	1
17.4	2	□	N	MZE1740SA	38.0	65.2	65.2	126.2	123	3.2	17.4	1
17.4	3	□	N	MZE1740MA	55.4	105.2	105.2	170.2	167	3.2	17.4	1
17.5	2	●	N	MZE1750SA	38.2	65.2	65.2	126.2	123	3.2	17.5	1
17.5	3	●	N	MZE1750MA	55.7	105.2	105.2	170.2	167	3.2	17.5	1
17.6	2	□	N	MZE1760SA	38.4	65.2	65.2	126.2	123	3.2	17.6	1
17.6	3	□	N	MZE1760MA	56.0	105.2	105.2	170.2	167	3.2	17.6	1
17.7	2	□	N	MZE1770SA	38.6	65.2	65.2	126.2	123	3.2	17.7	1
17.7	3	□	N	MZE1770MA	56.3	105.2	105.2	170.2	167	3.2	17.7	1
17.8	2	●	N	MZE1780SA	38.8	65.2	65.2	126.2	123	3.2	17.8	1
17.8	3	□	N	MZE1780MA	56.6	105.2	105.2	170.2	167	3.2	17.8	1
17.9	2	□	N	MZE1790SA	39.1	65.3	65.3	126.3	123	3.3	17.9	1
17.9	3	□	N	MZE1790MA	57.0	105.3	105.3	170.3	167	3.3	17.9	1
18.0	2	●	N	MZE1800SA	39.3	65.3	65.3	126.3	123	3.3	18.0	1
18.0	3	●	N	MZE1800MA	57.3	105.3	105.3	170.3	167	3.3	18.0	1
18.1	2	□	N	MZE1810SA	39.5	67.3	67.3	130.3	127	3.3	18.1	1
18.1	3	□	N	MZE1810MA	57.6	117.3	117.3	182.3	179	3.3	18.1	1
18.2	2	□	N	MZE1820SA	39.7	67.3	67.3	130.3	127	3.3	18.2	1
18.2	3	□	N	MZE1820MA	57.9	117.3	117.3	182.3	179	3.3	18.2	1
18.3	2	□	N	MZE1830SA	39.9	67.3	67.3	130.3	127	3.3	18.3	1
18.3	3	□	N	MZE1830MA	58.2	117.3	117.3	182.3	179	3.3	18.3	1
18.4	2	□	N	MZE1840SA	40.1	67.3	67.3	130.3	127	3.3	18.4	1
18.4	3	□	N	MZE1840MA	58.5	117.3	117.3	182.3	179	3.3	18.4	1
18.5	2	●	N	MZE1850SA	40.4	67.4	67.4	130.4	127	3.4	18.5	1
18.5	3	●	N	MZE1850MA	58.9	117.4	117.4	182.4	179	3.4	18.5	1

MZE/MZS

DC(mm)	Hole Depth(l/d)	VP15TF	Coolant (Int./Ext.)	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
18.6	2	□	N	**MZE1860SA**	40.6	67.4	67.4	130.4	127	3.4	18.6	1
18.6	3	□	N	**MZE1860MA**	59.2	117.4	117.4	182.4	179	3.4	18.6	1
18.7	2	□	N	**MZE1870SA**	40.8	67.4	67.4	130.4	127	3.4	18.7	1
18.7	3	□	N	**MZE1870MA**	59.5	117.4	117.4	182.4	179	3.4	18.7	1
18.8	2	□	N	**MZE1880SA**	41.0	67.4	67.4	130.4	127	3.4	18.8	1
18.8	3	□	N	**MZE1880MA**	59.8	117.4	117.4	182.4	179	3.4	18.8	1
18.9	2	□	N	**MZE1890SA**	41.2	67.4	67.4	130.4	127	3.4	18.9	1
18.9	3	□	N	**MZE1890MA**	60.1	117.4	117.4	182.4	179	3.4	18.9	1
19.0	2	●	N	**MZE1900SA**	41.5	67.5	67.5	130.5	127	3.5	19.0	1
19.0	3	●	N	**MZE1900MA**	60.5	117.5	117.5	182.5	179	3.5	19.0	1
19.1	2	□	N	**MZE1910SA**	41.7	69.5	69.5	134.5	131	3.5	19.1	1
19.1	3	□	N	**MZE1910MA**	60.8	117.5	117.5	182.5	179	3.5	19.1	1
19.2	2	□	N	**MZE1920SA**	41.9	69.5	69.5	134.5	131	3.5	19.2	1
19.2	3	□	N	**MZE1920MA**	61.1	117.5	117.5	182.5	179	3.5	19.2	1
19.3	2	□	N	**MZE1930SA**	42.1	69.5	69.5	134.5	131	3.5	19.3	1
19.3	3	□	N	**MZE1930MA**	61.4	117.5	117.5	182.5	179	3.5	19.3	1
19.4	2	□	N	**MZE1940SA**	42.3	69.5	69.5	134.5	131	3.5	19.4	1
19.4	3	□	N	**MZE1940MA**	61.7	117.5	117.5	182.5	179	3.5	19.4	1
19.5	2	●	N	**MZE1950SA**	42.5	69.5	69.5	134.5	131	3.5	19.5	1
19.5	3	●	N	**MZE1950MA**	62.0	117.5	117.5	182.5	179	3.5	19.5	1
19.6	2	□	N	**MZE1960SA**	42.8	69.6	69.6	134.6	131	3.6	19.6	1
19.6	3	□	N	**MZE1960MA**	62.4	117.6	117.6	182.6	179	3.6	19.6	1
19.7	2	□	N	**MZE1970SA**	43.0	69.6	69.6	134.6	131	3.6	19.7	1
19.7	3	□	N	**MZE1970MA**	62.7	117.6	117.6	182.6	179	3.6	19.7	1
19.8	2	□	N	**MZE1980SA**	43.2	69.6	69.6	134.6	131	3.6	19.8	1
19.8	3	□	N	**MZE1980MA**	63.0	117.6	117.6	182.6	179	3.6	19.8	1
19.9	2	□	N	**MZE1990SA**	43.4	69.6	69.6	134.6	131	3.6	19.9	1
19.9	3	□	N	**MZE1990MA**	63.3	117.6	117.6	182.6	179	3.6	19.9	1
20.0	2	●	N	**MZE2000SA**	43.6	69.6	69.6	134.6	131	3.6	20.0	1
20.0	3	●	N	**MZE2000MA**	63.6	117.6	117.6	182.6	179	3.6	20.0	1
1.0	5	●	Y	**MZS0100LB**	5.2	11.2	15.2	55.2	55	0.2	3.0	4
1.0	12	□	Y	**MZS0100XB**	12.2	23.2	27.2	55.2	55	0.2	3.0	4
1.1	5	●	Y	**MZS0110LB**	5.7	17.2	21.2	55.2	55	0.2	3.0	4
1.1	12	□	Y	**MZS0110XB**	13.4	23.2	27.2	55.2	55	0.2	3.0	4
1.2	5	●	Y	**MZS0120LB**	6.2	17.2	20.2	55.2	55	0.2	3.0	4
1.2	12	□	Y	**MZS0120XB**	14.6	23.2	26.2	55.2	55	0.2	3.0	4
1.3	5	●	Y	**MZS0130LB**	6.7	17.2	20.2	55.2	55	0.2	3.0	4
1.3	12	□	Y	**MZS0130XB**	15.8	23.2	26.2	55.2	55	0.2	3.0	4
1.4	5	●	Y	**MZS0140LB**	7.3	17.3	20.3	55.3	55	0.3	3.0	4
1.4	12	□	Y	**MZS0140XB**	17.1	23.3	26.3	55.3	55	0.3	3.0	4
1.5	5	●	Y	**MZS0150LB**	7.8	17.3	20.3	55.3	55	0.3	3.0	4
1.5	12	□	Y	**MZS0150XB**	18.3	23.3	26.3	55.3	55	0.3	3.0	4
1.6	5	●	Y	**MZS0160LB**	8.3	22.3	25.3	68.3	68	0.3	3.0	4
1.6	12	□	Y	**MZS0160XB**	19.5	30.3	33.3	68.3	68	0.3	3.0	4
1.7	5	●	Y	**MZS0170LB**	8.8	22.3	24.3	68.3	68	0.3	3.0	4
1.7	12	□	Y	**MZS0170XB**	20.7	30.3	32.3	68.3	68	0.3	3.0	4
1.8	5	●	Y	**MZS0180LB**	9.3	22.3	24.3	68.3	68	0.3	3.0	4
1.8	12	□	Y	**MZS0180XB**	21.9	30.3	32.3	68.3	68	0.3	3.0	4
1.9	5	●	Y	**MZS0190LB**	9.8	22.3	24.3	68.3	68	0.3	3.0	4
1.9	12	□	Y	**MZS0190XB**	23.1	30.3	32.3	68.3	68	0.3	3.0	4
2.0	3	●	Y	**MZS0200MB**	6.4	16.4	18.4	62.4	62	0.4	3.0	4
2.0	5	●	Y	**MZS0200LB**	10.4	22.4	24.4	68.4	68	0.4	3.0	4
2.0	12	□	Y	**MZS0200XB**	24.4	30.4	32.4	68.4	68	0.4	3.0	4
2.1	3	●	Y	**MZS0210MB**	6.7	20.4	22.4	66.4	66	0.4	3.0	4

DC(mm)	Hole Depth(l/d)	VP15TF	Coolant (Int./Ext.)	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
2.1	5	●	Y	**MZS0210LB**	10.9	28.4	30.4	74.4	74	0.4	3.0	4
2.1	12	□	Y	**MZS0210XB**	25.6	38.4	40.4	74.4	74	0.4	3.0	4
2.2	3	●	Y	**MZS0220MB**	7.0	20.4	21.4	66.4	66	0.4	3.0	4
2.2	5	●	Y	**MZS0220LB**	11.4	28.4	29.4	74.4	74	0.4	3.0	4
2.2	12	□	Y	**MZS0220XB**	26.8	38.4	39.4	74.4	74	0.4	3.0	4
2.3	3	●	Y	**MZS0230MB**	7.3	20.4	21.4	66.4	66	0.4	3.0	4
2.3	5	●	Y	**MZS0230LB**	11.9	28.4	29.4	74.4	74	0.4	3.0	4
2.3	12	□	Y	**MZS0230XB**	28.0	38.4	39.4	74.4	74	0.4	3.0	4
2.4	3	●	Y	**MZS0240MB**	7.6	20.4	21.4	66.4	66	0.4	3.0	4
2.4	5	●	Y	**MZS0240LB**	12.4	28.4	29.4	74.4	74	0.4	3.0	4
2.4	12	□	Y	**MZS0240XB**	29.2	38.4	39.4	74.4	74	0.4	3.0	4
2.5	3	●	Y	**MZS0250MB**	8.0	20.5	21.5	66.5	66	0.5	3.0	4
2.5	5	●	Y	**MZS0250LB**	13.0	28.5	29.5	74.5	74	0.5	3.0	4
2.5	12	□	Y	**MZS0250XB**	30.5	38.5	39.5	74.5	74	0.5	3.0	4
2.6	3	●	Y	**MZS0260MB**	8.3	24.5	24.5	72.5	72	0.5	3.0	3
2.6	5	●	Y	**MZS0260LB**	13.5	33.5	33.5	81.5	81	0.5	3.0	3
2.6	12	□	Y	**MZS0260XB**	31.7	45.5	45.5	81.5	81	0.5	3.0	3
2.7	3	●	Y	**MZS0270MB**	8.6	24.5	24.5	72.5	72	0.5	3.0	3
2.7	5	●	Y	**MZS0270LB**	14.0	33.5	33.5	81.5	81	0.5	3.0	3
2.7	12	□	Y	**MZS0270XB**	32.9	45.5	45.5	81.5	81	0.5	3.0	3
2.8	3	●	Y	**MZS0280MB**	8.9	24.5	24.5	72.5	72	0.5	3.0	3
2.8	5	●	Y	**MZS0280LB**	14.5	33.5	33.5	81.5	81	0.5	3.0	3
2.8	12	□	Y	**MZS0280XB**	34.1	45.5	45.5	81.5	81	0.5	3.0	3
2.9	3	●	Y	**MZS0290MB**	9.2	24.5	24.5	72.5	72	0.5	3.0	3
2.9	5	●	Y	**MZS0290LB**	15.0	33.5	33.5	81.5	81	0.5	3.0	3
2.9	12	□	Y	**MZS0290XB**	35.3	45.5	45.5	81.5	81	0.5	3.0	3
3.0	3	●	Y	**MZS0300MB**	9.5	24.5	24.5	72.5	72	0.5	3.0	3
3.0	5	●	Y	**MZS0300LB**	15.5	33.5	33.5	81.5	81	0.5	3.0	3
3.1	3	●	Y	**MZS0310MB**	9.9	28.6	28.6	76.6	76	0.6	4.0	3
3.1	5	●	Y	**MZS0310LB**	16.1	39.6	39.6	87.6	87	0.6	4.0	3
3.2	3	●	Y	**MZS0320MB**	10.2	28.6	28.6	76.6	76	0.6	4.0	3
3.2	5	●	Y	**MZS0320LB**	16.6	39.6	39.6	87.6	87	0.6	4.0	3
3.3	3	●	Y	**MZS0330MB**	10.5	28.6	28.6	76.6	76	0.6	4.0	3
3.3	5	●	Y	**MZS0330LB**	17.1	39.6	39.6	87.6	87	0.6	4.0	3
3.4	3	●	Y	**MZS0340MB**	10.8	28.6	28.6	76.6	76	0.6	4.0	3
3.4	5	●	Y	**MZS0340LB**	17.6	39.6	39.6	87.6	87	0.6	4.0	3
3.5	3	●	Y	**MZS0350MB**	11.1	28.6	28.6	76.6	76	0.6	4.0	3
3.5	5	●	Y	**MZS0350LB**	18.1	39.6	39.6	87.6	87	0.6	4.0	3
3.6	3	●	Y	**MZS0360MB**	11.5	32.7	32.7	80.7	80	0.7	4.0	3
3.6	5	●	Y	**MZS0360LB**	18.7	44.7	44.7	92.7	92	0.7	4.0	3
3.7	3	●	Y	**MZS0370MB**	11.8	32.7	32.7	80.7	80	0.7	4.0	3
3.7	5	●	Y	**MZS0370LB**	19.2	44.7	44.7	92.7	92	0.7	4.0	3
3.8	3	●	Y	**MZS0380MB**	12.1	32.7	32.7	80.7	80	0.7	4.0	3
3.8	5	●	Y	**MZS0380LB**	19.7	44.7	44.7	92.7	92	0.7	4.0	3
3.9	3	●	Y	**MZS0390MB**	12.4	32.7	32.7	80.7	80	0.7	4.0	3
3.9	5	●	Y	**MZS0390LB**	20.2	44.7	44.7	92.7	92	0.7	4.0	3
4.0	3	●	Y	**MZS0400MB**	12.7	32.7	32.7	80.7	80	0.7	4.0	3
4.0	5	●	Y	**MZS0400LB**	20.7	44.7	44.7	92.7	92	0.7	4.0	3
4.1	3	●	Y	**MZS0410MB**	13.0	36.7	36.7	86.7	86	0.7	5.0	3
4.1	5	●	Y	**MZS0410LB**	21.2	50.7	50.7	100.7	100	0.7	5.0	3
4.2	3	●	Y	**MZS0420MB**	13.4	36.8	36.8	86.8	86	0.8	5.0	3
4.2	5	●	Y	**MZS0420LB**	21.8	50.8	50.8	100.8	100	0.8	5.0	3
4.3	3	●	Y	**MZS0430MB**	13.7	36.8	36.8	86.8	86	0.8	5.0	3
4.3	5	●	Y	**MZS0430LB**	22.3	50.8	50.8	100.8	100	0.8	5.0	3

MZE/MZS

DC(mm)	Hole Depth(l/d)	VP15TF	Coolant (Int./Ext.)	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
4.4	3	●	Y	MZS0440MB	14.0	36.8	36.8	86.8	86	0.8	5.0	3
4.4	5	●	Y	MZS0440LB	22.8	50.8	50.8	100.8	100	0.8	5.0	3
4.5	3	●	Y	MZS0450MB	14.3	36.8	36.8	86.8	86	0.8	5.0	3
4.5	5	●	Y	MZS0450LB	23.3	50.8	50.8	100.8	100	0.8	5.0	3
4.6	3	●	Y	MZS0460MB	14.6	40.8	40.8	90.8	90	0.8	5.0	3
4.6	5	●	Y	MZS0460LB	23.8	55.8	55.8	105.8	105	0.8	5.0	3
4.7	3	●	Y	MZS0470MB	15.0	40.9	40.9	90.9	90	0.9	5.0	3
4.7	5	●	Y	MZS0470LB	24.4	55.9	55.9	105.9	105	0.9	5.0	3
4.8	3	●	Y	MZS0480MB	15.3	40.9	40.9	90.9	90	0.9	5.0	3
4.8	5	●	Y	MZS0480LB	24.9	55.9	55.9	105.9	105	0.9	5.0	3
4.9	3	●	Y	MZS0490MB	15.6	40.9	40.9	90.9	90	0.9	5.0	3
4.9	5	●	Y	MZS0490LB	25.4	55.9	55.9	105.9	105	0.9	5.0	3
5.0	3	●	Y	MZS0500MB	15.9	28.4	30.9	82.9	82	0.9	6.0	3
5.0	5	●	Y	MZS0500LB	25.9	44.9	48.9	100.9	100	0.9	6.0	3
5.1	3	●	Y	MZS0510MB	16.2	28.4	30.9	82.9	82	0.9	6.0	3
5.1	5	●	Y	MZS0510LB	26.4	44.9	48.9	100.9	100	0.9	6.0	3
5.2	3	●	Y	MZS0520MB	16.5	28.4	30.9	82.9	82	0.9	6.0	3
5.2	5	●	Y	MZS0520LB	26.9	44.9	48.9	100.9	100	0.9	6.0	3
5.3	3	●	Y	MZS0530MB	16.9	28.5	31.0	83.0	82	1.0	6.0	3
5.3	5	●	Y	MZS0530LB	27.5	45.0	49.0	101.0	100	1.0	6.0	3
5.4	3	●	Y	MZS0540MB	17.2	28.5	31.0	83.0	82	1.0	6.0	3
5.4	5	●	Y	MZS0540LB	28.0	45.0	49.0	101.0	100	1.0	6.0	3
5.5	3	●	Y	MZS0550MB	17.5	28.5	31.0	83.0	82	1.0	6.0	3
5.5	5	●	Y	MZS0550LB	28.5	45.0	49.0	101.0	100	1.0	6.0	3
5.6	3	●	Y	MZS0560MB	17.8	31.0	31.0	83.0	82	1.0	6.0	3
5.6	5	●	Y	MZS0560LB	29.0	49.0	49.0	101.0	100	1.0	6.0	3
5.7	3	●	Y	MZS0570MB	18.1	31.0	31.0	83.0	82	1.0	6.0	3
5.7	5	●	Y	MZS0570LB	29.5	49.0	49.0	101.0	100	1.0	6.0	3
5.8	3	●	Y	MZS0580MB	18.5	31.1	31.1	83.1	82	1.1	6.0	3
5.8	5	●	Y	MZS0580LB	30.1	49.1	49.1	101.1	100	1.1	6.0	3
5.9	3	●	Y	MZS0590MB	18.8	31.1	31.1	83.1	82	1.1	6.0	3
5.9	5	●	Y	MZS0590LB	30.6	49.1	49.1	101.1	100	1.1	6.0	3
6.0	3	●	Y	MZS0600MB	19.1	31.1	31.1	83.1	82	1.1	6.0	3
6.0	5	●	Y	MZS0600LB	31.1	49.1	49.1	101.1	100	1.1	6.0	3
6.1	3	●	Y	MZS0610MB	19.4	33.6	36.1	89.1	88	1.1	7.0	3
6.1	5	●	Y	MZS0610LB	31.6	53.1	57.1	110.1	109	1.1	7.0	3
6.2	3	●	Y	MZS0620MB	19.7	33.6	36.1	89.1	88	1.1	7.0	3
6.2	5	●	Y	MZS0620LB	32.1	53.1	57.1	110.1	109	1.1	7.0	3
6.3	3	●	Y	MZS0630MB	20.0	33.6	36.1	89.1	88	1.1	7.0	3
6.3	5	●	Y	MZS0630LB	32.6	53.1	57.1	110.1	109	1.1	7.0	3
6.4	3	●	Y	MZS0640MB	20.4	33.7	36.2	89.2	88	1.2	7.0	3
6.4	5	●	Y	MZS0640LB	33.2	53.2	57.2	110.2	109	1.2	7.0	3
6.5	3	●	Y	MZS0650MB	20.7	33.7	36.2	89.2	88	1.2	7.0	3
6.5	5	●	Y	MZS0650LB	33.7	53.2	57.2	110.2	109	1.2	7.0	3
6.6	3	●	Y	MZS0660MB	21.0	36.2	36.2	89.2	88	1.2	7.0	3
6.6	5	●	Y	MZS0660LB	34.2	57.2	57.2	110.2	109	1.2	7.0	3
6.7	3	●	Y	MZS0670MB	21.3	36.2	36.2	89.2	88	1.2	7.0	3
6.7	5	●	Y	MZS0670LB	34.7	57.2	57.2	110.2	109	1.2	7.0	3
6.8	3	●	Y	MZS0680MB	21.6	36.2	36.2	89.2	88	1.2	7.0	3
6.8	5	●	Y	MZS0680LB	35.2	57.2	57.2	110.2	109	1.2	7.0	3
6.9	3	●	Y	MZS0690MB	22.0	36.3	36.3	89.3	88	1.3	7.0	3
6.9	5	●	Y	MZS0690LB	35.8	57.3	57.3	110.3	109	1.3	7.0	3
7.0	3	●	Y	MZS0700MB	22.3	36.3	36.3	89.3	88	1.3	7.0	3
7.0	5	●	Y	MZS0700LB	36.3	57.3	57.3	110.3	109	1.3	7.0	3
7.1	3	●	Y	MZS0710MB	22.6	38.8	41.3	95.3	94	1.3	8.0	3
7.1	5	●	Y	MZS0710LB	36.8	61.3	65.3	119.3	118	1.3	8.0	3
7.2	3	●	Y	MZS0720MB	22.9	38.8	41.3	95.3	94	1.3	8.0	3
7.2	5	●	Y	MZS0720LB	37.3	61.3	65.3	119.3	118	1.3	8.0	3
7.3	3	●	Y	MZS0730MB	23.2	38.8	41.3	95.3	94	1.3	8.0	3
7.3	5	●	Y	MZS0730LB	37.8	61.3	65.3	119.3	118	1.3	8.0	3
7.4	3	●	Y	MZS0740MB	23.5	38.8	41.3	95.3	94	1.3	8.0	3
7.4	5	●	Y	MZS0740LB	38.3	61.3	65.3	119.3	118	1.3	8.0	3
7.5	3	●	Y	MZS0750MB	23.9	38.9	41.4	95.4	94	1.4	8.0	3
7.5	5	●	Y	MZS0750LB	38.9	61.4	65.4	119.4	118	1.4	8.0	3
7.6	3	●	Y	MZS0760MB	24.2	41.4	41.4	95.4	94	1.4	8.0	3
7.6	5	●	Y	MZS0760LB	39.4	65.4	65.4	119.4	118	1.4	8.0	3
7.7	3	●	Y	MZS0770MB	24.5	41.4	41.4	95.4	94	1.4	8.0	3
7.7	5	●	Y	MZS0770LB	39.9	65.4	65.4	119.4	118	1.4	8.0	3
7.8	3	●	Y	MZS0780MB	24.8	41.4	41.4	95.4	94	1.4	8.0	3
7.8	5	●	Y	MZS0780LB	40.4	65.4	65.4	119.4	118	1.4	8.0	3
7.9	3	●	Y	MZS0790MB	25.1	41.4	41.4	95.4	94	1.4	8.0	3
7.9	5	●	Y	MZS0790LB	40.9	65.4	65.4	119.4	118	1.4	8.0	3
8.0	3	●	Y	MZS0800MB	25.5	41.5	41.5	95.5	94	1.5	8.0	3
8.0	5	●	Y	MZS0800LB	41.5	65.5	65.5	119.5	118	1.5	8.0	3
8.1	3	●	Y	MZS0810MB	25.8	44.0	46.5	101.5	100	1.5	9.0	3
8.1	5	●	Y	MZS0810LB	42.0	69.5	73.5	128.5	127	1.5	9.0	3
8.2	3	●	Y	MZS0820MB	26.1	44.0	46.5	101.5	100	1.5	9.0	3
8.2	5	●	Y	MZS0820LB	42.5	69.5	73.5	128.5	127	1.5	9.0	3
8.3	3	●	Y	MZS0830MB	26.4	44.0	46.5	101.5	100	1.5	9.0	3
8.3	5	●	Y	MZS0830LB	43.0	69.5	73.5	128.5	127	1.5	9.0	3
8.4	3	●	Y	MZS0840MB	26.7	44.0	46.5	101.5	100	1.5	9.0	3
8.4	5	●	Y	MZS0840LB	43.5	69.5	73.5	128.5	127	1.5	9.0	3
8.5	3	●	Y	MZS0850MB	27.0	44.0	46.5	101.5	100	1.5	9.0	3
8.5	5	●	Y	MZS0850LB	44.0	69.5	73.5	128.5	127	1.5	9.0	3
8.6	3	●	Y	MZS0860MB	27.4	46.6	46.6	101.6	100	1.6	9.0	3
8.6	5	●	Y	MZS0860LB	44.6	73.6	73.6	128.6	127	1.6	9.0	3
8.7	3	●	Y	MZS0870MB	27.7	46.6	46.6	101.6	100	1.6	9.0	3
8.7	5	●	Y	MZS0870LB	45.1	73.6	73.6	128.6	127	1.6	9.0	3
8.8	3	●	Y	MZS0880MB	28.0	46.6	46.6	101.6	100	1.6	9.0	3
8.8	5	●	Y	MZS0880LB	45.6	73.6	73.6	128.6	127	1.6	9.0	3
8.9	3	●	Y	MZS0890MB	28.3	46.6	46.6	101.6	100	1.6	9.0	3
8.9	5	●	Y	MZS0890LB	46.1	73.6	73.6	128.6	127	1.6	9.0	3
9.0	3	●	Y	MZS0900MB	28.6	46.6	46.6	101.6	100	1.6	9.0	3
9.0	5	●	Y	MZS0900LB	46.6	73.6	73.6	128.6	127	1.6	9.0	3
9.1	3	●	Y	MZS0910MB	29.0	49.2	51.7	107.7	106	1.7	10.0	3
9.1	5	●	Y	MZS0910LB	47.2	77.7	81.7	137.7	136	1.7	10.0	3
9.2	3	●	Y	MZS0920MB	29.3	49.2	51.7	107.7	106	1.7	10.0	3
9.2	5	●	Y	MZS0920LB	47.7	77.7	81.7	137.7	136	1.7	10.0	3
9.3	3	●	Y	MZS0930MB	29.6	49.2	51.7	107.7	106	1.7	10.0	3
9.3	5	●	Y	MZS0930LB	48.2	77.7	81.7	137.7	136	1.7	10.0	3
9.4	3	●	Y	MZS0940MB	29.9	49.2	51.7	107.7	106	1.7	10.0	3
9.4	5	●	Y	MZS0940LB	48.7	77.7	81.7	137.7	136	1.7	10.0	3
9.5	3	●	Y	MZS0950MB	30.2	49.2	51.7	107.7	106	1.7	10.0	3
9.5	5	●	Y	MZS0950LB	49.2	77.7	81.7	137.7	136	1.7	10.0	3
9.6	3	●	Y	MZS0960MB	30.5	51.7	51.7	107.7	106	1.7	10.0	3
9.6	5	●	Y	MZS0960LB	49.7	81.7	81.7	137.7	136	1.7	10.0	3
9.7	3	●	Y	MZS0970MB	30.9	51.8	51.8	107.8	106	1.8	10.0	3
9.7	5	●	Y	MZS0970LB	50.3	81.8	81.8	137.8	136	1.8	10.0	3

MZE/MZS

DC(mm)	Hole Depth(l/d)	VP15TF	Coolant (Int./Ext.)	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
9.8	3	●	Y	**MZS0980MB**	31.2	51.8	51.8	107.8	106	1.8	10.0	3
9.8	5	●	Y	**MZS0980LB**	50.8	81.8	81.8	137.8	136	1.8	10.0	3
9.9	3	●	Y	**MZS0990MB**	31.5	51.8	51.8	107.8	106	1.8	10.0	3
9.9	5	●	Y	**MZS0990LB**	51.3	81.8	81.8	137.8	136	1.8	10.0	3
10.0	3	●	Y	**MZS1000MB**	31.8	51.8	51.8	107.8	106	1.8	10.0	3
10.0	5	●	Y	**MZS1000LB**	51.8	81.8	81.8	137.8	136	1.8	10.0	3
10.1	3	●	Y	**MZS1010MB**	32.1	54.3	56.8	117.8	116	1.8	11.0	3
10.1	5	●	Y	**MZS1010LB**	52.3	85.8	89.8	150.8	149	1.8	11.0	3
10.2	3	●	Y	**MZS1020MB**	32.5	54.4	56.9	117.9	116	1.9	11.0	3
10.2	5	●	Y	**MZS1020LB**	52.9	85.9	89.9	150.9	149	1.9	11.0	3
10.3	3	●	Y	**MZS1030MB**	32.8	54.4	56.9	117.9	116	1.9	11.0	3
10.3	5	●	Y	**MZS1030LB**	53.4	85.9	89.9	150.9	149	1.9	11.0	3
10.4	3	●	Y	**MZS1040MB**	33.1	54.4	56.9	117.9	116	1.9	11.0	3
10.4	5	●	Y	**MZS1040LB**	53.9	85.9	89.9	150.9	149	1.9	11.0	3
10.5	3	●	Y	**MZS1050MB**	33.4	54.4	56.9	117.9	116	1.9	11.0	3
10.5	5	●	Y	**MZS1050LB**	54.4	85.9	89.9	150.9	149	1.9	11.0	3
10.6	3	●	Y	**MZS1060MB**	33.7	56.9	56.9	117.9	116	1.9	11.0	3
10.6	5	●	Y	**MZS1060LB**	54.9	89.9	89.9	150.9	149	1.9	11.0	3
10.7	3	●	Y	**MZS1070MB**	34.0	56.9	56.9	117.9	116	1.9	11.0	3
10.7	5	●	Y	**MZS1070LB**	55.4	89.9	89.9	150.9	149	1.9	11.0	3
10.8	3	●	Y	**MZS1080MB**	34.4	57.0	57.0	118.0	116	2.0	11.0	3
10.8	5	●	Y	**MZS1080LB**	56.0	90.0	90.0	151.0	149	2.0	11.0	3
10.9	3	●	Y	**MZS1090MB**	34.7	57.0	57.0	118.0	116	2.0	11.0	3
10.9	5	●	Y	**MZS1090LB**	56.5	90.0	90.0	151.0	149	2.0	11.0	3
11.0	3	●	Y	**MZS1100MB**	35.0	57.0	57.0	118.0	116	2.0	11.0	3
11.0	5	●	Y	**MZS1100LB**	57.0	90.0	90.0	151.0	149	2.0	11.0	3
11.1	3	●	Y	**MZS1110MB**	35.3	59.5	62.0	124.0	122	2.0	12.0	3
11.1	5	●	Y	**MZS1110LB**	57.5	94.0	98.0	160.0	158	2.0	12.0	3
11.2	3	●	Y	**MZS1120MB**	35.6	59.5	62.0	124.0	122	2.0	12.0	3
11.2	5	●	Y	**MZS1120LB**	58.0	94.0	98.0	160.0	158	2.0	12.0	3
11.3	3	●	Y	**MZS1130MB**	36.0	59.6	62.1	124.1	122	2.1	12.0	3
11.3	5	●	Y	**MZS1130LB**	58.6	94.1	98.1	160.1	158	2.1	12.0	3
11.4	3	●	Y	**MZS1140MB**	36.3	59.6	62.1	124.1	122	2.1	12.0	3
11.4	5	●	Y	**MZS1140LB**	59.1	94.1	98.1	160.1	158	2.1	12.0	3
11.5	3	●	Y	**MZS1150MB**	36.6	59.6	62.1	124.1	122	2.1	12.0	3
11.5	5	●	Y	**MZS1150LB**	59.6	94.1	98.1	160.1	158	2.1	12.0	3
11.6	3	●	Y	**MZS1160MB**	36.9	62.1	62.1	124.1	122	2.1	12.0	3
11.6	5	●	Y	**MZS1160LB**	60.1	98.1	98.1	160.1	158	2.1	12.0	3
11.7	3	●	Y	**MZS1170MB**	37.2	62.1	62.1	124.1	122	2.1	12.0	3
11.7	5	●	Y	**MZS1170LB**	60.6	98.1	98.1	160.1	158	2.1	12.0	3
11.8	3	●	Y	**MZS1180MB**	37.5	62.1	62.1	124.1	122	2.1	12.0	3
11.8	5	●	Y	**MZS1180LB**	61.1	98.1	98.1	160.1	158	2.1	12.0	3
11.9	3	●	Y	**MZS1190MB**	37.9	62.2	62.2	124.2	122	2.2	12.0	3
11.9	5	●	Y	**MZS1190LB**	61.7	98.2	98.2	160.2	158	2.2	12.0	3
12.0	3	●	Y	**MZS1200MB**	38.2	62.2	62.2	124.2	122	2.2	12.0	3
12.0	5	●	Y	**MZS1200LB**	62.2	98.2	98.2	160.2	158	2.2	12.0	3
12.1	3	●	Y	**MZS1210MB**	38.5	64.7	67.2	130.2	128	2.2	13.0	3
12.1	5	●	Y	**MZS1210LB**	62.7	102.2	106.2	169.2	167	2.2	13.0	3
12.2	3	●	Y	**MZS1220MB**	38.8	64.7	67.2	130.2	128	2.2	13.0	3
12.2	5	●	Y	**MZS1220LB**	63.2	102.2	106.2	169.2	167	2.2	13.0	3
12.3	3	●	Y	**MZS1230MB**	39.1	64.7	67.2	130.2	128	2.2	13.0	3
12.3	5	●	Y	**MZS1230LB**	63.7	102.2	106.2	169.2	167	2.2	13.0	3
12.4	3	●	Y	**MZS1240MB**	39.5	64.8	67.3	130.3	128	2.3	13.0	3
12.4	5	●	Y	**MZS1240LB**	64.3	102.3	106.3	169.3	167	2.3	13.0	3

DC(mm)	Hole Depth(l/d)	VP15TF	Coolant (Int./Ext.)	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
12.5	3	●	Y	**MZS1250MB**	39.8	64.8	67.3	130.3	128	2.3	13.0	3
12.5	5	●	Y	**MZS1250LB**	64.8	102.3	106.3	169.3	167	2.3	13.0	3
12.6	3	●	Y	**MZS1260MB**	40.1	67.3	67.3	130.3	128	2.3	13.0	3
12.6	5	●	Y	**MZS1260LB**	65.3	106.3	106.3	169.3	167	2.3	13.0	3
12.7	3	●	Y	**MZS1270MB**	40.4	67.3	67.3	130.3	128	2.3	13.0	3
12.7	5	●	Y	**MZS1270LB**	65.8	106.3	106.3	169.3	167	2.3	13.0	3
12.8	3	●	Y	**MZS1280MB**	40.7	67.3	67.3	130.3	128	2.3	13.0	3
12.8	5	●	Y	**MZS1280LB**	66.3	106.3	106.3	169.3	167	2.3	13.0	3
12.9	3	●	Y	**MZS1290MB**	41.0	67.3	67.3	130.3	128	2.3	13.0	3
12.9	5	●	Y	**MZS1290LB**	66.8	106.3	106.3	169.3	167	2.3	13.0	3
13.0	3	●	Y	**MZS1300MB**	41.4	67.4	67.4	130.4	128	2.4	13.0	3
13.0	5	●	Y	**MZS1300LB**	67.4	106.4	106.4	169.4	167	2.4	13.0	3
13.1	3	●	Y	**MZS1310MB**	41.7	69.9	72.4	136.4	134	2.4	14.0	3
13.1	5	●	Y	**MZS1310LB**	67.9	110.4	114.4	178.4	176	2.4	14.0	3
13.2	3	●	Y	**MZS1320MB**	42.0	69.9	72.4	136.4	134	2.4	14.0	3
13.2	5	●	Y	**MZS1320LB**	68.4	110.4	114.4	178.4	176	2.4	14.0	3
13.3	3	●	Y	**MZS1330MB**	42.3	69.9	72.4	136.4	134	2.4	14.0	3
13.3	5	●	Y	**MZS1330LB**	68.9	110.4	114.4	178.4	176	2.4	14.0	3
13.4	3	●	Y	**MZS1340MB**	42.6	69.9	72.4	136.4	134	2.4	14.0	3
13.4	5	●	Y	**MZS1340LB**	69.4	110.4	114.4	178.4	176	2.4	14.0	3
13.5	3	●	Y	**MZS1350MB**	43.0	70.0	72.5	136.5	134	2.5	14.0	3
13.5	5	●	Y	**MZS1350LB**	70.0	110.5	114.5	178.5	176	2.5	14.0	3
13.6	3	●	Y	**MZS1360MB**	43.3	72.5	72.5	136.5	134	2.5	14.0	3
13.6	5	●	Y	**MZS1360LB**	70.5	114.5	114.5	178.5	176	2.5	14.0	3
13.7	3	●	Y	**MZS1370MB**	43.6	72.5	72.5	136.5	134	2.5	14.0	3
13.7	5	●	Y	**MZS1370LB**	71.0	114.5	114.5	178.5	176	2.5	14.0	3
13.8	3	●	Y	**MZS1380MB**	43.9	72.5	72.5	136.5	134	2.5	14.0	3
13.8	5	●	Y	**MZS1380LB**	71.5	114.5	114.5	178.5	176	2.5	14.0	3
13.9	3	●	Y	**MZS1390MB**	44.2	72.5	72.5	136.5	134	2.5	14.0	3
13.9	5	●	Y	**MZS1390LB**	72.0	114.5	114.5	178.5	176	2.5	14.0	3
14.0	3	●	Y	**MZS1400MB**	44.5	72.5	72.5	136.5	134	2.5	14.0	3
14.0	5	●	Y	**MZS1400LB**	72.5	114.5	114.5	178.5	176	2.5	14.0	3
14.1	3	●	Y	**MZS1410MB**	44.9	75.1	77.6	142.6	140	2.6	15.0	3
14.1	5	●	Y	**MZS1410LB**	73.1	118.6	122.6	187.6	185	2.6	15.0	3
14.2	3	●	Y	**MZS1420MB**	45.2	75.1	77.6	142.6	140	2.6	15.0	3
14.2	5	●	Y	**MZS1420LB**	73.6	118.6	122.6	187.6	185	2.6	15.0	3
14.3	3	●	Y	**MZS1430MB**	45.5	75.1	77.6	142.6	140	2.6	15.0	3
14.3	5	●	Y	**MZS1430LB**	74.1	118.6	122.6	187.6	185	2.6	15.0	3
14.4	3	●	Y	**MZS1440MB**	45.8	75.1	77.6	142.6	140	2.6	15.0	3
14.4	5	●	Y	**MZS1440LB**	74.6	118.6	122.6	187.6	185	2.6	15.0	3
14.5	3	●	Y	**MZS1450MB**	46.1	75.1	77.6	142.6	140	2.6	15.0	3
14.5	5	●	Y	**MZS1450LB**	75.1	118.6	122.6	187.6	185	2.6	15.0	3
14.6	3	●	Y	**MZS1460MB**	46.5	77.7	77.7	142.7	140	2.7	15.0	3
14.6	5	●	Y	**MZS1460LB**	75.7	122.7	122.7	187.7	185	2.7	15.0	3
14.7	3	●	Y	**MZS1470MB**	46.8	77.7	77.7	142.7	140	2.7	15.0	3
14.7	5	●	Y	**MZS1470LB**	76.2	122.7	122.7	187.7	185	2.7	15.0	3
14.8	3	●	Y	**MZS1480MB**	47.1	77.7	77.7	142.7	140	2.7	15.0	3
14.8	5	●	Y	**MZS1480LB**	76.7	122.7	122.7	187.7	185	2.7	15.0	3
14.9	3	●	Y	**MZS1490MB**	47.4	77.7	77.7	142.7	140	2.7	15.0	3
14.9	5	●	Y	**MZS1490LB**	77.2	122.7	122.7	187.7	185	2.7	15.0	3
15.0	3	●	Y	**MZS1500MB**	47.7	77.7	77.7	142.7	140	2.7	15.0	3
15.0	5	●	Y	**MZS1500LB**	77.7	122.7	122.7	187.7	185	2.7	15.0	3
15.1	3	●	Y	**MZS1510MB**	48.0	80.2	82.7	147.7	145	2.7	16.0	3
15.1	5	●	Y	**MZS1510LB**	78.2	126.7	130.7	195.7	193	2.7	16.0	3

MZE/MZS

DC(mm)	Hole Depth(l/d)	VP15TF	Coolant (Int./Ext.)	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
15.2	3	●	Y	MZS1520MB	48.4	80.3	82.8	147.8	145	2.8	16.0	3
15.2	5	●	Y	MZS1520LB	78.8	126.8	130.8	195.8	193	2.8	16.0	3
15.3	3	●	Y	MZS1530MB	48.7	80.3	82.8	147.8	145	2.8	16.0	3
15.3	5	●	Y	MZS1530LB	79.3	126.8	130.8	195.8	193	2.8	16.0	3
15.4	3	●	Y	MZS1540MB	49.0	80.3	82.8	147.8	145	2.8	16.0	3
15.4	5	●	Y	MZS1540LB	79.8	126.8	130.8	195.8	193	2.8	16.0	3
15.5	3	●	Y	MZS1550MB	49.3	80.3	82.8	147.8	145	2.8	16.0	3
15.5	5	●	Y	MZS1550LB	80.3	126.8	130.8	195.8	193	2.8	16.0	3
15.6	3	●	Y	MZS1560MB	49.6	82.8	82.8	147.8	145	2.8	16.0	3
15.6	5	●	Y	MZS1560LB	80.8	130.8	130.8	195.8	193	2.8	16.0	3
15.7	3	●	Y	MZS1570MB	50.0	82.9	82.9	147.9	145	2.9	16.0	3
15.7	5	●	Y	MZS1570LB	81.4	130.9	130.9	195.9	193	2.9	16.0	3
15.8	3	●	Y	MZS1580MB	50.3	82.9	82.9	147.9	145	2.9	16.0	3
15.8	5	●	Y	MZS1580LB	81.9	130.9	130.9	195.9	193	2.9	16.0	3
15.9	3	●	Y	MZS1590MB	50.6	82.9	82.9	147.9	145	2.9	16.0	3
15.9	5	●	Y	MZS1590LB	82.4	130.9	130.9	195.9	193	2.9	16.0	3
16.0	3	●	Y	MZS1600MB	50.9	82.9	82.9	147.9	145	2.9	16.0	3
16.0	5	●	Y	MZS1600LB	82.9	130.9	130.9	195.9	193	2.9	16.0	3
16.1	3	□	Y	MZS1610MB	51.2	85.4	87.9	152.9	150	2.9	17.0	3
16.1	5	□	Y	MZS1610LB	83.4	134.9	138.9	203.9	201	2.9	17.0	3
16.2	3	□	Y	MZS1620MB	51.5	85.4	87.9	152.9	150	2.9	17.0	3
16.2	5	□	Y	MZS1620LB	83.9	134.9	138.9	203.9	201	2.9	17.0	3
16.3	3	□	Y	MZS1630MB	51.9	85.5	88.0	153.0	150	3.0	17.0	3
16.3	5	□	Y	MZS1630LB	84.5	135.0	139.0	204.0	201	3.0	17.0	3
16.4	3	□	Y	MZS1640MB	52.2	85.5	88.0	153.0	150	3.0	17.0	3
16.4	5	□	Y	MZS1640LB	85.0	135.0	139.0	204.0	201	3.0	17.0	3
16.5	3	●	Y	MZS1650MB	52.5	85.5	88.0	153.0	150	3.0	17.0	3
16.5	5	●	Y	MZS1650LB	85.5	135.0	139.0	204.0	201	3.0	17.0	3
16.6	3	□	Y	MZS1660MB	52.8	88.0	88.0	153.0	150	3.0	17.0	3
16.6	5	□	Y	MZS1660LB	86.0	139.0	139.0	204.0	201	3.0	17.0	3
16.7	3	□	Y	MZS1670MB	53.1	88.0	88.0	153.0	150	3.0	17.0	3
16.7	5	□	Y	MZS1670LB	86.5	139.0	139.0	204.0	201	3.0	17.0	3
16.8	3	□	Y	MZS1680MB	53.5	88.1	88.1	153.1	150	3.1	17.0	3
16.8	5	□	Y	MZS1680LB	87.1	139.1	139.1	204.1	201	3.1	17.0	3
16.9	3	□	Y	MZS1690MB	53.8	88.1	88.1	153.1	150	3.1	17.0	3
16.9	5	□	Y	MZS1690LB	87.6	139.1	139.1	204.1	201	3.1	17.0	3
17.0	3	●	Y	MZS1700MB	54.1	88.1	88.1	153.1	150	3.1	17.0	3
17.0	5	●	Y	MZS1700LB	88.1	139.1	139.1	204.1	201	3.1	17.0	3
17.1	3	□	Y	MZS1710MB	54.4	90.6	93.1	158.1	155	3.1	18.0	3
17.1	5	□	Y	MZS1710LB	88.6	143.1	147.1	212.1	209	3.1	18.0	3
17.2	3	□	Y	MZS1720MB	54.7	90.6	93.1	158.1	155	3.1	18.0	3
17.2	5	□	Y	MZS1720LB	89.1	143.1	147.1	212.1	209	3.1	18.0	3
17.3	3	□	Y	MZS1730MB	55.0	90.6	93.1	158.1	155	3.1	18.0	3
17.3	5	□	Y	MZS1730LB	89.6	143.1	147.1	212.1	209	3.1	18.0	3
17.4	3	□	Y	MZS1740MB	55.4	90.7	93.2	158.2	155	3.2	18.0	3
17.4	5	□	Y	MZS1740LB	90.2	143.2	147.2	212.2	209	3.2	18.0	3
17.5	3	●	Y	MZS1750MB	55.7	90.7	93.2	158.2	155	3.2	18.0	3
17.5	5	●	Y	MZS1750LB	90.7	143.2	147.2	212.2	209	3.2	18.0	3
17.6	3	□	Y	MZS1760MB	56.0	93.2	93.2	158.2	155	3.2	18.0	3
17.6	5	□	Y	MZS1760LB	91.2	147.2	147.2	212.2	209	3.2	18.0	3
17.7	3	□	Y	MZS1770MB	56.3	93.2	93.2	158.2	155	3.2	18.0	3
17.7	5	□	Y	MZS1770LB	91.7	147.2	147.2	212.2	209	3.2	18.0	3
17.8	3	□	Y	MZS1780MB	56.6	93.2	93.2	158.2	155	3.2	18.0	3
17.8	5	□	Y	MZS1780LB	92.2	147.2	147.2	212.2	209	3.2	18.0	3
17.9	3	□	Y	MZS1790MB	57.0	93.3	93.3	158.3	155	3.3	18.0	3
17.9	5	□	Y	MZS1790LB	92.8	147.3	147.3	212.3	209	3.3	18.0	3
18.0	3	●	Y	MZS1800MB	57.3	93.3	93.3	158.3	155	3.3	18.0	3
18.0	5	●	Y	MZS1800LB	93.3	147.3	147.3	212.3	209	3.3	18.0	3
18.1	3	□	Y	MZS1810MB	57.6	95.8	98.3	163.3	160	3.3	19.0	3
18.1	5	□	Y	MZS1810LB	93.8	151.3	155.3	220.3	217	3.3	19.0	3
18.2	3	□	Y	MZS1820MB	57.9	95.8	98.3	163.3	160	3.3	19.0	3
18.2	5	□	Y	MZS1820LB	94.3	151.3	155.3	220.3	217	3.3	19.0	3
18.3	3	□	Y	MZS1830MB	58.2	95.8	98.3	163.3	160	3.3	19.0	3
18.3	5	□	Y	MZS1830LB	94.8	151.3	155.3	220.3	217	3.3	19.0	3
18.4	3	□	Y	MZS1840MB	58.5	95.8	98.3	163.3	160	3.3	19.0	3
18.4	5	□	Y	MZS1840LB	95.3	151.3	155.3	220.3	217	3.3	19.0	3
18.5	3	●	Y	MZS1850MB	58.9	95.9	98.4	163.4	160	3.4	19.0	3
18.5	5	●	Y	MZS1850LB	95.9	151.4	155.4	220.4	217	3.4	19.0	3
18.6	3	□	Y	MZS1860MB	59.2	98.4	98.4	163.4	160	3.4	19.0	3
18.6	5	□	Y	MZS1860LB	96.4	155.4	155.4	220.4	217	3.4	19.0	3
18.7	3	□	Y	MZS1870MB	59.5	98.4	98.4	163.4	160	3.4	19.0	3
18.7	5	□	Y	MZS1870LB	96.9	155.4	155.4	220.4	217	3.4	19.0	3
18.8	3	□	Y	MZS1880MB	59.8	98.4	98.4	163.4	160	3.4	19.0	3
18.8	5	□	Y	MZS1880LB	97.4	155.4	155.4	220.4	217	3.4	19.0	3
18.9	3	□	Y	MZS1890MB	60.1	98.4	98.4	163.4	160	3.4	19.0	3
18.9	5	□	Y	MZS1890LB	97.9	155.4	155.4	220.4	217	3.4	19.0	3
19.0	3	●	Y	MZS1900MB	60.5	98.5	98.5	163.5	160	3.5	19.0	3
19.0	5	●	Y	MZS1900LB	98.5	155.5	155.5	220.5	217	3.5	19.0	3
19.1	3	□	Y	MZS1910MB	60.8	101.0	103.5	168.5	165	3.5	20.0	3
19.1	5	□	Y	MZS1910LB	99.0	159.5	163.5	228.5	225	3.5	20.0	3
19.2	3	□	Y	MZS1920MB	61.1	101.0	103.5	168.5	165	3.5	20.0	3
19.2	5	□	Y	MZS1920LB	99.5	159.5	163.5	228.5	225	3.5	20.0	3
19.3	3	□	Y	MZS1930MB	61.4	101.0	103.5	168.5	165	3.5	20.0	3
19.3	5	□	Y	MZS1930LB	100.0	159.5	163.5	228.5	225	3.5	20.0	3
19.4	3	□	Y	MZS1940MB	61.7	101.0	103.5	168.5	165	3.5	20.0	3
19.4	5	□	Y	MZS1940LB	100.5	159.5	163.5	228.5	225	3.5	20.0	3
19.5	3	●	Y	MZS1950MB	62.0	101.0	103.5	168.5	165	3.5	20.0	3
19.5	5	●	Y	MZS1950LB	101.0	159.5	163.5	228.5	225	3.5	20.0	3
19.6	3	□	Y	MZS1960MB	62.4	103.6	103.6	168.6	165	3.6	20.0	3
19.6	5	□	Y	MZS1960LB	101.6	163.6	163.6	228.6	225	3.6	20.0	3
19.7	3	□	Y	MZS1970MB	62.7	103.6	103.6	168.6	165	3.6	20.0	3
19.7	5	□	Y	MZS1970LB	102.1	163.6	163.6	228.6	225	3.6	20.0	3
19.8	3	□	Y	MZS1980MB	63.0	103.6	103.6	168.6	165	3.6	20.0	3
19.8	5	□	Y	MZS1980LB	102.6	163.6	163.6	228.6	225	3.6	20.0	3
19.9	3	□	Y	MZS1990MB	63.3	103.6	103.6	168.6	165	3.6	20.0	3
19.9	5	□	Y	MZS1990LB	103.1	163.6	163.6	228.6	225	3.6	20.0	3
20.0	3	●	Y	MZS2000MB	63.6	103.6	103.6	168.6	165	3.6	20.0	3
20.0	5	●	Y	MZS2000LB	103.6	163.6	163.6	228.6	225	3.6	20.0	3

MZE/MZS

Recommended Cutting Condition

·MZE (External coolant)

Work material	Mild Steel(≦180HB) AISI 1010 etc		Carbon steel, Alloy steel(180—280HB) AISI 1045, AISI 4140 etc		Carbon steel, Alloy steel(280—350HB) AISI 4340 etc	
Dia. DC (mm)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)
1.0	12700	0.035(0.020—0.050)	11100	0.035(0.020—0.050)	9500	0.035(0.020—0.050)
1.2	10600	0.045(0.030—0.060)	9200	0.045(0.030—0.060)	7900	0.045(0.030—0.060)
1.6	8900	0.055(0.035—0.080)	7900	0.055(0.035—0.080)	6900	0.055(0.035—0.080)
2.0	7100	0.07(0.040—0.100)	6300	0.07(0.040—0.100)	5500	0.07(0.040—0.100)
2.5	5700	0.085(0.050—0.125)	5000	0.085(0.050—0.125)	4400	0.085(0.050—0.125)
3.2	4400	0.1(0.060—0.13)	3900	0.1(0.06—0.13)	3400	0.09(0.06—0.12)
4.0	3500	0.12(0.080—0.16)	3100	0.12(0.08—0.16)	2700	0.11(0.07—0.14)
5.0	2800	0.15(0.100—0.20)	2500	0.15(0.10—0.20)	2200	0.14(0.09—0.18)
6.3	2700	0.2(0.13—0.26)	2500	0.2(0.13—0.26)	2200	0.18(0.11—0.24)
8.0	2100	0.23(0.18—0.28)	1900	0.23(0.18—0.28)	1700	0.21(0.16—0.25)
10.0	1700	0.27(0.22—0.32)	1500	0.27(0.22—0.32)	1400	0.23(0.19—0.27)
12.0	1700	0.31(0.28—0.34)	1500	0.31(0.28—0.34)	1400	0.26(0.23—0.29)
16.0	1300	0.33(0.28—0.38)	1200	0.33(0.28—0.38)	1100	0.29(0.24—0.33)
20.0	1100	0.35(0.30—0.40)	1000	0.35(0.30—0.40)	900	0.3(0.26—0.34)

Work material	Austenitic Stainless Steel(≦200HB) AISI 304,AISI 316 etc		Gray Cast Iron(≦350MPa) No 45 B etc		Ductile Cast Iron(≦450MPa) 60-40-8 etc	
Dia. DC (mm)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)
1.0	4700	0.03(0.020—0.044)	14300	0.035(0.020—0.050)	12700	0.035(0.020—0.050)
1.2	3900	0.04(0.030—0.053)	11900	0.045(0.030—0.060)	10600	0.045(0.030—0.060)
1.6	3900	0.05(0.035—0.070)	9900	0.055(0.035—0.080)	8900	0.055(0.035—0.080)
2.0	3100	0.06(0.040—0.080)	7900	0.07(0.040—0.100)	7100	0.07(0.040—0.100)
2.5	2500	0.075(0.050—0.100)	6300	0.085(0.050—0.125)	5700	0.085(0.050—0.125)
3.2	1900	0.07(0.05—0.08)	4900	0.1(0.06—0.13)	4400	0.1(0.06—0.13)
4.0	1500	0.08(0.06—0.10)	3900	0.12(0.08—0.16)	3500	0.12(0.08—0.16)
5.0	1200	0.1(0.07—0.13)	3100	0.15(0.10—0.20)	2800	0.15(0.10—0.20)
6.3	1200	0.13(0.09—0.17)	3000	0.2(0.13—0.26)	2700	0.2(0.13—0.26)
8.0	900	0.14(0.10—0.18)	2300	0.25(0.18—0.31)	2100	0.23(0.18—0.28)
10.0	700	0.16(0.12—0.19)	1900	0.29(0.22—0.35)	1700	0.27(0.22—0.32)
12.0	600	0.18(0.15—0.20)	1800	0.33(0.28—0.37)	1700	0.31(0.28—0.34)
16.0	400	0.19(0.15—0.23)	1300	0.35(0.28—0.42)	1300	0.33(0.28—0.38)
20.0	300	0.2(0.15—0.24)	1100	0.37(0.30—0.44)	1100	0.35(0.30—0.40)

MZE/MZS

Work material	Aluminium Alloy(Si<5%) A6061, A7075		Heat resistant alloys Inconel718		Hardened Steel(40—55HRC) AISI H13, AISI L6	
Dia. DC (mm)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)
1.0	15900	0.05(0.030—0.075)	3100	0.02(0.016—0.027)	3100	0.02(0.016—0.031)
1.2	13200	0.065(0.045—0.090)	2600	0.025(0.022—0.032)	2600	0.03(0.022—0.037)
1.6	11900	0.085(0.053—0.120)	1900	0.03(0.025—0.040)	1900	0.03(0.025—0.040)
2.0	9500	0.105(0.060—0.150)	2300	0.04(0.032—0.050)	2300	0.04(0.032—0.050)
2.5	8900	0.135(0.075—0.200)	1900	0.05(0.040—0.060)	1900	0.05(0.040—0.060)
3.2	7900	0.1(0.06—0.13)	1900	0.07(0.05—0.09)	1900	0.07(0.05—0.09)
4.0	6300	0.12(0.08—0.16)	1500	0.09(0.06—0.11)	1500	0.09(0.06—0.11)
5.0	5000	0.15(0.10—0.20)	1200	0.11(0.08—0.14)	1200	0.11(0.08—0.14)
6.3	4500	0.2(0.13—0.26)	1200	0.14(0.09—0.19)	1200	0.14(0.09—0.19)
8.0	3500	0.23(0.18—0.28)	900	0.14(0.11—0.17)	900	0.14(0.11—0.17)
10.0	2800	0.27(0.22—0.32)	700	0.16(0.12—0.19)	700	0.16(0.12—0.19)
12.0	2600	0.31(0.28—0.34)	600	0.16(0.13—0.18)	600	0.16(0.13—0.18)
16.0	2100	0.33(0.28—0.38)	400	0.18(0.14—0.21)	500	0.18(0.14—0.21)
20.0	1700	0.35(0.30—0.40)	400	0.19(0.15—0.22)	400	0.19(0.15—0.22)

·MZS (Internal coolant)

Work material	Mild Steel(≦180HB) AISI 1010 etc		Carbon steel, Alloy steel(180—280HB) AISI 1045, AISI 4140 etc		Carbon steel, Alloy steel(280—350HB) AISI 4340 etc	
Dia. DC (mm)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)
1.0	12700	0.035(0.020—0.050)	9500	0.035(0.020—0.050)	9500	0.035(0.020—0.050)
1.2	10600	0.045(0.030—0.060)	7900	0.045(0.030—0.060)	7900	0.045(0.030—0.060)
1.6	8900	0.055(0.035—0.080)	6900	0.055(0.035—0.080)	6900	0.055(0.035—0.080)
2.0	7900	0.07(0.040—0.100)	6300	0.07(0.040—0.100)	6300	0.07(0.040—0.100)
2.5	6300	0.085(0.050—0.125)	5700	0.085(0.050—0.125)	5000	0.085(0.050—0.125)
3.2	7900	0.1(0.06—0.13)	6900	0.1(0.06—0.13)	5900	0.1(0.06—0.13)
4.0	6300	0.12(0.08—0.16)	6300	0.12(0.08—0.16)	5100	0.11(0.07—0.14)
5.0	5700	0.15(0.10—0.20)	5700	0.15(0.10—0.20)	4400	0.14(0.09—0.18)
6.3	5000	0.2(0.13—0.26)	4500	0.2(0.13—0.26)	3500	0.18(0.11—0.24)
8.0	4300	0.23(0.18—0.28)	3900	0.23(0.18—0.28)	3100	0.21(0.16—0.25)
10.0	3800	0.27(0.22—0.32)	3500	0.27(0.22—0.32)	2500	0.23(0.19—0.27)
12.0	3400	0.3(0.26—0.34)	3100	0.3(0.28—0.34)	2300	0.26(0.22—0.29)
16.0	2700	0.33(0.27—0.38)	2500	0.33(0.28—0.38)	1700	0.28(0.23—0.33)
20.0	2300	0.35(0.30—0.40)	2200	0.35(0.30—0.40)	1500	0.3(0.26—0.34)

MZE/MZS

Work material	Austenitic Stainless Steel(≦200HB) AISI 304,AISI 316 etc		Gray Cast Iron(≦350MPa) No 45 B etc		Ductile Cast Iron(≦450MPa) 60-40-8 etc	
Dia. DC (mm)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)
1.0	6300	0.03(0.020—0.044)	12700	0.035(0.020—0.050)	9500	0.035(0.020—0.050)
1.2	5300	0.04(0.030—0.053)	10600	0.045(0.030—0.060)	7900	0.045(0.030—0.060)
1.6	4900	0.05(0.035—0.070)	8900	0.055(0.035—0.080)	6900	0.055(0.035—0.080)
2.0	4700	0.06(0.040—0.080)	7900	0.07(0.040—0.100)	6300	0.07(0.040—0.100)
2.5	3800	0.075(0.050—0.100)	6300	0.085(0.050—0.125)	5000	0.085(0.050—0.125)
3.2	2900	0.08(0.06—0.10)	7900	0.1(0.06—0.13)	5900	0.1(0.06—0.13)
4.0	3100	0.09(0.06—0.11)	6300	0.12(0.08—0.16)	5100	0.12(0.08—0.16)
5.0	2500	0.11(0.08—0.14)	5700	0.15(0.10—0.20)	4400	0.15(0.10—0.20)
6.3	2200	0.14(0.09—0.18)	5000	0.2(0.13—0.26)	3500	0.2(0.13—0.26)
8.0	1900	0.15(0.10—0.19)	4300	0.25(0.18—0.31)	3100	0.23(0.18—0.28)
10.0	1500	0.16(0.12—0.20)	3800	0.29(0.22—0.35)	2500	0.27(0.22—0.32)
12.0	1500	0.18(0.15—0.21)	3400	0.32(0.26—0.37)	2300	0.3(0.26—0.34)
16.0	1200	0.19(0.14—0.24)	2700	0.35(0.27—0.42)	1700	0.33(0.28—0.38)
20.0	1100	0.21(0.15—0.26)	2300	0.37(0.30—0.44)	1500	0.35(0.30—0.40)

Work materi-al	Aluminium Alloy(Si<5%) A6061, A7075		Heat resistant alloys Inconel718	
Dia. DC (mm)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)
1.0	19000	0.05(0.030—0.075)	3100	0.02(0.016—0.027)
1.2	15900	0.065(0.045—0.090)	2600	0.025(0.022—0.032)
1.6	13900	0.085(0.053—0.120)	1900	0.03(0.025—0.040)
2.0	11100	0.105(0.060—0.150)	1500	0.04(0.032—0.050)
2.5	10100	0.135(0.075—0.200)	1200	0.05(0.040—0.060)
3.2	9900	0.23(0.10—0.35)	1400	0.07(0.05—0.09)
4.0	7900	0.24(0.12—0.35)	1100	0.09(0.06—0.11)
5.0	7000	0.25(0.15—0.35)	1200	0.11(0.08—0.14)
6.3	6000	0.35(0.20—0.50)	1200	0.13(0.09—0.16)
8.0	4700	0.35(0.20—0.50)	900	0.14(0.11—0.17)
10.0	4100	0.5(0.20—0.80)	700	0.15(0.12—0.17)
12.0	3900	0.5(0.20—0.80)	600	0.16(0.13—0.18)
16.0	3300	0.6(0.20—1.00)	500	0.18(0.14—0.21)
20.0	2700	0.6(0.20—1.00)	400	0.19(0.15—0.22)

MZE/MZS Step ZET1 DRILLS

STEP DRILLS

Product Information

UWC VP 140° SIG X Thinning

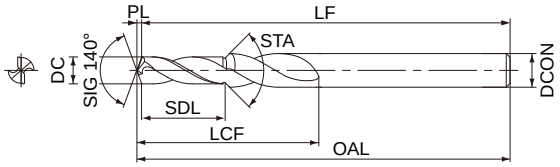
Work Material

P M K N S

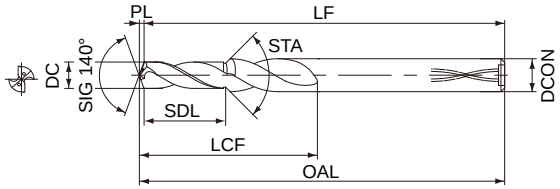
TECHNICAL DATA >> 1997 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 1623 DRILLS SELECTION CHART >> 1624

MZE

MZS



Type1



Type2

—	3<DC≦6	6<DC≦10	10<DC≦18
	0 −0.018	0 −0.022	0 −0.027
MZE	0 −0.018	0 −0.022	0 −0.027
MZS	0 −0.008	0 −0.009	0 −0.011

- MZS type bigger than φ5.0 have a recess in the end face.
- Spot face drilling is not possible (chamfering only).
- For metric coarse thread.
- MZS type also available for shrink fit holder.

Stock status indication:●: Inventory maintained in Japan.▲: This item to be discontinued within two years.□: Non stock, produced to order only.

Unit: mm

DC(mm)	Hole Depth(l/d)	Coolant (Int./Ext.)	Order Number	Thread Size	VP15TF	SDL	LCF	OAL	LF	PL	DCON	Type
3.4	2	N	**MZE0340SM04**	M4	●	6.7	21.6	73.6	73	0.6	6.0	1
3.4	3	N	**MZE0340MM04**	M4	●	10.7	25.6	77.6	77	0.6	6.0	1
4.3	2	N	**MZE0430SM05**	M5	●	8.7	26.8	79.8	79	0.8	7.0	1
4.3	3	N	**MZE0430MM05**	M5	●	13.7	31.8	84.8	84	0.8	7.0	1
5.1	2	N	**MZE0510SM06**	M6	●	10.6	30.9	84.9	84	0.9	8.0	1
5.1	3	N	**MZE0510MM06**	M6	●	16.6	36.9	90.9	90	0.9	8.0	1
6.8	2	N	**MZE0680SM08**	M8	●	14.4	41.2	97.2	96	1.2	10.0	1
6.8	3	N	**MZE0680MM08**	M8	●	22.4	49.2	105.2	104	1.2	10.0	1
8.5	2	N	**MZE0850SM10**	M10	●	18.3	51.5	113.5	112	1.5	12.0	1
8.5	3	N	**MZE0850MM10**	M10	●	28.3	61.5	123.5	122	1.5	12.0	1
10.3	2	N	**MZE1030SM12**	M12	●	22.2	61.9	125.9	124	1.9	14.0	1
10.3	3	N	**MZE1030MM12**	M12	●	34.2	73.9	137.9	136	1.9	14.0	1

DC(mm)	Hole Depth(l/d)	Coolant (Int./Ext.)	Order Number	Thread Size	VP15TF	SDL	LCF	OAL	LF	PL	DCON	Type
3.4	2	Y	**MZS0340SM04**	M4	●	6.7	21.6	73.6	73	0.6	6.0	2
3.4	3	Y	**MZS0340MM04**	M4	●	10.7	25.6	77.6	77	0.6	6.0	2
4.3	2	Y	**MZS0430SM05**	M5	●	8.7	26.8	79.8	79	0.8	7.0	2
4.3	3	Y	**MZS0430MM05**	M5	●	13.7	31.8	84.8	84	0.8	7.0	2
5.1	2	Y	**MZS0510SM06**	M6	●	10.6	30.9	84.9	84	0.9	8.0	2
5.1	3	Y	**MZS0510MM06**	M6	●	16.6	36.9	90.9	90	0.9	8.0	2
6.8	2	Y	**MZS0680SM08**	M18	●	14.4	41.2	97.2	96	1.2	10.0	2
6.8	3	Y	**MZS0680MM08**	M8	●	22.4	49.2	105.2	104	1.2	10.0	2
8.5	2	Y	**MZS0850SM10**	M10	●	18.3	51.5	113.5	112	1.5	12.0	2
8.5	3	Y	**MZS0850MM10**	M10	●	28.3	61.5	123.5	122	1.5	12.0	2
10.3	2	Y	**MZS1030SM12**	M12	●	22.2	61.9	125.9	124	1.9	14.0	2
10.3	3	Y	**MZS1030MM12**	M12	●	34.2	73.9	137.9	136	1.9	14.0	2

MZE/MZS Step

Recommended Cutting Condition

·MZE (External coolant)

Work material	Mild Steel(≦180HB) AISI 1010 etc		Carbon steel, Alloy steel(180—280HB) AISI 1045, AISI 4140 etc		Carbon steel, Alloy steel(280—350HB) AISI 4340 etc	
Dia. DC (mm)	Revolution (min-1)	Feed rate (Min.—Max.) (mm/rev)	Revolution (min-1)	Feed rate (Min.—Max.) (mm/rev)	Revolution (min-1)	Feed rate (Min.—Max.) (mm/rev)
1.0	12700	0.035(0.020—0.050)	11100	0.035(0.020—0.050)	9500	0.035(0.020—0.050)
1.2	10600	0.045(0.030—0.060)	9200	0.045(0.030—0.060)	7900	0.045(0.030—0.060)
1.6	8900	0.055(0.035—0.080)	7900	0.055(0.035—0.080)	6900	0.055(0.035—0.080)
2.0	7100	0.07(0.040—0.100)	6300	0.07(0.040—0.100)	5500	0.07(0.040—0.100)
2.5	5700	0.085(0.050—0.125)	5000	0.085(0.050—0.125)	4400	0.085(0.050—0.125)
3.2	4400	0.1(0.060—0.13)	3900	0.1(0.06—0.13)	3400	0.09(0.06—0.12)
4.0	3500	0.12(0.080—0.16)	3100	0.12(0.08—0.16)	2700	0.11(0.07—0.14)
5.0	2800	0.15(0.100—0.20)	2500	0.15(0.10—0.20)	2200	0.14(0.09—0.18)
6.3	2700	0.2(0.13—0.26)	2500	0.2(0.13—0.26)	2200	0.18(0.11—0.24)
8.0	2100	0.23(0.18—0.28)	1900	0.23(0.18—0.28)	1700	0.21(0.16—0.25)
10.0	1700	0.27(0.22—0.32)	1500	0.27(0.22—0.32)	1400	0.23(0.19—0.27)
12.0	1700	0.31(0.28—0.34)	1500	0.31(0.28—0.34)	1400	0.26(0.23—0.29)
16.0	1300	0.33(0.28—0.38)	1200	0.33(0.28—0.38)	1100	0.29(0.24—0.33)
20.0	1100	0.35(0.30—0.40)	1000	0.35(0.30—0.40)	900	0.3(0.26—0.34)

Work material	Austenitic Stainless Steel(≦200HB) AISI 304,AISI 316 etc		Gray Cast Iron(≦350MPa) No 45 B etc		Ductile Cast Iron(≦450MPa) 60-40-8 etc	
Dia. DC (mm)	Revolution (min-1)	Feed rate (Min.—Max.) (mm/rev)	Revolution (min-1)	Feed rate (Min.—Max.) (mm/rev)	Revolution (min-1)	Feed rate (Min.—Max.) (mm/rev)
1.0	4700	0.03(0.020—0.044)	14300	0.035(0.020—0.050)	12700	0.035(0.020—0.050)
1.2	3900	0.04(0.030—0.053)	11900	0.045(0.030—0.060)	10600	0.045(0.030—0.060)
1.6	3900	0.05(0.035—0.070)	9900	0.055(0.035—0.080)	8900	0.055(0.035—0.080)
2.0	3100	0.06(0.040—0.080)	7900	0.07(0.040—0.100)	7100	0.07(0.040—0.100)
2.5	2500	0.075(0.050—0.100)	6300	0.085(0.050—0.125)	5700	0.085(0.050—0.125)
3.2	1900	0.07(0.05—0.08)	4900	0.1(0.06—0.13)	4400	0.1(0.06—0.13)
4.0	1500	0.08(0.06—0.10)	3900	0.12(0.08—0.16)	3500	0.12(0.08—0.16)
5.0	1200	0.1(0.07—0.13)	3100	0.15(0.10—0.20)	2800	0.15(0.10—0.20)
6.3	1200	0.13(0.09—0.17)	3000	0.2(0.13—0.26)	2700	0.2(0.13—0.26)
8.0	900	0.14(0.10—0.18)	2300	0.25(0.18—0.31)	2100	0.23(0.18—0.28)
10.0	700	0.16(0.12—0.19)	1900	0.29(0.22—0.35)	1700	0.27(0.22—0.32)
12.0	600	0.18(0.15—0.20)	1800	0.33(0.28—0.37)	1700	0.31(0.28—0.34)
16.0	400	0.19(0.15—0.23)	1300	0.35(0.28—0.42)	1300	0.33(0.28—0.38)
20.0	300	0.2(0.15—0.24)	1100	0.37(0.30—0.44)	1100	0.35(0.30—0.40)

MZE/MZS Step

Work material	Aluminium Alloy(Si<5%) A6061, A7075		Heat resistant alloys Inconel718		Hardened Steel(40—55HRC) AISI H13, AISI L6	
Dia. DC (mm)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)
1.0	15900	0.05(0.030—0.075)	3100	0.02(0.016—0.027)	3100	0.02(0.016—0.031)
1.2	13200	0.065(0.045—0.090)	2600	0.025(0.022—0.032)	2600	0.03(0.022—0.037)
1.6	11900	0.085(0.053—0.120)	1900	0.03(0.025—0.040)	1900	0.03(0.025—0.040)
2.0	9500	0.105(0.060—0.150)	2300	0.04(0.032—0.050)	2300	0.04(0.032—0.050)
2.5	8900	0.135(0.075—0.200)	1900	0.05(0.040—0.060)	1900	0.05(0.040—0.060)
3.2	7900	0.1(0.06—0.13)	1900	0.07(0.05—0.09)	1900	0.07(0.05—0.09)
4.0	6300	0.12(0.08—0.16)	1500	0.09(0.06—0.11)	1500	0.09(0.06—0.11)
5.0	5000	0.15(0.10—0.20)	1200	0.11(0.08—0.14)	1200	0.11(0.08—0.14)
6.3	4500	0.2(0.13—0.26)	1200	0.14(0.09—0.19)	1200	0.14(0.09—0.19)
8.0	3500	0.23(0.18—0.28)	900	0.14(0.11—0.17)	900	0.14(0.11—0.17)
10.0	2800	0.27(0.22—0.32)	700	0.16(0.12—0.19)	700	0.16(0.12—0.19)
12.0	2600	0.31(0.28—0.34)	600	0.16(0.13—0.18)	600	0.16(0.13—0.18)
16.0	2100	0.33(0.28—0.38)	400	0.18(0.14—0.21)	500	0.18(0.14—0.21)
20.0	1700	0.35(0.30—0.40)	400	0.19(0.15—0.22)	400	0.19(0.15—0.22)

·MZS (Internal coolant)

Work material	Mild Steel(≦180HB) AISI 1010 etc		Carbon steel, Alloy steel(180—280HB) AISI 1045, AISI 4140 etc		Carbon steel, Alloy steel(280—350HB) AISI 4340 etc	
Dia. DC (mm)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)
1.0	12700	0.035(0.020—0.050)	9500	0.035(0.020—0.050)	9500	0.035(0.020—0.050)
1.2	10600	0.045(0.030—0.060)	7900	0.045(0.030—0.060)	7900	0.045(0.030—0.060)
1.6	8900	0.055(0.035—0.080)	6900	0.055(0.035—0.080)	6900	0.055(0.035—0.080)
2.0	7900	0.07(0.040—0.100)	6300	0.07(0.040—0.100)	6300	0.07(0.040—0.100)
2.5	6300	0.085(0.050—0.125)	5700	0.085(0.050—0.125)	5000	0.085(0.050—0.125)
3.2	7900	0.1(0.06—0.13)	6900	0.1(0.06—0.13)	5900	0.1(0.06—0.13)
4.0	6300	0.12(0.08—0.16)	6300	0.12(0.08—0.16)	5100	0.11(0.07—0.14)
5.0	5700	0.15(0.10—0.20)	5700	0.15(0.10—0.20)	4400	0.14(0.09—0.18)
6.3	5000	0.2(0.13—0.26)	4500	0.2(0.13—0.26)	3500	0.18(0.11—0.24)
8.0	4300	0.23(0.18—0.28)	3900	0.23(0.18—0.28)	3100	0.21(0.16—0.25)
10.0	3800	0.27(0.22—0.32)	3500	0.27(0.22—0.32)	2500	0.23(0.19—0.27)
12.0	3400	0.3(0.26—0.34)	3100	0.3(0.28—0.34)	2300	0.26(0.22—0.29)
16.0	2700	0.33(0.27—0.38)	2500	0.33(0.28—0.38)	1700	0.28(0.23—0.33)
20.0	2300	0.35(0.30—0.40)	2200	0.35(0.30—0.40)	1500	0.3(0.26—0.34)

MZE/MZS Step

Work material	Austenitic Stainless Steel(≦200HB) AISI 304,AISI 316 etc		Gray Cast Iron(≦350MPa) No 45 B etc		Ductile Cast Iron(≦450MPa) 60-40-8 etc	
Dia. DC (mm)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)
1.0	6300	0.03(0.020—0.044)	12700	0.035(0.020—0.050)	9500	0.035(0.020—0.050)
1.2	5300	0.04(0.030—0.053)	10600	0.045(0.030—0.060)	7900	0.045(0.030—0.060)
1.6	4900	0.05(0.035—0.070)	8900	0.055(0.035—0.080)	6900	0.055(0.035—0.080)
2.0	4700	0.06(0.040—0.080)	7900	0.07(0.040—0.100)	6300	0.07(0.040—0.100)
2.5	3800	0.075(0.050—0.100)	6300	0.085(0.050—0.125)	5000	0.085(0.050—0.125)
3.2	2900	0.08(0.06—0.10)	7900	0.1(0.06—0.13)	5900	0.1(0.06—0.13)
4.0	3100	0.09(0.06—0.11)	6300	0.12(0.08—0.16)	5100	0.12(0.08—0.16)
5.0	2500	0.11(0.08—0.14)	5700	0.15(0.10—0.20)	4400	0.15(0.10—0.20)
6.3	2200	0.14(0.09—0.18)	5000	0.2(0.13—0.26)	3500	0.2(0.13—0.26)
8.0	1900	0.15(0.10—0.19)	4300	0.25(0.18—0.31)	3100	0.23(0.18—0.28)
10.0	1500	0.16(0.12—0.20)	3800	0.29(0.22—0.35)	2500	0.27(0.22—0.32)
12.0	1500	0.18(0.15—0.21)	3400	0.32(0.26—0.37)	2300	0.3(0.26—0.34)
16.0	1200	0.19(0.14—0.24)	2700	0.35(0.27—0.42)	1700	0.33(0.28—0.38)
20.0	1100	0.21(0.15—0.26)	2300	0.37(0.30—0.44)	1500	0.35(0.30—0.40)

Work materi-al	Aluminium Alloy(Si<5%) A6061, A7075		Heat resistant alloys Inconel718	
Dia. DC (mm)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)
1.0	19000	0.05(0.030—0.075)	3100	0.02(0.016—0.027)
1.2	15900	0.065(0.045—0.090)	2600	0.025(0.022—0.032)
1.6	13900	0.085(0.053—0.120)	1900	0.03(0.025—0.040)
2.0	11100	0.105(0.060—0.150)	1500	0.04(0.032—0.050)
2.5	10100	0.135(0.075—0.200)	1200	0.05(0.040—0.060)
3.2	9900	0.23(0.10—0.35)	1400	0.07(0.05—0.09)
4.0	7900	0.24(0.12—0.35)	1100	0.09(0.06—0.11)
5.0	7000	0.25(0.15—0.35)	1200	0.11(0.08—0.14)
6.3	6000	0.35(0.20—0.50)	1200	0.13(0.09—0.16)
8.0	4700	0.35(0.20—0.50)	900	0.14(0.11—0.17)
10.0	4100	0.5(0.20—0.80)	700	0.15(0.12—0.17)
12.0	3900	0.5(0.20—0.80)	600	0.16(0.13—0.18)
16.0	3300	0.6(0.20—1.00)	500	0.18(0.14—0.21)
20.0	2700	0.6(0.20—1.00)	400	0.19(0.15—0.22)

Memo

MGS

SOLID GUN DRILL

Deep Hole Drilling

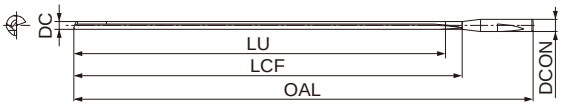
Product Information

UWC X Thinning

Work Material

P M K N S H

TECHNICAL DATA >> 1997 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 1623 DRILLS SELECTION CHART >> 1624



Type1

	0 −0.005
h6	0 −0.006

Stock status indication:●: Inventory maintained in Japan.▲: This item to be discontinued within two years.□: Non stock, produced to order only.

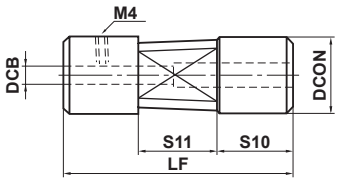
Internal Coolant Unit（mm）

DC(mm)	Hole Depth(l/d)	HTi10	Order Number	LU	LCF	OAL	DCON	Type
0.7	50	●	MGS0070L040B	35.0	40	80	3	1
0.7	80	●	MGS0070L060B	56.0	60	100	3	1
0.8	45	●	MGS0080L040B	36.0	40	80	3	1
0.8	70	●	MGS0080L060B	56.0	60	100	3	1
0.9	40	●	MGS0090L040B	36.0	40	80	3	1
0.9	60	●	MGS0090L060B	54.0	60	100	3	1
1.0	35	●	MGS0100L040B	35.0	40	80	3	1
1.0	55	●	MGS0100L060B	55.0	60	100	3	1
1.0	75	●	MGS0100L080B	75.0	80	120	3	1
1.1	30	●	MGS0110L040B	33.0	40	80	3	1
1.1	50	●	MGS0110L060B	55.0	60	100	3	1
1.1	65	●	MGS0110L080B	71.5	80	120	3	1
1.2	30	●	MGS0120L040B	36.0	40	80	3	1
1.2	45	●	MGS0120L060B	54.0	60	100	3	1
1.2	60	●	MGS0120L080B	72.0	80	120	3	1
1.3	40	●	MGS0130L060B	52.0	60	100	3	1
1.3	55	●	MGS0130L080B	71.5	80	120	3	1
1.3	70	●	MGS0130L100B	91.0	100	140	3	1
1.4	35	●	MGS0140L060B	49.0	60	100	3	1
1.4	50	●	MGS0140L080B	70.0	80	120	3	1
1.4	65	●	MGS0140L100B	91.0	100	140	3	1
1.5	35	●	MGS0150L060B	52.5	60	100	3	1
1.5	50	●	MGS0150L080B	75.0	80	120	3	1
1.5	60	●	MGS0150L100B	90.0	100	140	3	1
1.6	30	●	MGS0160L060B	48.0	60	100	3	1
1.6	45	●	MGS0160L080B	72.0	80	120	3	1
1.6	55	●	MGS0160L100B	88.0	100	140	3	1
1.7	30	●	MGS0170L060B	51.0	60	100	3	1
1.7	40	●	MGS0170L080B	68.0	80	120	3	1
1.7	55	●	MGS0170L100B	93.5	100	140	3	1
1.8	30	●	MGS0180L060B	54.0	60	100	3	1
1.8	40	●	MGS0180L080B	72.0	80	120	3	1
1.8	50	●	MGS0180L100B	90.0	100	140	3	1
1.9	25	●	MGS0190L060B	47.5	60	100	3	1
1.9	35	●	MGS0190L080B	66.5	80	120	3	1
1.9	45	●	MGS0190L100B	85.5	100	140	3	1
2.0	25	●	MGS0200L060B	50.0	60	100	3	1
2.0	35	●	MGS0200L080B	70.0	80	120	3	1
2.0	45	●	MGS0200L100B	90.0	100	140	3	1
2.1	35	●	MGS0210L080B	73.5	80	120	3	1
2.1	40	●	MGS0210L100B	84.0	100	140	3	1
2.2	30	●	MGS0220L080B	66.0	80	120	3	1
2.2	40	●	MGS0220L100B	88.0	100	140	3	1
2.3	30	●	MGS0230L080B	69.0	80	120	3	1
2.3	40	●	MGS0230L100B	92.0	100	140	3	1
2.4	30	●	MGS0240L080B	72.0	80	120	3	1
2.4	35	●	MGS0240L100B	84.0	100	140	3	1
2.5	25	●	MGS0250L080B	62.5	80	120	3	1
2.5	35	●	MGS0250L100B	87.5	100	140	3	1
2.6	25	●	MGS0260L080B	65.0	80	120	3	1
2.6	35	●	MGS0260L100B	91.0	100	140	3	1
2.7	25	●	MGS0270L080B	67.5	80	120	3	1
2.7	30	●	MGS0270L100B	81.0	100	140	3	1
2.8	25	●	MGS0280L080B	70.0	80	120	3	1
2.8	30	●	MGS0280L100B	84.0	100	140	3	1
2.9	20	●	MGS0290L080B	58.0	80	120	3	1
2.9	30	●	MGS0290L100B	87.0	100	140	3	1
3.0	20	●	MGS0300L080B	60.0	80	120	3	1
3.0	30	●	MGS0300L100B	90.0	100	140	3	1

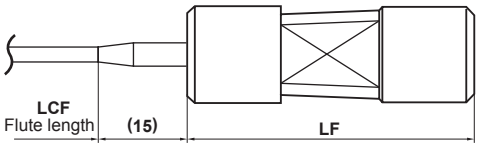
- Please consult us regarding coated type drills(VP,GP and UP coated carbide).
- MGS drills are suitable for use with shrink fit holders.

MGS

DRIVER



WHEN CONNECTED WITH A DRIVER

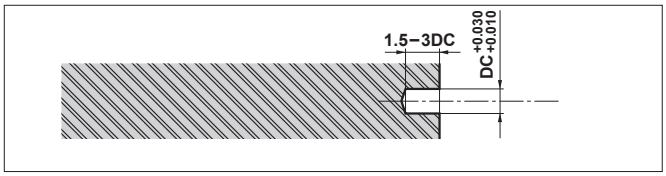


Order Number	Stock	Dimensions (mm)						
		DCON	DCB	LF	S10	S11	Set Screw	Wrench
MGD38	●	12.7	3.0	38.1	12.6	12.7	HSS04004	HKY20F
MGD70	●	12.7	3.0	70.0	25.0	20.0	HSS04004	HKY20F

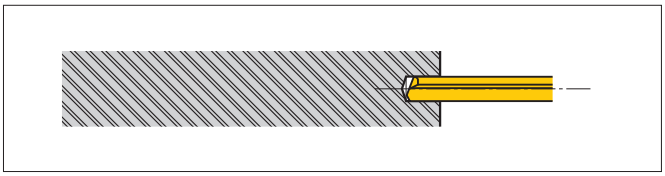
SPECIAL APPLICATION NOTES

- For safety and success, high pressure coolant is required.
  (Minimum coolant pressure=1,000PSI)
- Coolant filter must be less than 5 microns.
  Fine filtration is necessary to prevent blockage of the coolant holes.
- A pilot hole or guide bushing is required.

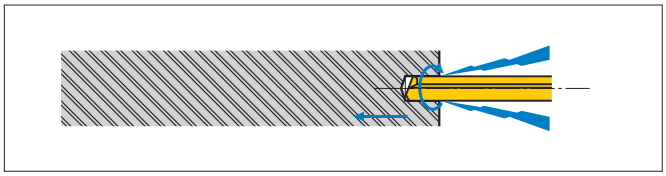
HOW TO USE



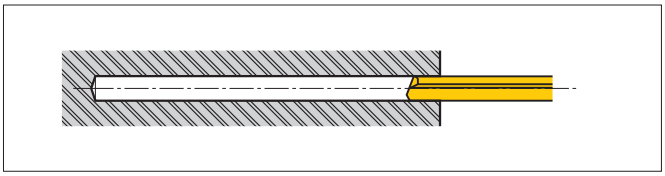
1. Pilot hole drilling.
   (Mitsubishi's MZE, MZS, MWE or MWS is recommended.)



2. Drill is inserted into the pilot hole with the MSG drill rotation stopped or rotating CCW at 300rpm or less.
   ● UP to 1-2mm before hole bottom.



3. Coolant is turned ON, raise cutting speed and feed to the recommended cutting condition.



4. Return to "Pos 2" after drilling end, coolant turned OFF and drill rotation is stopped.

MGS

RECOMMENDED CUTTING CONDITIONS

Work Material	Mild Steel (≤180HB) AISI 1010 etc				Carbon steel, Alloy steel (180−280HB) AISI 1045, AISI 4140 etc			
Recommended grinding fluid	Water insoluble				Water insoluble			
Dia. DC (mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.–Max.) (mm/rev)	Table Feed (mm/min)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.–Max.) (mm/rev)	Table Feed (mm/min)
0.8	50	19800	0.01 (0.005−0.016)	195	40	15900	0.01 (0.005−0.016)	155
1.0	50	15900	0.01 (0.007−0.020)	155	40	12700	0.01 (0.007−0.020)	125
1.2	60	15900	0.015 (0.008−0.024)	235	50	13200	0.015 (0.008−0.024)	195
1.6	60	11900	0.02 (0.011−0.032)	235	50	9900	0.02 (0.011−0.032)	195
2.0	60	9500	0.025 (0.013−0.040)	235	50	7900	0.025 (0.013−0.040)	195
2.5	70	8900	0.03 (0.017−0.050)	265	60	7600	0.03 (0.017−0.050)	225
3.0	70	7400	0.04 (0.020−0.060)	295	60	6300	0.04 (0.020−0.060)	250

Work Material	Carbon steel, Alloy steel (280−350HB) AISI 4340 etc				Austenitic Stainless Steel (≤200HB) AISI 304, AISI 316 etc			
Recommended grinding fluid	Water insoluble				Water insoluble			
Dia. DC (mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.–Max.) (mm/rev)	Table Feed (mm/min)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.–Max.) (mm/rev)	Table Feed (mm/min)
0.8	30	11900	0.005 (0.004−0.005)	55	30	11900	0.01 (0.005−0.016)	115
1.0	30	9500	0.005 (0.005−0.007)	45	30	9500	0.01 (0.007−0.020)	95
1.2	40	10600	0.005 (0.006−0.008)	50	30	7900	0.015 (0.008−0.024)	115
1.6	40	7900	0.01 (0.008−0.011)	75	40	7900	0.02 (0.011−0.032)	155
2.0	40	6300	0.01 (0.010−0.013)	60	40	6300	0.025 (0.013−0.040)	155
2.5	50	6300	0.015 (0.013−0.017)	90	40	5000	0.03 (0.017−0.050)	150
3.0	50	5300	0.015 (0.015−0.020)	75	40	4200	0.04 (0.020−0.060)	165

Work Material	Gray Cast Iron (≤350MPa) No 45 B etc				Ductile Cast Iron (≤450MPa) 60-40-8 etc			
Recommended grinding fluid	Water insoluble Water soluble				Water insoluble Water soluble			
Dia. DC (mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.–Max.) (mm/rev)	Table Feed (mm/min)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.–Max.) (mm/rev)	Table Feed (mm/min)
0.8	50	19800	0.01 (0.008−0.016)	195	40	15900	0.005 (0.005−0.008)	75
1.0	50	15900	0.015 (0.010−0.020)	235	40	12700	0.005 (0.007−0.010)	60
1.2	60	15900	0.015 (0.012−0.024)	235	50	13200	0.01 (0.008−0.012)	130
1.6	60	11900	0.02 (0.016−0.032)	235	50	9900	0.01 (0.011−0.016)	95
2.0	60	9500	0.03 (0.020−0.040)	285	50	7900	0.015 (0.013−0.020)	115
2.5	70	8900	0.035 (0.025−0.050)	310	60	7600	0.02 (0.017−0.025)	150
3.0	70	7400	0.045 (0.030−0.060)	330	60	6300	0.025 (0.020−0.030)	155

Work Material	Aluminium Alloy (Si<5%)				Copper, Copper alloy			
Recommended grinding fluid	Water insoluble Water soluble				Water insoluble Water soluble			
Dia. DC (mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.–Max.) (mm/rev)	Table Feed (mm/min)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.–Max.) (mm/rev)	Table Feed (mm/min)
0.8	50	19800	0.01 (0.008−0.016)	195	40	15900	0.01 (0.008−0.016)	155
1.0	60	19000	0.015 (0.010−0.020)	285	50	15900	0.015 (0.010−0.020)	235
1.2	70	18500	0.015 (0.012−0.024)	275	60	15900	0.015 (0.012−0.024)	235
1.6	80	15900	0.02 (0.016−0.032)	315	70	13900	0.02 (0.016−0.032)	275
2.0	90	14300	0.03 (0.020−0.040)	425	80	12700	0.03 (0.020−0.040)	380
2.5	100	12700	0.035 (0.025−0.050)	440	90	11400	0.035 (0.025−0.050)	395
3.0	100	10600	0.045 (0.030−0.060)	475	100	10600	0.045 (0.030−0.060)	475

1) For safety and success, high pressure coolant is required. (Minimum coolant pressure=1,000PSI)
2) Coolant filter must be less than 5 microns. Fine filtration is necessary to prevent blockage of the coolant holes.
3) A pilot hole or guide bushing is required.

Memo

MAE/MAS

MAE/MAS DRILLS SERIES

For Aluminium Alloy, Cast Iron

Product Information

UWC 140° SIG N Thinning

Work Material

K N

TECHNICAL DATA >> 1997

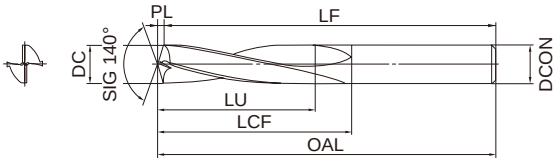
ISO13399 Property >> 1966

SYMBOL DESCRIPTIONS >> 1623

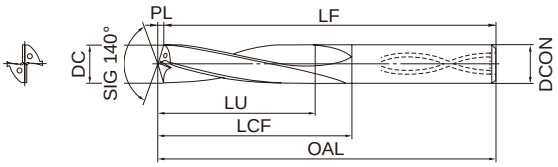
DRILLS SELECTION CHART >> 1624

MAE

MAS



Type1



Type2

	DC=3	3<DC≦6	6<DC≦10	10<DC≦16
	+ 0.005 0	+ 0.005 0	+ 0.005 0	+ 0.005 0
h6	0 −0.006	0 −0.008	0 −0.009	0 −0.011

Stock status indication:●: Inventory maintained in Japan.▲: This item to be discontinued within two years.□: Non stock, produced to order only.

Unit: mm

DC(mm)	Hole Depth(l/d)	Coolant (Int./Ext.)	HT10	Order Number	LU	LCF	OAL	LF	PL	DCON	Type
3.0	3	N	●	MAE0300MB	9.5	21.5	61.5	61	0.5	3	1
3.1	3	N	●	MAE0310MB	9.9	24.6	64.6	64	0.6	4	1
3.2	3	N	●	MAE0320MB	10.2	24.6	64.6	64	0.6	4	1
3.3	3	N	●	MAE0330MB	10.5	24.6	64.6	64	0.6	4	1
3.4	3	N	●	MAE0340MB	10.8	24.6	64.6	64	0.6	4	1
3.5	3	N	●	MAE0350MB	11.1	24.6	64.6	64	0.6	4	1
3.6	3	N	●	MAE0360MB	11.5	28.7	68.7	68	0.7	4	1
3.65	3	N	●	MAE0365MB	11.7	28.7	68.7	68	0.7	4	1
3.7	3	N	●	MAE0370MB	11.8	28.7	68.7	68	0.7	4	1
3.8	3	N	●	MAE0380MB	12.1	28.7	68.7	68	0.7	4	1
3.9	3	N	●	MAE0390MB	12.4	28.7	68.7	68	0.7	4	1
4.0	3	N	●	MAE0400MB	12.7	28.7	68.7	68	0.7	4	1
4.1	3	N	●	MAE0410MB	13.0	31.7	71.7	71	0.7	5	1
4.2	3	N	●	MAE0420MB	13.4	31.8	71.8	71	0.8	5	1
4.3	3	N	●	MAE0430MB	13.7	31.8	71.8	71	0.8	5	1
4.4	3	N	●	MAE0440MB	14.0	31.8	71.8	71	0.8	5	1
4.5	3	N	●	MAE0450MB	14.3	31.8	71.8	71	0.8	5	1
4.6	3	N	●	MAE0460MB	14.6	33.8	73.8	73	0.8	5	1
4.7	3	N	●	MAE0470MB	15.0	33.9	73.9	73	0.9	5	1
4.8	3	N	●	MAE0480MB	15.3	33.9	73.9	73	0.9	5	1
4.9	3	N	●	MAE0490MB	15.6	33.9	73.9	73	0.9	5	1
5.0	3	N	●	MAE0500MB	15.9	33.9	73.9	73	0.9	5	1
5.1	3	N	●	MAE0510MB	16.2	36.9	76.9	76	0.9	6	1
5.2	3	N	●	MAE0520MB	16.5	36.9	76.9	76	0.9	6	1
5.3	3	N	●	MAE0530MB	16.9	37.0	77.0	76	1.0	6	1
5.4	3	N	●	MAE0540MB	17.2	37.0	77.0	76	1.0	6	1
5.5	3	N	●	MAE0550MB	17.5	37.0	77.0	76	1.0	6	1
5.6	3	N	●	MAE0560MB	17.8	40.0	80.0	79	1.0	6	1
5.7	3	N	●	MAE0570MB	18.1	40.0	80.0	79	1.0	6	1
5.8	3	N	●	MAE0580MB	18.5	40.1	80.1	79	1.1	6	1
5.9	3	N	●	MAE0590MB	18.8	40.1	80.1	79	1.1	6	1
6.0	3	N	●	MAE0600MB	19.1	40.1	80.1	79	1.1	6	1
6.1	3	N	●	MAE0610MB	19.4	43.1	85.1	84	1.1	7	1
6.2	3	N	●	MAE0620MB	19.7	43.1	85.1	84	1.1	7	1
6.3	3	N	●	MAE0630MB	20.0	43.1	85.1	84	1.1	7	1
6.4	3	N	●	MAE0640MB	20.4	43.2	85.2	84	1.2	7	1
6.5	3	N	●	MAE0650MB	20.7	43.2	85.2	84	1.2	7	1
6.6	3	N	●	MAE0660MB	21.0	43.2	85.2	84	1.2	7	1
6.7	3	N	●	MAE0670MB	21.3	43.2	85.2	84	1.2	7	1
6.8	3	N	●	MAE0680MB	21.6	43.2	85.2	84	1.2	7	1
6.9	3	N	●	MAE0690MB	22.0	43.3	85.3	84	1.3	7	1
7.0	3	N	●	MAE0700MB	22.3	43.3	85.3	84	1.3	7	1
7.1	3	N	●	MAE0710MB	22.6	49.3	91.3	90	1.3	8	1
7.2	3	N	●	MAE0720MB	22.9	49.3	91.3	90	1.3	8	1
7.3	3	N	●	MAE0730MB	23.2	49.3	91.3	90	1.3	8	1
7.35	3	N	●	MAE0735MB	23.4	49.3	91.3	90	1.3	8	1
7.4	3	N	●	MAE0740MB	23.5	49.3	91.3	90	1.3	8	1
7.5	3	N	●	MAE0750MB	23.9	49.4	91.4	90	1.4	8	1
7.6	3	N	●	MAE0760MB	24.2	49.4	91.4	90	1.4	8	1
7.7	3	N	●	MAE0770MB	24.5	49.4	91.4	90	1.4	8	1

MAE/MAS

DC(mm)	Hole Depth(l/d)	Coolant (Int./Ext.)	HTi10	Order Number	LU	LCF	OAL	LF	PL	DCON	Type
7.8	3	N	●	MAE0780MB	24.8	49.4	91.4	90	1.4	8	1
7.9	3	N	●	MAE0790MB	25.1	49.4	91.4	90	1.4	8	1
8.0	3	N	●	MAE0800MB	25.5	49.5	91.5	90	1.5	8	1
8.1	3	N	●	MAE0810MB	25.8	51.5	95.5	94	1.5	9	1
8.2	3	N	●	MAE0820MB	26.1	51.5	95.5	94	1.5	9	1
8.3	3	N	●	MAE0830MB	26.4	51.5	95.5	94	1.5	9	1
8.4	3	N	●	MAE0840MB	26.7	51.5	95.5	94	1.5	9	1
8.5	3	N	●	MAE0850MB	27.0	51.5	95.5	94	1.5	9	1
8.6	3	N	●	MAE0860MB	27.4	51.6	95.6	94	1.6	9	1
8.7	3	N	●	MAE0870MB	27.7	51.6	95.6	94	1.6	9	1
8.8	3	N	●	MAE0880MB	28.0	51.6	95.6	94	1.6	9	1
8.9	3	N	●	MAE0890MB	28.3	51.6	95.6	94	1.6	9	1
9.0	3	N	●	MAE0900MB	28.6	51.6	95.6	94	1.6	9	1
9.1	3	N	●	MAE0910MB	29.0	54.7	98.7	97	1.7	10	1
9.2	3	N	●	MAE0920MB	29.3	54.7	98.7	97	1.7	10	1
9.21	3	N	●	MAE0921MB	29.3	54.7	98.7	97	1.7	10	1
9.3	3	N	●	MAE0930MB	29.6	54.7	98.7	97	1.7	10	1
9.4	3	N	●	MAE0940MB	29.9	54.7	98.7	97	1.7	10	1
9.5	3	N	●	MAE0950MB	30.2	54.7	98.7	97	1.7	10	1
9.6	3	N	●	MAE0960MB	30.5	54.7	98.7	97	1.7	10	1
9.7	3	N	●	MAE0970MB	30.9	54.8	98.8	97	1.8	10	1
9.8	3	N	●	MAE0980MB	31.2	54.8	98.8	97	1.8	10	1
9.9	3	N	●	MAE0990MB	31.5	54.8	98.8	97	1.8	10	1
10.0	3	N	●	MAE1000MB	31.8	54.8	98.8	97	1.8	10	1
10.1	3	N	□	MAE1010MB	32.1	56.8	102.8	101	1.8	11	1
10.2	3	N	□	MAE1020MB	32.5	56.9	102.9	101	1.9	11	1
10.3	3	N	●	MAE1030MB	32.8	56.9	102.9	101	1.9	11	1
10.4	3	N	□	MAE1040MB	33.1	56.9	102.9	101	1.9	11	1
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10.6	3	N	□	MAE1060MB	33.7	56.9	102.9	101	1.9	11	1
10.7	3	N	□	MAE1070MB	34.0	56.9	102.9	101	1.9	11	1
10.8	3	N	□	MAE1080MB	34.4	57.0	103.0	101	2.0	11	1
10.9	3	N	□	MAE1090MB	34.7	57.0	103.0	101	2.0	11	1
11.0	3	N	●	MAE1100MB	35.0	57.0	103.0	101	2.0	11	1
11.08	3	N	●	MAE1108MB	35.2	62.0	108.0	106	2.0	12	1
11.1	3	N	□	MAE1110MB	35.3	62.0	108.0	106	2.0	12	1
11.2	3	N	□	MAE1120MB	35.6	62.0	108.0	106	2.0	12	1
11.3	3	N	□	MAE1130MB	36.0	62.1	108.1	106	2.1	12	1
11.4	3	N	□	MAE1140MB	36.3	62.1	108.1	106	2.1	12	1
11.5	3	N	□	MAE1150MB	36.6	62.1	108.1	106	2.1	12	1
11.6	3	N	□	MAE1160MB	36.9	62.1	108.1	106	2.1	12	1
11.7	3	N	□	MAE1170MB	37.2	62.1	108.1	106	2.1	12	1
11.8	3	N	□	MAE1180MB	37.5	62.1	108.1	106	2.1	12	1
11.9	3	N	□	MAE1190MB	37.9	62.2	108.2	106	2.2	12	1
12.0	3	N	●	MAE1200MB	38.2	62.2	108.2	106	2.2	12	1
12.1	3	N	□	MAE1210MB	38.5	67.2	117.2	115	2.2	13	1
12.2	3	N	□	MAE1220MB	38.8	67.2	117.2	115	2.2	13	1
12.3	3	N	□	MAE1230MB	39.1	67.2	117.2	115	2.2	13	1
12.4	3	N	□	MAE1240MB	39.5	67.3	117.3	115	2.3	13	1
12.5	3	N	●	MAE1250MB	39.8	67.3	117.3	115	2.3	13	1
12.6	3	N	□	MAE1260MB	40.1	67.3	117.3	115	2.3	13	1
12.7	3	N	□	MAE1270MB	40.4	67.3	117.3	115	2.3	13	1
12.8	3	N	□	MAE1280MB	40.7	67.3	117.3	115	2.3	13	1
12.9	3	N	□	MAE1290MB	41.0	67.3	117.3	115	2.3	13	1
12.96	3	N	●	MAE1296MB	41.3	67.4	117.4	115	2.4	13	1
13.0	3	N	●	MAE1300MB	41.4	67.4	117.4	115	2.4	13	1
13.1	3	N	□	MAE1310MB	41.7	72.4	122.4	120	2.4	14	1
13.2	3	N	□	MAE1320MB	42.0	72.4	122.4	120	2.4	14	1
13.3	3	N	□	MAE1330MB	42.3	72.4	122.4	120	2.4	14	1
13.4	3	N	□	MAE1340MB	42.6	72.4	122.4	120	2.4	14	1
13.5	3	N	●	MAE1350MB	43.0	72.5	122.5	120	2.5	14	1
13.6	3	N	□	MAE1360MB	43.3	72.5	122.5	120	2.5	14	1
13.7	3	N	□	MAE1370MB	43.6	72.5	122.5	120	2.5	14	1
13.8	3	N	□	MAE1380MB	43.9	72.5	122.5	120	2.5	14	1
13.9	3	N	□	MAE1390MB	44.2	72.5	122.5	120	2.5	14	1
14.0	3	N	●	MAE1400MB	44.5	72.5	122.5	120	2.5	14	1
14.1	3	N	□	MAE1410MB	44.9	74.6	132.6	130	2.6	15	1
14.2	3	N	□	MAE1420MB	45.2	74.6	132.6	130	2.6	15	1
14.3	3	N	□	MAE1430MB	45.5	74.6	132.6	130	2.6	15	1
14.4	3	N	□	MAE1440MB	45.8	74.6	132.6	130	2.6	15	1
14.5	3	N	□	MAE1450MB	46.1	74.6	132.6	130	2.6	15	1
14.6	3	N	□	MAE1460MB	46.5	74.7	132.7	130	2.7	15	1
14.7	3	N	□	MAE1470MB	46.8	74.7	132.7	130	2.7	15	1
14.8	3	N	□	MAE1480MB	47.1	74.7	132.7	130	2.7	15	1
14.9	3	N	□	MAE1490MB	47.4	74.7	132.7	130	2.7	15	1
14.96	3	N	●	MAE1496MB	47.6	74.7	132.7	130	2.7	15	1
15.0	3	N	●	MAE1500MB	47.7	74.7	132.7	130	2.7	15	1
15.1	3	N	□	MAE1510MB	48.0	78.7	136.7	134	2.7	16	1
15.2	3	N	□	MAE1520MB	48.4	78.8	136.8	134	2.8	16	1
15.3	3	N	□	MAE1530MB	48.7	78.8	136.8	134	2.8	16	1
15.4	3	N	□	MAE1540MB	49.0	78.8	136.8	134	2.8	16	1
15.5	3	N	□	MAE1550MB	49.3	78.8	136.8	134	2.8	16	1
15.6	3	N	□	MAE1560MB	49.6	78.8	136.8	134	2.8	16	1
15.7	3	N	□	MAE1570MB	50.0	78.9	136.9	134	2.9	16	1
15.8	3	N	□	MAE1580MB	50.3	78.9	136.9	134	2.9	16	1
15.9	3	N	□	MAE1590MB	50.6	78.9	136.9	134	2.9	16	1
16.0	3	N	●	MAE1600MB	50.9	78.9	136.9	134	2.9	16	1
3.0	3	Y	□	MAS0300MB	9.5	21.5	61.5	61	0.5	3	2
3.0	6	Y	●	MAS0300LB	18.5	30.5	70.5	70	0.5	3	2
3.1	3	Y	□	MAS0310MB	9.9	24.6	64.6	64	0.6	4	2
3.1	6	Y	●	MAS0310LB	19.2	34.6	74.6	74	0.6	4	2
3.2	3	Y	□	MAS0320MB	10.2	24.6	64.6	64	0.6	4	2
3.2	6	Y	●	MAS0320LB	19.8	34.6	74.6	74	0.6	4	2
3.3	3	Y	□	MAS0330MB	10.5	24.6	64.6	64	0.6	4	2
3.3	6	Y	●	MAS0330LB	20.4	34.6	74.6	74	0.6	4	2
3.4	3	Y	□	MAS0340MB	10.8	24.6	64.6	64	0.6	4	2
3.4	6	Y	●	MAS0340LB	21.0	34.6	74.6	74	0.6	4	2
3.5	3	Y	□	MAS0350MB	11.1	24.6	64.6	64	0.6	4	2
3.5	6	Y	●	MAS0350LB	21.6	34.6	74.6	74	0.6	4	2
3.6	3	Y	□	MAS0360MB	11.5	28.7	68.7	68	0.7	4	2
3.6	6	Y	●	MAS0360LB	22.3	40.7	80.7	80	0.7	4	2
3.65	3	Y	□	MAS0365MB	11.7	28.7	68.7	68	0.7	4	2
3.65	6	Y	●	MAS0365LB	22.6	40.7	80.7	80	0.7	4	2
3.7	3	Y	□	MAS0370MB	11.8	28.7	68.7	68	0.7	4	2
3.7	6	Y	●	MAS0370LB	22.9	40.7	80.7	80	0.7	4	2
3.8	3	Y	□	MAS0380MB	12.1	28.7	68.7	68	0.7	4	2
3.8	6	Y	●	MAS0380LB	23.5	40.7	80.7	80	0.7	4	2
3.9	3	Y	□	MAS0390MB	12.4	28.7	68.7	68	0.7	4	2

MAE/MAS

DC(mm)	Hole Depth(l/d)	Coolant (Int./Ext.)	HTi10	Order Number	LU	LCF	OAL	LF	PL	DCON	Type
3.9	6	Y	●	MAS0390LB	24.1	40.7	80.7	80	0.7	4	2
4.0	3	Y	□	MAS0400MB	12.7	28.7	68.7	68	0.7	4	2
4.0	6	Y	●	MAS0400LB	24.7	40.7	80.7	80	0.7	4	2
4.1	3	Y	□	MAS0410MB	13.0	31.7	71.7	71	0.7	5	2
4.1	6	Y	●	MAS0410LB	25.3	44.7	84.7	84	0.7	5	2
4.2	3	Y	□	MAS0420MB	13.4	31.8	71.8	71	0.8	5	2
4.2	6	Y	●	MAS0420LB	26.0	44.8	84.8	84	0.8	5	2
4.3	3	Y	□	MAS0430MB	13.7	31.8	71.8	71	0.8	5	2
4.3	6	Y	●	MAS0430LB	26.6	44.8	84.8	84	0.8	5	2
4.4	3	Y	□	MAS0440MB	14.0	31.8	71.8	71	0.8	5	2
4.4	6	Y	●	MAS0440LB	27.2	44.8	84.8	84	0.8	5	2
4.5	3	Y	□	MAS0450MB	14.3	31.8	71.8	71	0.8	5	2
4.5	6	Y	●	MAS0450LB	27.8	44.8	84.8	84	0.8	5	2
4.6	3	Y	□	MAS0460MB	14.6	33.8	73.8	73	0.8	5	2
4.6	6	Y	●	MAS0460LB	28.4	48.8	88.8	88	0.8	5	2
4.7	3	Y	□	MAS0470MB	15.0	33.9	73.9	73	0.9	5	2
4.7	6	Y	●	MAS0470LB	29.1	48.9	88.9	88	0.9	5	2
4.8	3	Y	□	MAS0480MB	15.3	33.9	73.9	73	0.9	5	2
4.8	6	Y	●	MAS0480LB	29.7	48.9	88.9	88	0.9	5	2
4.9	3	Y	□	MAS0490MB	15.6	33.9	73.9	73	0.9	5	2
4.9	6	Y	●	MAS0490LB	30.3	48.9	88.9	88	0.9	5	2
5.0	3	Y	●	MAS0500MB	15.9	33.9	73.9	73	0.9	5	2
5.0	6	Y	●	MAS0500LB	30.9	48.9	88.9	88	0.9	5	2
5.1	3	Y	□	MAS0510MB	16.2	36.9	76.9	76	0.9	6	2
5.1	6	Y	●	MAS0510LB	31.5	52.9	92.9	92	0.9	6	2
5.2	3	Y	□	MAS0520MB	16.5	36.9	76.9	76	0.9	6	2
5.2	6	Y	●	MAS0520LB	32.1	52.9	92.9	92	0.9	6	2
5.3	3	Y	□	MAS0530MB	16.9	37.0	77.0	76	1.0	6	2
5.3	6	Y	●	MAS0530LB	32.8	53.0	93.0	92	1.0	6	2
5.4	3	Y	□	MAS0540MB	17.2	37.0	77.0	76	1.0	6	2
5.4	6	Y	●	MAS0540LB	33.4	53.0	93.0	92	1.0	6	2
5.5	3	Y	●	MAS0550MB	17.5	37.0	77.0	76	1.0	6	2
5.5	6	Y	●	MAS0550LB	34.0	53.0	93.0	92	1.0	6	2
5.6	3	Y	□	MAS0560MB	17.8	40.0	80.0	79	1.0	6	2
5.6	6	Y	●	MAS0560LB	34.6	58.0	98.0	97	1.0	6	2
5.7	3	Y	□	MAS0570MB	18.1	40.0	80.0	79	1.0	6	2
5.7	6	Y	●	MAS0570LB	35.2	58.0	98.0	97	1.0	6	2
5.8	3	Y	□	MAS0580MB	18.5	40.1	80.1	79	1.1	6	2
5.8	6	Y	●	MAS0580LB	35.9	58.1	98.1	97	1.1	6	2
5.9	3	Y	□	MAS0590MB	18.8	40.1	80.1	79	1.1	6	2
5.9	6	Y	●	MAS0590LB	36.5	58.1	98.1	97	1.1	6	2
6.0	3	Y	●	MAS0600MB	19.1	40.1	80.1	79	1.1	6	2
6.0	6	Y	●	MAS0600LB	37.1	58.1	98.1	97	1.1	6	2
6.1	3	Y	□	MAS0610MB	19.4	43.1	85.1	84	1.1	7	2
6.1	6	Y	●	MAS0610LB	37.7	63.1	105.1	104	1.1	7	2
6.2	3	Y	□	MAS0620MB	19.7	43.1	85.1	84	1.1	7	2
6.2	6	Y	●	MAS0620LB	38.3	63.1	105.1	104	1.1	7	2
6.3	3	Y	□	MAS0630MB	20.0	43.1	85.1	84	1.1	7	2
6.3	6	Y	●	MAS0630LB	38.9	63.1	105.1	104	1.1	7	2
6.4	3	Y	□	MAS0640MB	20.4	43.2	85.2	84	1.2	7	2
6.4	6	Y	●	MAS0640LB	39.6	63.2	105.2	104	1.2	7	2
6.5	3	Y	●	MAS0650MB	20.7	43.2	85.2	84	1.2	7	2
6.5	6	Y	●	MAS0650LB	40.2	63.2	105.2	104	1.2	7	2
6.6	3	Y	□	MAS0660MB	21.0	43.2	85.2	84	1.2	7	2
6.6	6	Y	●	MAS0660LB	40.8	66.2	108.2	107	1.2	7	2
6.7	3	Y	□	MAS0670MB	21.3	43.2	85.2	84	1.2	7	2
6.7	6	Y	●	MAS0670LB	41.4	66.2	108.2	107	1.2	7	2
6.8	3	Y	●	MAS0680MB	21.6	43.2	85.2	84	1.2	7	2
6.8	6	Y	●	MAS0680LB	42.0	66.2	108.2	107	1.2	7	2
6.9	3	Y	□	MAS0690MB	22.0	43.3	85.3	84	1.3	7	2
6.9	6	Y	●	MAS0690LB	42.7	66.3	108.3	107	1.3	7	2
7.0	3	Y	●	MAS0700MB	22.3	43.3	85.3	84	1.3	7	2
7.0	6	Y	●	MAS0700LB	43.3	66.3	108.3	107	1.3	7	2
7.1	3	Y	□	MAS0710MB	22.6	49.3	91.3	90	1.3	8	2
7.1	6	Y	●	MAS0710LB	43.9	69.3	111.3	110	1.3	8	2
7.2	3	Y	□	MAS0720MB	22.9	49.3	91.3	90	1.3	8	2
7.2	6	Y	●	MAS0720LB	44.5	69.3	111.3	110	1.3	8	2
7.3	3	Y	□	MAS0730MB	23.2	49.3	91.3	90	1.3	8	2
7.3	6	Y	●	MAS0730LB	45.1	69.3	111.3	110	1.3	8	2
7.35	3	Y	●	MAS0735MB	23.4	49.3	91.3	90	1.3	8	2
7.35	6	Y	●	MAS0735LB	45.4	69.3	111.3	110	1.3	8	2
7.4	3	Y	□	MAS0740MB	23.5	49.3	91.3	90	1.3	8	2
7.4	6	Y	●	MAS0740LB	45.7	69.3	111.3	110	1.3	8	2
7.5	3	Y	□	MAS0750MB	23.9	49.4	91.4	90	1.4	8	2
7.5	6	Y	●	MAS0750LB	46.4	69.4	111.4	110	1.4	8	2
7.6	3	Y	□	MAS0760MB	24.2	49.4	91.4	90	1.4	8	2
7.6	6	Y	●	MAS0760LB	47.0	73.4	115.4	114	1.4	8	2
7.7	3	Y	□	MAS0770MB	24.5	49.4	91.4	90	1.4	8	2
7.7	6	Y	●	MAS0770LB	47.6	73.4	115.4	114	1.4	8	2
7.8	3	Y	□	MAS0780MB	24.8	49.4	91.4	90	1.4	8	2
7.8	6	Y	●	MAS0780LB	48.2	73.4	115.4	114	1.4	8	2
7.9	3	Y	□	MAS0790MB	25.1	49.4	91.4	90	1.4	8	2
7.9	6	Y	●	MAS0790LB	48.8	73.4	115.4	114	1.4	8	2
8.0	3	Y	●	MAS0800MB	25.5	49.5	91.5	90	1.5	8	2
8.0	6	Y	●	MAS0800LB	49.5	73.5	115.5	114	1.5	8	2
8.1	3	Y	□	MAS0810MB	25.8	51.5	95.5	94	1.5	9	2
8.1	6	Y	●	MAS0810LB	50.1	76.5	120.5	119	1.5	9	2
8.2	3	Y	□	MAS0820MB	26.1	51.5	95.5	94	1.5	9	2
8.2	6	Y	●	MAS0820LB	50.7	76.5	120.5	119	1.5	9	2
8.3	3	Y	□	MAS0830MB	26.4	51.5	95.5	94	1.5	9	2
8.3	6	Y	●	MAS0830LB	51.3	76.5	120.5	119	1.5	9	2
8.4	3	Y	□	MAS0840MB	26.7	51.5	95.5	94	1.5	9	2
8.4	6	Y	●	MAS0840LB	51.9	76.5	120.5	119	1.5	9	2
8.5	3	Y	●	MAS0850MB	27.0	51.5	95.5	94	1.5	9	2
8.5	6	Y	●	MAS0850LB	52.5	76.5	120.5	119	1.5	9	2
8.6	3	Y	□	MAS0860MB	27.4	51.6	95.6	94	1.6	9	2
8.6	6	Y	●	MAS0860LB	53.2	78.6	122.6	121	1.6	9	2
8.7	3	Y	□	MAS0870MB	27.7	51.6	95.6	94	1.6	9	2
8.7	6	Y	●	MAS0870LB	53.8	78.6	122.6	121	1.6	9	2
8.8	3	Y	□	MAS0880MB	28.0	51.6	95.6	94	1.6	9	2
8.8	6	Y	●	MAS0880LB	54.4	78.6	122.6	121	1.6	9	2
8.9	3	Y	□	MAS0890MB	28.3	51.6	95.6	94	1.6	9	2
8.9	6	Y	●	MAS0890LB	55.0	78.6	122.6	121	1.6	9	2
9.0	3	Y	●	MAS0900MB	28.6	51.6	95.6	94	1.6	9	2
9.0	6	Y	●	MAS0900LB	55.6	78.6	122.6	121	1.6	9	2
9.1	3	Y	□	MAS0910MB	29.0	54.7	98.7	97	1.7	10	2
9.1	6	Y	●	MAS0910LB	56.3	82.7	126.7	125	1.7	10	2
9.2	3	Y	□	MAS0920MB	29.3	54.7	98.7	97	1.7	10	2

MAE/MAS

DC(mm)	Hole Depth(l/d)	Coolant (Int./Ext.)	HTi10	Order Number	LU	LCF	OAL	LF	PL	DCON	Type
9.2	6	Y	●	MAS0920LB	56.9	82.7	126.7	125	1.7	10	2
9.21	3	Y	●	MAS0921MB	29.3	54.7	98.7	97	1.7	10	2
9.21	6	Y	●	MAS0921LB	57.0	82.7	126.7	125	1.7	10	2
9.3	3	Y	□	MAS0930MB	29.6	54.7	98.7	97	1.7	10	2
9.3	6	Y	●	MAS0930LB	57.5	82.7	126.7	125	1.7	10	2
9.4	3	Y	□	MAS0940MB	29.9	54.7	98.7	97	1.7	10	2
9.4	6	Y	●	MAS0940LB	58.1	82.7	126.7	125	1.7	10	2
9.5	3	Y	●	MAS0950MB	30.2	54.7	98.7	97	1.7	10	2
9.5	6	Y	●	MAS0950LB	58.7	82.7	126.7	125	1.7	10	2
9.6	3	Y	□	MAS0960MB	30.5	54.7	98.7	97	1.7	10	2
9.6	6	Y	●	MAS0960LB	59.3	82.7	126.7	125	1.7	10	2
9.7	3	Y	□	MAS0970MB	30.9	54.8	98.8	97	1.8	10	2
9.7	6	Y	●	MAS0970LB	60.0	82.8	126.8	125	1.8	10	2
9.8	3	Y	□	MAS0980MB	31.2	54.8	98.8	97	1.8	10	2
9.8	6	Y	●	MAS0980LB	60.6	82.8	126.8	125	1.8	10	2
9.9	3	Y	□	MAS0990MB	31.5	54.8	98.8	97	1.8	10	2
9.9	6	Y	●	MAS0990LB	61.2	82.8	126.8	125	1.8	10	2
10.0	3	Y	●	MAS1000MB	31.8	54.8	98.8	97	1.8	10	2
10.0	6	Y	●	MAS1000LB	61.8	82.8	126.8	125	1.8	10	2
10.1	3	Y	□	MAS1010MB	32.1	56.8	102.8	101	1.8	11	2
10.1	6	Y	□	MAS1010LB	62.4	90.8	136.8	135	1.8	11	2
10.2	3	Y	□	MAS1020MB	32.5	56.9	102.9	101	1.9	11	2
10.2	6	Y	□	MAS1020LB	63.1	90.9	136.9	135	1.9	11	2
10.3	3	Y	●	MAS1030MB	32.8	56.9	102.9	101	1.9	11	2
10.3	6	Y	●	MAS1030LB	63.7	90.9	136.9	135	1.9	11	2
10.4	3	Y	□	MAS1040MB	33.1	56.9	102.9	101	1.9	11	2
10.4	6	Y	□	MAS1040LB	64.3	90.9	136.9	135	1.9	11	2
10.5	3	Y	●	MAS1050MB	33.4	56.9	102.9	101	1.9	11	2
10.5	6	Y	●	MAS1050LB	64.9	90.9	136.9	135	1.9	11	2
10.6	3	Y	□	MAS1060MB	33.7	56.9	102.9	101	1.9	11	2
10.6	6	Y	□	MAS1060LB	65.5	90.9	136.9	135	1.9	11	2
10.7	3	Y	□	MAS1070MB	34.0	56.9	102.9	101	1.9	11	2
10.7	6	Y	□	MAS1070LB	66.1	90.9	136.9	135	1.9	11	2
10.8	3	Y	□	MAS1080MB	34.4	57.0	103.0	101	2.0	11	2
10.8	6	Y	□	MAS1080LB	66.8	91.0	137.0	135	2.0	11	2
10.9	3	Y	□	MAS1090MB	34.7	57.0	103.0	101	2.0	11	2
10.9	6	Y	□	MAS1090LB	67.4	91.0	137.0	135	2.0	11	2
11.0	3	Y	●	MAS1100MB	35.0	57.0	103.0	101	2.0	11	2
11.0	6	Y	●	MAS1100LB	68.0	91.0	137.0	135	2.0	11	2
11.08	3	Y	●	MAS1108MB	35.2	62.0	108.0	106	2.0	12	2
11.08	6	Y	●	MAS1108LB	68.5	96.0	142.0	140	2.0	12	2
11.1	3	Y	□	MAS1110MB	35.3	62.0	108.0	106	2.0	12	2
11.1	6	Y	□	MAS1110LB	68.6	96.0	142.0	140	2.0	12	2
11.2	3	Y	□	MAS1120MB	35.6	62.0	108.0	106	2.0	12	2
11.2	6	Y	□	MAS1120LB	69.2	96.0	142.0	140	2.0	12	2
11.3	3	Y	□	MAS1130MB	36.0	62.1	108.1	106	2.1	12	2
11.3	6	Y	□	MAS1130LB	69.9	96.1	142.1	140	2.1	12	2
11.4	3	Y	□	MAS1140MB	36.3	62.1	108.1	106	2.1	12	2
11.4	6	Y	□	MAS1140LB	70.5	96.1	142.1	140	2.1	12	2
11.5	3	Y	□	MAS1150MB	36.6	62.1	108.1	106	2.1	12	2
11.5	6	Y	□	MAS1150LB	71.1	96.1	142.1	140	2.1	12	2
11.6	3	Y	□	MAS1160MB	36.9	62.1	108.1	106	2.1	12	2
11.6	6	Y	□	MAS1160LB	71.7	96.1	142.1	140	2.1	12	2
11.7	3	Y	□	MAS1170MB	37.2	62.1	108.1	106	2.1	12	2
11.7	6	Y	□	MAS1170LB	72.3	96.1	142.1	140	2.1	12	2
11.8	3	Y	□	MAS1180MB	37.5	62.1	108.1	106	2.1	12	2
11.8	6	Y	□	MAS1180LB	72.9	96.1	142.1	140	2.1	12	2
11.9	3	Y	□	MAS1190MB	37.9	62.2	108.2	106	2.2	12	2
11.9	6	Y	□	MAS1190LB	73.6	96.2	142.2	140	2.2	12	2
12.0	3	Y	●	MAS1200MB	38.2	62.2	108.2	106	2.2	12	2
12.0	6	Y	●	MAS1200LB	74.2	96.2	142.2	140	2.2	12	2
12.1	3	Y	□	MAS1210MB	38.5	67.2	117.2	115	2.2	13	2
12.1	6	Y	□	MAS1210LB	74.8	102.2	152.2	150	2.2	13	2
12.2	3	Y	□	MAS1220MB	38.8	67.2	117.2	115	2.2	13	2
12.2	6	Y	□	MAS1220LB	75.4	102.2	152.2	150	2.2	13	2
12.3	3	Y	□	MAS1230MB	39.1	67.2	117.2	115	2.2	13	2
12.3	6	Y	□	MAS1230LB	76.0	102.2	152.2	150	2.2	13	2
12.4	3	Y	□	MAS1240MB	39.5	67.3	117.3	115	2.3	13	2
12.4	6	Y	□	MAS1240LB	76.7	102.3	152.3	150	2.3	13	2
12.5	3	Y	●	MAS1250MB	39.8	67.3	117.3	115	2.3	13	2
12.5	6	Y	●	MAS1250LB	77.3	102.3	152.3	150	2.3	13	2
12.6	3	Y	□	MAS1260MB	40.1	67.3	117.3	115	2.3	13	2
12.6	6	Y	□	MAS1260LB	77.9	102.3	152.3	150	2.3	13	2
12.7	3	Y	□	MAS1270MB	40.4	67.3	117.3	115	2.3	13	2
12.7	6	Y	□	MAS1270LB	78.5	102.3	152.3	150	2.3	13	2
12.8	3	Y	□	MAS1280MB	40.7	67.3	117.3	115	2.3	13	2
12.8	6	Y	□	MAS1280LB	79.1	102.3	152.3	150	2.3	13	2
12.9	3	Y	□	MAS1290MB	41.0	67.3	117.3	115	2.3	13	2
12.9	6	Y	□	MAS1290LB	79.7	102.3	152.3	150	2.3	13	2
12.96	3	Y	●	MAS1296MB	41.3	67.4	117.4	115	2.4	13	2
12.96	6	Y	●	MAS1296LB	80.2	102.4	152.4	150	2.4	13	2
13.0	3	Y	●	MAS1300MB	41.4	67.4	117.4	115	2.4	13	2
13.0	6	Y	●	MAS1300LB	80.4	102.4	152.4	150	2.4	13	2
13.1	3	Y	□	MAS1310MB	41.7	72.4	122.4	120	2.4	14	2
13.1	6	Y	□	MAS1310LB	81.0	112.4	162.4	160	2.4	14	2
13.2	3	Y	□	MAS1320MB	42.0	72.4	122.4	120	2.4	14	2
13.2	6	Y	□	MAS1320LB	81.6	112.4	162.4	160	2.4	14	2
13.3	3	Y	□	MAS1330MB	42.3	72.4	122.4	120	2.4	14	2
13.3	6	Y	□	MAS1330LB	82.2	112.4	162.4	160	2.4	14	2
13.4	3	Y	□	MAS1340MB	42.6	72.4	122.4	120	2.4	14	2
13.4	6	Y	□	MAS1340LB	82.8	112.4	162.4	160	2.4	14	2
13.5	3	Y	●	MAS1350MB	43.0	72.5	122.5	120	2.5	14	2
13.5	6	Y	●	MAS1350LB	83.5	112.5	162.5	160	2.5	14	2
13.6	3	Y	□	MAS1360MB	43.3	72.5	122.5	120	2.5	14	2
13.6	6	Y	□	MAS1360LB	84.1	112.5	162.5	160	2.5	14	2
13.7	3	Y	□	MAS1370MB	43.6	72.5	122.5	120	2.5	14	2
13.7	6	Y	□	MAS1370LB	84.7	112.5	162.5	160	2.5	14	2
13.8	3	Y	□	MAS1380MB	43.9	72.5	122.5	120	2.5	14	2
13.8	6	Y	□	MAS1380LB	85.3	112.5	162.5	160	2.5	14	2
13.9	3	Y	□	MAS1390MB	44.2	72.5	122.5	120	2.5	14	2
13.9	6	Y	□	MAS1390LB	85.9	112.5	162.5	160	2.5	14	2
14.0	3	Y	●	MAS1400MB	44.5	72.5	122.5	120	2.5	14	2
14.0	6	Y	●	MAS1400LB	86.5	112.5	162.5	160	2.5	14	2
14.1	3	Y	□	MAS1410MB	44.9	74.6	132.6	130	2.6	15	2
14.1	6	Y	□	MAS1410LB	87.2	117.6	175.6	173	2.6	15	2
14.2	3	Y	□	MAS1420MB	45.2	74.6	132.6	130	2.6	15	2
14.2	6	Y	□	MAS1420LB	87.8	117.6	175.6	173	2.6	15	2
14.3	3	Y	□	MAS1430MB	45.5	74.6	132.6	130	2.6	15	2

MAE/MAS

DC(mm)	Hole Depth(l/d)	Coolant (Int./Ext.)	HTi10	Order Number	LU	LCF	OAL	LF	PL	DCON	Type
14.3	6	Y	□	**MAS1430LB**	88.4	117.6	175.6	173	2.6	15	2
14.4	3	Y	□	**MAS1440MB**	45.8	74.6	132.6	130	2.6	15	2
14.4	6	Y	□	**MAS1440LB**	89.0	117.6	175.6	173	2.6	15	2
14.5	3	Y	□	**MAS1450MB**	46.1	74.6	132.6	130	2.6	15	2
14.5	6	Y	□	**MAS1450LB**	89.6	117.6	175.6	173	2.6	15	2
14.6	3	Y	□	**MAS1460MB**	46.5	74.7	132.7	130	2.7	15	2
14.6	6	Y	□	**MAS1460LB**	90.3	117.7	175.7	173	2.7	15	2
14.7	3	Y	□	**MAS1470MB**	46.8	74.7	132.7	130	2.7	15	2
14.7	6	Y	□	**MAS1470LB**	90.9	117.7	175.7	173	2.7	15	2
14.8	3	Y	□	**MAS1480MB**	47.1	74.7	132.7	130	2.7	15	2
14.8	6	Y	□	**MAS1480LB**	91.5	117.7	175.7	173	2.7	15	2
14.9	3	Y	□	**MAS1490MB**	47.4	74.7	132.7	130	2.7	15	2
14.9	6	Y	□	**MAS1490LB**	92.1	117.7	175.7	173	2.7	15	2
14.96	3	Y	●	**MAS1496MB**	47.6	74.7	132.7	130	2.7	15	2
14.96	6	Y	●	**MAS1496LB**	92.5	117.7	175.7	173	2.7	15	2
15.0	3	Y	●	**MAS1500MB**	47.7	74.7	132.7	130	2.7	15	2
15.0	6	Y	●	**MAS1500LB**	92.7	117.7	175.7	173	2.7	15	2
15.1	3	Y	□	**MAS1510MB**	48.0	78.7	136.7	134	2.7	16	2
15.1	6	Y	□	**MAS1510LB**	93.3	122.7	180.7	178	2.7	16	2

DC(mm)	Hole Depth(l/d)	Coolant (Int./Ext.)	HTi10	Order Number	LU	LCF	OAL	LF	PL	DCON	Type
15.2	3	Y	□	**MAS1520MB**	48.4	78.8	136.8	134	2.8	16	2
15.2	6	Y	□	**MAS1520LB**	94.0	122.8	180.8	178	2.8	16	2
15.3	3	Y	□	**MAS1530MB**	48.7	78.8	136.8	134	2.8	16	2
15.3	6	Y	□	**MAS1530LB**	94.6	122.8	180.8	178	2.8	16	2
15.4	3	Y	□	**MAS1540MB**	49.0	78.8	136.8	134	2.8	16	2
15.4	6	Y	□	**MAS1540LB**	95.2	122.8	180.8	178	2.8	16	2
15.5	3	Y	□	**MAS1550MB**	49.3	78.8	136.8	134	2.8	16	2
15.5	6	Y	□	**MAS1550LB**	95.8	122.8	180.8	178	2.8	16	2
15.6	3	Y	□	**MAS1560MB**	49.6	78.8	136.8	134	2.8	16	2
15.6	6	Y	□	**MAS1560LB**	96.4	122.8	180.8	178	2.8	16	2
15.7	3	Y	□	**MAS1570MB**	50.0	78.9	136.9	134	2.9	16	2
15.7	6	Y	□	**MAS1570LB**	97.1	122.9	180.9	178	2.9	16	2
15.8	3	Y	□	**MAS1580MB**	50.3	78.9	136.9	134	2.9	16	2
15.8	6	Y	□	**MAS1580LB**	97.7	122.9	180.9	178	2.9	16	2
15.9	3	Y	□	**MAS1590MB**	50.6	78.9	136.9	134	2.9	16	2
15.9	6	Y	□	**MAS1590LB**	98.3	122.9	180.9	178	2.9	16	2
16.0	3	Y	●	**MAS1600MB**	50.9	78.9	136.9	134	2.9	16	2
16.0	6	Y	●	**MAS1600LB**	98.9	122.9	180.9	178	2.9	16	2

- MAS type bigger thanø5.0 have a recess in the end face.
- MAE/MAS drills are suitable for use with shrink fit holders.
- DC=3.65,5.5,7.35,9.21,10.08,12.96,17.96 for rolled thread taps.

MAE/MAS

RECOMMENDED CUTTING CONDITIONS

Type		Work Material	Drill Dia. ϕ3.0−ϕ6.0		Drill Dia. ϕ6.1−ϕ10.0		Drill Dia. ϕ10.1−ϕ16.0	
			Cutting Speed (m/min)	Feed (mm/rev)	Cutting Speed (m/min)	Feed (mm/rev)	Cutting Speed (m/min)	Feed (mm/rev)
MAE	N	Aluminium Alloy Casting	90 (40−140)	0.15 (0.05−0.3)	100 (50−150)	0.2 (0.1−0.3)	120 (60−170)	0.25 (0.1−0.4)
		Aluminium Alloy Die Casting	100 (60−150)	0.12 (0.05−0.25)	110 (70−160)	0.15 (0.05−0.25)	130 (80−180)	0.2 (0.1−0.3)
	K	Gray Cast Iron	40 (20−60)	0.15 (0.1−0.2)	60 (40−80)	0.2 (0.1−0.3)	80 (60−100)	0.3 (0.2−0.4)
		Ductile Cast Iron	30 (20−40)	0.1 (0.05−0.15)	40 (20−60)	0.12 (0.05−0.2)	60 (40−80)	0.2 (0.1−0.3)
MAS	N	Aluminium Alloy Casting	100 (60−150)	0.15 (0.05−0.3)	120 (80−170)	0.2 (0.1−0.3)	150 (100−200)	0.25 (0.1−0.4)
		Aluminium Alloy Die Casting	120 (80−170)	0.12 (0.05−0.25)	150 (100−180)	0.15 (0.05−0.25)	160 (120−200)	0.2 (0.1−0.3)
	K	Gray Cast Iron	60 (40−80)	0.15 (0.1−0.2)	80 (60−110)	0.2 (0.1−0.3)	100 (70−130)	0.3 (0.2−0.4)
		Ductile Cast Iron	45 (30−60)	0.1 (0.05−0.15)	60 (40−80)	0.12 (0.05−0.2)	80 (60−100)	0.2 (0.1−0.3)

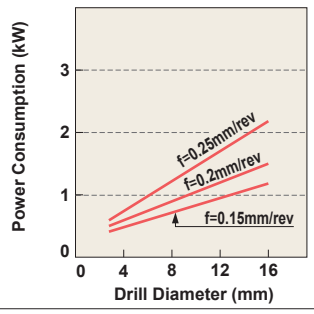
HOLE AND DRILL DIAMETERS FOR THREAD TAPPING

Thread Size	Thread Tapping			Rolled Thread Tapping		
	Drill Diameter (DC)	Hole Diameter Tolerance		Drill Diameter (DC)	Hole Diameter Tolerance	
		max.	min.		max.	min.
M4x0.7	**3.3**	3.242	3.422	**3.65**	3.65	3.70
M5x0.8	**4.2**	4.134	4.334	**4.60**	4.59	4.66
M6x1.0	**5.0**	4.917	5.153	**5.50**	5.48	5.57
M8x1.25	**6.8**	6.647	6.912	**7.35**	7.34	7.41
M10x1.5	**8.5**	8.376	8.676	**9.21**	9.18	9.28
M12x1.75	**10.3**	10.106	10.441	**11.08**	11.05	11.15
M14x2	**12.0**	11.835	12.210	**12.96**	12.92	13.04
M16x2	**14.0**	13.835	14.210	**14.96**	14.92	15.04

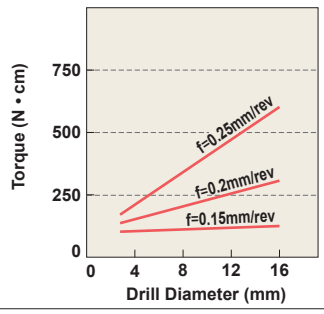
CUTTING RESISTANCE

Workpiece : JIS AC4B-T6 Drilled Depth : l/d=3(Through Hole) Cutting Speed : 100m/min WSO (10%)

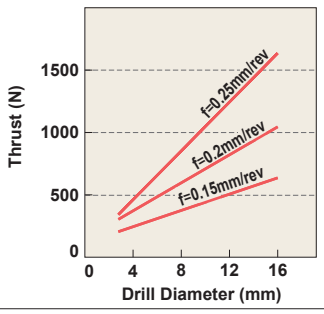
Power Consumption



Torque



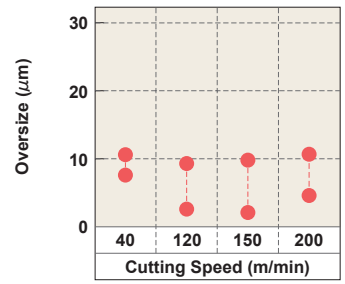
Thrust



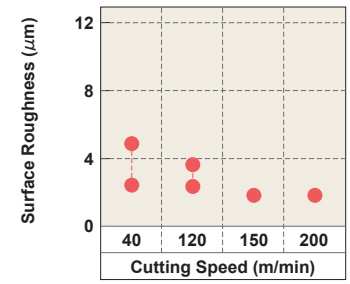
MACHINED HOLE ACCURACY

Tool : MAS1100MB Workpiece : JIS AC4B-T6 Feed : 0.35mm/rev Drilled Depth : 33mm WSO (10%)

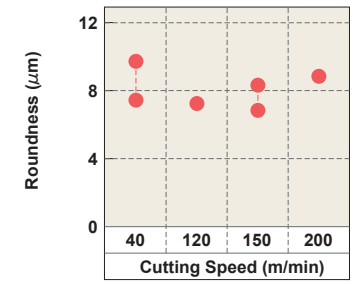
Oversize



Surface Roughness



Roundness



MFE

Solid Carbide Flat Bottom Drills

Product Information

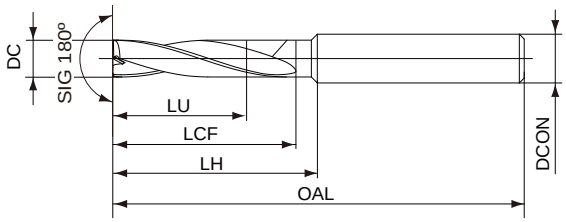
UWC DP1 180° SIG X Thinning

Work Material

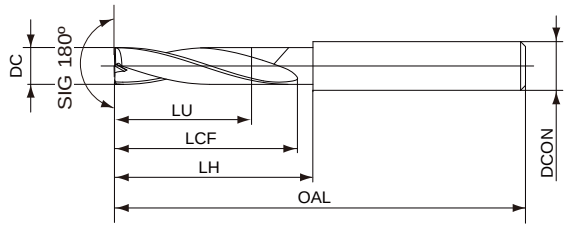
P M K N

TECHNICAL DATA >> 1997 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 1623 DRILLS SELECTION CHART >> 1624

	3≦DC≦6	6<DC≦10	10<DC≦18	18<DC≦20
	0 −0.012	0 −0.015	0 −0.018	0 −0.021
	DCON=6	DCON=8,10	DCON=12,14,16,18	DCON=20
h6	0 −0.008	0 −0.009	0 −0.011	0 −0.013



Type1



Type2

Stock status indication:●: Inventory maintained in Japan.▲: This item to be discontinued within two years.□: Non stock, produced to order only.

External Coolant Unit（mm）

DC(mm)	Hole Depth(l/d)	DP1020	Order Number	LU	LCF	LH	OAL	DCON	Type
3.0	2	●	MFE0300X02S060	6.0	12.0	19.6	55.0	6	1
3.1	2	●	MFE0310X02S060	6.2	14.0	21.4	55.0	6	1
3.2	2	●	MFE0320X02S060	6.4	14.0	21.3	55.0	6	1
3.3	2	●	MFE0330X02S060	6.6	14.0	21.1	55.0	6	1
3.4	2	●	MFE0340X02S060	6.8	14.0	20.9	55.0	6	1
3.5	2	●	MFE0350X02S060	7.0	14.0	20.7	55.0	6	1
3.6	2	●	MFE0360X02S060	7.2	16.0	22.5	55.0	6	1
3.7	2	●	MFE0370X02S060	7.4	16.0	22.3	55.0	6	1
3.8	2	●	MFE0380X02S060	7.6	16.0	22.1	55.0	6	1
3.9	2	●	MFE0390X02S060	7.8	16.0	22.0	55.0	6	1
4.0	2	●	MFE0400X02S060	8.0	16.0	16.8	55.0	6	1
4.1	2	●	MFE0410X02S060	8.2	18.0	23.6	62.0	6	1
4.2	2	●	MFE0420X02S060	8.4	18.0	23.4	62.0	6	1
4.3	2	●	MFE0430X02S060	8.6	18.0	23.2	62.0	6	1
4.4	2	●	MFE0440X02S060	8.8	18.0	23.0	62.0	6	1
4.5	2	●	MFE0450X02S060	9.0	18.0	22.8	62.0	6	1
4.6	2	●	MFE0460X02S060	9.2	20.0	23.7	62.0	6	1
4.7	2	●	MFE0470X02S060	9.4	20.0	23.7	62.0	6	1
4.8	2	●	MFE0480X02S060	9.6	20.0	23.6	62.0	6	1
4.9	2	●	MFE0490X02S060	9.8	20.0	23.6	62.0	6	1
5.0	2	●	MFE0500X02S060	10.0	20.0	23.5	62.0	6	1
5.1	2	●	MFE0510X02S060	10.2	22.0	25.5	62.0	6	1
5.2	2	●	MFE0520X02S060	10.4	22.0	25.4	62.0	6	1
5.3	2	●	MFE0530X02S060	10.6	22.0	25.4	62.0	6	1
5.4	2	●	MFE0540X02S060	10.8	22.0	25.3	62.0	6	1
5.5	2	●	MFE0550X02S060	11.0	22.0	25.3	62.0	6	1
5.6	2	●	MFE0560X02S060	11.2	24.0	27.2	62.0	6	1
5.7	2	●	MFE0570X02S060	11.4	24.0	27.2	62.0	6	1
5.8	2	●	MFE0580X02S060	11.6	24.1	27.2	62.1	6	1
5.9	2	●	MFE0590X02S060	11.8	24.1	27.1	62.1	6	1

MFE

DC(mm)	Hole Depth(l/d)	DP1020	Order Number	LU	LCF	LH	OAL	DCON	Type
6.0	2	●	MFE0600X02S060	12.0	24.1	27.1	62.1	6	1
6.1	2	●	MFE0610X02S080	12.2	26.1	30.0	74.1	8	1
6.2	2	●	MFE0620X02S080	12.4	26.1	30.0	74.1	8	1
6.3	2	●	MFE0630X02S080	12.6	26.1	29.9	74.1	8	1
6.4	2	●	MFE0640X02S080	12.8	26.1	29.9	74.1	8	1
6.5	2	●	MFE0650X02S080	13.0	26.1	29.8	74.1	8	1
6.6	2	●	MFE0660X02S080	13.2	28.1	31.8	74.1	8	1
6.7	2	●	MFE0670X02S080	13.4	28.1	31.7	74.1	8	1
6.8	2	●	MFE0680X02S080	13.6	28.1	31.7	74.1	8	1
6.9	2	●	MFE0690X02S080	13.8	28.1	31.6	74.1	8	1
7.0	2	●	MFE0700X02S080	14.0	28.1	31.6	74.1	8	1
7.1	2	●	MFE0710X02S080	14.2	30.1	33.5	74.1	8	1
7.2	2	●	MFE0720X02S080	14.4	30.1	33.5	74.1	8	1
7.3	2	●	MFE0730X02S080	14.6	30.1	33.4	74.1	8	1
7.4	2	●	MFE0740X02S080	14.8	30.1	33.4	74.1	8	1
7.5	2	●	MFE0750X02S080	15.0	30.1	33.3	74.1	8	1
7.6	2	●	MFE0760X02S080	15.2	32.1	35.3	74.1	8	1
7.7	2	●	MFE0770X02S080	15.4	32.1	35.2	74.1	8	1
7.8	2	●	MFE0780X02S080	15.6	32.1	35.2	74.1	8	1
7.9	2	●	MFE0790X02S080	15.8	32.1	35.1	74.1	8	1
8.0	2	●	MFE0800X02S080	16.0	32.1	35.1	74.1	8	1
8.1	2	●	MFE0810X02S100	16.2	34.1	38.0	84.1	10	1
8.2	2	●	MFE0820X02S100	16.4	34.1	38.0	84.1	10	1
8.3	2	●	MFE0830X02S100	16.6	34.1	37.9	84.1	10	1
8.4	2	●	MFE0840X02S100	16.8	34.1	37.9	84.1	10	1
8.5	2	●	MFE0850X02S100	17.0	34.1	37.8	84.1	10	1
8.6	2	●	MFE0860X02S100	17.2	36.1	39.8	84.1	10	1
8.7	2	●	MFE0870X02S100	17.4	36.1	39.7	84.1	10	1
8.8	2	●	MFE0880X02S100	17.6	36.1	39.7	84.1	10	1
8.9	2	●	MFE0890X02S100	17.8	36.1	39.6	84.1	10	1
9.0	2	●	MFE0900X02S100	18.0	36.1	39.6	84.1	10	1
9.1	2	●	MFE0910X02S100	18.2	38.1	41.5	84.1	10	1
9.2	2	●	MFE0920X02S100	18.4	38.1	41.5	84.1	10	1
9.3	2	●	MFE0930X02S100	18.6	38.1	41.4	84.1	10	1
9.4	2	●	MFE0940X02S100	18.8	38.1	41.4	84.1	10	1
9.5	2	●	MFE0950X02S100	19.0	38.1	41.3	84.1	10	1
9.6	2	●	MFE0960X02S100	19.2	40.1	43.3	84.1	10	1
9.7	2	●	MFE0970X02S100	19.4	40.1	43.2	84.1	10	1
9.8	2	●	MFE0980X02S100	19.6	40.1	43.2	84.1	10	1
9.9	2	●	MFE0990X02S100	19.8	40.1	43.1	84.1	10	1
10.0	2	●	MFE1000X02S100	20.0	40.1	43.1	84.1	10	1
10.1	2	●	MFE1010X02S120	20.2	42.1	46.0	95.1	12	1
10.2	2	●	MFE1020X02S120	20.4	42.1	46.0	95.1	12	1
10.3	2	●	MFE1030X02S120	20.6	42.1	45.9	95.1	12	1
10.4	2	●	MFE1040X02S120	20.8	42.1	45.9	95.1	12	1
10.5	2	●	MFE1050X02S120	21.0	42.1	45.8	95.1	12	1
10.6	2	●	MFE1060X02S120	21.2	44.1	47.8	95.1	12	1
10.7	2	●	MFE1070X02S120	21.4	44.1	47.7	95.1	12	1
10.8	2	●	MFE1080X02S120	21.6	44.1	47.7	95.1	12	1
10.9	2	●	MFE1090X02S120	21.8	44.1	47.6	95.1	12	1
11.0	2	●	MFE1100X02S120	22.0	44.1	47.6	95.1	12	1
11.1	2	●	MFE1110X02S120	22.2	46.1	49.5	95.1	12	1
11.2	2	●	MFE1120X02S120	22.4	46.1	49.5	95.1	12	1
11.3	2	●	MFE1130X02S120	22.6	46.1	49.4	95.1	12	1

MFE

DC(mm)	Hole Depth(l/d)	DP1020	Order Number	LU	LCF	LH	OAL	DCON	Type
11.4	2	●	MFE1140X02S120	22.8	46.1	49.4	95.1	12	1
11.5	2	●	MFE1150X02S120	23.0	46.1	49.4	95.1	12	1
11.6	2	●	MFE1160X02S120	23.2	48.1	51.3	95.1	12	1
11.7	2	●	MFE1170X02S120	23.4	48.1	51.3	95.1	12	1
11.8	2	●	MFE1180X02S120	23.6	48.1	51.2	95.1	12	1
11.9	2	●	MFE1190X02S120	23.8	48.1	51.2	95.1	12	1
12.0	2	●	MFE1200X02S120	24.0	48.1	51.1	95.1	12	1
12.5	2	●	MFE1250X02S140	25.0	50.1	53.1	102.1	14	2
13.0	2	●	MFE1300X02S140	26.0	52.1	55.1	102.1	14	2
13.5	2	●	MFE1350X02S140	27.0	54.1	57.1	102.1	14	2
14.0	2	●	MFE1400X02S140	28.0	56.1	59.1	102.1	14	2
14.5	2	●	MFE1450X02S160	29.0	58.1	61.1	111.1	16	2
15.0	2	●	MFE1500X02S160	30.0	60.1	63.1	111.1	16	2
15.5	2	●	MFE1550X02S160	31.0	62.1	65.1	111.1	16	2
16.0	2	●	MFE1600X02S160	32.0	64.1	67.1	111.1	16	2
16.5	2	●	MFE1650X02S180	33.0	66.1	69.1	119.1	18	2
17.0	2	●	MFE1700X02S180	34.0	68.1	71.1	119.1	18	2
17.5	2	●	MFE1750X02S180	35.0	70.2	73.2	119.2	18	2
18.0	2	●	MFE1800X02S180	36.0	72.2	75.2	119.2	18	2
18.5	2	●	MFE1850X02S200	37.0	74.2	77.2	127.2	20	2
19.0	2	●	MFE1900X02S200	38.0	76.2	79.2	127.2	20	2
19.5	2	●	MFE1950X02S200	39.0	78.2	81.2	127.2	20	2
20.0	2	●	MFE2000X02S200	40.0	80.2	83.2	127.2	20	2

MFE

·Recommended Cutting Condition

Cutting of the Flat Surface

(mm)

Work Material	Mild Steel (≤180HB) AISI 1010 etc		Carbon Steel, Alloy Steel (180—280HB) AISI 1045, 4140 etc		Carbon Steel, Alloy Steel (280—350HB) AISI 4340 etc	
DC	n (min^{-1})	fr (Min.—Max.) (mm/rev)	n (min^{-1})	fr (Min.—Max.) (mm/rev)	n (min^{-1})	fr (Min.—Max.) (mm/rev)
3.2	7460	0.06 (0.04—0.08)	7460	0.06 (0.04—0.08)	6466	0.06 (0.04—0.08)
4.0	5968	0.08 (0.06—0.10)	5968	0.08 (0.06—0.10)	5173	0.08 (0.06—0.10)
5.0	4775	0.10 (0.08—0.13)	4775	0.10 (0.08—0.13)	4138	0.10 (0.08—0.15)
6.3	3789	0.13 (0.10—0.15)	3789	0.13 (0.10—0.15)	3284	0.13 (0.10—0.15)
8.0	2984	0.15 (0.13—0.17)	2984	0.15 (0.13—0.17)	2586	0.15 (0.13—0.20)
10.0	2387	0.17 (0.15—0.20)	2387	0.17 (0.15—0.20)	2069	0.17 (0.15—0.22)
12.0	1984	0.20 (0.17—0.25)	1984	0.20 (0.17—0.25)	1724	0.20 (0.17—0.25)
16.0	1492	0.25 (0.20—0.30)	1492	0.25 (0.20—0.30)	1293	0.25 (0.20—0.30)
20.0	1194	0.30 (0.25—0.35)	1194	0.30 (0.25—0.35)	1035	0.30 (0.25—0.35)

Work Material	Austenitic Stainless Steel (≤200HB) AISI 304, 316 etc		Gray Cast Iron (≤350MPa) No45B etc		Ductile Cast Iron (≤450MPa) 60-40-18 etc	
DC	n (min^{-1})	fr (Min.—Max.) (mm/rev)	n (min^{-1})	fr (Min.—Max.) (mm/rev)	n (min^{-1})	fr (Min.—Max.) (mm/rev)
3.2	2984	0.02 (0.01—0.03)	7460	0.06 (0.04—0.08)	6466	0.05 (0.04—0.06)
4.0	2387	0.03 (0.02—0.04)	5968	0.08 (0.06—0.10)	5570	0.06 (0.05—0.08)
5.0	1910	0.04 (0.03—0.05)	4775	0.10 (0.08—0.12)	4456	0.08 (0.06—0.10)
6.3	1516	0.05 (0.04—0.06)	3789	0.12 (0.10—0.14)	3537	0.10 (0.08—0.12)
8.0	1194	0.06 (0.05—0.08)	2984	0.14 (0.12—0.16)	2785	0.12 (0.10—0.15)
10.0	955	0.08 (0.06—0.10)	2387	0.16 (0.14—0.18)	2228	0.15 (0.12—0.18)
12.0	796	0.10 (0.08—0.12)	1984	0.18 (0.16—0.20)	1857	0.18 (0.15—0.20)
16.0	597	0.12 (0.10—0.15)	1492	0.20 (0.18—0.24)	1393	0.20 (0.18—0.25)
20.0	477	0.15 (0.12—0.20)	1194	0.24 (0.20—0.28)	1114	0.25 (0.20—0.30)

Work Material	Aluminum Alloy (Si<5%) ASTM A6061, 7075 etc	
DC	n (min^{-1})	fr (Min.—Max.) (mm/rev)
3.2	10942	0.06 (0.04—0.08)
4.0	8754	0.08 (0.06—0.10)
5.0	7003	0.10 (0.08—0.13)
6.3	5558	0.13 (0.10—0.16)
8.0	4377	0.16 (0.13—0.20)
10.0	3501	0.20 (0.16—0.24)
12.0	2918	0.24 (0.20—0.28)
16.0	2188	0.28 (0.24—0.32)
20.0	1750	0.32 (0.28—0.36)

MFE

Cutting of the < 30° Angled Surface

(mm)

Work Material	Mild Steel (≤180HB) AISI 1010 etc.		Carbon Steel, Alloy Steel (180—280HB) AISI 1045, 4140 etc.		Carbon Steel, Alloy Steel (280—350HB) AISI 4340 etc.	
DC	n (min^{-1})	fr (Min.—Max.) (mm/rev)	n (min^{-1})	fr (Min.—Max.) (mm/rev)	n (min^{-1})	fr (Min.—Max.) (mm/rev)
3.2	7460	0.04 (0.03—0.06)	7460	0.04 (0.03—0.06)	6466	0.04 (0.03—0.06)
4.0	5968	0.06 (0.04—0.07)	5968	0.06 (0.04—0.07)	5173	0.06 (0.04—0.07)
5.0	4775	0.07 (0.06—0.09)	4775	0.07 (0.06—0.09)	4138	0.07 (0.06—0.11)
6.3	3789	0.09 (0.07—0.11)	3789	0.09 (0.07—0.11)	3284	0.09 (0.07—0.11)
8.0	2984	0.11 (0.09—0.12)	2984	0.11 (0.09—0.12)	2586	0.11 (0.09—0.14)
10.0	2387	0.12 (0.11—0.14)	2387	0.12 (0.11—0.14)	2069	0.12 (0.11—0.15)
12.0	1984	0.14 (0.12—0.18)	1984	0.14 (0.12—0.18)	1724	0.14 (0.12—0.18)
16.0	1492	0.18 (0.14—0.21)	1492	0.18 (0.14—0.21)	1293	0.18 (0.14—0.21)
20.0	1194	0.21 (0.18—0.25)	1194	0.21 (0.18—0.25)	1035	0.21 (0.18—0.25)

Work Material	Austenitic Stainless Steel (≤200HB) AISI 304, 316 etc.		Gray Cast Iron (≤350MPa) No45B etc.		Ductile Cast Iron (≤450MPa) 60-40-18 etc.	
DC	n (min^{-1})	fr (Min.—Max.) (mm/rev)	n (min^{-1})	fr (Min.—Max.) (mm/rev)	n (min^{-1})	fr (Min.—Max.) (mm/rev)
3.2	2984	0.01 (0.01—0.02)	7460	0.04 (0.03—0.06)	6466	0.04 (0.03—0.04)
4.0	2387	0.02 (0.01—0.03)	5968	0.06 (0.04—0.07)	5570	0.04 (0.04—0.06)
5.0	1910	0.03 (0.02—0.04)	4775	0.07 (0.06—0.08)	4456	0.06 (0.04—0.07)
6.3	1516	0.04 (0.03—0.04)	3789	0.08 (0.07—0.10)	3537	0.07 (0.06—0.08)
8.0	1194	0.04 (0.04—0.06)	2984	0.10 (0.08—0.11)	2785	0.08 (0.07—0.11)
10.0	955	0.06 (0.04—0.07)	2387	0.11 (0.10—0.13)	2228	0.11 (0.08—0.13)
12.0	796	0.07 (0.06—0.08)	1984	0.13 (0.11—0.14)	1857	0.13 (0.11—0.14)
16.0	597	0.08 (0.07—0.11)	1492	0.14 (0.13—0.17)	1393	0.14 (0.13—0.18)
20.0	477	0.11 (0.08—0.14)	1194	0.17 (0.14—0.20)	1114	0.18 (0.14—0.21)

Work Material	Aluminum Alloy (Si<5%) ASTM A6061, 7075 etc.	
DC	n (min^{-1})	fr (Min.—Max.) (mm/rev)
3.2	10942	0.04 (0.03—0.06)
4.0	8754	0.06 (0.04—0.07)
5.0	7003	0.07 (0.06—0.09)
6.3	5558	0.09 (0.07—0.11)
8.0	4377	0.11 (0.09—0.14)
10.0	3501	0.14 (0.11—0.17)
12.0	2918	0.17 (0.14—0.20)
16.0	2188	0.20 (0.17—0.22)
20.0	1750	0.22 (0.20—0.25)

MFE

Cutting of the > 30° Angled Surface

(mm)

Work Material	Mild Steel (≤180HB) AISI 1010 etc.		Carbon Steel, Alloy Steel (180—280HB) AISI 1045, 4140 etc.		Carbon Steel, Alloy Steel (280—350HB) AISI 4340 etc.	
DC	n (min^{-1})	fr (Min.—Max.) (mm/rev)	n (min^{-1})	fr (Min.—Max.) (mm/rev)	n (min^{-1})	fr (Min.—Max.) (mm/rev)
3.2	7460	0.03 (0.02—0.04)	7460	0.03 (0.02—0.04)	6466	0.03 (0.02—0.04)
4.0	5968	0.04 (0.03—0.05)	5968	0.04 (0.03—0.05)	5173	0.04 (0.03—0.05)
5.0	4775	0.05 (0.04—0.07)	4775	0.05 (0.04—0.07)	4138	0.05 (0.04—0.07)
6.3	3789	0.07 (0.05—0.08)	3789	0.07 (0.05—0.08)	3284	0.07 (0.05—0.08)
8.0	2984	0.08 (0.07—0.09)	2984	0.08 (0.07—0.09)	2586	0.08 (0.07—0.10)
10.0	2387	0.09 (0.08—0.10)	2387	0.09 (0.08—0.10)	2069	0.09 (0.08—0.11)
12.0	1984	0.10 (0.09—0.13)	1984	0.10 (0.09—0.13)	1724	0.10 (0.09—0.13)
16.0	1492	0.13 (0.10—0.15)	1492	0.13 (0.10—0.15)	1293	0.13 (0.10—0.15)
20.0	1194	0.15 (0.13—0.18)	1194	0.15 (0.13—0.18)	1035	0.15 (0.13—0.18)

Work Material	Austenitic Stainless Steel (≤200HB) AISI 304, 316 etc.		Gray Cast Iron (≤350MPa) No45B etc.		Ductile Cast Iron (≤450MPa) 60-40-18 etc.	
DC	n (min^{-1})	fr (Min.—Max.) (mm/rev)	n (min^{-1})	fr (Min.—Max.) (mm/rev)	n (min^{-1})	fr (Min.—Max.) (mm/rev)
3.2	2984	0.01 (0.01—0.02)	7460	0.03 (0.02—0.04)	6466	0.03 (0.02—0.03)
4.0	2387	0.02 (0.01—0.02)	5968	0.04 (0.03—0.05)	5570	0.03 (0.03—0.04)
5.0	1910	0.02 (0.02—0.03)	4775	0.05 (0.04—0.06)	4456	0.04 (0.03—0.05)
6.3	1516	0.03 (0.02—0.03)	3789	0.06 (0.05—0.07)	3537	0.05 (0.04—0.06)
8.0	1194	0.03 (0.03—0.04)	2984	0.07 (0.06—0.08)	2785	0.06 (0.05—0.08)
10.0	955	0.04 (0.03—0.05)	2387	0.08 (0.07—0.09)	2228	0.08 (0.06—0.09)
12.0	796	0.05 (0.04—0.06)	1984	0.09 (0.08—0.10)	1857	0.09 (0.08—0.10)
16.0	597	0.06 (0.05—0.08)	1492	0.10 (0.09—0.12)	1393	0.10 (0.09—0.13)
20.0	477	0.08 (0.06—0.10)	1194	0.12 (0.10—0.14)	1114	0.13 (0.10—0.15)

Work Material	Aluminum Alloy (Si<5%) ASTM A6061, 7075 etc.	
DC	n (min^{-1})	fr (Min.—Max.) (mm/rev)
3.2	10942	0.03 (0.02—0.04)
4.0	8754	0.04 (0.03—0.05)
5.0	7003	0.05 (0.04—0.07)
6.3	5558	0.07 (0.05—0.08)
8.0	4377	0.08 (0.07—0.10)
10.0	3501	0.10 (0.08—0.12)
12.0	2918	0.12 (0.10—0.14)
16.0	2188	0.14 (0.12—0.16)
20.0	1750	0.16 (0.14—0.18)

MCC

DRILLS FOR COMPOSITES

For CNC Machine / CFRP

Product Information

UWC DD 90° SIG X Thinning

Work Material

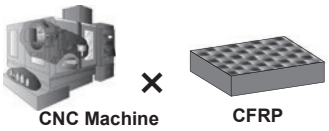
N

TECHNICAL DATA >> 1997

ISO13399 Property >> 1966

SYMBOL DESCRIPTIONS >> 1623

DRILLS SELECTION CHART >> 1624



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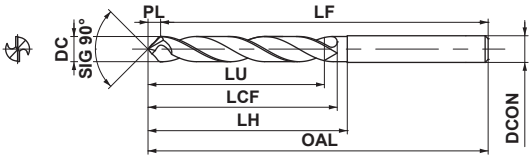
h6	0 −0.008	0 −0.009	0 −0.011	0 −0.013



Hole Dia.		Drill Dia.		Hole Depth	Order Number	Grade	Dimensions (mm)						
* AWG	inch	DC (mm)	inch	(L/D)		DD2105	LU	LCF	LH	OAL	LF	PL	DCON
—	3/16	4.76	.1875	3	**MCC0476X03S060**	●	16.7	40	40	80	77.6	2.4	6
—	1/4	6.38	.251	3	**MCC0638X03S080**	●	22.3	50	50	90	86.8	3.2	8
—	5/16	7.96	.3125	3	**MCC0796X03S080**	●	27.9	50	50	90	86.0	4.0	8
—	3/8	9.55	.375	3	**MCC0955X03S100**	●	33.5	50	50	100	95.2	4.8	10
—	7/16	11.14	.4375	3	**MCC1114X03S120**	●	39.0	60	60	110	104.4	5.6	12

***AWG :** American Wire Gage

● : Inventory maintained in Japan. **□ : Non stock, produced to order only.**

RECOMMENDED CUTTING CONDITIONS

Work Material		CFRP			
Dia. DC (inch)	Dia. DC (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed (Min.—Max.) (mm/rev)	Feed rate (mm/min)
.1875	**4.76**	100	6700	0.08 (0.05—0.12)	540
.251	**6.38**	100	5000	0.1 (0.05—0.12)	500
.3125	**7.96**	100	4000	0.1 (0.05—0.12)	400
.375	**9.55**	100	3400	0.1 (0.05—0.12)	340
.4375	**11.14**	100	2900	0.1 (0.05—0.12)	290

MCA

DRILLS FOR COMPOSITES

For CNC Machine / CFRP + Al

Product Information

UWC DD 130° SIG X Thinning

Work Material

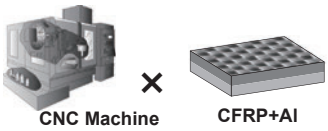
N

TECHNICAL DATA >> 1997

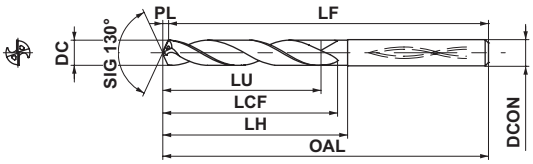
ISO13399 Property >> 1966

SYMBOL DESCRIPTIONS >> 1623

DRILLS SELECTION CHART >> 1624



	3<DC≤6	6<DC≤10	10<DC≤18	18<DC≤20
	0 −0.018	0 −0.022	0 −0.027	0 −0.033
h6	0 −0.008	0 −0.009	0 −0.011	0 −0.013



Hole Dia.		Drill Dia.		Hole Depth	Order Number	Grade	Dimensions (mm)						
AWG *	inch	DC (mm)	inch	(L/D)		DD2110	LU	LCF	LH	OAL	LF	PL	DCON
—	1/4	6.38	.251	5	**MCA0638X05S070**	□	33.4	51	51	91	89.5	1.5	7
—	3/8	9.55	.375	5	**MCA0955X05S100**	□	50.0	77	77	118	115.8	2.2	10

***AWG :** American Wire Gage

● **: Inventory maintained in Japan.** □ **: Non stock, produced to order only.**

RECOMMENDED CUTTING CONDITIONS

Work Material		CFRP				Aluminum Alloy (Si<5%) ASTM A6061, ASTM A7075 etc			
Dia. DC (inch)	Dia. DC (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed (Min.—Max.) (mm/rev)	Feed rate (mm/min)	Cutting speed (m/min)	Revolution (min^{-1})	Feed (Min.—Max.) (mm/rev)	Feed rate (mm/min)
.251	**6.38**	100	5000	0.15 (0.10—0.20)	750	100	5000	0.03 (0.02—0.04)	150
.375	**9.55**	100	3400	0.15 (0.10—0.20)	680	100	3400	0.03 (0.02—0.04)	100

1) We recommend to divide cutting conditions in each work materials.

MCT

DRILLS FOR COMPOSITES

For CNC Machine / CFRP + Ti

Product Information

UWC DD 150° SIG X Thinning

Work Material

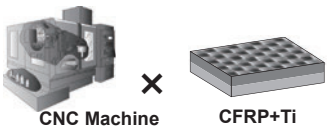
N

TECHNICAL DATA >> 1997

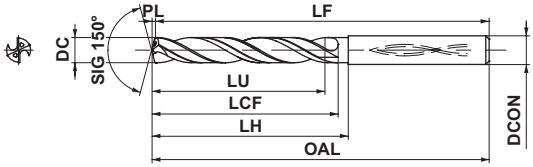
ISO13399 Property >> 1966

SYMBOL DESCRIPTIONS >> 1623

DRILLS SELECTION CHART >> 1624



	3<DC≤6	6<DC≤10	10<DC≤18	18<DC≤20
	0 −0.018	0 −0.022	0 −0.027	0 −0.033
h6	0 −0.008	0 −0.009	0 −0.011	0 −0.013



Hole Dia.		Drill Dia.		Hole Depth	Order Number	Grade	Dimensions (mm)						
AWG *	inch	DC (mm)	inch	(L/D)		TF15	LU	LCF	LH	OAL	LF	PL	DCON
—	1/4	6.38	.251	5	**MCT0638X05S070**	□	32.8	47	47	96	95.1	0.9	7
—	3/8	9.55	.375	5	**MCT0955X05S100**	□	49.1	71	71	122	120.7	1.3	10

***AWG :** American Wire Gage

● : Inventory maintained in Japan. **□ : Non stock, produced to order only.**

RECOMMENDED CUTTING CONDITIONS

Work Material		CFRP				Titanium Alloy Ti-6Al-4V etc.				
Dia. DC (inch)	Dia. DC (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed (Min.—Max.) (mm/rev)	Feed rate (mm/min)	Cutting speed (m/min)	Revolution (min^{-1})	Feed (Min.—Max.) (mm/rev)	Feed rate (mm/min)	Peck machining (mm)
.251	**6.38**	100	5000	0.15 (0.10—0.20)	750	15	750	0.02 (0.01—0.03)	15	1
.375	**9.55**	100	3400	0.15 (0.10—0.20)	680	15	500	0.02 (0.01—0.03)	10	1

1) This condition is for when internal air or mist is used.
2) We recommend to divide cutting conditions in each work materials.

MCW

DRILLS FOR COMPOSITES

For CNC Machine / CFRP and stack material
high precision

Product Information

UWC DD 120° SIG X Thinning

Work Material

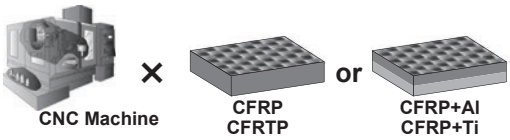
N

TECHNICAL DATA >> 1997

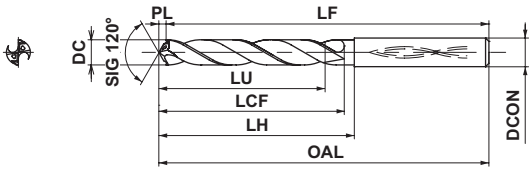
ISO13399 Property >> 1966

SYMBOL DESCRIPTIONS >> 1623

DRILLS SELECTION CHART >> 1624



	3<DC≤6	6<DC≤10	10<DC≤18	18<DC≤20
	0 −0.018	0 −0.022	0 −0.027	0 −0.033
h6	0 −0.008	0 −0.009	0 −0.011	0 −0.013



Hole Dia.		Drill Dia.		Hole Depth	Order Number	Grade		Dimensions (mm)						
AWG *	inch	DC (mm)	inch	(L/D)		HTi10	DD2110	LU	LCF	LH	OAL	LF	PL	DCON
—	1/4	6.38	.251	5	**MCW0638X05S070**	□	□	33.7	52	52	92	90.2	1.8	7
—	3/8	9.55	.375	5	**MCW0955X05S100**	□	□	50.6	73	73	119	116.2	2.8	10

∗AWG : American Wire Gage

● : Inventory maintained in Japan. **□ : Non stock, produced to order only.**

RECOMMENDED CUTTING CONDITIONS

Work Material		CFRP			
Dia. DC (inch)	Dia. DC (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed (Min.—Max.) (mm/rev)	Feed rate (mm/min)
.251	**6.38**	100	5000	0.15 (0.10—0.20)	750
.375	**9.55**	100	3400	0.15 (0.10—0.20)	680

Work Material		Aluminum Alloy (Si<5%) A6061, A7075 etc.					Titanium Alloy Ti-6Al-4V etc.				
Dia. DC (inch)	Dia. DC (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed (Min.—Max.) (mm/rev)	Feed rate (mm/min)	Peck machining (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed (Min.—Max.) (mm/rev)	Feed rate (mm/min)	Peck machining (mm)
.251	**6.38**	100	5000	0.15 (0.10—0.20)	750	3	15	750	0.02 (0.01—0.03)	15	1
.375	**9.55**	100	3400	0.15 (0.10—0.20)	500	3	15	500	0.02 (0.01—0.03)	10	1

1) This condition is for when internal air or mist is used.
2) We recommend to divide cutting conditions in each work materials.

MCCH

DRILLS FOR COMPOSITES

For Hand tool / CFRP

Product Information

UWC DD 120° SIG X Thinning

Work Material

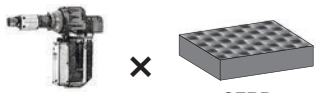
N

TECHNICAL DATA >> 1997

ISO13399 Property >> 1966

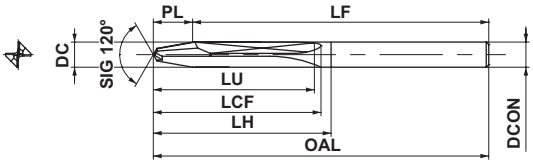
SYMBOL DESCRIPTIONS >> 1623

DRILLS SELECTION CHART >> 1624



Hand Tool × CFRP

	1≤DC≤3	3<DC≤6	6<DC≤10	10<DC≤18	18<DC≤20
	0 −0.014	0 −0.018	0 −0.022	0 −0.027	0 −0.033
h6	0 −0.006	0 −0.008	0 −0.009	0 −0.011	0 −0.013



Hole Dia.		Drill Dia.		Hole Depth	Order Number	Grade	Dimensions (mm)						
AWG *	inch	DC (mm)	inch	(L/D)		DT2030	LU	LCF	LH	OAL	LF	PL	DCON
#40	—	2.5	.0985	15	**MCCH0250X15S030**	●	42.1	48	50	100	95.4	4.6	3
#30	—	3.26	.1285	10	**MCCH0326X10S040**	●	38.6	48	50	100	94.0	6.0	4
#20	—	4.1	.1615	8	**MCCH0410X08S050**	●	40.3	48	50	100	92.5	7.5	5
#11	—	4.86	.1915	5	**MCCH0486X05S050**	●	33.2	48	50	100	91.1	8.9	5
—	1/4	6.38	.251	3	**MCCH0638X03S070**	●	30.8	48	50	100	88.3	11.7	7
—	3/8	9.55	.375	2	**MCCH0955X02S100**	●	36.6	48	50	100	82.5	17.5	10

***AWG :** American Wire Gage

● : Inventory maintained in Japan. **□ : Non stock, produced to order only.**

MCAH

DRILLS FOR COMPOSITES

For Hand tool / CFRP + Al

Product Information

UWC DD 120° SIG X Thinning

Work Material

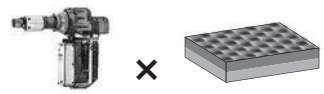
N

TECHNICAL DATA >> 1997

ISO13399 Property >> 1966

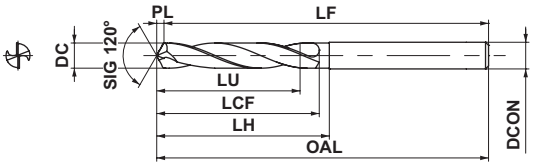
SYMBOL DESCRIPTIONS >> 1623

DRILLS SELECTION CHART >> 1624



Hand Tool × CFRP+Al

	1≤DC≤3	3<DC≤6	6<DC≤10	10<DC≤18	18<DC≤20
	0 −0.014	0 −0.018	0 −0.022	0 −0.027	0 −0.033
h6	0 −0.006	0 −0.008	0 −0.009	0 −0.011	0 −0.013



Hole Dia.		Drill Dia.		Hole Depth	Order Number	Grade	Dimensions (mm)						
AWG *	inch	DC (mm)	inch	(L/D)		DT2030	LU	LCF	LH	OAL	LF	PL	DCON
#40	—	2.5	.0985	15	**MCAH0250X15S030**	●	38.2	50	50	100	99.3	0.7	3
#30	—	3.26	.1285	15	**MCAH0326X15S040**	●	49.8	50	50	100	99.1	0.9	4
#20	—	4.1	.1615	10	**MCAH0410X10S050**	●	42.2	50	50	100	98.8	1.2	5
#11	—	4.86	.1915	8	**MCAH0486X08S050**	●	40.3	50	50	100	98.6	1.4	5
—	1/4	6.38	.251	5	**MCAH0638X05S070**	●	33.7	50	50	100	98.2	1.8	7
—	3/8	9.55	.375	3	**MCAH0955X03S100**	●	31.5	50	50	100	97.2	2.8	10

***AWG :** American Wire Gage

● : Inventory maintained in Japan. **□ : Non stock, produced to order only.**

MCS

DRILLS FOR COMPOSITES

For CFRP

Product Information

UWC DD 130° SIG X Thinning

Work Material

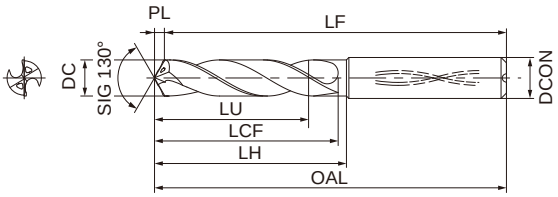
N

TECHNICAL DATA >> 1997

ISO13399 Property >> 1966

SYMBOL DESCRIPTIONS >> 1623

DRILLS SELECTION CHART >> 1624



Type1

	3<DC≦6	6<DC≦10	10<DC≦18	18<DC≦20
	0 −0.018	0 −0.022	0 −0.027	0 −0.033
h6	0 −0.008	0 −0.009	0 −0.011	0 −0.013

Internal Coolant

Unit（mm）

DC (inch)	DC (mm)	Hole Depth(l/d)	DD2010	Order Number	LU	LCF	LH	OAL	LF	PL	DCON	Type
.1719	4.366	3	▲	**MCS01719X3DB**	14.1	24.0	29.0	66.0	65	1.0	6	1
.1915	4.864	3	▲	**MCS01915X3DB**	15.7	28.1	29.1	66.1	65	1.1	6	1
.2510	6.375	3	▲	**MCS02510X3DB**	20.6	34.5	42.5	79.5	78	1.5	8	1
.3125	7.938	3	▲	**MCS03125X3DB**	25.7	41.9	42.9	79.9	78	1.9	8	1
.3760	9.550	3	▲	**MCS03760X3DB**	30.9	47.2	48.2	89.2	87	2.2	10	1
.3765	9.563	3	▲	**MCS03765X3DB**	30.9	47.2	48.2	89.2	87	2.2	10	1
.4380	11.125	3	▲	**MCS04380X3DB**	36.0	55.6	56.6	102.6	100	2.6	12	1
.5010	12.725	3	▲	**MCS05010X3DB**	41.2	61.0	62.0	108.0	105	3.0	14	1

MCS drills are suitable for use with shrink fit holders.

Stock status indication:▲: This item to be discontinued within two years.

MCS

Recommended Cutting Condition

·DD2010

Work material		CFRP				CFRP with Aluminium stack A7075 etc.			
Dia. DC (inch)	Dia. DC (mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Feed rate (mm/min)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Feed rate (mm/min)
.1719	4.366	85	6100	0.04(0.03—0.08)	240	55	4000	0.04(0.03—0.06)	160
.1915	4.864	85	5500	0.04(0.03—0.08)	220	55	3500	0.04(0.03—0.06)	140
.2510	6.375	95	4700	0.05(0.03—0.10)	235	65	3200	0.05(0.03—0.07)	160
.3125	7.938	95	3800	0.05(0.03—0.10)	190	65	2600	0.05(0.03—0.07)	130
.3760	9.55	95	3100	0.07(0.04—0.12)	215	65	2100	0.06(0.04—0.08)	125
.3765	9.563	95	3100	0.07(0.04—0.12)	215	65	2100	0.06(0.04—0.08)	125
.4380	11.125	100	2800	0.1(0.05—0.15)	280	70	2000	0.07(0.05—0.10)	140
.5010	12.725	100	2500	0.1(0.05—0.15)	250	70	1700	0.08(0.05—0.12)	135

·TF15

Work material		CFRP with Titanium alloy stack Ti-6Al-4V			
Dia. DC (inch)	Dia. DC (mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Feed rate (mm/min)
.1719	4.366	8	500	0.03(0.02—0.04)	15
.1915	4.864	8	500	0.03(0.02—0.04)	15
.2510	6.375	8	300	0.03(0.02—0.04)	5
.3125	7.938	8	300	0.03(0.02—0.04)	5
.3760	9.55	10	300	0.04(0.03—0.05)	10
.3765	9.563	10	300	0.04(0.03—0.05)	10
.4380	11.125	10	200	0.04(0.03—0.05)	5
.5010	12.725	10	200	0.04(0.03—0.05)	5

DCSSS

CVD DIAMOND COATED DRILLS

Short, For non-ferrous material

Product Information

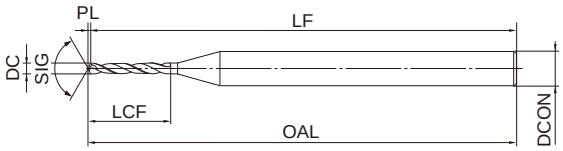
UWC DC 130° SIG 135° SIG X Thinning

DC<1.5 DC≧1.5 DC≧1.5

Work Material

N

TECHNICAL DATA >> 1997 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 1623 DRILLS SELECTION CHART >> 1624



Type1

	0.2≦DC≦2
	0 −0.014
h6	0 −0.006

Stock status indication:●: Inventory maintained in Japan.▲: This item to be discontinued within two years.□: Non stock, produced to order only.

Unit: mm

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
DCSSSD0020	0.2	2.1	38.1	38	0.05	3	●	1
DCSSSD0030	0.3	3.1	38.1	38	0.07	3	●	1
DCSSSD0040	0.4	4.1	38.1	38	0.09	3	●	1
DCSSSD0050	0.5	4.1	38.1	38	0.12	3	●	1
DCSSSD0060	0.6	5.1	38.1	38	0.14	3	●	1
DCSSSD0070	0.7	5.2	38.2	38	0.16	3	●	1
DCSSSD0080	0.8	6.2	38.2	38	0.19	3	●	1
DCSSSD0090	0.9	6.2	38.2	38	0.21	3	●	1
DCSSSD0100	1.0	8.2	38.2	38	0.2	3	●	1
DCSSSD0110	1.1	8.3	38.3	38	0.3	3	●	1
DCSSSD0120	1.2	8.3	38.3	38	0.3	3	●	1
DCSSSD0130	1.3	8.3	38.3	38	0.3	3	●	1
DCSSSD0140	1.4	8.3	38.3	38	0.3	3	●	1
DCSSSD0150	1.5	10.3	45.3	45	0.3	3	●	1
DCSSSD0160	1.6	10.3	45.3	45	0.3	3	●	1
DCSSSD0170	1.7	10.4	45.4	45	0.4	3	●	1
DCSSSD0180	1.8	10.4	45.4	45	0.4	3	●	1
DCSSSD0190	1.9	10.4	45.4	45	0.4	3	●	1
DCSSSD0200	2.0	12.4	45.4	45	0.4	3	●	1

DCSSS

Recommended cutting condition

Work material	Aluminium alloy A6061 A7075 etc.		Aluminium alloy AC4B ADC10		Copper Copper alloy brass Magnesium alloy		Graphite Machineable Ceramics		MMC FRP	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)
0.2	20000	0.006	10000	0.003	20000	0.003	20000	0.01	10000	0.003
0.5	20000	0.02	10000	0.01	20000	0.01	20000	0.03	10000	0.01
1.0	20000	0.04	10000	0.02	20000	0.02	20000	0.05	10000	0.02
1.5	20000	0.05	10000	0.02	16000	0.02	16000	0.08	10000	0.02
2.0	20000	0.06	9000	0.03	11000	0.03	11000	0.10	9000	0.03
2.5	18500	0.08	7500	0.04	10000	0.04	10000	0.12	7500	0.04
3.0	17000	0.10	6000	0.05	8500	0.05	8500	0.15	6000	0.05

- When drilling very hard work materials, reduce the feed.
- Use water soluble coolant or grinding fluid when working.
- When drilling deep holes, moderate the cutting conditions.
- The revolution can be increased by using a high speed spindle.

DCSSM

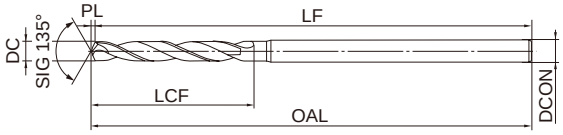
CVD DIAMOND COATED DRILLS

Medium, For non-ferrous material

Product Information

Work Material

TECHNICAL DATA >> 1997 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 1623 DRILLS SELECTION CHART >> 1624



Type1

	2.1≦DC≦3
	0 −0.014
h6	0 −0.006

Stock status indication:●: Inventory maintained in Japan.▲: This item to be discontinued within two years.□: Non stock, produced to order only.

Unit: mm

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
DCSSMD0210	2.1	17.4	60.4	60	0.4	3	●	1
DCSSMD0220	2.2	17.5	60.5	60	0.5	3	●	1
DCSSMD0230	2.3	17.5	60.5	60	0.5	3	●	1
DCSSMD0240	2.4	17.5	60.5	60	0.5	3	●	1
DCSSMD0250	2.5	21.5	60.5	60	0.5	3	●	1
DCSSMD0260	2.6	21.5	60.5	60	0.5	3	●	1
DCSSMD0270	2.7	21.6	60.6	60	0.6	3	●	1
DCSSMD0280	2.8	21.6	60.6	60	0.6	3	●	1
DCSSMD0290	2.9	21.6	60.6	60	0.6	3	●	1
DCSSMD0300	3.0	21.6	60.6	60	0.6	3	●	1

DCSSM

Recommended cutting condition

Work material	Aluminium alloy A6061 A7075 etc.		Aluminium alloy AC4B ADC10		Copper Copper alloy brass Magnesium alloy		Graphite Machineable Ceramics		MMC FRP	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)
0.2	20000	0.006	10000	0.003	20000	0.003	20000	0.01	10000	0.003
0.5	20000	0.02	10000	0.01	20000	0.01	20000	0.03	10000	0.01
1.0	20000	0.04	10000	0.02	20000	0.02	20000	0.05	10000	0.02
1.5	20000	0.05	10000	0.02	16000	0.02	16000	0.08	10000	0.02
2.0	20000	0.06	9000	0.03	11000	0.03	11000	0.10	9000	0.03
2.5	18500	0.08	7500	0.04	10000	0.04	10000	0.12	7500	0.04
3.0	17000	0.10	6000	0.05	8500	0.05	8500	0.15	6000	0.05

- When drilling very hard work materials, reduce the feed.
- Use water soluble coolant or grinding fluid when working.
- When drilling deep holes, moderate the cutting conditions.
- The revolution can be increased by using a high speed spindle.

DCBSS

CVD DIAMOND COATED DRILLS

Drill for hard brittle materials

Product Information

UWC DC 166° SIG 180° SIG

D-C≧0.07

TECHNICAL DATA >> 1997

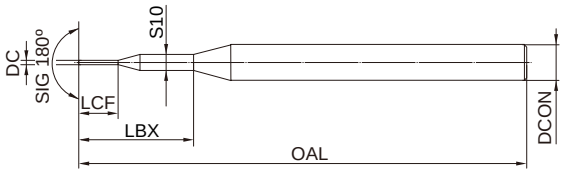
ISO13399 Property >> 1966

Work Material

N

SYMBOL DESCRIPTIONS >> 1623

DRILLS SELECTION CHART >> 1624



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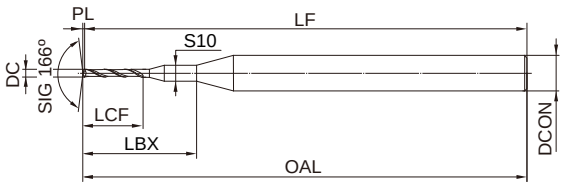

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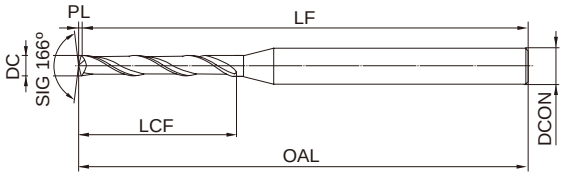


Type3

	0.05≦DC<0.2	0.2≦DC≦3
	0 −0.009	0 −0.014
h6	0 −0.006	0 −0.006

Stock status indication:●: Inventory maintained in Japan.▲: This item to be discontinued within two years.□: Non stock, produced to order only.

Unit: mm

Order Number	DC	LBX	LCF	OAL	LF	PL	S10	DCON	Stock	Type
DCBSSD0005	0.05	6	0.5	38.0	38	0	1.0	3	□	1
DCBSSD0006	0.06	6	0.6	38.0	38	0	1.0	3	□	1
DCBSSD0007	0.07	6	0.7	38.004	38	0.004	1.0	3	□	2
DCBSSD0008	0.08	6	0.8	38.005	38	0.005	1.0	3	□	2
DCBSSD0009	0.09	6	0.9	38.006	38	0.006	1.0	3	□	2
DCBSSD0010	0.10	6	1.0	38.01	38	0.01	1.0	3	●	2
DCBSSD0011	0.11	6	1.2	38.01	38	0.01	1.0	3	●	2
DCBSSD0012	0.12	6	1.4	38.01	38	0.01	1.0	3	●	2
DCBSSD0013	0.13	6	1.5	38.01	38	0.01	1.0	3	●	2
DCBSSD0014	0.14	6	1.5	38.01	38	0.01	1.0	3	●	2
DCBSSD0015	0.15	6	1.5	38.01	38	0.01	1.0	3	●	2
DCBSSD0016	0.16	6	1.5	38.01	38	0.01	1.0	3	●	2
DCBSSD0017	0.17	6	1.5	38.01	38	0.01	1.0	3	●	2
DCBSSD0018	0.18	6	1.5	38.01	38	0.01	1.0	3	●	2
DCBSSD0019	0.19	6	1.5	38.01	38	0.01	1.0	3	●	2

DCBSS

Order Number	DC	LBX	LCF	OAL	LF	PL	S10	DCON	Stock	Type
DCBSSD0020	0.20		2.0	38.01	38	0.01		3	●	3
DCBSSD0021	0.21		2.0	38.01	38	0.01		3	□	3
DCBSSD0022	0.22		2.0	38.01	38	0.01		3	□	3
DCBSSD0023	0.23		2.0	38.01	38	0.01		3	□	3
DCBSSD0024	0.24		2.0	38.01	38	0.01		3	□	3
DCBSSD0025	0.25		2.5	38.02	38	0.02		3	●	3
DCBSSD0026	0.26		2.5	38.02	38	0.02		3	□	3
DCBSSD0027	0.27		2.5	38.02	38	0.02		3	□	3
DCBSSD0028	0.28		2.5	38.02	38	0.02		3	□	3
DCBSSD0029	0.29		2.5	38.02	38	0.02		3	□	3
DCBSSD0030	0.30		3.0	38.02	38	0.02		3	●	3
DCBSSD0031	0.31		3.0	38.02	38	0.02		3	□	3
DCBSSD0032	0.32		3.0	38.02	38	0.02		3	□	3
DCBSSD0033	0.33		3.0	38.02	38	0.02		3	□	3
DCBSSD0034	0.34		3.5	38.02	38	0.02		3	□	3
DCBSSD0035	0.35		3.5	38.02	38	0.02		3	●	3
DCBSSD0036	0.36		3.5	38.02	38	0.02		3	□	3
DCBSSD0040	0.40		4.0	38.02	38	0.02		3	●	3
DCBSSD0045	0.45		4.0	38.03	38	0.03		3	□	3
DCBSSD0050	0.50		4.0	38.03	38	0.03		3	●	3
DCBSSD0055	0.55		4.5	38.03	38	0.03		3	□	3
DCBSSD0060	0.60		5.0	38.04	38	0.04		3	●	3
DCBSSD0070	0.70		5.0	38.04	38	0.04		3	●	3
DCBSSD0080	0.80		6.1	38.05	38	0.05		3	●	3
DCBSSD0085	0.85		6.1	38.05	38	0.05		3	□	3
DCBSSD0090	0.90		6.1	38.06	38	0.06		3	●	3
DCBSSD0100	1.00		8.1	38.1	38	0.1		3	●	3
DCBSSD0110	1.10		8.1	38.1	38	0.1		3	●	3
DCBSSD0120	1.20		8.1	38.1	38	0.1		3	●	3
DCBSSD0130	1.30		8.1	38.1	38	0.1		3	●	3
DCBSSD0140	1.40		8.1	38.1	38	0.1		3	●	3
DCBSSD0150	1.50		10.1	38.1	38	0.1		3	●	3
DCBSSD0160	1.60		10.1	38.1	38	0.1		3	●	3
DCBSSD0170	1.70		10.1	38.1	38	0.1		3	●	3
DCBSSD0180	1.80		10.1	38.1	38	0.1		3	●	3
DCBSSD0190	1.90		10.1	38.1	38	0.1		3	●	3
DCBSSD0200	2.00		12.1	38.1	38	0.1		3	●	3
DCBSSD0210	2.10		12.1	38.1	38	0.1		3	□	3
DCBSSD0220	2.20		12.1	38.1	38	0.1		3	□	3
DCBSSD0230	2.30		12.1	38.1	38	0.1		3	□	3
DCBSSD0240	2.40		12.2	38.2	38	0.2		3	□	3
DCBSSD0250	2.50		12.2	38.2	38	0.2		3	●	3
DCBSSD0260	2.60		12.2	38.2	38	0.2		3	□	3
DCBSSD0270	2.70		12.2	38.2	38	0.2		3	□	3
DCBSSD0280	2.80		12.2	38.2	38	0.2		3	□	3
DCBSSD0290	2.90		12.2	38.2	38	0.2		3	□	3
DCBSSD0300	3.00		12.2	38.2	38	0.2		3	□	3

DCBSS

Recommended cutting condition

Work material	Aluminium nitride				Alumina				Zirconia			
Dia. DC(mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (mm/rev)	Step (mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (mm/rev)	Step (mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (mm/rev)	Step (mm)
0.05	3	20,000	0.000015	0.001	3	20,000	0.00001	0.001	3	20,000	0.00001	0.001
0.08	5	20,000	0.00003	0.003	5	20,000	0.00002	0.002	5	20,000	0.00002	0.001
0.1	6	20,000	0.0002	0.01	6	20,000	0.0001	0.005	6	20,000	0.0001	0.003
0.16	9	18,000	0.0002	0.01	9	18,000	0.0001	0.005	9	18,000	0.0001	0.003
0.2	9	15,000	0.0002	0.01	9	15,000	0.0001	0.005	9	15,000	0.0001	0.003
0.32	12	12,000	0.0002	0.01	12	12,000	0.0001	0.005	12	12,000	0.0001	0.003
0.4	15	12,000	0.0002	0.01	15	12,000	0.0001	0.005	15	12,000	0.0001	0.003
0.5	19	12,000	0.0002	0.01	19	12,000	0.0001	0.005	19	12,000	0.0001	0.003
0.6	19	10,000	0.0002	0.01	19	10,000	0.0001	0.005	19	10,000	0.0001	0.003
0.8	25	10,000	0.0002	0.01	25	10,000	0.0001	0.005	25	10,000	0.0001	0.003
1	31	10,000	0.0002	0.01	31	10,000	0.0001	0.005	31	10,000	0.0001	0.003
1.2	30	8,000	0.00025	0.01	30	8,000	0.00015	0.005	30	8,000	0.00015	0.003
1.6	40	8,000	0.0003	0.01	40	8,000	0.0002	0.005	40	8,000	0.0002	0.003
2	38	6,000	0.0003	0.01	38	6,000	0.0002	0.005	38	6,000	0.0002	0.003
3	47	5,000	0.0003	0.01	47	5,000	0.0003	0.005	47	5,000	0.0002	0.003

Work material	Silicon carbide Silicon nitride				Quartz glass			
Dia. DC(mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (mm/rev)	Step (mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (mm/rev)	Step (mm)
0.05	3	20,000	0.000005	0.0005	3	20,000	0.000015	0.001
0.08	5	20,000	0.00001	0.001	5	20,000	0.00003	0.005
0.1	6	20,000	0.00005	0.002	6	20,000	0.0002	0.05
0.16	9	18,000	0.00005	0.002	9	18,000	0.0002	0.05
0.2	9	15,000	0.00005	0.002	9	15,000	0.0002	0.05
0.32	12	12,000	0.00005	0.002	12	12,000	0.0002	0.05
0.4	15	12,000	0.00005	0.002	15	12,000	0.0003	0.05
0.5	19	12,000	0.00005	0.002	19	12,000	0.0003	0.05
0.6	19	10,000	0.00005	0.002	19	10,000	0.0003	0.05
0.8	25	10,000	0.00005	0.002	25	10,000	0.0003	0.05
1	31	10,000	0.00005	0.002	31	10,000	0.0003	0.05
1.2	30	8,000	0.00007	0.002	30	8,000	0.0004	0.05
1.6	40	8,000	0.0001	0.002	40	8,000	0.0004	0.05
2	38	6,000	0.0001	0.002	38	6,000	0.0004	0.05
3	47	5,000	0.0001	0.002	47	5,000	0.0005	0.05

- Depending on the type of machine, it is possible to apply cutting speeds over 20000min^{-1}.
- Use water soluble coolant or grinding fluid when working.
- The intermediate diameter revolution is not tabulated. It is matched to the large diameter side and closest drill diameter conditions or by calculating the cutting speed of the closest drill diameter. Set the feedrate per revolution to a suitable value with the recommended feedrate of the closest drill diameter as the standard.

SEPDS

HSS MILLING SHANK DRILLS

SE High Precision Drill (S)

Product Information

CO HSS D-STH | 135° SIG | X Thinning

Work Material

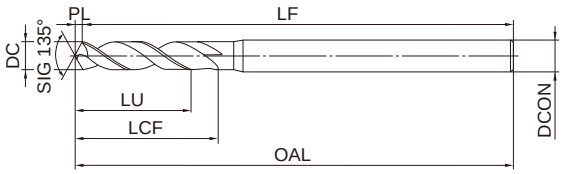
P M K N

TECHNICAL INFO >> 1997

ISO13399 PROPERTY >> 1966

SYMBOL DESCRIPTIONS >> 1623

DRILLS SELECTION CHART >> 1636



Type1

	0.5≦DC≦3	3.1≦DC≦4
	0 −0.006	0 −0.008

Standard drill depth : LU=LCF-3DC

Stock status indication:●: Inventory maintained in Japan.▲: This item to be discontinued within two years.□: Non stock, produced to order only.

unit (mm)

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
SEPDSD0050	0.50	3.1	50.1	50	0.10	3	●	1
SEPDSD0055	0.55	3.1	50.1	50	0.11	3	●	1
SEPDSD0060	0.60	5.1	50.1	50	0.12	3	●	1
SEPDSD0065	0.65	5.1	50.1	50	0.13	3	●	1
SEPDSD0070	0.70	5.1	50.1	50	0.14	3	●	1
SEPDSD0075	0.75	5.2	50.2	50	0.16	3	●	1
SEPDSD0080	0.80	5.2	50.2	50	0.17	3	●	1
SEPDSD0085	0.85	5.2	50.2	50	0.18	3	●	1
SEPDSD0090	0.90	6.2	50.2	50	0.19	3	●	1
SEPDSD0095	0.95	6.2	50.2	50	0.2	3	●	1
SEPDSD0100	1.0	6.2	50.2	50	0.2	3	●	1
SEPDSD0110	1.1	8.2	55.2	55	0.2	3	●	1
SEPDSD0120	1.2	8.3	55.3	55	0.3	3	●	1
SEPDSD0130	1.3	9.3	55.3	55	0.3	3	●	1
SEPDSD0140	1.4	9.3	55.3	55	0.3	3	●	1
SEPDSD0150	1.5	9.3	55.3	55	0.3	3	●	1
SEPDSD0160	1.6	11.3	55.3	55	0.3	3	●	1
SEPDSD0170	1.7	11.4	55.4	55	0.4	3	●	1
SEPDSD0180	1.8	11.4	55.4	55	0.4	3	●	1
SEPDSD0190	1.9	12.4	55.4	55	0.4	3	●	1
SEPDSD0200	2.0	12.4	60.4	60	0.4	3	●	1

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
SEPDSD0210	2.1	12.4	60.4	60	0.4	3	●	1
SEPDSD0220	2.2	12.5	60.5	60	0.5	3	●	1
SEPDSD0230	2.3	13.5	60.5	60	0.5	3	●	1
SEPDSD0240	2.4	13.5	60.5	60	0.5	3	●	1
SEPDSD0250	2.5	13.5	60.5	60	0.5	3	●	1
SEPDSD0260	2.6	15.5	60.5	60	0.5	3	●	1
SEPDSD0270	2.7	15.6	60.6	60	0.6	3	●	1
SEPDSD0280	2.8	15.6	60.6	60	0.6	3	●	1
SEPDSD0290	2.9	15.6	60.6	60	0.6	3	●	1
SEPDSD0300	3.0	15.6	60.6	60	0.6	3	●	1
SEPDSD0310	3.1	17.6	70.6	70	0.6	4	●	1
SEPDSD0320	3.2	17.7	70.7	70	0.7	4	●	1
SEPDSD0330	3.3	19.7	70.7	70	0.7	4	●	1
SEPDSD0340	3.4	19.7	70.7	70	0.7	4	●	1
SEPDSD0350	3.5	19.7	70.7	70	0.7	4	●	1
SEPDSD0360	3.6	21.8	70.8	70	0.8	4	●	1
SEPDSD0370	3.7	21.8	70.8	70	0.8	4	●	1
SEPDSD0380	3.8	21.8	70.8	70	0.8	4	●	1
SEPDSD0390	3.9	21.8	70.8	70	0.8	4	●	1
SEPDSD0400	4.0	21.8	70.8	70	0.8	4	●	1

SEPDS

Recommended cutting condition

Work material	Mild Steel(≦180HB), Aluminium Alloy(Si<5%) AISI 1010 etc				Carbon steel, Alloy steel(180—280HB) Gray Cast Iron(≦350MPa), Copper, Copper Alloys AISI 1045, AISI 4140, No 45 B etc				Alloy tool steel(≦250HB) Ferritic and Martensitic Stainless Steel (≦200HB) AISI D2, AISI 410, AISI 430 etc			
Dia. DC (mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (mm/rev)	Feed rate (mm/min)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (mm/rev)	Feed rate (mm/min)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (mm/rev)	Feed rate (mm/min)
0.5	24	15000	0.02	300	18	11250	0.01	110	13	8000	0.01	80
0.65	28	13700	0.03	410	22	10700	0.02	210	14	6800	0.02	135
0.8	33	13100	0.04	520	27	10700	0.03	320	14	5500	0.03	165
1.0	38	12000	0.05	600	31	10000	0.05	500	16	5000	0.05	250
1.2	38	10000	0.06	600	31	8200	0.06	490	17	4500	0.05	225
1.6	40	8000	0.08	640	33	6500	0.08	520	18	3500	0.06	210
2.0	40	6400	0.09	575	35	5500	0.09	495	18	2900	0.06	170
2.5	40	5100	0.11	560	35	4400	0.11	480	18	2300	0.08	180
3.2	40	4000	0.13	520	34	3400	0.13	440	18	1800	0.09	160
4.0	40	3200	0.15	480	35	2800	0.15	420	18	1400	0.10	140

Work material	Austenitic Stainless Steel(≦200HB) AISI 304,AISI 316 etc				Alloy tool steel(≦30HRC) AISI H13, L6 etc			
Dia. DC (mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (mm/rev)	Feed rate (mm/min)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (mm/rev)	Feed rate (mm/min)
0.5	10	6600	0.01	65	10	6600	0.01	65
0.65	11	5300	0.012	60	11	5300	0.012	60
0.8	11	4300	0.015	60	11	4300	0.015	60
1.0	12	3800	0.02	75	12	3800	0.02	75
1.2	12	3100	0.025	75	12	3100	0.023	70
1.6	14	2700	0.03	80	14	2700	0.03	80
2.0	15	2400	0.04	95	15	2400	0.04	95
2.5	15	1900	0.05	95	15	1900	0.04	75
3.2	15	1500	0.07	105	15	1500	0.05	75
4.0	15	1200	0.09	105	15	1200	0.07	80

- Please reduce the revolution and feed rate depending on the drilling situation when the installation of workpiece or machine lacks rigidity.
- Please use a collet type drill chuck or a milling chuck.
- Use sufficient cutting fluid.
- VAPDM is recommended when the work material hardness exceeds 30HRC.
- WSTAR drill (MVE, MVS, MMS) are recommended for precipitation hardening stainless steel (JIS-SUS630/ISOL-No58X5CrNiCuNb16-4/ASTM-S17400, JIS-SUS631/DIN-X7CrNiAl177/ASTM-S17700)
- When drilling holes greater than 4 x drill diameter hole depths, please use a peck feed.
- The above-mentioned cutting condition is standard when using water-soluble cutting fluid. Please reduce the revolution when using non-water-soluble cutting fluid.
- The intermediate diameter revolution is not tabulated. It is matched to the large diameter side and closest drill diameter conditions or by calculating the cutting speed of the closest drill diameter. Set the feedrate per revolution to a suitable value with the recommended feedrate of the closest drill diameter as the standard.

SEPDM

HSS MILLING SHANK DRILLS

SE High Precision Drill (M)

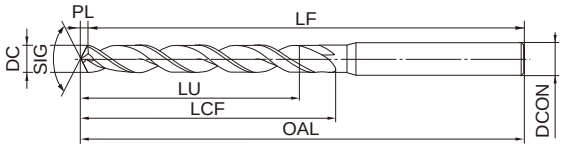
Product Information

CO HSS D-STH | 118° SIG (DC<4) | 135° SIG (DC=4) | X Thinning

Work Material

P M K N

TECHNICAL INFO >> 1997 ISO13399 PROPERTY >> 1966 SYMBOL DESCRIPTIONS >> 1623 DRILLS SELECTION CHART >> 1636



Type1

	0.5≦DC≦3	3.1≦DC≦4
	0 −0.006	0 −0.008

Standard drill depth : LU=LCF-3DC

Stock status indication:●: Inventory maintained in Japan.▲: This item to be discontinued within two years.□: Non stock, produced to order only.

unit (mm)

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
SEPDMD0050	0.50	6.2	50.2	50	0.15	3	●	1
SEPDMD0055	0.55	6.2	50.2	50	0.17	3	●	1
SEPDMD0060	0.60	8.2	50.2	50	0.18	3	●	1
SEPDMD0065	0.65	8.2	50.2	50	0.20	3	●	1
SEPDMD0070	0.70	10.2	50.2	50	0.21	3	●	1
SEPDMD0075	0.75	10.2	50.2	50	0.23	3	●	1
SEPDMD0080	0.80	10.2	50.2	50	0.24	3	●	1
SEPDMD0085	0.85	10.3	50.3	50	0.26	3	●	1
SEPDMD0090	0.90	12.3	50.3	50	0.27	3	●	1
SEPDMD0095	0.95	12.3	50.3	50	0.29	3	●	1
SEPDMD0100	1.0	12.3	60.3	60	0.3	3	●	1
SEPDMD0110	1.1	16.3	60.3	60	0.3	3	●	1
SEPDMD0120	1.2	16.4	60.4	60	0.4	3	●	1
SEPDMD0130	1.3	16.4	60.4	60	0.4	3	●	1
SEPDMD0140	1.4	18.4	60.4	60	0.4	3	●	1
SEPDMD0150	1.5	18.5	60.5	60	0.5	3	●	1
SEPDMD0160	1.6	20.5	60.5	60	0.5	3	●	1
SEPDMD0170	1.7	20.5	60.5	60	0.5	3	●	1
SEPDMD0180	1.8	22.5	60.5	60	0.5	3	●	1
SEPDMD0190	1.9	22.6	60.6	60	0.6	3	●	1
SEPDMD0200	2.0	23.6	70.6	70	0.6	3	●	1

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
SEPDMD0210	2.1	23.6	70.6	70	0.6	3	●	1
SEPDMD0220	2.2	26.7	70.7	70	0.7	3	●	1
SEPDMD0230	2.3	26.7	70.7	70	0.7	3	●	1
SEPDMD0240	2.4	29.7	70.7	70	0.7	3	●	1
SEPDMD0250	2.5	29.8	70.8	70	0.8	3	●	1
SEPDMD0260	2.6	29.8	70.8	70	0.8	3	●	1
SEPDMD0270	2.7	32.8	70.8	70	0.8	3	●	1
SEPDMD0280	2.8	32.8	70.8	70	0.8	3	●	1
SEPDMD0290	2.9	32.9	70.9	70	0.9	3	●	1
SEPDMD0300	3.0	32.9	70.9	70	0.9	3	●	1
SEPDMD0310	3.1	35.9	85.9	85	0.9	4	●	1
SEPDMD0320	3.2	36.0	86.0	85	1.0	4	●	1
SEPDMD0330	3.3	36.0	86.0	85	1.0	4	●	1
SEPDMD0340	3.4	39.0	86.0	85	1.0	4	●	1
SEPDMD0350	3.5	39.1	86.1	85	1.1	4	●	1
SEPDMD0360	3.6	39.1	86.1	85	1.1	4	●	1
SEPDMD0370	3.7	39.1	86.1	85	1.1	4	●	1
SEPDMD0380	3.8	43.1	86.1	85	1.1	4	●	1
SEPDMD0390	3.9	43.2	86.2	85	1.2	4	●	1
SEPDMD0400	4.0	42.8	85.8	85	0.8	4	●	1

SEPDM

Recommended cutting condition

Work material	Mild Steel(≦180HB), Aluminium Alloy(Si<5%) AISI 1010 etc				Carbon steel, Alloy steel(180—280HB) Gray Cast Iron(≦350MPa), Copper, Copper Alloys AISI 1045, AISI 4140, No 45 B etc				Alloy tool steel(≦250HB) Ferritic and Martensitic Stainless Steel (≦200HB) AISI D2, AISI 410, AISI 430 etc			
Dia. DC (mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (mm/rev)	Feed rate (mm/min)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (mm/rev)	Feed rate (mm/min)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (mm/rev)	Feed rate (mm/min)
0.5	24	15000	0.02	300	18	11250	0.01	110	13	8000	0.01	80
0.65	28	13700	0.03	410	22	10700	0.02	210	14	6800	0.02	135
0.8	33	13100	0.04	520	27	10700	0.03	320	14	5500	0.03	165
1.0	38	12000	0.05	600	31	10000	0.05	500	16	5000	0.05	250
1.2	38	10000	0.06	600	31	8200	0.06	490	17	4500	0.05	225
1.6	40	8000	0.08	640	33	6500	0.08	520	18	3500	0.06	210
2.0	40	6400	0.09	575	35	5500	0.09	495	18	2900	0.06	170
2.5	40	5100	0.11	560	35	4400	0.11	480	18	2300	0.08	180
3.2	40	4000	0.13	520	34	3400	0.13	440	18	1800	0.09	160
4.0	40	3200	0.15	480	35	2800	0.15	420	18	1400	0.10	140

Work material	Austenitic Stainless Steel(≦200HB) AISI 304,AISI 316 etc				Alloy tool steel(≦30HRC) AISI H13, L6 etc			
Dia. DC (mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (mm/rev)	Feed rate (mm/min)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (mm/rev)	Feed rate (mm/min)
0.5	10	6600	0.01	65	10	6600	0.01	65
0.65	11	5300	0.012	60	11	5300	0.012	60
0.8	11	4300	0.015	60	11	4300	0.015	60
1.0	12	3800	0.02	75	12	3800	0.02	75
1.2	12	3100	0.025	75	12	3100	0.023	70
1.6	14	2700	0.03	80	14	2700	0.03	80
2.0	15	2400	0.04	95	15	2400	0.04	95
2.5	15	1900	0.05	95	15	1900	0.04	75
3.2	15	1500	0.07	105	15	1500	0.05	75
4.0	15	1200	0.09	105	15	1200	0.07	80

- Please reduce the revolution and feed rate depending on the drilling situation when the installation of workpiece or machine lacks rigidity.
- Please use a collet type drill chuck or a milling chuck.
- Use sufficient cutting fluid.
- VAPDM is recommended when the work material hardness exceeds 30HRC.
- WSTAR drill (MVE, MVS, MMS) are recommended for precipitation hardening stainless steel (JIS-SUS630/ISOL-No58X5CrNiCuNb16-4/ASTM-S17400, JIS-SUS631/DIN-X7CrNiAl177/ASTM-S17700)
- When drilling holes greater than 4 x drill diameter hole depths, please use a peck feed.
- The above-mentioned cutting condition is standard when using water-soluble cutting fluid. Please reduce the revolution when using non-water-soluble cutting fluid.
- The intermediate diameter revolution is not tabulated. It is matched to the large diameter side and closest drill diameter conditions or by calculating the cutting speed of the closest drill diameter. Set the feedrate per revolution to a suitable value with the recommended feedrate of the closest drill diameter as the standard.

VAPDS

VIOLET DRILLS

Short, High precision

Product Information

HG HSS | V | 118° SIG (DC<2) | 135° SIG (DC≧2) | X Thinning

Work Material

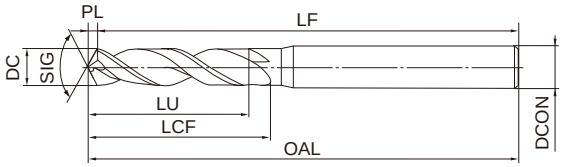
P M K S

TECHNICAL INFO >> 1997

ISO13399 PROPERTY >> 1966

SYMBOL DESCRIPTIONS >> 1623

DRILLS SELECTION CHART >> 1636



Type1

	0.5≦DC≦3	3<DC≦6	6<DC≦10	10<DC≦13
	0 −0.014	0 −0.018	0 −0.022	0 −0.027

Standard drill depth : LU=LCF-3DC

Stock status indication:●: Inventory maintained in Japan.▲: This item to be discontinued within two years.□: Non stock, produced to order only.

unit (mm)

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
VAPDSD0050	0.50	3.2	50.2	50	0.15	3	●	1
VAPDSD0051	0.51	3.2	50.2	50	0.15	3	●	1
VAPDSD0052	0.52	3.2	50.2	50	0.16	3	●	1
VAPDSD0053	0.53	3.2	50.2	50	0.16	3	●	1
VAPDSD0054	0.54	3.2	50.2	50	0.16	3	●	1
VAPDSD0055	0.55	3.2	50.2	50	0.17	3	●	1
VAPDSD0056	0.56	4.2	50.2	50	0.17	3	●	1
VAPDSD0057	0.57	4.2	50.2	50	0.17	3	●	1
VAPDSD0058	0.58	4.2	50.2	50	0.17	3	●	1
VAPDSD0059	0.59	4.2	50.2	50	0.18	3	●	1
VAPDSD0060	0.60	5.2	50.2	50	0.18	3	●	1
VAPDSD0061	0.61	5.2	50.2	50	0.18	3	●	1
VAPDSD0062	0.62	5.2	50.2	50	0.19	3	●	1
VAPDSD0063	0.63	5.2	50.2	50	0.19	3	●	1
VAPDSD0064	0.64	5.2	50.2	50	0.19	3	●	1
VAPDSD0065	0.65	5.2	50.2	50	0.20	3	●	1
VAPDSD0066	0.66	5.2	50.2	50	0.20	3	●	1
VAPDSD0067	0.67	5.2	50.2	50	0.20	3	●	1
VAPDSD0068	0.68	5.2	50.2	50	0.20	3	●	1
VAPDSD0069	0.69	5.2	50.2	50	0.21	3	●	1
VAPDSD0070	0.70	5.2	50.2	50	0.21	3	●	1
VAPDSD0071	0.71	5.2	50.2	50	0.21	3	●	1
VAPDSD0072	0.72	5.2	50.2	50	0.22	3	●	1
VAPDSD0073	0.73	5.2	50.2	50	0.22	3	●	1
VAPDSD0074	0.74	5.2	50.2	50	0.22	3	●	1
VAPDSD0075	0.75	5.2	50.2	50	0.23	3	●	1
VAPDSD0076	0.76	5.2	50.2	50	0.23	3	●	1
VAPDSD0077	0.77	5.2	50.2	50	0.23	3	●	1
VAPDSD0078	0.78	5.2	50.2	50	0.23	3	●	1
VAPDSD0079	0.79	5.2	50.2	50	0.24	3	●	1
VAPDSD0080	0.80	5.2	50.2	50	0.24	3	●	1
VAPDSD0081	0.81	5.2	50.2	50	0.24	3	●	1

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
VAPDSD0082	0.82	5.3	50.3	50	0.25	3	●	1
VAPDSD0083	0.83	5.3	50.3	50	0.25	3	●	1
VAPDSD0084	0.84	5.3	50.3	50	0.25	3	●	1
VAPDSD0085	0.85	5.3	50.3	50	0.26	3	●	1
VAPDSD0086	0.86	6.3	50.3	50	0.26	3	●	1
VAPDSD0087	0.87	6.3	50.3	50	0.26	3	●	1
VAPDSD0088	0.88	6.3	50.3	50	0.26	3	●	1
VAPDSD0089	0.89	6.3	50.3	50	0.27	3	●	1
VAPDSD0090	0.90	6.3	50.3	50	0.27	3	●	1
VAPDSD0091	0.91	6.3	50.3	50	0.27	3	●	1
VAPDSD0092	0.92	6.3	50.3	50	0.28	3	●	1
VAPDSD0093	0.93	6.3	50.3	50	0.28	3	●	1
VAPDSD0094	0.94	6.3	50.3	50	0.28	3	●	1
VAPDSD0095	0.95	6.3	50.3	50	0.29	3	●	1
VAPDSD0096	0.96	6.3	50.3	50	0.29	3	●	1
VAPDSD0097	0.97	6.3	50.3	50	0.29	3	●	1
VAPDSD0098	0.98	6.3	50.3	50	0.29	3	●	1
VAPDSD0099	0.99	6.3	50.3	50	0.30	3	●	1
VAPDSD0100	1.00	6.3	50.3	50	0.3	3	●	1
VAPDSD0101	1.01	6.3	50.3	50	0.3	3	●	1
VAPDSD0102	1.02	6.3	50.3	50	0.3	3	●	1
VAPDSD0103	1.03	6.3	50.3	50	0.3	3	●	1
VAPDSD0104	1.04	6.3	50.3	50	0.3	3	●	1
VAPDSD0105	1.05	6.3	50.3	50	0.3	3	●	1
VAPDSD0106	1.06	6.3	50.3	50	0.3	3	●	1
VAPDSD0107	1.07	8.3	55.3	55	0.3	3	●	1
VAPDSD0108	1.08	8.3	55.3	55	0.3	3	●	1
VAPDSD0109	1.09	8.3	55.3	55	0.3	3	●	1
VAPDSD0110	1.10	8.3	55.3	55	0.3	3	●	1
VAPDSD0111	1.11	8.3	55.3	55	0.3	3	●	1
VAPDSD0112	1.12	8.3	55.3	55	0.3	3	●	1
VAPDSD0113	1.13	8.3	55.3	55	0.3	3	●	1

VAPDS

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
VAPDSD0114	1.14	8.3	55.3	55	0.3	3	●	1
VAPDSD0115	1.15	8.4	55.4	55	0.4	3	●	1
VAPDSD0116	1.16	8.4	55.4	55	0.4	3	●	1
VAPDSD0117	1.17	8.4	55.4	55	0.4	3	●	1
VAPDSD0118	1.18	8.4	55.4	55	0.4	3	●	1
VAPDSD0119	1.19	8.4	55.4	55	0.4	3	●	1
VAPDSD0120	1.20	8.4	55.4	55	0.4	3	●	1
VAPDSD0121	1.21	8.4	55.4	55	0.4	3	●	1
VAPDSD0122	1.22	8.4	55.4	55	0.4	3	●	1
VAPDSD0123	1.23	8.4	55.4	55	0.4	3	●	1
VAPDSD0124	1.24	8.4	55.4	55	0.4	3	●	1
VAPDSD0125	1.25	8.4	55.4	55	0.4	3	●	1
VAPDSD0126	1.26	8.4	55.4	55	0.4	3	●	1
VAPDSD0127	1.27	8.4	55.4	55	0.4	3	●	1
VAPDSD0128	1.28	8.4	55.4	55	0.4	3	●	1
VAPDSD0129	1.29	8.4	55.4	55	0.4	3	●	1
VAPDSD0130	1.30	9.4	55.4	55	0.4	3	●	1
VAPDSD0131	1.31	9.4	55.4	55	0.4	3	●	1
VAPDSD0132	1.32	9.4	55.4	55	0.4	3	●	1
VAPDSD0133	1.33	9.4	55.4	55	0.4	3	●	1
VAPDSD0134	1.34	9.4	55.4	55	0.4	3	●	1
VAPDSD0135	1.35	9.4	55.4	55	0.4	3	●	1
VAPDSD0136	1.36	9.4	55.4	55	0.4	3	●	1
VAPDSD0137	1.37	9.4	55.4	55	0.4	3	●	1
VAPDSD0138	1.38	9.4	55.4	55	0.4	3	●	1
VAPDSD0139	1.39	9.4	55.4	55	0.4	3	●	1
VAPDSD0140	1.40	9.4	55.4	55	0.4	3	●	1
VAPDSD0141	1.41	9.4	55.4	55	0.4	3	●	1
VAPDSD0142	1.42	9.4	55.4	55	0.4	3	●	1
VAPDSD0143	1.43	9.4	55.4	55	0.4	3	●	1
VAPDSD0144	1.44	9.4	55.4	55	0.4	3	●	1
VAPDSD0145	1.45	9.4	55.4	55	0.4	3	●	1
VAPDSD0146	1.46	9.4	55.4	55	0.4	3	●	1
VAPDSD0147	1.47	9.4	55.4	55	0.4	3	●	1
VAPDSD0148	1.48	9.4	55.4	55	0.4	3	●	1
VAPDSD0149	1.49	9.5	55.5	55	0.5	3	●	1
VAPDSD0150	1.50	9.5	55.5	55	0.5	3	●	1
VAPDSD0151	1.51	11.5	55.5	55	0.5	3	●	1
VAPDSD0152	1.52	11.5	55.5	55	0.5	3	●	1
VAPDSD0153	1.53	11.5	55.5	55	0.5	3	●	1
VAPDSD0154	1.54	11.5	55.5	55	0.5	3	●	1
VAPDSD0155	1.55	11.5	55.5	55	0.5	3	●	1
VAPDSD0156	1.56	11.5	55.5	55	0.5	3	●	1
VAPDSD0157	1.57	11.5	55.5	55	0.5	3	●	1
VAPDSD0158	1.58	11.5	55.5	55	0.5	3	●	1
VAPDSD0159	1.59	11.5	55.5	55	0.5	3	●	1
VAPDSD0160	1.60	11.5	55.5	55	0.5	3	●	1
VAPDSD0161	1.61	11.5	55.5	55	0.5	3	●	1
VAPDSD0162	1.62	11.5	55.5	55	0.5	3	●	1
VAPDSD0163	1.63	11.5	55.5	55	0.5	3	●	1
VAPDSD0164	1.64	11.5	55.5	55	0.5	3	●	1
VAPDSD0165	1.65	11.5	55.5	55	0.5	3	●	1
VAPDSD0166	1.66	11.5	55.5	55	0.5	3	●	1
VAPDSD0167	1.67	11.5	55.5	55	0.5	3	●	1

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
VAPDSD0168	1.68	11.5	55.5	55	0.5	3	●	1
VAPDSD0169	1.69	11.5	55.5	55	0.5	3	●	1
VAPDSD0170	1.70	11.5	55.5	55	0.5	3	●	1
VAPDSD0171	1.71	11.5	55.5	55	0.5	3	●	1
VAPDSD0172	1.72	11.5	55.5	55	0.5	3	●	1
VAPDSD0173	1.73	11.5	55.5	55	0.5	3	●	1
VAPDSD0174	1.74	11.5	55.5	55	0.5	3	●	1
VAPDSD0175	1.75	11.5	55.5	55	0.5	3	●	1
VAPDSD0176	1.76	11.5	55.5	55	0.5	3	●	1
VAPDSD0177	1.77	11.5	55.5	55	0.5	3	●	1
VAPDSD0178	1.78	11.5	55.5	55	0.5	3	●	1
VAPDSD0179	1.79	11.5	55.5	55	0.5	3	●	1
VAPDSD0180	1.80	11.5	55.5	55	0.5	3	●	1
VAPDSD0181	1.81	11.5	55.5	55	0.5	3	●	1
VAPDSD0182	1.82	11.6	55.6	55	0.6	3	●	1
VAPDSD0183	1.83	11.6	55.6	55	0.6	3	●	1
VAPDSD0184	1.84	11.6	55.6	55	0.6	3	●	1
VAPDSD0185	1.85	11.6	55.6	55	0.6	3	●	1
VAPDSD0186	1.86	11.6	55.6	55	0.6	3	●	1
VAPDSD0187	1.87	11.6	55.6	55	0.6	3	●	1
VAPDSD0188	1.88	11.6	55.6	55	0.6	3	●	1
VAPDSD0189	1.89	11.6	55.6	55	0.6	3	●	1
VAPDSD0190	1.90	12.6	55.6	55	0.6	3	●	1
VAPDSD0191	1.91	12.6	60.6	60	0.6	3	●	1
VAPDSD0192	1.92	12.6	60.6	60	0.6	3	●	1
VAPDSD0193	1.93	12.6	60.6	60	0.6	3	●	1
VAPDSD0194	1.94	12.6	60.6	60	0.6	3	●	1
VAPDSD0195	1.95	12.6	60.6	60	0.6	3	●	1
VAPDSD0196	1.96	12.6	60.6	60	0.6	3	●	1
VAPDSD0197	1.97	12.6	60.6	60	0.6	3	●	1
VAPDSD0198	1.98	12.6	60.6	60	0.6	3	●	1
VAPDSD0199	1.99	12.6	60.6	60	0.6	3	●	1
VAPDSD0200	2.00	12.4	60.4	60	0.4	3	●	1
VAPDSD0205	2.05	12.4	60.4	60	0.4	3	●	1
VAPDSD0210	2.10	12.4	60.4	60	0.4	3	●	1
VAPDSD0215	2.15	12.5	60.5	60	0.5	3	●	1
VAPDSD0220	2.20	12.5	60.5	60	0.5	3	●	1
VAPDSD0225	2.25	12.5	60.5	60	0.5	3	●	1
VAPDSD0230	2.30	13.5	60.5	60	0.5	3	●	1
VAPDSD0235	2.35	13.5	60.5	60	0.5	3	●	1
VAPDSD0240	2.40	13.5	60.5	60	0.5	3	●	1
VAPDSD0245	2.45	13.5	60.5	60	0.5	3	●	1
VAPDSD0250	2.50	13.5	60.5	60	0.5	3	●	1
VAPDSD0255	2.55	13.5	60.5	60	0.5	3	●	1
VAPDSD0260	2.60	15.5	60.5	60	0.5	3	●	1
VAPDSD0265	2.65	15.6	60.6	60	0.6	3	●	1
VAPDSD0270	2.70	15.6	60.6	60	0.6	3	●	1
VAPDSD0275	2.75	15.6	60.6	60	0.6	3	●	1
VAPDSD0280	2.80	15.6	60.6	60	0.6	3	●	1
VAPDSD0285	2.85	15.6	60.6	60	0.6	3	●	1
VAPDSD0290	2.90	15.6	60.6	60	0.6	3	●	1
VAPDSD0295	2.95	15.6	60.6	60	0.6	3	●	1
VAPDSD0300	3.00	15.6	60.6	60	0.6	3	●	1
VAPDSD0305	3.05	17.6	70.6	70	0.6	4	●	1

VAPDS

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
VAPDSD0310	3.10	17.6	70.6	70	0.6	4	●	1
VAPDSD0315	3.15	17.7	70.7	70	0.7	4	●	1
VAPDSD0320	3.20	17.7	70.7	70	0.7	4	●	1
VAPDSD0325	3.25	17.7	70.7	70	0.7	4	●	1
VAPDSD0330	3.30	19.7	70.7	70	0.7	4	●	1
VAPDSD0335	3.35	19.7	70.7	70	0.7	4	●	1
VAPDSD0340	3.40	19.7	70.7	70	0.7	4	●	1
VAPDSD0345	3.45	19.7	70.7	70	0.7	4	●	1
VAPDSD0350	3.50	19.7	70.7	70	0.7	4	●	1
VAPDSD0355	3.55	19.7	70.7	70	0.7	4	●	1
VAPDSD0360	3.60	21.8	70.8	70	0.8	4	●	1
VAPDSD0365	3.65	21.8	70.8	70	0.8	4	●	1
VAPDSD0370	3.70	21.8	70.8	70	0.8	4	●	1
VAPDSD0375	3.75	21.8	70.8	70	0.8	4	●	1
VAPDSD0380	3.80	21.8	70.8	70	0.8	4	●	1
VAPDSD0385	3.85	21.8	70.8	70	0.8	4	●	1
VAPDSD0390	3.90	21.8	70.8	70	0.8	4	●	1
VAPDSD0395	3.95	21.8	70.8	70	0.8	4	●	1
VAPDSD0400	4.00	21.8	70.8	70	0.8	4	●	1
VAPDSD0405	4.05	21.8	80.8	80	0.8	6	●	1
VAPDSD0410	4.10	21.9	80.9	80	0.9	6	●	1
VAPDSD0415	4.15	21.9	80.9	80	0.9	6	●	1
VAPDSD0420	4.20	21.9	80.9	80	0.9	6	●	1
VAPDSD0425	4.25	21.9	80.9	80	0.9	6	●	1
VAPDSD0430	4.30	23.9	80.9	80	0.9	6	●	1
VAPDSD0435	4.35	23.9	80.9	80	0.9	6	●	1
VAPDSD0440	4.40	23.9	80.9	80	0.9	6	●	1
VAPDSD0445	4.45	23.9	80.9	80	0.9	6	●	1
VAPDSD0450	4.50	23.9	80.9	80	0.9	6	●	1
VAPDSD0455	4.55	23.9	80.9	80	0.9	6	●	1
VAPDSD0460	4.60	26.0	81.0	80	1.0	6	●	1
VAPDSD0465	4.65	26.0	81.0	80	1.0	6	●	1
VAPDSD0470	4.70	26.0	81.0	80	1.0	6	●	1
VAPDSD0475	4.75	26.0	81.0	80	1.0	6	●	1
VAPDSD0480	4.80	26.0	81.0	80	1.0	6	●	1
VAPDSD0485	4.85	26.0	81.0	80	1.0	6	●	1
VAPDSD0490	4.90	26.0	81.0	80	1.0	6	●	1
VAPDSD0495	4.95	26.0	81.0	80	1.0	6	●	1
VAPDSD0500	5.00	26.0	81.0	80	1.0	6	●	1
VAPDSD0505	5.05	26.1	81.1	80	1.1	6	●	1
VAPDSD0510	5.10	26.1	81.1	80	1.1	6	●	1
VAPDSD0515	5.15	26.1	81.1	80	1.1	6	●	1
VAPDSD0520	5.20	26.1	81.1	80	1.1	6	●	1
VAPDSD0525	5.25	26.1	81.1	80	1.1	6	●	1
VAPDSD0530	5.30	26.1	81.1	80	1.1	6	●	1
VAPDSD0535	5.35	28.1	81.1	80	1.1	6	●	1
VAPDSD0540	5.40	28.1	81.1	80	1.1	6	●	1
VAPDSD0545	5.45	28.1	81.1	80	1.1	6	●	1
VAPDSD0550	5.50	28.1	81.1	80	1.1	6	●	1
VAPDSD0555	5.55	28.2	81.2	80	1.2	6	●	1
VAPDSD0560	5.60	28.2	81.2	80	1.2	6	●	1
VAPDSD0565	5.65	28.2	81.2	80	1.2	6	●	1
VAPDSD0570	5.70	28.2	81.2	80	1.2	6	●	1
VAPDSD0575	5.75	28.2	81.2	80	1.2	6	●	1

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
VAPDSD0580	5.80	28.2	81.2	80	1.2	6	●	1
VAPDSD0585	5.85	28.2	81.2	80	1.2	6	●	1
VAPDSD0590	5.90	28.2	81.2	80	1.2	6	●	1
VAPDSD0595	5.95	28.2	81.2	80	1.2	6	●	1
VAPDSD0600	6.00	28.2	81.2	80	1.2	6	●	1
VAPDSD0605	6.05	31.3	81.3	80	1.3	8	●	1
VAPDSD0610	6.10	31.3	81.3	80	1.3	8	●	1
VAPDSD0615	6.15	31.3	81.3	80	1.3	8	●	1
VAPDSD0620	6.20	31.3	81.3	80	1.3	8	●	1
VAPDSD0625	6.25	31.3	81.3	80	1.3	8	●	1
VAPDSD0630	6.30	31.3	81.3	80	1.3	8	●	1
VAPDSD0635	6.35	31.3	81.3	80	1.3	8	●	1
VAPDSD0640	6.40	31.3	81.3	80	1.3	8	●	1
VAPDSD0645	6.45	31.3	81.3	80	1.3	8	●	1
VAPDSD0650	6.50	31.4	81.4	80	1.4	8	●	1
VAPDSD0655	6.55	31.4	81.4	80	1.4	8	●	1
VAPDSD0660	6.60	31.4	81.4	80	1.4	8	●	1
VAPDSD0665	6.65	31.4	81.4	80	1.4	8	●	1
VAPDSD0670	6.70	31.4	81.4	80	1.4	8	●	1
VAPDSD0675	6.75	33.4	81.4	80	1.4	8	●	1
VAPDSD0680	6.80	33.4	81.4	80	1.4	8	●	1
VAPDSD0685	6.85	33.4	81.4	80	1.4	8	●	1
VAPDSD0690	6.90	33.4	81.4	80	1.4	8	●	1
VAPDSD0695	6.95	33.4	81.4	80	1.4	8	●	1
VAPDSD0700	7.00	33.5	81.5	80	1.5	8	●	1
VAPDSD0705	7.05	33.5	81.5	80	1.5	8	●	1
VAPDSD0710	7.10	33.5	81.5	80	1.5	8	●	1
VAPDSD0715	7.15	33.5	81.5	80	1.5	8	●	1
VAPDSD0720	7.20	33.5	81.5	80	1.5	8	●	1
VAPDSD0725	7.25	33.5	81.5	80	1.5	8	●	1
VAPDSD0730	7.30	33.5	81.5	80	1.5	8	●	1
VAPDSD0735	7.35	33.5	81.5	80	1.5	8	●	1
VAPDSD0740	7.40	33.5	81.5	80	1.5	8	●	1
VAPDSD0745	7.45	33.5	81.5	80	1.5	8	●	1
VAPDSD0750	7.50	33.6	81.6	80	1.6	8	●	1
VAPDSD0755	7.55	36.6	86.6	85	1.6	8	●	1
VAPDSD0760	7.60	36.6	86.6	85	1.6	8	●	1
VAPDSD0765	7.65	36.6	86.6	85	1.6	8	●	1
VAPDSD0770	7.70	36.6	86.6	85	1.6	8	●	1
VAPDSD0775	7.75	36.6	86.6	85	1.6	8	●	1
VAPDSD0780	7.80	36.6	86.6	85	1.6	8	●	1
VAPDSD0785	7.85	36.6	86.6	85	1.6	8	●	1
VAPDSD0790	7.90	36.6	86.6	85	1.6	8	●	1
VAPDSD0795	7.95	36.7	86.7	85	1.7	8	●	1
VAPDSD0800	8.00	36.7	86.7	85	1.7	8	●	1
VAPDSD0805	8.05	36.7	91.7	90	1.7	10	●	1
VAPDSD0810	8.10	36.7	91.7	90	1.7	10	●	1
VAPDSD0815	8.15	36.7	91.7	90	1.7	10	●	1
VAPDSD0820	8.20	36.7	91.7	90	1.7	10	●	1
VAPDSD0825	8.25	36.7	91.7	90	1.7	10	●	1
VAPDSD0830	8.30	36.7	91.7	90	1.7	10	●	1
VAPDSD0835	8.35	36.7	91.7	90	1.7	10	●	1
VAPDSD0840	8.40	36.7	91.7	90	1.7	10	●	1
VAPDSD0845	8.45	36.8	91.8	90	1.8	10	●	1

VAPDS

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
VAPDSD0850	8.50	36.8	91.8	90	1.8	10	●	1
VAPDSD0855	8.55	39.8	94.8	93	1.8	10	●	1
VAPDSD0860	8.60	39.8	94.8	93	1.8	10	●	1
VAPDSD0865	8.65	39.8	94.8	93	1.8	10	●	1
VAPDSD0870	8.70	39.8	94.8	93	1.8	10	●	1
VAPDSD0875	8.75	39.8	94.8	93	1.8	10	●	1
VAPDSD0880	8.80	39.8	94.8	93	1.8	10	●	1
VAPDSD0885	8.85	39.8	94.8	93	1.8	10	●	1
VAPDSD0890	8.90	39.8	94.8	93	1.8	10	●	1
VAPDSD0895	8.95	39.9	94.9	93	1.9	10	●	1
VAPDSD0900	9.00	39.9	94.9	93	1.9	10	●	1
VAPDSD0910	9.10	39.9	94.9	93	1.9	10	●	1
VAPDSD0920	9.20	39.9	94.9	93	1.9	10	●	1
VAPDSD0930	9.30	39.9	94.9	93	1.9	10	●	1
VAPDSD0940	9.40	40.0	95.0	93	2.0	10	●	1
VAPDSD0950	9.50	40.0	95.0	93	2.0	10	●	1
VAPDSD0960	9.60	43.0	98.0	96	2.0	10	●	1
VAPDSD0970	9.70	43.0	98.0	96	2.0	10	●	1
VAPDSD0980	9.80	43.0	98.0	96	2.0	10	●	1
VAPDSD0990	9.90	43.1	98.1	96	2.1	10	●	1
VAPDSD1000	10.00	43.1	98.1	96	2.1	10	●	1
VAPDSD1010	10.10	43.1	103.1	101	2.1	12	●	1
VAPDSD1020	10.20	43.1	103.1	101	2.1	12	●	1
VAPDSD1030	10.30	43.1	103.1	101	2.1	12	●	1
VAPDSD1040	10.40	43.2	103.2	101	2.2	12	●	1
VAPDSD1050	10.50	43.2	103.2	101	2.2	12	●	1

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
VAPDSD1060	10.60	43.2	103.2	101	2.2	12	●	1
VAPDSD1070	10.70	47.2	107.2	105	2.2	12	●	1
VAPDSD1080	10.80	47.2	107.2	105	2.2	12	●	1
VAPDSD1090	10.90	47.3	107.3	105	2.3	12	●	1
VAPDSD1100	11.00	47.3	107.3	105	2.3	12	●	1
VAPDSD1110	11.10	47.3	107.3	105	2.3	12	●	1
VAPDSD1120	11.20	47.3	107.3	105	2.3	12	●	1
VAPDSD1130	11.30	47.3	107.3	105	2.3	12	●	1
VAPDSD1140	11.40	47.4	107.4	105	2.4	12	●	1
VAPDSD1150	11.50	47.4	107.4	105	2.4	12	●	1
VAPDSD1160	11.60	47.4	107.4	105	2.4	12	●	1
VAPDSD1170	11.70	47.4	107.4	105	2.4	12	●	1
VAPDSD1180	11.80	47.4	107.4	105	2.4	12	●	1
VAPDSD1190	11.90	51.5	111.5	109	2.5	12	●	1
VAPDSD1200	12.0	51.5	111.5	109	2.5	12	●	1
VAPDSD1210	12.1	51.5	111.5	109	2.5	12	●	1
VAPDSD1220	12.2	51.5	111.5	109	2.5	12	●	1
VAPDSD1230	12.3	51.6	111.6	109	2.6	12	●	1
VAPDSD1240	12.4	51.6	111.6	109	2.6	12	●	1
VAPDSD1250	12.5	51.6	111.6	109	2.6	12	●	1
VAPDSD1260	12.6	51.6	111.6	109	2.6	12	●	1
VAPDSD1270	12.7	51.6	111.6	109	2.6	12	●	1
VAPDSD1280	12.8	51.7	111.7	109	2.7	12	●	1
VAPDSD1290	12.9	51.7	111.7	109	2.7	12	●	1
VAPDSD1300	13.0	51.7	111.7	109	2.7	12	●	1

VAPDS

Recommended Cutting Condition

Standard drill depth : LU=LCF-3DC

Work material	Structural steel		Carbon steel AISI 1049 Alloy steel SCM Cast iron FC		Alloy tool steel AISI D11(Low-hardness materials) Ferritic stainless steel AISI 430, AISI 405 Martensitic stainless steel AISI 420, AISI 440		Alloy tool steel AISI H61 (—40HRC) Precipitation hardening stainless steel ASTM 630, ASTM 631	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)
0.5	18000	0.02	16000	0.02	9000	0.02	8200	0.02
1.0	12000	0.05	10000	0.05	6300	0.05	5500	0.04
2.0	6400	0.09	5500	0.09	3200	0.09	2900	0.05
3.0	4300	0.13	3700	0.13	2100	0.13	1900	0.06
4.0	3200	0.15	2800	0.15	1600	0.15	1400	0.08
5.0	2600	0.18	2200	0.18	1300	0.18	1100	0.10
6.0	2100	0.19	1800	0.19	1100	0.20	950	0.11
8.0	1600	0.24	1400	0.24	800	0.22	720	0.13
10.0	1300	0.28	1100	0.28	640	0.25	570	0.15
12.0	1100	0.34	930	0.34	530	0.30	480	0.17
13.0	980	0.36	860	0.36	490	0.32	440	0.19

- Please reduce the revolution and feed rate depending on the drilling situation when the installation of workpiece or machine lacks rigidity.
- Please use a collet type drill chuck or a milling chuck.
- Use sufficient cutting fluid.
- VAPDSSUS are recommended for austenitic stainless steels(AISI 304).
- When drilling holes greater than 4 x drill diameter hole depths, please use a peck feed.
- The above-mentioned cutting condition is standard when using water-soluble cutting fluid. Please reduce the revolution when using non-water-soluble cutting fluid.

VAPDM

VIOLET DRILLS

Medium, High precision

Product Information

HG HSS | V | 118° SIG (DC<2) | 135° SIG (DC≧2) | X Thinning

TECHNICAL INFO >> 1997

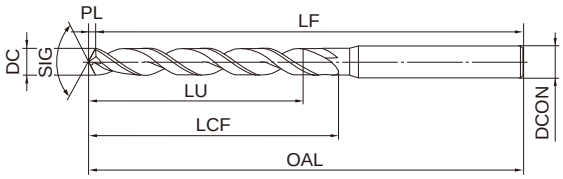
ISO13399 PROPERTY >> 1966

Work Material

P M K S

SYMBOL DESCRIPTIONS >> 1623

DRILLS SELECTION CHART >> 1636



Type1

	0.5≦D C≦3	3<D C≦6	6<D C≦10	10<D C≦18	18<D C≦30	30<D C≦32
	0 −0.014	0 −0.018	0 −0.022	0 −0.027	0 −0.033	0 −0.039

Standard drill depth : LU=LCF-3DC

Stock status indication:●: Inventory maintained in Japan.▲: This item to be discontinued within two years.□: Non stock, produced to order only.

unit (mm)

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
VAPDMD0050	0.50	6.2	50.2	50	0.15	3	●	1
VAPDMD0055	0.55	6.2	50.2	50	0.17	3	●	1
VAPDMD0060	0.60	8.2	50.2	50	0.18	3	●	1
VAPDMD0065	0.65	8.2	50.2	50	0.20	3	●	1
VAPDMD0070	0.70	10.2	50.2	50	0.21	3	●	1
VAPDMD0075	0.75	10.2	50.2	50	0.23	3	●	1
VAPDMD0080	0.80	10.2	50.2	50	0.24	3	●	1
VAPDMD0085	0.85	10.3	50.3	50	0.26	3	●	1
VAPDMD0090	0.90	12.3	50.3	50	0.27	3	●	1
VAPDMD0095	0.95	12.3	50.3	50	0.29	3	●	1
VAPDMD0100	1.00	12.3	60.3	60	0.3	3	●	1
VAPDMD0105	1.05	12.3	60.3	60	0.3	3	●	1
VAPDMD0110	1.10	16.3	60.3	60	0.3	3	●	1
VAPDMD0115	1.15	16.4	60.4	60	0.4	3	●	1
VAPDMD0120	1.20	16.4	60.4	60	0.4	3	●	1
VAPDMD0125	1.25	16.4	60.4	60	0.4	3	●	1
VAPDMD0130	1.30	16.4	60.4	60	0.4	3	●	1
VAPDMD0135	1.35	18.4	60.4	60	0.4	3	●	1
VAPDMD0140	1.40	18.4	60.4	60	0.4	3	●	1
VAPDMD0145	1.45	18.4	60.4	60	0.4	3	●	1
VAPDMD0150	1.50	18.5	60.5	60	0.5	3	●	1
VAPDMD0155	1.55	20.5	60.5	60	0.5	3	●	1
VAPDMD0160	1.60	20.5	60.5	60	0.5	3	●	1
VAPDMD0165	1.65	20.5	60.5	60	0.5	3	●	1
VAPDMD0170	1.70	20.5	60.5	60	0.5	3	●	1
VAPDMD0175	1.75	20.5	60.5	60	0.5	3	●	1
VAPDMD0180	1.80	22.5	60.5	60	0.5	3	●	1
VAPDMD0185	1.85	22.6	60.6	60	0.6	3	●	1
VAPDMD0190	1.90	22.6	60.6	60	0.6	3	●	1
VAPDMD0195	1.95	23.6	60.6	60	0.6	3	●	1
VAPDMD0200	2.00	23.4	70.4	70	0.4	3	●	1

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
VAPDMD0205	2.05	23.4	70.4	70	0.4	3	●	1
VAPDMD0210	2.10	23.4	70.4	70	0.4	3	●	1
VAPDMD0215	2.15	23.5	70.5	70	0.5	3	●	1
VAPDMD0220	2.20	26.5	70.5	70	0.5	3	●	1
VAPDMD0225	2.25	26.5	70.5	70	0.5	3	●	1
VAPDMD0230	2.30	26.5	70.5	70	0.5	3	●	1
VAPDMD0235	2.35	26.5	70.5	70	0.5	3	●	1
VAPDMD0240	2.40	29.5	70.5	70	0.5	3	●	1
VAPDMD0245	2.45	29.5	70.5	70	0.5	3	●	1
VAPDMD0250	2.50	29.5	70.5	70	0.5	3	●	1
VAPDMD0255	2.55	29.5	70.5	70	0.5	3	●	1
VAPDMD0260	2.60	29.5	70.5	70	0.5	3	●	1
VAPDMD0265	2.65	29.6	70.6	70	0.6	3	●	1
VAPDMD0270	2.70	32.6	70.6	70	0.6	3	●	1
VAPDMD0275	2.75	32.6	70.6	70	0.6	3	●	1
VAPDMD0280	2.80	32.6	70.6	70	0.6	3	●	1
VAPDMD0285	2.85	32.6	70.6	70	0.6	3	●	1
VAPDMD0290	2.90	32.6	70.6	70	0.6	3	●	1
VAPDMD0295	2.95	32.6	70.6	70	0.6	3	●	1
VAPDMD0300	3.00	32.6	70.6	70	0.6	3	●	1
VAPDMD0305	3.05	35.6	85.6	85	0.6	4	●	1
VAPDMD0310	3.10	35.6	85.6	85	0.6	4	●	1
VAPDMD0315	3.15	35.7	85.7	85	0.7	4	●	1
VAPDMD0320	3.20	35.7	85.7	85	0.7	4	●	1
VAPDMD0325	3.25	35.7	85.7	85	0.7	4	●	1
VAPDMD0330	3.30	35.7	85.7	85	0.7	4	●	1
VAPDMD0335	3.35	35.7	85.7	85	0.7	4	●	1
VAPDMD0340	3.40	38.7	85.7	85	0.7	4	●	1
VAPDMD0345	3.45	38.7	85.7	85	0.7	4	●	1
VAPDMD0350	3.50	38.7	85.7	85	0.7	4	●	1
VAPDMD0355	3.55	38.7	85.7	85	0.7	4	●	1

VAPDM

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
VAPDMD0360	3.60	38.8	85.8	85	0.8	4	●	1
VAPDMD0365	3.65	38.8	85.8	85	0.8	4	●	1
VAPDMD0370	3.70	38.8	85.8	85	0.8	4	●	1
VAPDMD0375	3.75	42.8	85.8	85	0.8	4	●	1
VAPDMD0380	3.80	42.8	85.8	85	0.8	4	●	1
VAPDMD0385	3.85	42.8	85.8	85	0.8	4	●	1
VAPDMD0390	3.90	42.8	85.8	85	0.8	4	●	1
VAPDMD0395	3.95	42.8	85.8	85	0.8	4	●	1
VAPDMD0400	4.00	42.8	85.8	85	0.8	4	●	1
VAPDMD0405	4.05	42.8	100.8	100	0.8	6	●	1
VAPDMD0410	4.10	42.9	100.9	100	0.9	6	●	1
VAPDMD0415	4.15	42.9	100.9	100	0.9	6	●	1
VAPDMD0420	4.20	42.9	100.9	100	0.9	6	●	1
VAPDMD0425	4.25	46.9	100.9	100	0.9	6	●	1
VAPDMD0430	4.30	46.9	100.9	100	0.9	6	●	1
VAPDMD0435	4.35	46.9	100.9	100	0.9	6	●	1
VAPDMD0440	4.40	46.9	100.9	100	0.9	6	●	1
VAPDMD0445	4.45	46.9	100.9	100	0.9	6	●	1
VAPDMD0450	4.50	46.9	100.9	100	0.9	6	●	1
VAPDMD0455	4.55	46.9	100.9	100	0.9	6	●	1
VAPDMD0460	4.60	47.0	101.0	100	1.0	6	●	1
VAPDMD0465	4.65	47.0	101.0	100	1.0	6	●	1
VAPDMD0470	4.70	47.0	101.0	100	1.0	6	●	1
VAPDMD0475	4.75	47.0	101.0	100	1.0	6	●	1
VAPDMD0480	4.80	52.0	101.0	100	1.0	6	●	1
VAPDMD0485	4.85	52.0	101.0	100	1.0	6	●	1
VAPDMD0490	4.90	52.0	101.0	100	1.0	6	●	1
VAPDMD0495	4.95	52.0	101.0	100	1.0	6	●	1
VAPDMD0500	5.00	52.0	101.0	100	1.0	6	●	1
VAPDMD0505	5.05	52.1	101.1	100	1.1	6	●	1
VAPDMD0510	5.10	52.1	101.1	100	1.1	6	●	1
VAPDMD0515	5.15	52.1	101.1	100	1.1	6	●	1
VAPDMD0520	5.20	52.1	101.1	100	1.1	6	●	1
VAPDMD0525	5.25	52.1	101.1	100	1.1	6	●	1
VAPDMD0530	5.30	52.1	101.1	100	1.1	6	●	1
VAPDMD0535	5.35	57.1	107.1	106	1.1	6	●	1
VAPDMD0540	5.40	57.1	107.1	106	1.1	6	●	1
VAPDMD0545	5.45	57.1	107.1	106	1.1	6	●	1
VAPDMD0550	5.50	57.1	107.1	106	1.1	6	●	1
VAPDMD0555	5.55	57.2	107.2	106	1.2	6	●	1
VAPDMD0560	5.60	57.2	107.2	106	1.2	6	●	1
VAPDMD0565	5.65	57.2	107.2	106	1.2	6	●	1
VAPDMD0570	5.70	57.2	107.2	106	1.2	6	●	1
VAPDMD0575	5.75	57.2	107.2	106	1.2	6	●	1
VAPDMD0580	5.80	57.2	107.2	106	1.2	6	●	1
VAPDMD0585	5.85	57.2	107.2	106	1.2	6	●	1
VAPDMD0590	5.90	57.2	107.2	106	1.2	6	●	1
VAPDMD0595	5.95	57.2	107.2	106	1.2	6	●	1
VAPDMD0600	6.00	57.2	107.2	106	1.2	6	●	1
VAPDMD0605	6.05	63.3	113.3	112	1.3	8	●	1
VAPDMD0610	6.10	63.3	113.3	112	1.3	8	●	1
VAPDMD0615	6.15	63.3	113.3	112	1.3	8	●	1
VAPDMD0620	6.20	63.3	113.3	112	1.3	8	●	1
VAPDMD0625	6.25	63.3	113.3	112	1.3	8	●	1

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
VAPDMD0630	6.30	63.3	113.3	112	1.3	8	●	1
VAPDMD0635	6.35	63.3	113.3	112	1.3	8	●	1
VAPDMD0640	6.40	63.3	113.3	112	1.3	8	●	1
VAPDMD0645	6.45	63.3	113.3	112	1.3	8	●	1
VAPDMD0650	6.50	63.4	113.4	112	1.4	8	●	1
VAPDMD0655	6.55	63.4	113.4	112	1.4	8	●	1
VAPDMD0660	6.60	63.4	113.4	112	1.4	8	●	1
VAPDMD0665	6.65	63.4	113.4	112	1.4	8	●	1
VAPDMD0670	6.70	63.4	113.4	112	1.4	8	●	1
VAPDMD0675	6.75	68.4	118.4	117	1.4	8	●	1
VAPDMD0680	6.80	68.4	118.4	117	1.4	8	●	1
VAPDMD0685	6.85	68.4	118.4	117	1.4	8	●	1
VAPDMD0690	6.90	68.4	118.4	117	1.4	8	●	1
VAPDMD0695	6.95	68.4	118.4	117	1.4	8	●	1
VAPDMD0700	7.00	68.5	118.5	117	1.5	8	●	1
VAPDMD0705	7.05	68.5	118.5	117	1.5	8	●	1
VAPDMD0710	7.10	68.5	118.5	117	1.5	8	●	1
VAPDMD0715	7.15	68.5	118.5	117	1.5	8	●	1
VAPDMD0720	7.20	68.5	118.5	117	1.5	8	●	1
VAPDMD0725	7.25	68.5	118.5	117	1.5	8	●	1
VAPDMD0730	7.30	68.5	118.5	117	1.5	8	●	1
VAPDMD0735	7.35	68.5	118.5	117	1.5	8	●	1
VAPDMD0740	7.40	68.5	118.5	117	1.5	8	●	1
VAPDMD0745	7.45	68.5	118.5	117	1.5	8	●	1
VAPDMD0750	7.50	68.6	118.6	117	1.6	8	●	1
VAPDMD0755	7.55	74.6	124.6	123	1.6	8	●	1
VAPDMD0760	7.60	74.6	124.6	123	1.6	8	●	1
VAPDMD0765	7.65	74.6	124.6	123	1.6	8	●	1
VAPDMD0770	7.70	74.6	124.6	123	1.6	8	●	1
VAPDMD0775	7.75	74.6	124.6	123	1.6	8	●	1
VAPDMD0780	7.80	74.6	124.6	123	1.6	8	●	1
VAPDMD0785	7.85	74.6	124.6	123	1.6	8	●	1
VAPDMD0790	7.90	74.6	124.6	123	1.6	8	●	1
VAPDMD0795	7.95	74.7	124.7	123	1.7	8	●	1
VAPDMD0800	8.00	74.7	124.7	123	1.7	8	●	1
VAPDMD0805	8.05	74.7	129.7	128	1.7	10	●	1
VAPDMD0810	8.10	74.7	129.7	128	1.7	10	●	1
VAPDMD0815	8.15	74.7	129.7	128	1.7	10	●	1
VAPDMD0820	8.20	74.7	129.7	128	1.7	10	●	1
VAPDMD0825	8.25	74.7	129.7	128	1.7	10	●	1
VAPDMD0830	8.30	74.7	129.7	128	1.7	10	●	1
VAPDMD0835	8.35	74.7	129.7	128	1.7	10	●	1
VAPDMD0840	8.40	74.7	129.7	128	1.7	10	●	1
VAPDMD0845	8.45	74.8	129.8	128	1.8	10	●	1
VAPDMD0850	8.50	74.8	129.8	128	1.8	10	●	1
VAPDMD0855	8.55	80.8	135.8	134	1.8	10	●	1
VAPDMD0860	8.60	80.8	135.8	134	1.8	10	●	1
VAPDMD0865	8.65	80.8	135.8	134	1.8	10	●	1
VAPDMD0870	8.70	80.8	135.8	134	1.8	10	●	1
VAPDMD0875	8.75	80.8	135.8	134	1.8	10	●	1
VAPDMD0880	8.80	80.8	135.8	134	1.8	10	●	1
VAPDMD0885	8.85	80.8	135.8	134	1.8	10	●	1
VAPDMD0890	8.90	80.8	135.8	134	1.8	10	●	1
VAPDMD0895	8.95	80.9	135.9	134	1.9	10	●	1

VAPDM

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
VAPDMD0900	9.00	80.9	135.9	134	1.9	10	●	1
VAPDMD0910	9.10	80.9	135.9	134	1.9	10	●	1
VAPDMD0920	9.20	80.9	135.9	134	1.9	10	●	1
VAPDMD0930	9.30	80.9	135.9	134	1.9	10	●	1
VAPDMD0940	9.40	81.0	136.0	134	2.0	10	●	1
VAPDMD0950	9.50	81.0	136.0	134	2.0	10	●	1
VAPDMD0960	9.60	87.0	142.0	140	2.0	10	●	1
VAPDMD0970	9.70	87.0	142.0	140	2.0	10	●	1
VAPDMD0980	9.80	87.0	142.0	140	2.0	10	●	1
VAPDMD0990	9.90	87.1	142.1	140	2.1	10	●	1
VAPDMD1000	10.0	87.1	142.1	140	2.1	10	●	1
VAPDMD1010	10.1	87.1	147.1	145	2.1	12	●	1
VAPDMD1020	10.2	87.1	147.1	145	2.1	12	●	1
VAPDMD1030	10.3	87.1	147.1	145	2.1	12	●	1
VAPDMD1040	10.4	87.2	147.2	145	2.2	12	●	1
VAPDMD1050	10.5	87.2	147.2	145	2.2	12	●	1
VAPDMD1060	10.6	87.2	147.2	145	2.2	12	●	1
VAPDMD1070	10.7	94.2	154.2	152	2.2	12	●	1
VAPDMD1080	10.8	94.2	154.2	152	2.2	12	●	1
VAPDMD1090	10.9	94.3	154.3	152	2.3	12	●	1
VAPDMD1100	11.0	94.3	154.3	152	2.3	12	●	1
VAPDMD1110	11.1	94.3	154.3	152	2.3	12	●	1
VAPDMD1120	11.2	94.3	154.3	152	2.3	12	●	1
VAPDMD1130	11.3	94.3	154.3	152	2.3	12	●	1
VAPDMD1140	11.4	94.4	154.4	152	2.4	12	●	1
VAPDMD1150	11.5	94.4	154.4	152	2.4	12	●	1
VAPDMD1160	11.6	94.4	154.4	152	2.4	12	●	1
VAPDMD1170	11.7	94.4	154.4	152	2.4	12	●	1
VAPDMD1180	11.8	94.4	154.4	152	2.4	12	●	1
VAPDMD1190	11.9	101.5	161.5	159	2.5	12	●	1
VAPDMD1200	12.0	101.5	161.5	159	2.5	12	●	1
VAPDMD1210	12.1	101.5	161.5	159	2.5	12	●	1
VAPDMD1220	12.2	101.5	161.5	159	2.5	12	●	1
VAPDMD1230	12.3	101.6	161.6	159	2.6	12	●	1
VAPDMD1240	12.4	101.6	161.6	159	2.6	12	●	1
VAPDMD1250	12.5	101.6	161.6	159	2.6	12	●	1
VAPDMD1260	12.6	101.6	161.6	159	2.6	12	●	1
VAPDMD1270	12.7	101.6	161.6	159	2.6	12	●	1
VAPDMD1280	12.8	101.7	161.7	159	2.7	12	●	1
VAPDMD1290	12.9	101.7	161.7	159	2.7	12	●	1
VAPDMD1300	13.0	101.7	161.7	159	2.7	12	●	1
VAPDMD1350	13.5	102.8	162.8	160	2.8	16	●	1

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
VAPDMD1400	14.0	102.9	162.9	160	2.9	16	●	1
VAPDMD1410	14.1	107.9	167.9	165	2.9	16	●	1
VAPDMD1420	14.2	107.9	167.9	165	2.9	16	●	1
VAPDMD1450	14.5	108.0	168.0	165	3.0	16	●	1
VAPDMD1500	15.0	108.1	168.1	165	3.1	16	●	1
VAPDMD1550	15.5	113.2	173.2	170	3.2	16	●	1
VAPDMD1560	15.6	113.2	173.2	170	3.2	16	●	1
VAPDMD1570	15.7	113.3	173.3	170	3.3	16	●	1
VAPDMD1600	16.0	113.3	173.3	170	3.3	16	●	1
VAPDMD1650	16.5	113.4	178.4	175	3.4	20	●	1
VAPDMD1700	17.0	113.5	178.5	175	3.5	20	●	1
VAPDMD1750	17.5	118.6	183.6	180	3.6	20	●	1
VAPDMD1760	17.6	118.7	183.7	180	3.7	20	●	1
VAPDMD1770	17.7	118.7	183.7	180	3.7	20	●	1
VAPDMD1800	18.0	118.7	183.7	180	3.7	20	●	1
VAPDMD1850	18.5	123.8	188.8	185	3.8	20	●	1
VAPDMD1900	19.0	123.9	188.9	185	3.9	20	●	1
VAPDMD1950	19.5	124.0	189.0	185	4.0	20	●	1
VAPDMD1960	19.6	124.1	189.1	185	4.1	20	●	1
VAPDMD1970	19.7	124.1	189.1	185	4.1	20	●	1
VAPDMD2000	20.0	124.1	189.1	185	4.1	20	●	1
VAPDMD2050	20.5	129.3	204.3	200	4.3	25	●	1
VAPDMD2100	21.0	129.4	204.4	200	4.4	25	●	1
VAPDMD2110	21.1	129.4	204.4	200	4.4	25	●	1
VAPDMD2120	21.2	129.4	204.4	200	4.4	25	●	1
VAPDMD2150	21.5	129.5	204.5	200	4.5	25	●	1
VAPDMD2200	22.0	129.6	204.6	200	4.6	25	●	1
VAPDMD2250	22.5	134.7	209.7	205	4.7	25	●	1
VAPDMD2300	23.0	134.8	209.8	205	4.8	25	●	1
VAPDMD2350	23.5	134.9	209.9	205	4.9	25	●	1
VAPDMD2400	24.0	140.0	215.0	210	5.0	25	●	1
VAPDMD2450	24.5	140.1	215.1	210	5.1	25	●	1
VAPDMD2500	25.0	140.2	215.2	210	5.2	25	●	1
VAPDMD2550	25.5	145.3	225.3	220	5.3	32	●	1
VAPDMD2600	26.0	145.4	225.4	220	5.4	32	●	1
VAPDMD2650	26.5	145.5	225.5	220	5.5	32	●	1
VAPDMD2700	27.0	145.6	225.6	220	5.6	32	●	1
VAPDMD2800	28.0	145.8	225.8	220	5.8	32	●	1
VAPDMD2900	29.0	151.0	231.0	225	6.0	32	●	1
VAPDMD3000	30.0	151.2	231.2	225	6.2	32	●	1
VAPDMD3100	31.0	156.4	236.4	230	6.4	32	●	1
VAPDMD3200	32.0	161.6	241.6	235	6.6	32	●	1

VAPDM

Recommended Cutting Condition

Standard drill depth : LU=LCF-3DC

Work material	Structural steel		Carbon steel AISI 50 Alloy steel SCM Cast iron FC		Alloy tool steel AISI D2(Low-hardness materials) Ferritic stainless steel AISI 430, AISI 405 Martensitic stainless steel AISI 420, AISI 440		Alloy tool steel AISI H13 (—40HRC) Precipitation hardening stainless steel ASTM 630, ASTM 631	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)
0.5	17000	0.01	12800	0.01	8000	0.01	6600	0.01
1.0	11000	0.05	8300	0.05	5000	0.05	4100	0.04
2.0	6400	0.09	4800	0.09	2900	0.06	2400	0.05
3.0	4300	0.13	3200	0.13	1900	0.10	1600	0.06
4.0	3200	0.15	2400	0.15	1400	0.10	1200	0.08
5.0	2600	0.18	1900	0.18	1100	0.13	950	0.10
6.0	2100	0.19	1600	0.20	950	0.15	800	0.11
8.0	1600	0.24	1200	0.22	720	0.18	600	0.13
10.0	1300	0.28	950	0.25	570	0.21	480	0.15
12.0	1100	0.34	800	0.30	480	0.25	400	0.17
14.0	910	0.39	680	0.35	410	0.30	340	0.21
15.0	850	0.40	640	0.36	380	0.31	320	0.22
16.0	800	0.42	600	0.38	360	0.32	300	0.23
18.0	710	0.44	530	0.40	320	0.34	270	0.24
20.0	570	0.44	450	0.40	250	0.34	220	0.24
22.0	520	0.46	410	0.42	230	0.36	200	0.25
24.0	480	0.48	370	0.44	210	0.37	190	0.26
26.0	440	0.51	340	0.46	200	0.39	170	0.28
28.0	410	0.53	320	0.48	180	0.41	160	0.29
30.0	380	0.55	300	0.50	170	0.43	150	0.30
32.0	360	0.55	280	0.50	160	0.43	140	0.30

- Please reduce the revolution and feed rate depending on the drilling situation when the installation of workpiece or machine lacks rigidity.
- Please use a collet type drill chuck or a milling chuck.
- Use sufficient cutting fluid.
- VAPDMSUS are recommended for austenitic stainless steels(AISI 304).
- When drilling holes greater than 4 x drill diameter hole depths, please use a peck feed.
- The above-mentioned cutting condition is standard when using water-soluble cutting fluid. Please reduce the revolution when using non-water-soluble cutting fluid.

VAPDSSUS VIOLET DRILLS

Short, High precision, For stainless steel

Product Information

CO HSS V 135° SIG X Thinning

DC≧1

TECHNICAL INFO >> 1997

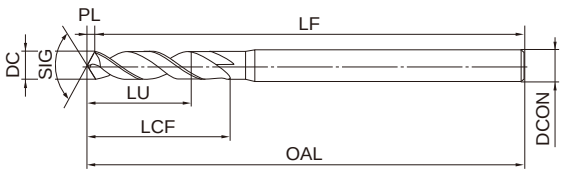
ISO13399 PROPERTY >> 1966

Work Material

P M K N

SYMBOL DESCRIPTIONS >> 1623

DRILLS SELECTION CHART >> 1636



Type1

	0.5≦D C≦3	3<DC≦6	6<D C≦10	10<D C≦18	18<D C≦20
	0 −0.014	0 −0.018	0 −0.022	0 −0.027	0 −0.033

Standard drill depth : LU=LCF-3DC

All drills except those with intervals of 0.1mm and under dia. 4.0mm have a tolerance of 0—-0.009mm.

Stock status indication:●: Inventory maintained in Japan.▲: This item to be discontinued within two years.□: Non stock, produced to order only.

unit (mm)

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
VAPDSSUSD0050	0.50	3.1	50.1	50	0.10	3	●	1
VAPDSSUSD0051	0.51	3.1	50.1	50	0.11	3	●	1
VAPDSSUSD0052	0.52	3.1	50.1	50	0.11	3	●	1
VAPDSSUSD0053	0.53	3.1	50.1	50	0.11	3	●	1
VAPDSSUSD0054	0.54	3.1	50.1	50	0.11	3	●	1
VAPDSSUSD0055	0.55	3.1	50.1	50	0.11	3	●	1
VAPDSSUSD0056	0.56	4.1	50.1	50	0.12	3	●	1
VAPDSSUSD0057	0.57	4.1	50.1	50	0.12	3	●	1
VAPDSSUSD0058	0.58	4.1	50.1	50	0.12	3	●	1
VAPDSSUSD0059	0.59	4.1	50.1	50	0.12	3	●	1
VAPDSSUSD0060	0.60	5.1	50.1	50	0.12	3	●	1
VAPDSSUSD0061	0.61	5.1	50.1	50	0.13	3	●	1
VAPDSSUSD0062	0.62	5.1	50.1	50	0.13	3	●	1
VAPDSSUSD0063	0.63	5.1	50.1	50	0.13	3	●	1
VAPDSSUSD0064	0.64	5.1	50.1	50	0.13	3	●	1
VAPDSSUSD0065	0.65	5.1	50.1	50	0.13	3	●	1
VAPDSSUSD0066	0.66	5.1	50.1	50	0.14	3	●	1
VAPDSSUSD0067	0.67	5.1	50.1	50	0.14	3	●	1
VAPDSSUSD0068	0.68	5.1	50.1	50	0.14	3	●	1
VAPDSSUSD0069	0.69	5.1	50.1	50	0.14	3	●	1
VAPDSSUSD0070	0.70	5.1	50.1	50	0.14	3	●	1
VAPDSSUSD0071	0.71	5.2	50.2	50	0.15	3	●	1
VAPDSSUSD0072	0.72	5.2	50.2	50	0.15	3	●	1
VAPDSSUSD0073	0.73	5.2	50.2	50	0.15	3	●	1
VAPDSSUSD0074	0.74	5.2	50.2	50	0.15	3	●	1
VAPDSSUSD0075	0.75	5.2	50.2	50	0.16	3	●	1
VAPDSSUSD0076	0.76	5.2	50.2	50	0.16	3	●	1
VAPDSSUSD0077	0.77	5.2	50.2	50	0.16	3	●	1
VAPDSSUSD0078	0.78	5.2	50.2	50	0.16	3	●	1

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
VAPDSSUSD0079	0.79	5.2	50.2	50	0.16	3	●	1
VAPDSSUSD0080	0.80	5.2	50.2	50	0.17	3	●	1
VAPDSSUSD0081	0.81	5.2	50.2	50	0.17	3	●	1
VAPDSSUSD0082	0.82	5.2	50.2	50	0.17	3	●	1
VAPDSSUSD0083	0.83	5.2	50.2	50	0.17	3	●	1
VAPDSSUSD0084	0.84	5.2	50.2	50	0.17	3	●	1
VAPDSSUSD0085	0.85	5.2	50.2	50	0.18	3	●	1
VAPDSSUSD0086	0.86	6.2	50.2	50	0.18	3	●	1
VAPDSSUSD0087	0.87	6.2	50.2	50	0.18	3	●	1
VAPDSSUSD0088	0.88	6.2	50.2	50	0.18	3	●	1
VAPDSSUSD0089	0.89	6.2	50.2	50	0.18	3	●	1
VAPDSSUSD0090	0.90	6.2	50.2	50	0.19	3	●	1
VAPDSSUSD0091	0.91	6.2	50.2	50	0.19	3	●	1
VAPDSSUSD0092	0.92	6.2	50.2	50	0.19	3	●	1
VAPDSSUSD0093	0.93	6.2	50.2	50	0.19	3	●	1
VAPDSSUSD0094	0.94	6.2	50.2	50	0.19	3	●	1
VAPDSSUSD0095	0.95	6.2	50.2	50	0.20	3	●	1
VAPDSSUSD0096	0.96	6.2	50.2	50	0.20	3	●	1
VAPDSSUSD0097	0.97	6.2	50.2	50	0.20	3	●	1
VAPDSSUSD0098	0.98	6.2	50.2	50	0.20	3	●	1
VAPDSSUSD0099	0.99	6.2	50.2	50	0.21	3	●	1
VAPDSSUSD0100	1.00	6.2	50.2	50	0.2	3	●	1
VAPDSSUSD0101	1.01	6.2	50.2	50	0.2	3	●	1
VAPDSSUSD0102	1.02	6.2	50.2	50	0.2	3	●	1
VAPDSSUSD0103	1.03	6.2	50.2	50	0.2	3	●	1
VAPDSSUSD0104	1.04	6.2	50.2	50	0.2	3	●	1
VAPDSSUSD0105	1.05	6.2	50.2	50	0.2	3	●	1
VAPDSSUSD0106	1.06	6.2	50.2	50	0.2	3	●	1
VAPDSSUSD0107	1.07	8.2	55.2	55	0.2	3	●	1

VAPDSSUS

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
VAPDSSUSD0108	1.08	8.2	55.2	55	0.2	3	●	1
VAPDSSUSD0109	1.09	8.2	55.2	55	0.2	3	●	1
VAPDSSUSD0110	1.10	8.2	55.2	55	0.2	3	●	1
VAPDSSUSD0111	1.11	8.2	55.2	55	0.2	3	●	1
VAPDSSUSD0112	1.12	8.2	55.2	55	0.2	3	●	1
VAPDSSUSD0113	1.13	8.2	55.2	55	0.2	3	●	1
VAPDSSUSD0114	1.14	8.2	55.2	55	0.2	3	●	1
VAPDSSUSD0115	1.15	8.2	55.2	55	0.2	3	●	1
VAPDSSUSD0116	1.16	8.2	55.2	55	0.2	3	●	1
VAPDSSUSD0117	1.17	8.2	55.2	55	0.2	3	●	1
VAPDSSUSD0118	1.18	8.2	55.2	55	0.2	3	●	1
VAPDSSUSD0119	1.19	8.3	55.3	55	0.3	3	●	1
VAPDSSUSD0120	1.20	8.3	55.3	55	0.3	3	●	1
VAPDSSUSD0121	1.21	8.3	55.3	55	0.3	3	●	1
VAPDSSUSD0122	1.22	8.3	55.3	55	0.3	3	●	1
VAPDSSUSD0123	1.23	8.3	55.3	55	0.3	3	●	1
VAPDSSUSD0124	1.24	8.3	55.3	55	0.3	3	●	1
VAPDSSUSD0125	1.25	8.3	55.3	55	0.3	3	●	1
VAPDSSUSD0126	1.26	8.3	55.3	55	0.3	3	●	1
VAPDSSUSD0127	1.27	8.3	55.3	55	0.3	3	●	1
VAPDSSUSD0128	1.28	8.3	55.3	55	0.3	3	●	1
VAPDSSUSD0129	1.29	8.3	55.3	55	0.3	3	●	1
VAPDSSUSD0130	1.30	9.3	55.3	55	0.3	3	●	1
VAPDSSUSD0131	1.31	9.3	55.3	55	0.3	3	●	1
VAPDSSUSD0132	1.32	9.3	55.3	55	0.3	3	●	1
VAPDSSUSD0133	1.33	9.3	55.3	55	0.3	3	●	1
VAPDSSUSD0134	1.34	9.3	55.3	55	0.3	3	●	1
VAPDSSUSD0135	1.35	9.3	55.3	55	0.3	3	●	1
VAPDSSUSD0136	1.36	9.3	55.3	55	0.3	3	●	1
VAPDSSUSD0137	1.37	9.3	55.3	55	0.3	3	●	1
VAPDSSUSD0138	1.38	9.3	55.3	55	0.3	3	●	1
VAPDSSUSD0139	1.39	9.3	55.3	55	0.3	3	●	1
VAPDSSUSD0140	1.40	9.3	55.3	55	0.3	3	●	1
VAPDSSUSD0141	1.41	9.3	55.3	55	0.3	3	●	1
VAPDSSUSD0142	1.42	9.3	55.3	55	0.3	3	●	1
VAPDSSUSD0143	1.43	9.3	55.3	55	0.3	3	●	1
VAPDSSUSD0144	1.44	9.3	55.3	55	0.3	3	●	1
VAPDSSUSD0145	1.45	9.3	55.3	55	0.3	3	●	1
VAPDSSUSD0146	1.46	9.3	55.3	55	0.3	3	●	1
VAPDSSUSD0147	1.47	9.3	55.3	55	0.3	3	●	1
VAPDSSUSD0148	1.48	9.3	55.3	55	0.3	3	●	1
VAPDSSUSD0149	1.49	9.3	55.3	55	0.3	3	●	1
VAPDSSUSD0150	1.50	9.3	55.3	55	0.3	3	●	1
VAPDSSUSD0151	1.51	11.3	55.3	55	0.3	3	●	1
VAPDSSUSD0152	1.52	11.3	55.3	55	0.3	3	●	1
VAPDSSUSD0153	1.53	11.3	55.3	55	0.3	3	●	1
VAPDSSUSD0154	1.54	11.3	55.3	55	0.3	3	●	1
VAPDSSUSD0155	1.55	11.3	55.3	55	0.3	3	●	1
VAPDSSUSD0156	1.56	11.3	55.3	55	0.3	3	●	1
VAPDSSUSD0157	1.57	11.3	55.3	55	0.3	3	●	1
VAPDSSUSD0158	1.58	11.3	55.3	55	0.3	3	●	1
VAPDSSUSD0159	1.59	11.3	55.3	55	0.3	3	●	1
VAPDSSUSD0160	1.60	11.3	55.3	55	0.3	3	●	1
VAPDSSUSD0161	1.61	11.3	55.3	55	0.3	3	●	1

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
VAPDSSUSD0162	1.62	11.3	55.3	55	0.3	3	●	1
VAPDSSUSD0163	1.63	11.3	55.3	55	0.3	3	●	1
VAPDSSUSD0164	1.64	11.3	55.3	55	0.3	3	●	1
VAPDSSUSD0165	1.65	11.3	55.3	55	0.3	3	●	1
VAPDSSUSD0166	1.66	11.3	55.3	55	0.3	3	●	1
VAPDSSUSD0167	1.67	11.4	55.4	55	0.4	3	●	1
VAPDSSUSD0168	1.68	11.4	55.4	55	0.4	3	●	1
VAPDSSUSD0169	1.69	11.4	55.4	55	0.4	3	●	1
VAPDSSUSD0170	1.70	11.4	55.4	55	0.4	3	●	1
VAPDSSUSD0171	1.71	11.4	55.4	55	0.4	3	●	1
VAPDSSUSD0172	1.72	11.4	55.4	55	0.4	3	●	1
VAPDSSUSD0173	1.73	11.4	55.4	55	0.4	3	●	1
VAPDSSUSD0174	1.74	11.4	55.4	55	0.4	3	●	1
VAPDSSUSD0175	1.75	11.4	55.4	55	0.4	3	●	1
VAPDSSUSD0176	1.76	11.4	55.4	55	0.4	3	●	1
VAPDSSUSD0177	1.77	11.4	55.4	55	0.4	3	●	1
VAPDSSUSD0178	1.78	11.4	55.4	55	0.4	3	●	1
VAPDSSUSD0179	1.79	11.4	55.4	55	0.4	3	●	1
VAPDSSUSD0180	1.80	11.4	55.4	55	0.4	3	●	1
VAPDSSUSD0181	1.81	11.4	55.4	55	0.4	3	●	1
VAPDSSUSD0182	1.82	11.4	55.4	55	0.4	3	●	1
VAPDSSUSD0183	1.83	11.4	55.4	55	0.4	3	●	1
VAPDSSUSD0184	1.84	11.4	55.4	55	0.4	3	●	1
VAPDSSUSD0185	1.85	11.4	55.4	55	0.4	3	●	1
VAPDSSUSD0186	1.86	11.4	55.4	55	0.4	3	●	1
VAPDSSUSD0187	1.87	11.4	55.4	55	0.4	3	●	1
VAPDSSUSD0188	1.88	11.4	55.4	55	0.4	3	●	1
VAPDSSUSD0189	1.89	11.4	55.4	55	0.4	3	●	1
VAPDSSUSD0190	1.90	12.4	55.4	55	0.4	3	●	1
VAPDSSUSD0191	1.91	12.4	60.4	60	0.4	3	●	1
VAPDSSUSD0192	1.92	12.4	60.4	60	0.4	3	●	1
VAPDSSUSD0193	1.93	12.4	60.4	60	0.4	3	●	1
VAPDSSUSD0194	1.94	12.4	60.4	60	0.4	3	●	1
VAPDSSUSD0195	1.95	12.4	60.4	60	0.4	3	●	1
VAPDSSUSD0196	1.96	12.4	60.4	60	0.4	3	●	1
VAPDSSUSD0197	1.97	12.4	60.4	60	0.4	3	●	1
VAPDSSUSD0198	1.98	12.4	60.4	60	0.4	3	●	1
VAPDSSUSD0199	1.99	12.4	60.4	60	0.4	3	●	1
VAPDSSUSD0200	2.00	12.4	60.4	60	0.4	3	●	1
VAPDSSUSD0201	2.01	12.4	60.4	60	0.4	3	●	1
VAPDSSUSD0202	2.02	12.4	60.4	60	0.4	3	●	1
VAPDSSUSD0203	2.03	12.4	60.4	60	0.4	3	●	1
VAPDSSUSD0204	2.04	12.4	60.4	60	0.4	3	●	1
VAPDSSUSD0205	2.05	12.4	60.4	60	0.4	3	●	1
VAPDSSUSD0206	2.06	12.4	60.4	60	0.4	3	●	1
VAPDSSUSD0207	2.07	12.4	60.4	60	0.4	3	●	1
VAPDSSUSD0208	2.08	12.4	60.4	60	0.4	3	●	1
VAPDSSUSD0209	2.09	12.4	60.4	60	0.4	3	●	1
VAPDSSUSD0210	2.10	12.4	60.4	60	0.4	3	●	1
VAPDSSUSD0211	2.11	12.4	60.4	60	0.4	3	●	1
VAPDSSUSD0212	2.12	12.4	60.4	60	0.4	3	●	1
VAPDSSUSD0213	2.13	12.4	60.4	60	0.4	3	●	1
VAPDSSUSD0214	2.14	12.4	60.4	60	0.4	3	●	1
VAPDSSUSD0215	2.15	12.5	60.5	60	0.5	3	●	1

VAPDSSUS

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
VAPDSSUSD0216	2.16	12.5	60.5	60	0.5	3	●	1
VAPDSSUSD0217	2.17	12.5	60.5	60	0.5	3	●	1
VAPDSSUSD0218	2.18	12.5	60.5	60	0.5	3	●	1
VAPDSSUSD0219	2.19	12.5	60.5	60	0.5	3	●	1
VAPDSSUSD0220	2.20	12.5	60.5	60	0.5	3	●	1
VAPDSSUSD0221	2.21	12.5	60.5	60	0.5	3	●	1
VAPDSSUSD0222	2.22	12.5	60.5	60	0.5	3	●	1
VAPDSSUSD0223	2.23	12.5	60.5	60	0.5	3	●	1
VAPDSSUSD0224	2.24	12.5	60.5	60	0.5	3	●	1
VAPDSSUSD0225	2.25	12.5	60.5	60	0.5	3	●	1
VAPDSSUSD0226	2.26	12.5	60.5	60	0.5	3	●	1
VAPDSSUSD0227	2.27	12.5	60.5	60	0.5	3	●	1
VAPDSSUSD0228	2.28	12.5	60.5	60	0.5	3	●	1
VAPDSSUSD0229	2.29	12.5	60.5	60	0.5	3	●	1
VAPDSSUSD0230	2.30	13.5	60.5	60	0.5	3	●	1
VAPDSSUSD0231	2.31	13.5	60.5	60	0.5	3	●	1
VAPDSSUSD0232	2.32	13.5	60.5	60	0.5	3	●	1
VAPDSSUSD0233	2.33	13.5	60.5	60	0.5	3	●	1
VAPDSSUSD0234	2.34	13.5	60.5	60	0.5	3	●	1
VAPDSSUSD0235	2.35	13.5	60.5	60	0.5	3	●	1
VAPDSSUSD0236	2.36	13.5	60.5	60	0.5	3	●	1
VAPDSSUSD0237	2.37	13.5	60.5	60	0.5	3	●	1
VAPDSSUSD0238	2.38	13.5	60.5	60	0.5	3	●	1
VAPDSSUSD0239	2.39	13.5	60.5	60	0.5	3	●	1
VAPDSSUSD0240	2.40	13.5	60.5	60	0.5	3	●	1
VAPDSSUSD0241	2.41	13.5	60.5	60	0.5	3	●	1
VAPDSSUSD0242	2.42	13.5	60.5	60	0.5	3	●	1
VAPDSSUSD0243	2.43	13.5	60.5	60	0.5	3	●	1
VAPDSSUSD0244	2.44	13.5	60.5	60	0.5	3	●	1
VAPDSSUSD0245	2.45	13.5	60.5	60	0.5	3	●	1
VAPDSSUSD0246	2.46	13.5	60.5	60	0.5	3	●	1
VAPDSSUSD0247	2.47	13.5	60.5	60	0.5	3	●	1
VAPDSSUSD0248	2.48	13.5	60.5	60	0.5	3	●	1
VAPDSSUSD0249	2.49	13.5	60.5	60	0.5	3	●	1
VAPDSSUSD0250	2.50	13.5	60.5	60	0.5	3	●	1
VAPDSSUSD0251	2.51	13.5	60.5	60	0.5	3	●	1
VAPDSSUSD0252	2.52	13.5	60.5	60	0.5	3	●	1
VAPDSSUSD0253	2.53	13.5	60.5	60	0.5	3	●	1
VAPDSSUSD0254	2.54	13.5	60.5	60	0.5	3	●	1
VAPDSSUSD0255	2.55	13.5	60.5	60	0.5	3	●	1
VAPDSSUSD0256	2.56	13.5	60.5	60	0.5	3	●	1
VAPDSSUSD0257	2.57	13.5	60.5	60	0.5	3	●	1
VAPDSSUSD0258	2.58	13.5	60.5	60	0.5	3	●	1
VAPDSSUSD0259	2.59	13.5	60.5	60	0.5	3	●	1
VAPDSSUSD0260	2.60	15.5	60.5	60	0.5	3	●	1
VAPDSSUSD0261	2.61	15.5	60.5	60	0.5	3	●	1
VAPDSSUSD0262	2.62	15.5	60.5	60	0.5	3	●	1
VAPDSSUSD0263	2.63	15.5	60.5	60	0.5	3	●	1
VAPDSSUSD0264	2.64	15.6	60.6	60	0.6	3	●	1
VAPDSSUSD0265	2.65	15.6	60.6	60	0.6	3	●	1
VAPDSSUSD0266	2.66	15.6	60.6	60	0.6	3	●	1
VAPDSSUSD0267	2.67	15.6	60.6	60	0.6	3	●	1
VAPDSSUSD0268	2.68	15.6	60.6	60	0.6	3	●	1
VAPDSSUSD0269	2.69	15.6	60.6	60	0.6	3	●	1

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
VAPDSSUSD0270	2.70	15.6	60.6	60	0.6	3	●	1
VAPDSSUSD0271	2.71	15.6	60.6	60	0.6	3	●	1
VAPDSSUSD0272	2.72	15.6	60.6	60	0.6	3	●	1
VAPDSSUSD0273	2.73	15.6	60.6	60	0.6	3	●	1
VAPDSSUSD0274	2.74	15.6	60.6	60	0.6	3	●	1
VAPDSSUSD0275	2.75	15.6	60.6	60	0.6	3	●	1
VAPDSSUSD0276	2.76	15.6	60.6	60	0.6	3	●	1
VAPDSSUSD0277	2.77	15.6	60.6	60	0.6	3	●	1
VAPDSSUSD0278	2.78	15.6	60.6	60	0.6	3	●	1
VAPDSSUSD0279	2.79	15.6	60.6	60	0.6	3	●	1
VAPDSSUSD0280	2.80	15.6	60.6	60	0.6	3	●	1
VAPDSSUSD0281	2.81	15.6	60.6	60	0.6	3	●	1
VAPDSSUSD0282	2.82	15.6	60.6	60	0.6	3	●	1
VAPDSSUSD0283	2.83	15.6	60.6	60	0.6	3	●	1
VAPDSSUSD0284	2.84	15.6	60.6	60	0.6	3	●	1
VAPDSSUSD0285	2.85	15.6	60.6	60	0.6	3	●	1
VAPDSSUSD0286	2.86	15.6	60.6	60	0.6	3	●	1
VAPDSSUSD0287	2.87	15.6	60.6	60	0.6	3	●	1
VAPDSSUSD0288	2.88	15.6	60.6	60	0.6	3	●	1
VAPDSSUSD0289	2.89	15.6	60.6	60	0.6	3	●	1
VAPDSSUSD0290	2.90	15.6	60.6	60	0.6	3	●	1
VAPDSSUSD0291	2.91	15.6	60.6	60	0.6	3	●	1
VAPDSSUSD0292	2.92	15.6	60.6	60	0.6	3	●	1
VAPDSSUSD0293	2.93	15.6	60.6	60	0.6	3	●	1
VAPDSSUSD0294	2.94	15.6	60.6	60	0.6	3	●	1
VAPDSSUSD0295	2.95	15.6	60.6	60	0.6	3	●	1
VAPDSSUSD0296	2.96	15.6	60.6	60	0.6	3	●	1
VAPDSSUSD0297	2.97	15.6	60.6	60	0.6	3	●	1
VAPDSSUSD0298	2.98	15.6	60.6	60	0.6	3	●	1
VAPDSSUSD0299	2.99	15.6	60.6	60	0.6	3	●	1
VAPDSSUSD0300	3.00	15.6	60.6	60	0.6	3	●	1
VAPDSSUSD0301	3.01	17.6	70.6	70	0.6	4	●	1
VAPDSSUSD0302	3.02	17.6	70.6	70	0.6	4	●	1
VAPDSSUSD0303	3.03	17.6	70.6	70	0.6	4	●	1
VAPDSSUSD0304	3.04	17.6	70.6	70	0.6	4	●	1
VAPDSSUSD0305	3.05	17.6	70.6	70	0.6	4	●	1
VAPDSSUSD0306	3.06	17.6	70.6	70	0.6	4	●	1
VAPDSSUSD0307	3.07	17.6	70.6	70	0.6	4	●	1
VAPDSSUSD0308	3.08	17.6	70.6	70	0.6	4	●	1
VAPDSSUSD0309	3.09	17.6	70.6	70	0.6	4	●	1
VAPDSSUSD0310	3.10	17.6	70.6	70	0.6	4	●	1
VAPDSSUSD0311	3.11	17.6	70.6	70	0.6	4	●	1
VAPDSSUSD0312	3.12	17.7	70.7	70	0.7	4	●	1
VAPDSSUSD0313	3.13	17.7	70.7	70	0.7	4	●	1
VAPDSSUSD0314	3.14	17.7	70.7	70	0.7	4	●	1
VAPDSSUSD0315	3.15	17.7	70.7	70	0.7	4	●	1
VAPDSSUSD0316	3.16	17.7	70.7	70	0.7	4	●	1
VAPDSSUSD0317	3.17	17.7	70.7	70	0.7	4	●	1
VAPDSSUSD0318	3.18	17.7	70.7	70	0.7	4	●	1
VAPDSSUSD0319	3.19	17.7	70.7	70	0.7	4	●	1
VAPDSSUSD0320	3.20	17.7	70.7	70	0.7	4	●	1
VAPDSSUSD0321	3.21	17.7	70.7	70	0.7	4	●	1
VAPDSSUSD0322	3.22	17.7	70.7	70	0.7	4	●	1
VAPDSSUSD0323	3.23	17.7	70.7	70	0.7	4	●	1

VAPDSSUS

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
VAPDSSUSD0324	3.24	17.7	70.7	70	0.7	4	●	1
VAPDSSUSD0325	3.25	17.7	70.7	70	0.7	4	●	1
VAPDSSUSD0326	3.26	17.7	70.7	70	0.7	4	●	1
VAPDSSUSD0327	3.27	17.7	70.7	70	0.7	4	●	1
VAPDSSUSD0328	3.28	17.7	70.7	70	0.7	4	●	1
VAPDSSUSD0329	3.29	17.7	70.7	70	0.7	4	●	1
VAPDSSUSD0330	3.30	19.7	70.7	70	0.7	4	●	1
VAPDSSUSD0331	3.31	19.7	70.7	70	0.7	4	●	1
VAPDSSUSD0332	3.32	19.7	70.7	70	0.7	4	●	1
VAPDSSUSD0333	3.33	19.7	70.7	70	0.7	4	●	1
VAPDSSUSD0334	3.34	19.7	70.7	70	0.7	4	●	1
VAPDSSUSD0335	3.35	19.7	70.7	70	0.7	4	●	1
VAPDSSUSD0336	3.36	19.7	70.7	70	0.7	4	●	1
VAPDSSUSD0337	3.37	19.7	70.7	70	0.7	4	●	1
VAPDSSUSD0338	3.38	19.7	70.7	70	0.7	4	●	1
VAPDSSUSD0339	3.39	19.7	70.7	70	0.7	4	●	1
VAPDSSUSD0340	3.40	19.7	70.7	70	0.7	4	●	1
VAPDSSUSD0341	3.41	19.7	70.7	70	0.7	4	●	1
VAPDSSUSD0342	3.42	19.7	70.7	70	0.7	4	●	1
VAPDSSUSD0343	3.43	19.7	70.7	70	0.7	4	●	1
VAPDSSUSD0344	3.44	19.7	70.7	70	0.7	4	●	1
VAPDSSUSD0345	3.45	19.7	70.7	70	0.7	4	●	1
VAPDSSUSD0346	3.46	19.7	70.7	70	0.7	4	●	1
VAPDSSUSD0347	3.47	19.7	70.7	70	0.7	4	●	1
VAPDSSUSD0348	3.48	19.7	70.7	70	0.7	4	●	1
VAPDSSUSD0349	3.49	19.7	70.7	70	0.7	4	●	1
VAPDSSUSD0350	3.50	19.7	70.7	70	0.7	4	●	1
VAPDSSUSD0351	3.51	19.7	70.7	70	0.7	4	●	1
VAPDSSUSD0352	3.52	19.7	70.7	70	0.7	4	●	1
VAPDSSUSD0353	3.53	19.7	70.7	70	0.7	4	●	1
VAPDSSUSD0354	3.54	19.7	70.7	70	0.7	4	●	1
VAPDSSUSD0355	3.55	19.7	70.7	70	0.7	4	●	1
VAPDSSUSD0356	3.56	19.7	70.7	70	0.7	4	●	1
VAPDSSUSD0357	3.57	19.7	70.7	70	0.7	4	●	1
VAPDSSUSD0358	3.58	19.7	70.7	70	0.7	4	●	1
VAPDSSUSD0359	3.59	19.7	70.7	70	0.7	4	●	1
VAPDSSUSD0360	3.60	21.8	70.8	70	0.8	4	●	1
VAPDSSUSD0361	3.61	21.8	70.8	70	0.8	4	●	1
VAPDSSUSD0362	3.62	21.8	70.8	70	0.8	4	●	1
VAPDSSUSD0363	3.63	21.8	70.8	70	0.8	4	●	1
VAPDSSUSD0364	3.64	21.8	70.8	70	0.8	4	●	1
VAPDSSUSD0365	3.65	21.8	70.8	70	0.8	4	●	1
VAPDSSUSD0366	3.66	21.8	70.8	70	0.8	4	●	1
VAPDSSUSD0367	3.67	21.8	70.8	70	0.8	4	●	1
VAPDSSUSD0368	3.68	21.8	70.8	70	0.8	4	●	1
VAPDSSUSD0369	3.69	21.8	70.8	70	0.8	4	●	1
VAPDSSUSD0370	3.70	21.8	70.8	70	0.8	4	●	1
VAPDSSUSD0371	3.71	21.8	70.8	70	0.8	4	●	1
VAPDSSUSD0372	3.72	21.8	70.8	70	0.8	4	●	1
VAPDSSUSD0373	3.73	21.8	70.8	70	0.8	4	●	1
VAPDSSUSD0374	3.74	21.8	70.8	70	0.8	4	●	1
VAPDSSUSD0375	3.75	21.8	70.8	70	0.8	4	●	1
VAPDSSUSD0376	3.76	21.8	70.8	70	0.8	4	●	1
VAPDSSUSD0377	3.77	21.8	70.8	70	0.8	4	●	1

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
VAPDSSUSD0378	3.78	21.8	70.8	70	0.8	4	●	1
VAPDSSUSD0379	3.79	21.8	70.8	70	0.8	4	●	1
VAPDSSUSD0380	3.80	21.8	70.8	70	0.8	4	●	1
VAPDSSUSD0381	3.81	21.8	70.8	70	0.8	4	●	1
VAPDSSUSD0382	3.82	21.8	70.8	70	0.8	4	●	1
VAPDSSUSD0383	3.83	21.8	70.8	70	0.8	4	●	1
VAPDSSUSD0384	3.84	21.8	70.8	70	0.8	4	●	1
VAPDSSUSD0385	3.85	21.8	70.8	70	0.8	4	●	1
VAPDSSUSD0386	3.86	21.8	70.8	70	0.8	4	●	1
VAPDSSUSD0387	3.87	21.8	70.8	70	0.8	4	●	1
VAPDSSUSD0388	3.88	21.8	70.8	70	0.8	4	●	1
VAPDSSUSD0389	3.89	21.8	70.8	70	0.8	4	●	1
VAPDSSUSD0390	3.90	21.8	70.8	70	0.8	4	●	1
VAPDSSUSD0391	3.91	21.8	70.8	70	0.8	4	●	1
VAPDSSUSD0392	3.92	21.8	70.8	70	0.8	4	●	1
VAPDSSUSD0393	3.93	21.8	70.8	70	0.8	4	●	1
VAPDSSUSD0394	3.94	21.8	70.8	70	0.8	4	●	1
VAPDSSUSD0395	3.95	21.8	70.8	70	0.8	4	●	1
VAPDSSUSD0396	3.96	21.8	70.8	70	0.8	4	●	1
VAPDSSUSD0397	3.97	21.8	70.8	70	0.8	4	●	1
VAPDSSUSD0398	3.98	21.8	70.8	70	0.8	4	●	1
VAPDSSUSD0399	3.99	21.8	70.8	70	0.8	4	●	1
VAPDSSUSD0400	4.00	21.8	70.8	70	0.8	4	●	1
VAPDSSUSD0405	4.05	21.8	80.8	80	0.8	6	●	1
VAPDSSUSD0410	4.10	21.9	80.9	80	0.9	6	●	1
VAPDSSUSD0415	4.15	21.9	80.9	80	0.9	6	●	1
VAPDSSUSD0420	4.20	21.9	80.9	80	0.9	6	●	1
VAPDSSUSD0425	4.25	21.9	80.9	80	0.9	6	●	1
VAPDSSUSD0430	4.30	23.9	80.9	80	0.9	6	●	1
VAPDSSUSD0435	4.35	23.9	80.9	80	0.9	6	●	1
VAPDSSUSD0440	4.40	23.9	80.9	80	0.9	6	●	1
VAPDSSUSD0445	4.45	23.9	80.9	80	0.9	6	●	1
VAPDSSUSD0450	4.50	23.9	80.9	80	0.9	6	●	1
VAPDSSUSD0455	4.55	23.9	80.9	80	0.9	6	●	1
VAPDSSUSD0460	4.60	26.0	81.0	80	1.0	6	●	1
VAPDSSUSD0465	4.65	26.0	81.0	80	1.0	6	●	1
VAPDSSUSD0470	4.70	26.0	81.0	80	1.0	6	●	1
VAPDSSUSD0475	4.75	26.0	81.0	80	1.0	6	●	1
VAPDSSUSD0480	4.80	26.0	81.0	80	1.0	6	●	1
VAPDSSUSD0485	4.85	26.0	81.0	80	1.0	6	●	1
VAPDSSUSD0490	4.90	26.0	81.0	80	1.0	6	●	1
VAPDSSUSD0495	4.95	26.0	81.0	80	1.0	6	●	1
VAPDSSUSD0500	5.00	26.0	81.0	80	1.0	6	●	1
VAPDSSUSD0505	5.05	26.1	81.1	80	1.1	6	●	1
VAPDSSUSD0510	5.10	26.1	81.1	80	1.1	6	●	1
VAPDSSUSD0515	5.15	26.1	81.1	80	1.1	6	●	1
VAPDSSUSD0520	5.20	26.1	81.1	80	1.1	6	●	1
VAPDSSUSD0525	5.25	26.1	81.1	80	1.1	6	●	1
VAPDSSUSD0530	5.30	26.1	81.1	80	1.1	6	●	1
VAPDSSUSD0535	5.35	28.1	81.1	80	1.1	6	●	1
VAPDSSUSD0540	5.40	28.1	81.1	80	1.1	6	●	1
VAPDSSUSD0545	5.45	28.1	81.1	80	1.1	6	●	1
VAPDSSUSD0550	5.50	28.1	81.1	80	1.1	6	●	1
VAPDSSUSD0555	5.55	28.2	81.2	80	1.2	6	●	1

VAPDSSUS

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
VAPDSSUSD0560	5.60	28.2	81.2	80	1.2	6	●	1
VAPDSSUSD0565	5.65	28.2	81.2	80	1.2	6	●	1
VAPDSSUSD0570	5.70	28.2	81.2	80	1.2	6	●	1
VAPDSSUSD0575	5.75	28.2	81.2	80	1.2	6	●	1
VAPDSSUSD0580	5.80	28.2	81.2	80	1.2	6	●	1
VAPDSSUSD0585	5.85	28.2	81.2	80	1.2	6	●	1
VAPDSSUSD0590	5.90	28.2	81.2	80	1.2	6	●	1
VAPDSSUSD0595	5.95	28.2	81.2	80	1.2	6	●	1
VAPDSSUSD0600	6.00	28.2	81.2	80	1.2	6	●	1
VAPDSSUSD0605	6.05	31.3	81.3	80	1.3	8	●	1
VAPDSSUSD0610	6.10	31.3	81.3	80	1.3	8	●	1
VAPDSSUSD0615	6.15	31.3	81.3	80	1.3	8	●	1
VAPDSSUSD0620	6.20	31.3	81.3	80	1.3	8	●	1
VAPDSSUSD0625	6.25	31.3	81.3	80	1.3	8	●	1
VAPDSSUSD0630	6.30	31.3	81.3	80	1.3	8	●	1
VAPDSSUSD0635	6.35	31.3	81.3	80	1.3	8	●	1
VAPDSSUSD0640	6.40	31.3	81.3	80	1.3	8	●	1
VAPDSSUSD0645	6.45	31.3	81.3	80	1.3	8	●	1
VAPDSSUSD0650	6.50	31.4	81.4	80	1.4	8	●	1
VAPDSSUSD0655	6.55	31.4	81.4	80	1.4	8	●	1
VAPDSSUSD0660	6.60	31.4	81.4	80	1.4	8	●	1
VAPDSSUSD0665	6.65	31.4	81.4	80	1.4	8	●	1
VAPDSSUSD0670	6.70	31.4	81.4	80	1.4	8	●	1
VAPDSSUSD0675	6.75	33.4	81.4	80	1.4	8	●	1
VAPDSSUSD0680	6.80	33.4	81.4	80	1.4	8	●	1
VAPDSSUSD0685	6.85	33.4	81.4	80	1.4	8	●	1
VAPDSSUSD0690	6.90	33.4	81.4	80	1.4	8	●	1
VAPDSSUSD0695	6.95	33.4	81.4	80	1.4	8	●	1
VAPDSSUSD0700	7.00	33.5	81.5	80	1.5	8	●	1
VAPDSSUSD0705	7.05	33.5	81.5	80	1.5	8	●	1
VAPDSSUSD0710	7.10	33.5	81.5	80	1.5	8	●	1
VAPDSSUSD0715	7.15	33.5	81.5	80	1.5	8	●	1
VAPDSSUSD0720	7.20	33.5	81.5	80	1.5	8	●	1
VAPDSSUSD0725	7.25	33.5	81.5	80	1.5	8	●	1
VAPDSSUSD0730	7.30	33.5	81.5	80	1.5	8	●	1
VAPDSSUSD0735	7.35	33.5	81.5	80	1.5	8	●	1
VAPDSSUSD0740	7.40	33.5	81.5	80	1.5	8	●	1
VAPDSSUSD0745	7.45	33.5	81.5	80	1.5	8	●	1
VAPDSSUSD0750	7.50	33.6	81.6	80	1.6	8	●	1
VAPDSSUSD0755	7.55	36.6	86.6	85	1.6	8	●	1
VAPDSSUSD0760	7.60	36.6	86.6	85	1.6	8	●	1
VAPDSSUSD0765	7.65	36.6	86.6	85	1.6	8	●	1
VAPDSSUSD0770	7.70	36.6	86.6	85	1.6	8	●	1
VAPDSSUSD0775	7.75	36.6	86.6	85	1.6	8	●	1
VAPDSSUSD0780	7.80	36.6	86.6	85	1.6	8	●	1
VAPDSSUSD0785	7.85	36.6	86.6	85	1.6	8	●	1
VAPDSSUSD0790	7.90	36.6	86.6	85	1.6	8	●	1
VAPDSSUSD0795	7.95	36.7	86.7	85	1.7	8	●	1
VAPDSSUSD0800	8.00	36.7	86.7	85	1.7	8	●	1
VAPDSSUSD0805	8.05	36.7	91.7	90	1.7	10	●	1
VAPDSSUSD0810	8.10	36.7	91.7	90	1.7	10	●	1
VAPDSSUSD0815	8.15	36.7	91.7	90	1.7	10	●	1
VAPDSSUSD0820	8.20	36.7	91.7	90	1.7	10	●	1
VAPDSSUSD0825	8.25	36.7	91.7	90	1.7	10	●	1

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
VAPDSSUSD0830	8.30	36.7	91.7	90	1.7	10	●	1
VAPDSSUSD0835	8.35	36.7	91.7	90	1.7	10	●	1
VAPDSSUSD0840	8.40	36.7	91.7	90	1.7	10	●	1
VAPDSSUSD0845	8.45	36.8	91.8	90	1.8	10	●	1
VAPDSSUSD0850	8.50	36.8	91.8	90	1.8	10	●	1
VAPDSSUSD0855	8.55	39.8	94.8	93	1.8	10	●	1
VAPDSSUSD0860	8.60	39.8	94.8	93	1.8	10	●	1
VAPDSSUSD0865	8.65	39.8	94.8	93	1.8	10	●	1
VAPDSSUSD0870	8.70	39.8	94.8	93	1.8	10	●	1
VAPDSSUSD0875	8.75	39.8	94.8	93	1.8	10	●	1
VAPDSSUSD0880	8.80	39.8	94.8	93	1.8	10	●	1
VAPDSSUSD0885	8.85	39.8	94.8	93	1.8	10	●	1
VAPDSSUSD0890	8.90	39.8	94.8	93	1.8	10	●	1
VAPDSSUSD0895	8.95	39.9	94.9	93	1.9	10	●	1
VAPDSSUSD0900	9.00	39.9	94.9	93	1.9	10	●	1
VAPDSSUSD0910	9.10	39.9	94.9	93	1.9	10	●	1
VAPDSSUSD0920	9.20	39.9	94.9	93	1.9	10	●	1
VAPDSSUSD0930	9.30	39.9	94.9	93	1.9	10	●	1
VAPDSSUSD0940	9.40	40.0	95.0	93	2.0	10	●	1
VAPDSSUSD0950	9.50	40.0	95.0	93	2.0	10	●	1
VAPDSSUSD0960	9.60	43.0	98.0	96	2.0	10	●	1
VAPDSSUSD0970	9.70	43.0	98.0	96	2.0	10	●	1
VAPDSSUSD0980	9.80	43.0	98.0	96	2.0	10	●	1
VAPDSSUSD0990	9.90	43.1	98.1	96	2.1	10	●	1
VAPDSSUSD1000	10.0	43.1	98.1	96	2.1	10	●	1
VAPDSSUSD1010	10.1	43.1	103.1	101	2.1	12	●	1
VAPDSSUSD1020	10.2	43.1	103.1	101	2.1	12	●	1
VAPDSSUSD1030	10.3	43.1	103.1	101	2.1	12	●	1
VAPDSSUSD1040	10.4	43.2	103.2	101	2.2	12	●	1
VAPDSSUSD1050	10.5	43.2	103.2	101	2.2	12	●	1
VAPDSSUSD1060	10.6	43.2	103.2	101	2.2	12	●	1
VAPDSSUSD1070	10.7	47.2	107.2	105	2.2	12	●	1
VAPDSSUSD1080	10.8	47.2	107.2	105	2.2	12	●	1
VAPDSSUSD1090	10.9	47.3	107.3	105	2.3	12	●	1
VAPDSSUSD1100	11.0	47.3	107.3	105	2.3	12	●	1
VAPDSSUSD1110	11.1	47.3	107.3	105	2.3	12	●	1
VAPDSSUSD1120	11.2	47.3	107.3	105	2.3	12	●	1
VAPDSSUSD1130	11.3	47.3	107.3	105	2.3	12	●	1
VAPDSSUSD1140	11.4	47.4	107.4	105	2.4	12	●	1
VAPDSSUSD1150	11.5	47.4	107.4	105	2.4	12	●	1
VAPDSSUSD1160	11.6	47.4	107.4	105	2.4	12	●	1
VAPDSSUSD1170	11.7	47.4	107.4	105	2.4	12	●	1
VAPDSSUSD1180	11.8	47.4	107.4	105	2.4	12	●	1
VAPDSSUSD1190	11.9	51.5	111.5	109	2.5	12	●	1
VAPDSSUSD1200	12.0	51.5	111.5	109	2.5	12	●	1
VAPDSSUSD1210	12.1	51.5	111.5	109	2.5	12	●	1
VAPDSSUSD1220	12.2	51.5	111.5	109	2.5	12	●	1
VAPDSSUSD1230	12.3	51.6	111.6	109	2.6	12	●	1
VAPDSSUSD1240	12.4	51.6	111.6	109	2.6	12	●	1
VAPDSSUSD1250	12.5	51.6	111.6	109	2.6	12	●	1
VAPDSSUSD1260	12.6	51.6	111.6	109	2.6	12	●	1
VAPDSSUSD1270	12.7	51.6	111.6	109	2.6	12	●	1
VAPDSSUSD1280	12.8	51.7	111.7	109	2.7	12	●	1
VAPDSSUSD1290	12.9	51.7	111.7	109	2.7	12	●	1

VAPDSSUS

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
VAPDSSUSD1300	13.0	51.7	111.7	109	2.7	12	●	1
VAPDSSUSD1350	13.5	53.8	113.8	111	2.8	16	●	1
VAPDSSUSD1400	14.0	53.9	113.9	111	2.9	16	●	1
VAPDSSUSD1410	14.1	55.9	115.9	113	2.9	16	●	1
VAPDSSUSD1420	14.2	55.9	115.9	113	2.9	16	●	1
VAPDSSUSD1450	14.5	56.0	116.0	113	3.0	16	●	1
VAPDSSUSD1500	15.0	56.1	116.1	113	3.1	16	●	1
VAPDSSUSD1550	15.5	58.2	118.2	115	3.2	16	●	1
VAPDSSUSD1560	15.6	58.2	118.2	115	3.2	16	●	1
VAPDSSUSD1570	15.7	58.3	118.3	115	3.3	16	●	1
VAPDSSUSD1600	16.0	58.3	118.3	115	3.3	16	●	1
VAPDSSUSD1650	16.5	60.4	125.4	122	3.4	20	●	1

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
VAPDSSUSD1700	17.0	60.5	125.5	122	3.5	20	●	1
VAPDSSUSD1750	17.5	61.6	126.6	123	3.6	20	●	1
VAPDSSUSD1760	17.6	61.7	126.7	123	3.7	20	●	1
VAPDSSUSD1770	17.7	61.7	126.7	123	3.7	20	●	1
VAPDSSUSD1800	18.0	61.7	126.7	123	3.7	20	●	1
VAPDSSUSD1850	18.5	63.8	128.8	125	3.8	20	●	1
VAPDSSUSD1900	19.0	63.9	128.9	125	3.9	20	●	1
VAPDSSUSD1950	19.5	66.0	131.0	127	4.0	20	●	1
VAPDSSUSD1960	19.6	66.1	131.1	127	4.1	20	●	1
VAPDSSUSD1970	19.7	66.1	131.1	127	4.1	20	●	1
VAPDSSUSD2000	20.0	66.1	131.1	127	4.1	20	●	1

VAPDSSUS

Recommended cutting condition

Work material	Austenitic stainless steel AISI 304, AISI 316		Martensitic stainless steel AISI420 Ferritic stainless steel AISI 430		Carbon steel AISI 1049 Alloy steel SCM Cast iron FC Copper, Copper alloy		Structural steel Aluminium alloy	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)
0.5	7600	0.01	8800	0.01	11250	0.01	15000	0.02
1.0	4800	0.02	6300	0.05	10000	0.05	12000	0.05
2.0	2400	0.04	3200	0.06	5500	0.09	6400	0.09
3.0	1600	0.07	2100	0.10	3700	0.13	4300	0.13
4.0	1200	0.09	1600	0.10	2800	0.15	3200	0.15
5.0	950	0.12	1300	0.13	2200	0.18	2600	0.18
6.0	800	0.14	1100	0.15	1800	0.20	2100	0.19
8.0	600	0.18	800	0.18	1400	0.22	1600	0.24
10.0	480	0.22	640	0.21	1100	0.25	1300	0.28
12.0	400	0.24	530	0.25	930	0.30	1100	0.34
13.0	370	0.26	490	0.28	860	0.32	1000	0.36
14.0	340	0.30	450	0.27	730	0.31	930	0.36
15.0	320	0.31	425	0.28	680	0.32	870	0.38
16.0	300	0.32	400	0.30	640	0.34	820	0.42
18.0	270	0.34	350	0.32	570	0.36	725	0.43
20.0	240	0.36	320	0.35	510	0.38	660	0.45

- Please reduce the revolution and feed rate depending on the drilling situation when the installation of workpiece or machine lacks rigidity.
- Please use a collet type drill chuck or a milling chuck.
- Use sufficient cutting fluid.
- WSTAR drill (MVE, MVS,MMS)are recommended for precipitation hardening stainless steel(JIS-SUS630/ISOL-No58X5CrNiCuNb16-4/ASTM-S17400, JIS-SUS631/DIN-X7CrNiAl177/ASTM-S17700)
- When drilling holes greater than 4 x drill diameter hole depths, please use a peck feed.
- The above-mentioned cutting condition is standard when using water-soluble cutting fluid. Please reduce the revolution when using non-water-soluble cutting fluid.

VAPDMSUS

VIOLET DRILLS

Medium, High precision, For stainless steel

Product Information

CO HSS | V | 118° SIG (DC<4) | 135° SIG (DC≧4) | X Thinning (DC≧1)

TECHNICAL INFO >> 1997

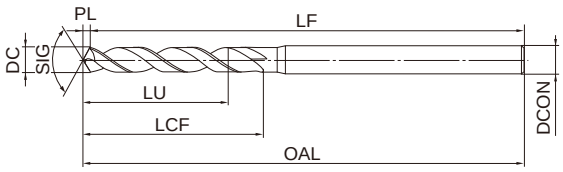
ISO13399 PROPERTY >> 1966

Work Material

P M K N

SYMBOL DESCRIPTIONS >> 1623

DRILLS SELECTION CHART >> 1636



Type1

	0.5≦DC≦3	3<DC≦6	6<DC≦10	10<DC≦13
	0 −0.014	0 −0.018	0 −0.022	0 −0.027

Standard drill depth : LU=LCF-3DC

All drills except those with intervals of 0.1mm and under dia. 4.0mm have a tolerance of 0—-0.009mm.

Stock status indication:●: Inventory maintained in Japan.▲: This item to be discontinued within two years.□: Non stock, produced to order only.

unit (mm)

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
VAPDMSUSD0050	0.50	6.2	50.2	50	0.15	3	●	1
VAPDMSUSD0051	0.51	6.2	50.2	50	0.15	3	●	1
VAPDMSUSD0052	0.52	6.2	50.2	50	0.16	3	●	1
VAPDMSUSD0053	0.53	6.2	50.2	50	0.16	3	●	1
VAPDMSUSD0054	0.54	6.2	50.2	50	0.16	3	●	1
VAPDMSUSD0055	0.55	6.2	50.2	50	0.17	3	●	1
VAPDMSUSD0056	0.56	8.2	50.2	50	0.17	3	●	1
VAPDMSUSD0057	0.57	8.2	50.2	50	0.17	3	●	1
VAPDMSUSD0058	0.58	8.2	50.2	50	0.17	3	●	1
VAPDMSUSD0059	0.59	8.2	50.2	50	0.18	3	●	1
VAPDMSUSD0060	0.60	8.2	50.2	50	0.18	3	●	1
VAPDMSUSD0061	0.61	8.2	50.2	50	0.18	3	●	1
VAPDMSUSD0062	0.62	8.2	50.2	50	0.19	3	●	1
VAPDMSUSD0063	0.63	8.2	50.2	50	0.19	3	●	1
VAPDMSUSD0064	0.64	8.2	50.2	50	0.19	3	●	1
VAPDMSUSD0065	0.65	8.2	50.2	50	0.20	3	●	1
VAPDMSUSD0066	0.66	8.2	50.2	50	0.20	3	●	1
VAPDMSUSD0067	0.67	8.2	50.2	50	0.20	3	●	1
VAPDMSUSD0068	0.68	8.2	50.2	50	0.20	3	●	1
VAPDMSUSD0069	0.69	8.2	50.2	50	0.21	3	●	1
VAPDMSUSD0070	0.70	10.2	50.2	50	0.21	3	●	1
VAPDMSUSD0071	0.71	10.2	50.2	50	0.21	3	●	1
VAPDMSUSD0072	0.72	10.2	50.2	50	0.22	3	●	1
VAPDMSUSD0073	0.73	10.2	50.2	50	0.22	3	●	1
VAPDMSUSD0074	0.74	10.2	50.2	50	0.22	3	●	1
VAPDMSUSD0075	0.75	10.2	50.2	50	0.23	3	●	1
VAPDMSUSD0076	0.76	10.2	50.2	50	0.23	3	●	1
VAPDMSUSD0077	0.77	10.2	50.2	50	0.23	3	●	1
VAPDMSUSD0078	0.78	10.2	50.2	50	0.23	3	●	1
VAPDMSUSD0079	0.79	10.2	50.2	50	0.24	3	●	1

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
VAPDMSUSD0080	0.80	10.2	50.2	50	0.24	3	●	1
VAPDMSUSD0081	0.81	10.2	50.2	50	0.24	3	●	1
VAPDMSUSD0082	0.82	10.3	50.3	50	0.25	3	●	1
VAPDMSUSD0083	0.83	10.3	50.3	50	0.25	3	●	1
VAPDMSUSD0084	0.84	10.3	50.3	50	0.25	3	●	1
VAPDMSUSD0085	0.85	10.3	50.3	50	0.26	3	●	1
VAPDMSUSD0086	0.86	12.3	50.3	50	0.26	3	●	1
VAPDMSUSD0087	0.87	12.3	50.3	50	0.26	3	●	1
VAPDMSUSD0088	0.88	12.3	50.3	50	0.26	3	●	1
VAPDMSUSD0089	0.89	12.3	50.3	50	0.27	3	●	1
VAPDMSUSD0090	0.90	12.3	50.3	50	0.27	3	●	1
VAPDMSUSD0091	0.91	12.3	50.3	50	0.27	3	●	1
VAPDMSUSD0092	0.92	12.3	50.3	50	0.28	3	●	1
VAPDMSUSD0093	0.93	12.3	50.3	50	0.28	3	●	1
VAPDMSUSD0094	0.94	12.3	50.3	50	0.28	3	●	1
VAPDMSUSD0095	0.95	12.3	50.3	50	0.29	3	●	1
VAPDMSUSD0096	0.96	12.3	50.3	50	0.29	3	●	1
VAPDMSUSD0097	0.97	12.3	50.3	50	0.29	3	●	1
VAPDMSUSD0098	0.98	12.3	50.3	50	0.29	3	●	1
VAPDMSUSD0099	0.99	12.3	50.3	50	0.3	3	●	1
VAPDMSUSD0100	1.00	12.3	60.3	60	0.3	3	●	1
VAPDMSUSD0101	1.01	12.3	60.3	60	0.3	3	●	1
VAPDMSUSD0102	1.02	12.3	60.3	60	0.3	3	●	1
VAPDMSUSD0103	1.03	12.3	60.3	60	0.3	3	●	1
VAPDMSUSD0104	1.04	12.3	60.3	60	0.3	3	●	1
VAPDMSUSD0105	1.05	12.3	60.3	60	0.3	3	●	1
VAPDMSUSD0106	1.06	12.3	60.3	60	0.3	3	●	1
VAPDMSUSD0107	1.07	16.3	60.3	60	0.3	3	●	1
VAPDMSUSD0108	1.08	16.3	60.3	60	0.3	3	●	1
VAPDMSUSD0109	1.09	16.3	60.3	60	0.3	3	●	1

VAPDMSUS

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
VAPDMSUSD0110	1.10	16.3	60.3	60	0.3	3	●	1
VAPDMSUSD0111	1.11	16.3	60.3	60	0.3	3	●	1
VAPDMSUSD0112	1.12	16.3	60.3	60	0.3	3	●	1
VAPDMSUSD0113	1.13	16.3	60.3	60	0.3	3	●	1
VAPDMSUSD0114	1.14	16.3	60.3	60	0.3	3	●	1
VAPDMSUSD0115	1.15	16.4	60.4	60	0.4	3	●	1
VAPDMSUSD0116	1.16	16.4	60.4	60	0.4	3	●	1
VAPDMSUSD0117	1.17	16.4	60.4	60	0.4	3	●	1
VAPDMSUSD0118	1.18	16.4	60.4	60	0.4	3	●	1
VAPDMSUSD0119	1.19	16.4	60.4	60	0.4	3	●	1
VAPDMSUSD0120	1.20	16.4	60.4	60	0.4	3	●	1
VAPDMSUSD0121	1.21	16.4	60.4	60	0.4	3	●	1
VAPDMSUSD0122	1.22	16.4	60.4	60	0.4	3	●	1
VAPDMSUSD0123	1.23	16.4	60.4	60	0.4	3	●	1
VAPDMSUSD0124	1.24	16.4	60.4	60	0.4	3	●	1
VAPDMSUSD0125	1.25	16.4	60.4	60	0.4	3	●	1
VAPDMSUSD0126	1.26	16.4	60.4	60	0.4	3	●	1
VAPDMSUSD0127	1.27	16.4	60.4	60	0.4	3	●	1
VAPDMSUSD0128	1.28	16.4	60.4	60	0.4	3	●	1
VAPDMSUSD0129	1.29	16.4	60.4	60	0.4	3	●	1
VAPDMSUSD0130	1.30	16.4	60.4	60	0.4	3	●	1
VAPDMSUSD0131	1.31	18.4	60.4	60	0.4	3	●	1
VAPDMSUSD0132	1.32	18.4	60.4	60	0.4	3	●	1
VAPDMSUSD0133	1.33	18.4	60.4	60	0.4	3	●	1
VAPDMSUSD0134	1.34	18.4	60.4	60	0.4	3	●	1
VAPDMSUSD0135	1.35	18.4	60.4	60	0.4	3	●	1
VAPDMSUSD0136	1.36	18.4	60.4	60	0.4	3	●	1
VAPDMSUSD0137	1.37	18.4	60.4	60	0.4	3	●	1
VAPDMSUSD0138	1.38	18.4	60.4	60	0.4	3	●	1
VAPDMSUSD0139	1.39	18.4	60.4	60	0.4	3	●	1
VAPDMSUSD0140	1.40	18.4	60.4	60	0.4	3	●	1
VAPDMSUSD0141	1.41	18.4	60.4	60	0.4	3	●	1
VAPDMSUSD0142	1.42	18.4	60.4	60	0.4	3	●	1
VAPDMSUSD0143	1.43	18.4	60.4	60	0.4	3	●	1
VAPDMSUSD0144	1.44	18.4	60.4	60	0.4	3	●	1
VAPDMSUSD0145	1.45	18.4	60.4	60	0.4	3	●	1
VAPDMSUSD0146	1.46	18.4	60.4	60	0.4	3	●	1
VAPDMSUSD0147	1.47	18.4	60.4	60	0.4	3	●	1
VAPDMSUSD0148	1.48	18.4	60.4	60	0.4	3	●	1
VAPDMSUSD0149	1.49	18.5	60.5	60	0.5	3	●	1
VAPDMSUSD0150	1.50	18.5	60.5	60	0.5	3	●	1
VAPDMSUSD0151	1.51	20.5	60.5	60	0.5	3	●	1
VAPDMSUSD0152	1.52	20.5	60.5	60	0.5	3	●	1
VAPDMSUSD0153	1.53	20.5	60.5	60	0.5	3	●	1
VAPDMSUSD0154	1.54	20.5	60.5	60	0.5	3	●	1
VAPDMSUSD0155	1.55	20.5	60.5	60	0.5	3	●	1
VAPDMSUSD0156	1.56	20.5	60.5	60	0.5	3	●	1
VAPDMSUSD0157	1.57	20.5	60.5	60	0.5	3	●	1
VAPDMSUSD0158	1.58	20.5	60.5	60	0.5	3	●	1
VAPDMSUSD0159	1.59	20.5	60.5	60	0.5	3	●	1
VAPDMSUSD0160	1.60	20.5	60.5	60	0.5	3	●	1
VAPDMSUSD0161	1.61	20.5	60.5	60	0.5	3	●	1
VAPDMSUSD0162	1.62	20.5	60.5	60	0.5	3	●	1
VAPDMSUSD0163	1.63	20.5	60.5	60	0.5	3	●	1

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
VAPDMSUSD0164	1.64	20.5	60.5	60	0.5	3	●	1
VAPDMSUSD0165	1.65	20.5	60.5	60	0.5	3	●	1
VAPDMSUSD0166	1.66	20.5	60.5	60	0.5	3	●	1
VAPDMSUSD0167	1.67	20.5	60.5	60	0.5	3	●	1
VAPDMSUSD0168	1.68	20.5	60.5	60	0.5	3	●	1
VAPDMSUSD0169	1.69	20.5	60.5	60	0.5	3	●	1
VAPDMSUSD0170	1.70	20.5	60.5	60	0.5	3	●	1
VAPDMSUSD0171	1.71	20.5	60.5	60	0.5	3	●	1
VAPDMSUSD0172	1.72	20.5	60.5	60	0.5	3	●	1
VAPDMSUSD0173	1.73	20.5	60.5	60	0.5	3	●	1
VAPDMSUSD0174	1.74	20.5	60.5	60	0.5	3	●	1
VAPDMSUSD0175	1.75	20.5	60.5	60	0.5	3	●	1
VAPDMSUSD0176	1.76	20.5	60.5	60	0.5	3	●	1
VAPDMSUSD0177	1.77	20.5	60.5	60	0.5	3	●	1
VAPDMSUSD0178	1.78	20.5	60.5	60	0.5	3	●	1
VAPDMSUSD0179	1.79	20.5	60.5	60	0.5	3	●	1
VAPDMSUSD0180	1.80	22.5	60.5	60	0.5	3	●	1
VAPDMSUSD0181	1.81	22.5	60.5	60	0.5	3	●	1
VAPDMSUSD0182	1.82	22.6	60.6	60	0.6	3	●	1
VAPDMSUSD0183	1.83	22.6	60.6	60	0.6	3	●	1
VAPDMSUSD0184	1.84	22.6	60.6	60	0.6	3	●	1
VAPDMSUSD0185	1.85	22.6	60.6	60	0.6	3	●	1
VAPDMSUSD0186	1.86	22.6	60.6	60	0.6	3	●	1
VAPDMSUSD0187	1.87	22.6	60.6	60	0.6	3	●	1
VAPDMSUSD0188	1.88	22.6	60.6	60	0.6	3	●	1
VAPDMSUSD0189	1.89	22.6	60.6	60	0.6	3	●	1
VAPDMSUSD0190	1.90	22.6	60.6	60	0.6	3	●	1
VAPDMSUSD0191	1.91	23.6	60.6	60	0.6	3	●	1
VAPDMSUSD0192	1.92	23.6	60.6	60	0.6	3	●	1
VAPDMSUSD0193	1.93	23.6	60.6	60	0.6	3	●	1
VAPDMSUSD0194	1.94	23.6	60.6	60	0.6	3	●	1
VAPDMSUSD0195	1.95	23.6	60.6	60	0.6	3	●	1
VAPDMSUSD0196	1.96	23.6	60.6	60	0.6	3	●	1
VAPDMSUSD0197	1.97	23.6	60.6	60	0.6	3	●	1
VAPDMSUSD0198	1.98	23.6	60.6	60	0.6	3	●	1
VAPDMSUSD0199	1.99	23.6	60.6	60	0.6	3	●	1
VAPDMSUSD0200	2.00	23.6	70.6	70	0.6	3	●	1
VAPDMSUSD0201	2.01	23.6	70.6	70	0.6	3	●	1
VAPDMSUSD0202	2.02	23.6	70.6	70	0.6	3	●	1
VAPDMSUSD0203	2.03	23.6	70.6	70	0.6	3	●	1
VAPDMSUSD0204	2.04	23.6	70.6	70	0.6	3	●	1
VAPDMSUSD0205	2.05	23.6	70.6	70	0.6	3	●	1
VAPDMSUSD0206	2.06	23.6	70.6	70	0.6	3	●	1
VAPDMSUSD0207	2.07	23.6	70.6	70	0.6	3	●	1
VAPDMSUSD0208	2.08	23.6	70.6	70	0.6	3	●	1
VAPDMSUSD0209	2.09	23.6	70.6	70	0.6	3	●	1
VAPDMSUSD0210	2.10	23.6	70.6	70	0.6	3	●	1
VAPDMSUSD0211	2.11	23.6	70.6	70	0.6	3	●	1
VAPDMSUSD0212	2.12	23.6	70.6	70	0.6	3	●	1
VAPDMSUSD0213	2.13	23.6	70.6	70	0.6	3	●	1
VAPDMSUSD0214	2.14	23.6	70.6	70	0.6	3	●	1
VAPDMSUSD0215	2.15	23.7	70.7	70	0.7	3	●	1
VAPDMSUSD0216	2.16	23.7	70.7	70	0.7	3	●	1
VAPDMSUSD0217	2.17	23.7	70.7	70	0.7	3	●	1

VAPDMSUS

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
VAPDMSUSD0218	2.18	23.7	70.7	70	0.7	3	●	1
VAPDMSUSD0219	2.19	23.7	70.7	70	0.7	3	●	1
VAPDMSUSD0220	2.20	26.7	70.7	70	0.7	3	●	1
VAPDMSUSD0221	2.21	26.7	70.7	70	0.7	3	●	1
VAPDMSUSD0222	2.22	26.7	70.7	70	0.7	3	●	1
VAPDMSUSD0223	2.23	26.7	70.7	70	0.7	3	●	1
VAPDMSUSD0224	2.24	26.7	70.7	70	0.7	3	●	1
VAPDMSUSD0225	2.25	26.7	70.7	70	0.7	3	●	1
VAPDMSUSD0226	2.26	26.7	70.7	70	0.7	3	●	1
VAPDMSUSD0227	2.27	26.7	70.7	70	0.7	3	●	1
VAPDMSUSD0228	2.28	26.7	70.7	70	0.7	3	●	1
VAPDMSUSD0229	2.29	26.7	70.7	70	0.7	3	●	1
VAPDMSUSD0230	2.30	26.7	70.7	70	0.7	3	●	1
VAPDMSUSD0231	2.31	26.7	70.7	70	0.7	3	●	1
VAPDMSUSD0232	2.32	26.7	70.7	70	0.7	3	●	1
VAPDMSUSD0233	2.33	26.7	70.7	70	0.7	3	●	1
VAPDMSUSD0234	2.34	26.7	70.7	70	0.7	3	●	1
VAPDMSUSD0235	2.35	26.7	70.7	70	0.7	3	●	1
VAPDMSUSD0236	2.36	26.7	70.7	70	0.7	3	●	1
VAPDMSUSD0237	2.37	26.7	70.7	70	0.7	3	●	1
VAPDMSUSD0238	2.38	26.7	70.7	70	0.7	3	●	1
VAPDMSUSD0239	2.39	26.7	70.7	70	0.7	3	●	1
VAPDMSUSD0240	2.40	29.7	70.7	70	0.7	3	●	1
VAPDMSUSD0241	2.41	29.7	70.7	70	0.7	3	●	1
VAPDMSUSD0242	2.42	29.7	70.7	70	0.7	3	●	1
VAPDMSUSD0243	2.43	29.7	70.7	70	0.7	3	●	1
VAPDMSUSD0244	2.44	29.7	70.7	70	0.7	3	●	1
VAPDMSUSD0245	2.45	29.7	70.7	70	0.7	3	●	1
VAPDMSUSD0246	2.46	29.7	70.7	70	0.7	3	●	1
VAPDMSUSD0247	2.47	29.7	70.7	70	0.7	3	●	1
VAPDMSUSD0248	2.48	29.8	70.8	70	0.8	3	●	1
VAPDMSUSD0249	2.49	29.8	70.8	70	0.8	3	●	1
VAPDMSUSD0250	2.50	29.8	70.8	70	0.8	3	●	1
VAPDMSUSD0251	2.51	29.8	70.8	70	0.8	3	●	1
VAPDMSUSD0252	2.52	29.8	70.8	70	0.8	3	●	1
VAPDMSUSD0253	2.53	29.8	70.8	70	0.8	3	●	1
VAPDMSUSD0254	2.54	29.8	70.8	70	0.8	3	●	1
VAPDMSUSD0255	2.55	29.8	70.8	70	0.8	3	●	1
VAPDMSUSD0256	2.56	29.8	70.8	70	0.8	3	●	1
VAPDMSUSD0257	2.57	29.8	70.8	70	0.8	3	●	1
VAPDMSUSD0258	2.58	29.8	70.8	70	0.8	3	●	1
VAPDMSUSD0259	2.59	29.8	70.8	70	0.8	3	●	1
VAPDMSUSD0260	2.60	29.8	70.8	70	0.8	3	●	1
VAPDMSUSD0261	2.61	29.8	70.8	70	0.8	3	●	1
VAPDMSUSD0262	2.62	29.8	70.8	70	0.8	3	●	1
VAPDMSUSD0263	2.63	29.8	70.8	70	0.8	3	●	1
VAPDMSUSD0264	2.64	29.8	70.8	70	0.8	3	●	1
VAPDMSUSD0265	2.65	29.8	70.8	70	0.8	3	●	1
VAPDMSUSD0266	2.66	29.8	70.8	70	0.8	3	●	1
VAPDMSUSD0267	2.67	29.8	70.8	70	0.8	3	●	1
VAPDMSUSD0268	2.68	29.8	70.8	70	0.8	3	●	1
VAPDMSUSD0269	2.69	29.8	70.8	70	0.8	3	●	1
VAPDMSUSD0270	2.70	32.8	70.8	70	0.8	3	●	1
VAPDMSUSD0271	2.71	32.8	70.8	70	0.8	3	●	1

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
VAPDMSUSD0272	2.72	32.8	70.8	70	0.8	3	●	1
VAPDMSUSD0273	2.73	32.8	70.8	70	0.8	3	●	1
VAPDMSUSD0274	2.74	32.8	70.8	70	0.8	3	●	1
VAPDMSUSD0275	2.75	32.8	70.8	70	0.8	3	●	1
VAPDMSUSD0276	2.76	32.8	70.8	70	0.8	3	●	1
VAPDMSUSD0277	2.77	32.8	70.8	70	0.8	3	●	1
VAPDMSUSD0278	2.78	32.8	70.8	70	0.8	3	●	1
VAPDMSUSD0279	2.79	32.8	70.8	70	0.8	3	●	1
VAPDMSUSD0280	2.80	32.8	70.8	70	0.8	3	●	1
VAPDMSUSD0281	2.81	32.8	70.8	70	0.8	3	●	1
VAPDMSUSD0282	2.82	32.9	70.9	70	0.9	3	●	1
VAPDMSUSD0283	2.83	32.9	70.9	70	0.9	3	●	1
VAPDMSUSD0284	2.84	32.9	70.9	70	0.9	3	●	1
VAPDMSUSD0285	2.85	32.9	70.9	70	0.9	3	●	1
VAPDMSUSD0286	2.86	32.9	70.9	70	0.9	3	●	1
VAPDMSUSD0287	2.87	32.9	70.9	70	0.9	3	●	1
VAPDMSUSD0288	2.88	32.9	70.9	70	0.9	3	●	1
VAPDMSUSD0289	2.89	32.9	70.9	70	0.9	3	●	1
VAPDMSUSD0290	2.90	32.9	70.9	70	0.9	3	●	1
VAPDMSUSD0291	2.91	32.9	70.9	70	0.9	3	●	1
VAPDMSUSD0292	2.92	32.9	70.9	70	0.9	3	●	1
VAPDMSUSD0293	2.93	32.9	70.9	70	0.9	3	●	1
VAPDMSUSD0294	2.94	32.9	70.9	70	0.9	3	●	1
VAPDMSUSD0295	2.95	32.9	70.9	70	0.9	3	●	1
VAPDMSUSD0296	2.96	32.9	70.9	70	0.9	3	●	1
VAPDMSUSD0297	2.97	32.9	70.9	70	0.9	3	●	1
VAPDMSUSD0298	2.98	32.9	70.9	70	0.9	3	●	1
VAPDMSUSD0299	2.99	32.9	70.9	70	0.9	3	●	1
VAPDMSUSD0300	3.00	32.9	70.9	70	0.9	3	●	1
VAPDMSUSD0301	3.01	35.9	85.9	85	0.9	4	●	1
VAPDMSUSD0302	3.02	35.9	85.9	85	0.9	4	●	1
VAPDMSUSD0303	3.03	35.9	85.9	85	0.9	4	●	1
VAPDMSUSD0304	3.04	35.9	85.9	85	0.9	4	●	1
VAPDMSUSD0305	3.05	35.9	85.9	85	0.9	4	●	1
VAPDMSUSD0306	3.06	35.9	85.9	85	0.9	4	●	1
VAPDMSUSD0307	3.07	35.9	85.9	85	0.9	4	●	1
VAPDMSUSD0308	3.08	35.9	85.9	85	0.9	4	●	1
VAPDMSUSD0309	3.09	35.9	85.9	85	0.9	4	●	1
VAPDMSUSD0310	3.10	35.9	85.9	85	0.9	4	●	1
VAPDMSUSD0311	3.11	35.9	85.9	85	0.9	4	●	1
VAPDMSUSD0312	3.12	35.9	85.9	85	0.9	4	●	1
VAPDMSUSD0313	3.13	35.9	85.9	85	0.9	4	●	1
VAPDMSUSD0314	3.14	35.9	85.9	85	0.9	4	●	1
VAPDMSUSD0315	3.15	36.0	86.0	85	1.0	4	●	1
VAPDMSUSD0316	3.16	36.0	86.0	85	1.0	4	●	1
VAPDMSUSD0317	3.17	36.0	86.0	85	1.0	4	●	1
VAPDMSUSD0318	3.18	36.0	86.0	85	1.0	4	●	1
VAPDMSUSD0319	3.19	36.0	86.0	85	1.0	4	●	1
VAPDMSUSD0320	3.20	36.0	86.0	85	1.0	4	●	1
VAPDMSUSD0321	3.21	36.0	86.0	85	1.0	4	●	1
VAPDMSUSD0322	3.22	36.0	86.0	85	1.0	4	●	1
VAPDMSUSD0323	3.23	36.0	86.0	85	1.0	4	●	1
VAPDMSUSD0324	3.24	36.0	86.0	85	1.0	4	●	1
VAPDMSUSD0325	3.25	36.0	86.0	85	1.0	4	●	1

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Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
VAPDMSUSD0326	3.26	36.0	86.0	85	1.0	4	●	1
VAPDMSUSD0327	3.27	36.0	86.0	85	1.0	4	●	1
VAPDMSUSD0328	3.28	36.0	86.0	85	1.0	4	●	1
VAPDMSUSD0329	3.29	36.0	86.0	85	1.0	4	●	1
VAPDMSUSD0330	3.30	36.0	86.0	85	1.0	4	●	1
VAPDMSUSD0331	3.31	39.0	86.0	85	1.0	4	●	1
VAPDMSUSD0332	3.32	39.0	86.0	85	1.0	4	●	1
VAPDMSUSD0333	3.33	39.0	86.0	85	1.0	4	●	1
VAPDMSUSD0334	3.34	39.0	86.0	85	1.0	4	●	1
VAPDMSUSD0335	3.35	39.0	86.0	85	1.0	4	●	1
VAPDMSUSD0336	3.36	39.0	86.0	85	1.0	4	●	1
VAPDMSUSD0337	3.37	39.0	86.0	85	1.0	4	●	1
VAPDMSUSD0338	3.38	39.0	86.0	85	1.0	4	●	1
VAPDMSUSD0339	3.39	39.0	86.0	85	1.0	4	●	1
VAPDMSUSD0340	3.40	39.0	86.0	85	1.0	4	●	1
VAPDMSUSD0341	3.41	39.0	86.0	85	1.0	4	●	1
VAPDMSUSD0342	3.42	39.0	86.0	85	1.0	4	●	1
VAPDMSUSD0343	3.43	39.0	86.0	85	1.0	4	●	1
VAPDMSUSD0344	3.44	39.0	86.0	85	1.0	4	●	1
VAPDMSUSD0345	3.45	39.0	86.0	85	1.0	4	●	1
VAPDMSUSD0346	3.46	39.0	86.0	85	1.0	4	●	1
VAPDMSUSD0347	3.47	39.0	86.0	85	1.0	4	●	1
VAPDMSUSD0348	3.48	39.1	86.1	85	1.1	4	●	1
VAPDMSUSD0349	3.49	39.1	86.1	85	1.1	4	●	1
VAPDMSUSD0350	3.50	39.1	86.1	85	1.1	4	●	1
VAPDMSUSD0351	3.51	39.1	86.1	85	1.1	4	●	1
VAPDMSUSD0352	3.52	39.1	86.1	85	1.1	4	●	1
VAPDMSUSD0353	3.53	39.1	86.1	85	1.1	4	●	1
VAPDMSUSD0354	3.54	39.1	86.1	85	1.1	4	●	1
VAPDMSUSD0355	3.55	39.1	86.1	85	1.1	4	●	1
VAPDMSUSD0356	3.56	39.1	86.1	85	1.1	4	●	1
VAPDMSUSD0357	3.57	39.1	86.1	85	1.1	4	●	1
VAPDMSUSD0358	3.58	39.1	86.1	85	1.1	4	●	1
VAPDMSUSD0359	3.59	39.1	86.1	85	1.1	4	●	1
VAPDMSUSD0360	3.60	39.1	86.1	85	1.1	4	●	1
VAPDMSUSD0361	3.61	39.1	86.1	85	1.1	4	●	1
VAPDMSUSD0362	3.62	39.1	86.1	85	1.1	4	●	1
VAPDMSUSD0363	3.63	39.1	86.1	85	1.1	4	●	1
VAPDMSUSD0364	3.64	39.1	86.1	85	1.1	4	●	1
VAPDMSUSD0365	3.65	39.1	86.1	85	1.1	4	●	1
VAPDMSUSD0366	3.66	39.1	86.1	85	1.1	4	●	1
VAPDMSUSD0367	3.67	39.1	86.1	85	1.1	4	●	1
VAPDMSUSD0368	3.68	39.1	86.1	85	1.1	4	●	1
VAPDMSUSD0369	3.69	39.1	86.1	85	1.1	4	●	1
VAPDMSUSD0370	3.70	39.1	86.1	85	1.1	4	●	1
VAPDMSUSD0371	3.71	43.1	86.1	85	1.1	4	●	1
VAPDMSUSD0372	3.72	43.1	86.1	85	1.1	4	●	1
VAPDMSUSD0373	3.73	43.1	86.1	85	1.1	4	●	1
VAPDMSUSD0374	3.74	43.1	86.1	85	1.1	4	●	1
VAPDMSUSD0375	3.75	43.1	86.1	85	1.1	4	●	1
VAPDMSUSD0376	3.76	43.1	86.1	85	1.1	4	●	1
VAPDMSUSD0377	3.77	43.1	86.1	85	1.1	4	●	1
VAPDMSUSD0378	3.78	43.1	86.1	85	1.1	4	●	1
VAPDMSUSD0379	3.79	43.1	86.1	85	1.1	4	●	1

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
VAPDMSUSD0380	3.80	43.1	86.1	85	1.1	4	●	1
VAPDMSUSD0381	3.81	43.1	86.1	85	1.1	4	●	1
VAPDMSUSD0382	3.82	43.2	86.2	85	1.2	4	●	1
VAPDMSUSD0383	3.83	43.2	86.2	85	1.2	4	●	1
VAPDMSUSD0384	3.84	43.2	86.2	85	1.2	4	●	1
VAPDMSUSD0385	3.85	43.2	86.2	85	1.2	4	●	1
VAPDMSUSD0386	3.86	43.2	86.2	85	1.2	4	●	1
VAPDMSUSD0387	3.87	43.2	86.2	85	1.2	4	●	1
VAPDMSUSD0388	3.88	43.2	86.2	85	1.2	4	●	1
VAPDMSUSD0389	3.89	43.2	86.2	85	1.2	4	●	1
VAPDMSUSD0390	3.90	43.2	86.2	85	1.2	4	●	1
VAPDMSUSD0391	3.91	43.2	86.2	85	1.2	4	●	1
VAPDMSUSD0392	3.92	43.2	86.2	85	1.2	4	●	1
VAPDMSUSD0393	3.93	43.2	86.2	85	1.2	4	●	1
VAPDMSUSD0394	3.94	43.2	86.2	85	1.2	4	●	1
VAPDMSUSD0395	3.95	43.2	86.2	85	1.2	4	●	1
VAPDMSUSD0396	3.96	43.2	86.2	85	1.2	4	●	1
VAPDMSUSD0397	3.97	43.2	86.2	85	1.2	4	●	1
VAPDMSUSD0398	3.98	43.2	86.2	85	1.2	4	●	1
VAPDMSUSD0399	3.99	43.2	86.2	85	1.2	4	●	1
VAPDMSUSD0400	4.00	42.8	85.8	85	0.8	4	●	1
VAPDMSUSD0405	4.05	42.8	100.8	100	0.8	6	●	1
VAPDMSUSD0410	4.10	42.9	100.9	100	0.9	6	●	1
VAPDMSUSD0415	4.15	42.9	100.9	100	0.9	6	●	1
VAPDMSUSD0420	4.20	42.9	100.9	100	0.9	6	●	1
VAPDMSUSD0425	4.25	46.9	100.9	100	0.9	6	●	1
VAPDMSUSD0430	4.30	46.9	100.9	100	0.9	6	●	1
VAPDMSUSD0435	4.35	46.9	100.9	100	0.9	6	●	1
VAPDMSUSD0440	4.40	46.9	100.9	100	0.9	6	●	1
VAPDMSUSD0445	4.45	46.9	100.9	100	0.9	6	●	1
VAPDMSUSD0450	4.50	46.9	100.9	100	0.9	6	●	1
VAPDMSUSD0455	4.55	46.9	100.9	100	0.9	6	●	1
VAPDMSUSD0460	4.60	47.0	101.0	100	1.0	6	●	1
VAPDMSUSD0465	4.65	47.0	101.0	100	1.0	6	●	1
VAPDMSUSD0470	4.70	47.0	101.0	100	1.0	6	●	1
VAPDMSUSD0475	4.75	47.0	101.0	100	1.0	6	●	1
VAPDMSUSD0480	4.80	52.0	101.0	100	1.0	6	●	1
VAPDMSUSD0485	4.85	52.0	101.0	100	1.0	6	●	1
VAPDMSUSD0490	4.90	52.0	101.0	100	1.0	6	●	1
VAPDMSUSD0495	4.95	52.0	101.0	100	1.0	6	●	1
VAPDMSUSD0500	5.00	52.0	101.0	100	1.0	6	●	1
VAPDMSUSD0505	5.05	52.1	101.1	100	1.1	6	●	1
VAPDMSUSD0510	5.10	52.1	101.1	100	1.1	6	●	1
VAPDMSUSD0515	5.15	52.1	101.1	100	1.1	6	●	1
VAPDMSUSD0520	5.20	52.1	101.1	100	1.1	6	●	1
VAPDMSUSD0525	5.25	52.1	101.1	100	1.1	6	●	1
VAPDMSUSD0530	5.30	52.1	101.1	100	1.1	6	●	1
VAPDMSUSD0535	5.35	57.1	107.1	106	1.1	6	●	1
VAPDMSUSD0540	5.40	57.1	107.1	106	1.1	6	●	1
VAPDMSUSD0545	5.45	57.1	107.1	106	1.1	6	●	1
VAPDMSUSD0550	5.50	57.1	107.1	106	1.1	6	●	1
VAPDMSUSD0555	5.55	57.2	107.2	106	1.2	6	●	1
VAPDMSUSD0560	5.60	57.2	107.2	106	1.2	6	●	1
VAPDMSUSD0565	5.65	57.2	107.2	106	1.2	6	●	1

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Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
VAPDMSUSD0570	5.70	57.2	107.2	106	1.2	6	●	1
VAPDMSUSD0575	5.75	57.2	107.2	106	1.2	6	●	1
VAPDMSUSD0580	5.80	57.2	107.2	106	1.2	6	●	1
VAPDMSUSD0585	5.85	57.2	107.2	106	1.2	6	●	1
VAPDMSUSD0590	5.90	57.2	107.2	106	1.2	6	●	1
VAPDMSUSD0595	5.95	57.2	107.2	106	1.2	6	●	1
VAPDMSUSD0600	6.00	57.2	107.2	106	1.2	6	●	1
VAPDMSUSD0605	6.05	63.3	113.3	112	1.3	8	●	1
VAPDMSUSD0610	6.10	63.3	113.3	112	1.3	8	●	1
VAPDMSUSD0615	6.15	63.3	113.3	112	1.3	8	●	1
VAPDMSUSD0620	6.20	63.3	113.3	112	1.3	8	●	1
VAPDMSUSD0625	6.25	63.3	113.3	112	1.3	8	●	1
VAPDMSUSD0630	6.30	63.3	113.3	112	1.3	8	●	1
VAPDMSUSD0635	6.35	63.3	113.3	112	1.3	8	●	1
VAPDMSUSD0640	6.40	63.3	113.3	112	1.3	8	●	1
VAPDMSUSD0645	6.45	63.3	113.3	112	1.3	8	●	1
VAPDMSUSD0650	6.50	63.4	113.4	112	1.4	8	●	1
VAPDMSUSD0655	6.55	63.4	113.4	112	1.4	8	●	1
VAPDMSUSD0660	6.60	63.4	113.4	112	1.4	8	●	1
VAPDMSUSD0665	6.65	63.4	113.4	112	1.4	8	●	1
VAPDMSUSD0670	6.70	63.4	113.4	112	1.4	8	●	1
VAPDMSUSD0675	6.75	68.4	118.4	117	1.4	8	●	1
VAPDMSUSD0680	6.80	68.4	118.4	117	1.4	8	●	1
VAPDMSUSD0685	6.85	68.4	118.4	117	1.4	8	●	1
VAPDMSUSD0690	6.90	68.4	118.4	117	1.4	8	●	1
VAPDMSUSD0695	6.95	68.4	118.4	117	1.4	8	●	1
VAPDMSUSD0700	7.00	68.5	118.5	117	1.5	8	●	1
VAPDMSUSD0705	7.05	68.5	118.5	117	1.5	8	●	1
VAPDMSUSD0710	7.10	68.5	118.5	117	1.5	8	●	1
VAPDMSUSD0715	7.15	68.5	118.5	117	1.5	8	●	1
VAPDMSUSD0720	7.20	68.5	118.5	117	1.5	8	●	1
VAPDMSUSD0725	7.25	68.5	118.5	117	1.5	8	●	1
VAPDMSUSD0730	7.30	68.5	118.5	117	1.5	8	●	1
VAPDMSUSD0735	7.35	68.5	118.5	117	1.5	8	●	1
VAPDMSUSD0740	7.40	68.5	118.5	117	1.5	8	●	1
VAPDMSUSD0745	7.45	68.5	118.5	117	1.5	8	●	1
VAPDMSUSD0750	7.50	68.6	118.6	117	1.6	8	●	1
VAPDMSUSD0755	7.55	74.6	124.6	123	1.6	8	●	1
VAPDMSUSD0760	7.60	74.6	124.6	123	1.6	8	●	1
VAPDMSUSD0765	7.65	74.6	124.6	123	1.6	8	●	1
VAPDMSUSD0770	7.70	74.6	124.6	123	1.6	8	●	1
VAPDMSUSD0775	7.75	74.6	124.6	123	1.6	8	●	1
VAPDMSUSD0780	7.80	74.6	124.6	123	1.6	8	●	1
VAPDMSUSD0785	7.85	74.6	124.6	123	1.6	8	●	1
VAPDMSUSD0790	7.90	74.6	124.6	123	1.6	8	●	1
VAPDMSUSD0795	7.95	74.7	124.7	123	1.7	8	●	1
VAPDMSUSD0800	8.00	74.7	124.7	123	1.7	8	●	1
VAPDMSUSD0805	8.05	74.7	129.7	128	1.7	10	●	1
VAPDMSUSD0810	8.10	74.7	129.7	128	1.7	10	●	1
VAPDMSUSD0815	8.15	74.7	129.7	128	1.7	10	●	1
VAPDMSUSD0820	8.20	74.7	129.7	128	1.7	10	●	1
VAPDMSUSD0825	8.25	74.7	129.7	128	1.7	10	●	1
VAPDMSUSD0830	8.30	74.7	129.7	128	1.7	10	●	1
VAPDMSUSD0835	8.35	74.7	129.7	128	1.7	10	●	1

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
VAPDMSUSD0840	8.40	74.7	129.7	128	1.7	10	●	1
VAPDMSUSD0845	8.45	74.8	129.8	128	1.8	10	●	1
VAPDMSUSD0850	8.50	74.8	129.8	128	1.8	10	●	1
VAPDMSUSD0855	8.55	80.8	135.8	134	1.8	10	●	1
VAPDMSUSD0860	8.60	80.8	135.8	134	1.8	10	●	1
VAPDMSUSD0865	8.65	80.8	135.8	134	1.8	10	●	1
VAPDMSUSD0870	8.70	80.8	135.8	134	1.8	10	●	1
VAPDMSUSD0875	8.75	80.8	135.8	134	1.8	10	●	1
VAPDMSUSD0880	8.80	80.8	135.8	134	1.8	10	●	1
VAPDMSUSD0885	8.85	80.8	135.8	134	1.8	10	●	1
VAPDMSUSD0890	8.90	80.8	135.8	134	1.8	10	●	1
VAPDMSUSD0895	8.95	80.9	135.9	134	1.9	10	●	1
VAPDMSUSD0900	9.00	80.9	135.9	134	1.9	10	●	1
VAPDMSUSD0910	9.10	80.9	135.9	134	1.9	10	●	1
VAPDMSUSD0920	9.20	80.9	135.9	134	1.9	10	●	1
VAPDMSUSD0930	9.30	80.9	135.9	134	1.9	10	●	1
VAPDMSUSD0940	9.40	81.0	136.0	134	2.0	10	●	1
VAPDMSUSD0950	9.50	81.0	136.0	134	2.0	10	●	1
VAPDMSUSD0960	9.60	87.0	142.0	140	2.0	10	●	1
VAPDMSUSD0970	9.70	87.0	142.0	140	2.0	10	●	1
VAPDMSUSD0980	9.80	87.0	142.0	140	2.0	10	●	1
VAPDMSUSD0990	9.90	87.1	142.1	140	2.1	10	●	1
VAPDMSUSD1000	10.0	87.1	142.1	140	2.1	10	●	1
VAPDMSUSD1010	10.1	87.1	147.1	145	2.1	12	●	1
VAPDMSUSD1020	10.2	87.1	147.1	145	2.1	12	●	1
VAPDMSUSD1030	10.3	87.1	147.1	145	2.1	12	●	1
VAPDMSUSD1040	10.4	87.2	147.2	145	2.2	12	●	1
VAPDMSUSD1050	10.5	87.2	147.2	145	2.2	12	●	1
VAPDMSUSD1060	10.6	87.2	147.2	145	2.2	12	●	1
VAPDMSUSD1070	10.7	94.2	154.2	152	2.2	12	●	1
VAPDMSUSD1080	10.8	94.2	154.2	152	2.2	12	●	1
VAPDMSUSD1090	10.9	94.3	154.3	152	2.3	12	●	1
VAPDMSUSD1100	11.0	94.3	154.3	152	2.3	12	●	1
VAPDMSUSD1110	11.1	94.3	154.3	152	2.3	12	●	1
VAPDMSUSD1120	11.2	94.3	154.3	152	2.3	12	●	1
VAPDMSUSD1130	11.3	94.3	154.3	152	2.3	12	●	1
VAPDMSUSD1140	11.4	94.4	154.4	152	2.4	12	●	1
VAPDMSUSD1150	11.5	94.4	154.4	152	2.4	12	●	1
VAPDMSUSD1160	11.6	94.4	154.4	152	2.4	12	●	1
VAPDMSUSD1170	11.7	94.4	154.4	152	2.4	12	●	1
VAPDMSUSD1180	11.8	94.4	154.4	152	2.4	12	●	1
VAPDMSUSD1190	11.9	101.5	161.5	159	2.5	12	●	1
VAPDMSUSD1200	12.0	101.5	161.5	159	2.5	12	●	1
VAPDMSUSD1210	12.1	101.5	161.5	159	2.5	12	●	1
VAPDMSUSD1220	12.2	101.5	161.5	159	2.5	12	●	1
VAPDMSUSD1230	12.3	101.6	161.6	159	2.6	12	●	1
VAPDMSUSD1240	12.4	101.6	161.6	159	2.6	12	●	1
VAPDMSUSD1250	12.5	101.6	161.6	159	2.6	12	●	1
VAPDMSUSD1260	12.6	101.6	161.6	159	2.6	12	●	1
VAPDMSUSD1270	12.7	101.6	161.6	159	2.6	12	●	1
VAPDMSUSD1280	12.8	101.7	161.7	159	2.7	12	●	1
VAPDMSUSD1290	12.9	101.7	161.7	159	2.7	12	●	1
VAPDMSUSD1300	13.0	101.7	161.7	159	2.7	12	●	1

VAPDMSUS

Recommended cutting condition

Work material	Austenitic stainless steel AISI 304, AISI 316		Martensitic stainless steel AISI420 Ferritic stainless steel AISI 430		Carbon steel AISI 1049 Alloy steel SCM Cast iron FC Copper, Copper alloy		Structural steel Aluminium alloy	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)
0.5	7600	0.01	8800	0.01	11250	0.01	15000	0.02
1.0	4800	0.02	6300	0.05	10000	0.05	12000	0.05
2.0	2400	0.04	3200	0.06	5500	0.09	6400	0.09
3.0	1600	0.07	2100	0.10	3700	0.13	4300	0.13
4.0	1200	0.09	1600	0.10	2800	0.15	3200	0.15
5.0	950	0.12	1300	0.13	2200	0.18	2600	0.18
6.0	800	0.14	1100	0.15	1800	0.20	2100	0.19
8.0	600	0.18	800	0.18	1400	0.22	1600	0.24
10.0	480	0.22	640	0.21	1100	0.25	1300	0.28
12.0	400	0.24	530	0.25	930	0.30	1100	0.34
13.0	370	0.26	490	0.28	860	0.32	1000	0.36
14.0	340	0.30	450	0.27	730	0.31	930	0.36
15.0	320	0.31	425	0.28	680	0.32	870	0.38
16.0	300	0.32	400	0.30	640	0.34	820	0.42
18.0	270	0.34	350	0.32	570	0.36	725	0.43
20.0	240	0.36	320	0.35	510	0.38	660	0.45

- Please reduce the revolution and feed rate depending on the drilling situation when the installation of workpiece or machine lacks rigidity.
- Please use a collet type drill chuck or a milling chuck.
- Use sufficient cutting fluid.
- WSTAR drill (MVE, MVS,MMS)are recommended for precipitation hardening stainless steel(JIS-SUS630/ISOL-No58X5CrNiCuNb16-4/ASTM-S17400, JIS-SUS631/DIN-X7CrNiAl177/ASTM-S17700)
- When drilling holes greater than 4 x drill diameter hole depths, please use a peck feed.
- The above-mentioned cutting condition is standard when using water-soluble cutting fluid. Please reduce the revolution when using non-water-soluble cutting fluid.

VAPDSCB

VIOLET DRILLS

Short flute length, High precision, For counter boring

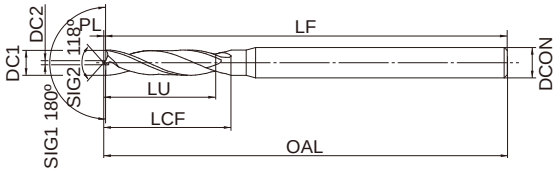
Product Information

HG HSS V 180° SIG 118° X Thinning

Work Material

P M K N

TECHNICAL INFO >> 1997 ISO13399 PROPERTY >> 1966 SYMBOL DESCRIPTIONS >> 1623 DRILLS SELECTION CHART >> 1636



Type1

	DC≦3	3<D C≦6	6<D C≦10	10<D C≦18	18<D C≦30	30<D C≦32
	0 −0.014	0 −0.018	0 −0.022	0 −0.027	0 −0.033	0 −0.039

Standard drill depth : LU=LCF-3DC

●Inventory maintained in Japan. Unit:mm

Order Number	DC1	DC2	LCF	OAL	LF	PL	DCON	Stock	Type
VAPDSCBD0200	2.0	0.7	12.0	60.2	60	0.2	3	●	1
VAPDSCBD0210	2.1	0.7	12.0	60.2	60	0.2	3	●	1
VAPDSCBD0220	2.2	0.7	12.0	60.2	60	0.2	3	●	1
VAPDSCBD0230	2.3	0.7	13.0	60.2	60	0.2	3	●	1
VAPDSCBD0240	2.4	0.7	13.0	60.2	60	0.2	3	●	1
VAPDSCBD0250	2.5	0.7	13.0	60.2	60	0.2	3	●	1
VAPDSCBD0260	2.6	0.8	15.0	60.2	60	0.2	3	●	1
VAPDSCBD0270	2.7	0.8	15.0	60.2	60	0.2	3	●	1
VAPDSCBD0280	2.8	0.8	15.0	60.2	60	0.2	3	●	1
VAPDSCBD0290	2.9	0.8	15.0	60.2	60	0.2	3	●	1
VAPDSCBD0300	3.0	0.8	15.0	60.2	60	0.2	3	●	1
VAPDSCBD0310	3.1	0.8	17.0	70.2	70	0.2	4	●	1
VAPDSCBD0320	3.2	0.8	17.0	70.2	70	0.2	4	●	1
VAPDSCBD0330	3.3	0.8	19.0	70.2	70	0.2	4	●	1
VAPDSCBD0340	3.4	0.8	19.0	70.2	70	0.2	4	●	1
VAPDSCBD0350	3.5	0.8	19.0	70.2	70	0.2	4	●	1
VAPDSCBD0360	3.6	1.0	21.0	70.2	70	0.2	4	●	1
VAPDSCBD0370	3.7	1.0	21.0	70.2	70	0.2	4	●	1
VAPDSCBD0380	3.8	1.0	21.0	70.2	70	0.2	4	●	1
VAPDSCBD0390	3.9	1.0	21.0	70.2	70	0.2	4	●	1
VAPDSCBD0400	4.0	1.0	21.0	70.3	70	0.3	4	●	1
VAPDSCBD0410	4.1	1.0	21.0	80.3	80	0.3	6	●	1
VAPDSCBD0420	4.2	1.0	21.0	80.3	80	0.3	6	●	1
VAPDSCBD0430	4.3	1.0	23.0	80.3	80	0.3	6	●	1
VAPDSCBD0440	4.4	1.0	23.0	80.3	80	0.3	6	●	1
VAPDSCBD0450	4.5	1.0	23.0	80.3	80	0.3	6	●	1
VAPDSCBD0460	4.6	1.4	25.0	80.3	80	0.3	6	●	1
VAPDSCBD0470	4.7	1.4	25.0	80.3	80	0.3	6	●	1
VAPDSCBD0480	4.8	1.4	25.0	80.3	80	0.3	6	●	1
VAPDSCBD0490	4.9	1.4	25.0	80.3	80	0.3	6	●	1
VAPDSCBD0500	5.0	1.4	25.0	80.4	80	0.4	6	●	1
VAPDSCBD0510	5.1	1.4	25.0	80.4	80	0.4	6	●	1
VAPDSCBD0520	5.2	1.4	25.0	80.4	80	0.4	6	●	1
VAPDSCBD0530	5.3	1.4	25.0	80.4	80	0.4	6	●	1

Order Number	DC1	DC2	LCF	OAL	LF	PL	DCON	Stock	Type
VAPDSCBD0540	5.4	1.4	27.0	80.4	80	0.4	6	●	1
VAPDSCBD0550	5.5	1.4	27.0	80.4	80	0.4	6	●	1
VAPDSCBD0560	5.6	1.4	27.0	80.4	80	0.4	6	●	1
VAPDSCBD0570	5.7	1.4	27.0	80.4	80	0.4	6	●	1
VAPDSCBD0580	5.8	1.4	27.0	80.4	80	0.4	6	●	1
VAPDSCBD0590	5.9	1.4	27.0	80.4	80	0.4	6	●	1
VAPDSCBD0600	6.0	1.4	27.0	80.4	80	0.4	6	●	1
VAPDSCBD0610	6.1	1.4	30.0	80.4	80	0.4	8	●	1
VAPDSCBD0620	6.2	1.4	30.0	80.4	80	0.4	8	●	1
VAPDSCBD0630	6.3	1.4	30.0	80.4	80	0.4	8	●	1
VAPDSCBD0640	6.4	1.4	30.0	80.4	80	0.4	8	●	1
VAPDSCBD0650	6.5	1.4	30.0	80.4	80	0.4	8	●	1
VAPDSCBD0660	6.6	1.8	30.0	80.4	80	0.4	8	●	1
VAPDSCBD0670	6.7	1.8	30.0	80.4	80	0.4	8	●	1
VAPDSCBD0680	6.8	1.8	32.0	80.4	80	0.4	8	●	1
VAPDSCBD0690	6.9	1.8	32.0	80.4	80	0.4	8	●	1
VAPDSCBD0700	7.0	1.8	32.0	80.6	80	0.6	8	●	1
VAPDSCBD0710	7.1	1.8	32.0	80.6	80	0.6	8	●	1
VAPDSCBD0720	7.2	1.8	32.0	80.6	80	0.6	8	●	1
VAPDSCBD0730	7.3	1.8	32.0	80.6	80	0.6	8	●	1
VAPDSCBD0740	7.4	1.8	32.0	80.6	80	0.6	8	●	1
VAPDSCBD0750	7.5	1.8	32.0	80.6	80	0.6	8	●	1
VAPDSCBD0760	7.6	2.0	35.0	85.6	85	0.6	8	●	1
VAPDSCBD0770	7.7	2.0	35.0	85.6	85	0.6	8	●	1
VAPDSCBD0780	7.8	2.0	35.0	85.6	85	0.6	8	●	1
VAPDSCBD0790	7.9	2.0	35.0	85.6	85	0.6	8	●	1
VAPDSCBD0800	8.0	2.0	35.0	85.6	85	0.6	8	●	1
VAPDSCBD0810	8.1	2.0	35.0	90.6	90	0.6	10	●	1
VAPDSCBD0850	8.5	2.0	35.0	90.6	90	0.6	10	●	1
VAPDSCBD0860	8.6	2.8	38.0	93.6	93	0.6	10	●	1
VAPDSCBD0880	8.8	2.8	38.0	93.6	93	0.6	10	●	1
VAPDSCBD0900	9.0	2.8	38.0	93.8	93	0.8	10	●	1
VAPDSCBD0910	9.1	2.8	38.0	93.8	93	0.8	10	●	1
VAPDSCBD0950	9.5	2.8	38.0	93.8	93	0.8	10	●	1

VAPDSCB

Order Number	DC1	DC2	LCF	OAL	LF	PL	DCON	Stock	Type
VAPDSCBD0960	9.6	3.2	41.0	96.8	96	0.8	10	●	1
VAPDSCBD0980	9.8	3.2	41.0	96.8	96	0.8	10	●	1
VAPDSCBD1000	10.0	3.2	41.0	96.9	96	0.9	10	●	1
VAPDSCBD1010	10.1	3.2	41.0	101.9	101	0.9	12	●	1
VAPDSCBD1030	10.3	3.2	41.0	101.9	101	0.9	12	●	1
VAPDSCBD1050	10.5	3.2	41.0	101.9	101	0.9	12	●	1
VAPDSCBD1080	10.8	3.7	45.0	105.9	105	0.9	12	●	1
VAPDSCBD1100	11.0	3.7	45.0	105.9	105	0.9	12	●	1
VAPDSCBD1110	11.1	3.7	45.0	105.9	105	0.9	12	●	1
VAPDSCBD1150	11.5	3.7	45.0	105.9	105	0.9	12	●	1
VAPDSCBD1180	11.8	3.7	45.0	105.9	105	0.9	12	●	1
VAPDSCBD1200	12.0	3.7	49.0	109.9	109	0.9	12	●	1
VAPDSCBD1250	12.5	3.7	49.0	109.9	109	0.9	12	●	1
VAPDSCBD1300	13.0	4.2	49.0	110.1	109	1.1	12	●	1
VAPDSCBD1350	13.5	4.2	51.0	122.1	121	1.1	16	●	1
VAPDSCBD1380	13.8	4.2	51.0	122.1	121	1.1	16	●	1
VAPDSCBD1400	14.0	4.2	51.0	122.1	121	1.1	16	●	1
VAPDSCBD1410	14.1	5.5	58.0	124.1	123	1.1	16	●	1
VAPDSCBD1420	14.2	5.5	58.0	124.1	123	1.1	16	●	1
VAPDSCBD1450	14.5	5.5	58.0	124.1	123	1.1	16	●	1
VAPDSCBD1480	14.8	5.5	58.0	124.1	123	1.1	16	●	1
VAPDSCBD1500	15.0	5.5	58.0	124.3	123	1.3	16	●	1
VAPDSCBD1550	15.5	5.5	60.0	126.3	125	1.3	16	●	1
VAPDSCBD1570	15.7	5.5	60.0	126.3	125	1.3	16	●	1
VAPDSCBD1580	15.8	5.5	60.0	126.3	125	1.3	16	●	1

Order Number	DC1	DC2	LCF	OAL	LF	PL	DCON	Stock	Type
VAPDSCBD1600	16.0	5.5	60.0	126.3	125	1.3	16	●	1
VAPDSCBD1700	17.0	5.5	62.0	133.3	132	1.3	20	●	1
VAPDSCBD1750	17.5	5.5	63.0	134.6	133	1.6	20	●	1
VAPDSCBD1760	17.6	6.5	63.0	134.6	133	1.6	20	●	1
VAPDSCBD1770	17.7	6.5	63.0	134.6	133	1.6	20	●	1
VAPDSCBD1780	17.8	6.5	63.0	134.6	133	1.6	20	●	1
VAPDSCBD1800	18.0	6.5	63.0	134.6	133	1.6	20	●	1
VAPDSCBD1810	18.1	6.5	65.0	136.6	135	1.6	20	●	1
VAPDSCBD1900	19.0	6.5	65.0	136.6	135	1.6	20	●	1
VAPDSCBD1980	19.8	7.5	67.0	138.6	137	1.6	20	●	1
VAPDSCBD2000	20.0	7.5	67.0	138.8	137	1.8	20	●	1
VAPDSCBD2010	20.1	7.5	67.0	138.8	137	1.8	20	●	1
VAPDSCBD2100	21.0	7.5	75.0	166.8	165	1.8	25	●	1
VAPDSCBD2200	22.0	7.5	75.0	166.8	165	1.8	25	●	1
VAPDSCBD2300	23.0	7.5	80.0	171.8	170	1.8	25	●	1
VAPDSCBD2400	24.0	8.5	80.0	172.2	170	2.2	25	●	1
VAPDSCBD2500	25.0	8.5	85.0	182.2	180	2.2	25	●	1
VAPDSCBD2600	26.0	9.0	85.0	182.2	180	2.2	32	●	1
VAPDSCBD2700	27.0	9.0	95.0	192.2	190	2.2	32	●	1
VAPDSCBD2800	28.0	10.0	95.0	192.6	190	2.6	32	●	1
VAPDSCBD2900	29.0	10.0	100.0	197.6	195	2.6	32	●	1
VAPDSCBD3000	30.0	11.0	100.0	197.6	195	2.6	32	●	1
VAPDSCBD3100	31.0	11.0	105.0	202.6	200	2.6	32	●	1
VAPDSCBD3200	32.0	13.0	105.0	202.6	200	2.6	32	●	1

VAPDSCB

Recommended cutting condition

Work material	Structural steel Aluminium alloy		Carbon steel AISI 1049 Alloy steel SCM Cast iron FCD		Alloy tool steel AISI D11(Low-hardness materials) Ferritic stainless steel AISI 430, AISI 405 Martensitic stainless steel AISI 420, AISI 440		Alloy tool steel AISI H61 (—40HRC) Precipitation hardening stainless steel ASTM 630, ASTM 631	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)
2.0	5600	0.07	4800	0.07	3200	0.07	2800	0.04
3.0	3700	0.10	3200	0.10	2100	0.10	1900	0.05
4.0	2800	0.12	2400	0.12	1600	0.12	1400	0.06
5.0	2200	0.14	1900	0.14	1300	0.14	1150	0.07
6.0	1850	0.15	1600	0.15	1050	0.15	950	0.08
8.0	1400	0.20	1200	0.20	800	0.20	720	0.10
10.0	1100	0.23	960	0.23	640	0.21	570	0.11
12.0	950	0.26	800	0.26	530	0.24	470	0.12
14.0	800	0.27	680	0.27	450	0.25	410	0.13
16.0	700	0.28	500	0.28	360	0.26	300	0.14
18.0	620	0.29	450	0.29	320	0.27	260	0.15
20.0	560	0.30	400	0.30	290	0.27	240	0.15
22.0	510	0.32	360	0.32	260	0.29	220	0.16
24.0	460	0.33	330	0.33	240	0.30	200	0.16
26.0	430	0.35	310	0.35	220	0.31	180	0.17
28.0	400	0.36	290	0.36	210	0.33	170	0.18
30.0	370	0.37	270	0.37	190	0.34	160	0.18
32.0	350	0.38	250	0.38	180	0.35	150	0.19

- The above cutting conditions are for drilling 3xDC hole depths without a pilot hole. When drilling holes smaller than 1xDC hole depths, it is possible to increase the revolution speed by 20%.
- Drilling without a pilot hole is recommended. If there is a pilot hole, chips are not broken. Use a pick feed when chip breaking is necessary.
- For counter boring of a sloped face, a carbide end mill is recommended.
- When machining austenitic stainless steels(JIS SUS304,SUS316),set the revolution at 40%-70% and the feed rate 40%-60%.
- Please use a collet type drill chuck or a milling chuck.
- Please reduce the revolution and feed rate depending on the drilling situation when the installation of workpiece or machine lacks rigidity.
- Use sufficient cutting fluid.
- The above-mentioned cutting condition is standard when using water-soluble cutting fluid. Please reduce the revolution when using non-water-soluble cutting fluid.

VSD

VIOLET DRILLS

STRAIGHT SHANK DRILLS

Product Information

HSS | V | 110° SIG (DC<0.7) | 118° SIG (DC≧0.7) | X Thinning (DC<2) | XR Thinning (DC≧2)

TECHNICAL INFO >> 1997

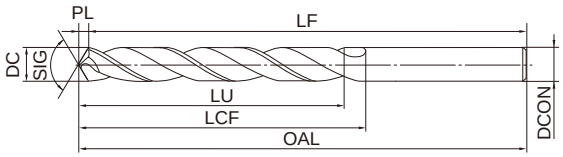
ISO13399 PROPERTY >> 1966

Work Material

P M K

SYMBOL DESCRIPTIONS >> 1623

DRILLS SELECTION CHART >> 1636



Type1

	0.5≦D C<1	1≦D C≦3	3<DC≦6	6<D C≦10	10<D C≦13
	0 −0.010	0 −0.014	0 −0.018	0 −0.022	0 −0.027

Standard drill depth : LU=LCF-3DC

●Inventory maintained in Japan. Unit:mm

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
VSDD0050	0.5	6.2	27.2	27	0.18	0.5	●	1
VSDD0060	0.6	7.2	30.2	30	0.21	0.6	●	1
VSDD0070	0.7	9.2	32.2	32	0.21	0.7	●	1
VSDD0080	0.8	10.2	34.2	34	0.24	0.8	●	1
VSDD0090	0.9	11.3	36.3	36	0.27	0.9	●	1
VSDD0100	1.0	12.3	40.3	40	0.3	1.0	●	1
VSDD0110	1.1	14.3	42.3	42	0.3	1.1	●	1
VSDD0120	1.2	16.4	42.4	42	0.4	1.2	●	1
VSDD0130	1.3	16.4	45.4	45	0.4	1.3	●	1
VSDD0140	1.4	18.4	48.4	48	0.4	1.4	●	1
VSDD0150	1.5	18.5	48.5	48	0.5	1.5	●	1
VSDD0160	1.6	20.5	50.5	50	0.5	1.6	●	1
VSDD0170	1.7	20.5	50.5	50	0.5	1.7	●	1
VSDD0180	1.8	22.5	52.5	52	0.5	1.8	●	1
VSDD0190	1.9	22.6	52.6	52	0.6	1.9	●	1
VSDD0200	2.0	23.6	55.6	55	0.6	2.0	●	1
VSDD0210	2.1	23.6	55.6	55	0.6	2.1	●	1
VSDD0220	2.2	26.7	58.7	58	0.7	2.2	●	1
VSDD0230	2.3	26.7	58.7	58	0.7	2.3	●	1
VSDD0240	2.4	29.7	61.7	61	0.7	2.4	●	1
VSDD0250	2.5	29.8	61.8	61	0.8	2.5	●	1
VSDD0260	2.6	29.8	64.8	64	0.8	2.6	●	1
VSDD0270	2.7	32.8	64.8	64	0.8	2.7	●	1
VSDD0280	2.8	32.8	67.8	67	0.8	2.8	●	1
VSDD0290	2.9	32.9	71.9	71	0.9	2.9	●	1
VSDD0300	3.0	32.9	71.9	71	0.9	3.0	●	1
VSDD0310	3.1	35.9	71.9	71	0.9	3.1	●	1
VSDD0320	3.2	36.0	72.0	71	1.0	3.2	●	1
VSDD0330	3.3	36.0	74.0	73	1.0	3.3	●	1
VSDD0340	3.4	39.0	74.0	73	1.0	3.4	●	1
VSDD0350	3.5	39.1	74.1	73	1.1	3.5	●	1
VSDD0360	3.6	39.1	77.1	76	1.1	3.6	●	1
VSDD0370	3.7	39.1	77.1	76	1.1	3.7	●	1
VSDD0380	3.8	43.1	77.1	76	1.1	3.8	●	1

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
VSDD0390	3.9	43.2	80.2	79	1.2	3.9	●	1
VSDD0400	4.0	43.2	84.2	83	1.2	4.0	●	1
VSDD0410	4.1	43.2	84.2	83	1.2	4.1	●	1
VSDD0420	4.2	43.3	84.3	83	1.3	4.2	●	1
VSDD0430	4.3	47.3	84.3	83	1.3	4.3	●	1
VSDD0440	4.4	47.3	87.3	86	1.3	4.4	●	1
VSDD0450	4.5	47.4	87.4	86	1.4	4.5	●	1
VSDD0460	4.6	47.4	87.4	86	1.4	4.6	●	1
VSDD0470	4.7	47.4	90.4	89	1.4	4.7	●	1
VSDD0480	4.8	52.4	90.4	89	1.4	4.8	●	1
VSDD0490	4.9	52.5	93.5	92	1.5	4.9	●	1
VSDD0500	5.0	52.5	93.5	92	1.5	5.0	●	1
VSDD0510	5.1	52.5	93.5	92	1.5	5.1	●	1
VSDD0520	5.2	52.6	96.6	95	1.6	5.2	●	1
VSDD0530	5.3	52.6	96.6	95	1.6	5.3	●	1
VSDD0540	5.4	57.6	96.6	95	1.6	5.4	●	1
VSDD0550	5.5	57.7	96.7	95	1.7	5.5	●	1
VSDD0560	5.6	57.7	99.7	98	1.7	5.6	●	1
VSDD0570	5.7	57.7	99.7	98	1.7	5.7	●	1
VSDD0580	5.8	57.7	99.7	98	1.7	5.8	●	1
VSDD0590	5.9	57.8	99.8	98	1.8	5.9	●	1
VSDD0600	6.0	57.8	103.8	102	1.8	6.0	●	1
VSDD0610	6.1	63.8	103.8	102	1.8	6.1	●	1
VSDD0620	6.2	63.9	103.9	102	1.9	6.2	●	1
VSDD0630	6.3	63.9	103.9	102	1.9	6.3	●	1
VSDD0640	6.4	63.9	106.9	105	1.9	6.4	●	1
VSDD0650	6.5	64.0	107.0	105	2.0	6.5	●	1
VSDD0660	6.6	64.0	107.0	105	2.0	6.6	●	1
VSDD0670	6.7	64.0	107.0	105	2.0	6.7	●	1
VSDD0680	6.8	69.0	107.0	105	2.0	6.8	●	1
VSDD0690	6.9	69.1	107.1	105	2.1	6.9	●	1
VSDD0700	7.0	69.1	107.1	105	2.1	7.0	●	1
VSDD0710	7.1	69.1	110.1	108	2.1	7.1	●	1
VSDD0720	7.2	69.2	110.2	108	2.2	7.2	●	1

VSD

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
VSDD0730	7.3	69.2	110.2	108	2.2	7.3	●	1
VSDD0740	7.4	69.2	113.2	111	2.2	7.4	●	1
VSDD0750	7.5	69.3	113.3	111	2.3	7.5	●	1
VSDD0760	7.6	75.3	113.3	111	2.3	7.6	●	1
VSDD0770	7.7	75.3	116.3	114	2.3	7.7	●	1
VSDD0780	7.8	75.3	116.3	114	2.3	7.8	●	1
VSDD0790	7.9	75.4	116.4	114	2.4	7.9	●	1
VSDD0800	8.0	75.4	116.4	114	2.4	8.0	●	1
VSDD0810	8.1	75.4	119.4	117	2.4	8.1	●	1
VSDD0820	8.2	75.5	119.5	117	2.5	8.2	●	1
VSDD0830	8.3	75.5	119.5	117	2.5	8.3	●	1
VSDD0840	8.4	75.5	123.5	121	2.5	8.4	●	1
VSDD0850	8.5	75.6	123.6	121	2.6	8.5	●	1
VSDD0860	8.6	81.6	123.6	121	2.6	8.6	●	1
VSDD0870	8.7	81.6	123.6	121	2.6	8.7	●	1
VSDD0880	8.8	81.6	126.6	124	2.6	8.8	●	1
VSDD0890	8.9	81.7	126.7	124	2.7	8.9	●	1
VSDD0900	9.0	81.7	126.7	124	2.7	9.0	●	1
VSDD0910	9.1	81.7	126.7	124	2.7	9.1	●	1
VSDD0920	9.2	81.8	129.8	127	2.8	9.2	●	1
VSDD0930	9.3	81.8	129.8	127	2.8	9.3	●	1
VSDD0940	9.4	81.8	129.8	127	2.8	9.4	●	1
VSDD0950	9.5	81.9	129.9	127	2.9	9.5	●	1
VSDD0960	9.6	87.9	132.9	130	2.9	9.6	●	1
VSDD0970	9.7	87.9	132.9	130	2.9	9.7	●	1
VSDD0980	9.8	87.9	132.9	130	2.9	9.8	●	1
VSDD0990	9.9	88.0	133.0	130	3.0	9.9	●	1
VSDD1000	10.0	88.0	133.0	130	3.0	10.0	●	1
VSDD1010	10.1	88.0	136.0	133	3.0	10.1	●	1

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
VSDD1020	10.2	88.1	136.1	133	3.1	10.2	●	1
VSDD1030	10.3	88.1	136.1	133	3.1	10.3	●	1
VSDD1040	10.4	88.1	136.1	133	3.1	10.4	●	1
VSDD1050	10.5	88.2	140.2	137	3.2	10.5	●	1
VSDD1060	10.6	88.2	140.2	137	3.2	10.6	●	1
VSDD1070	10.7	95.2	140.2	137	3.2	10.7	●	1
VSDD1080	10.8	95.2	143.2	140	3.2	10.8	●	1
VSDD1090	10.9	95.3	143.3	140	3.3	10.9	●	1
VSDD1100	11.0	95.3	143.3	140	3.3	11.0	●	1
VSDD1110	11.1	95.3	143.3	140	3.3	11.1	●	1
VSDD1120	11.2	95.4	146.4	143	3.4	11.2	●	1
VSDD1130	11.3	95.4	146.4	143	3.4	11.3	●	1
VSDD1140	11.4	95.4	146.4	143	3.4	11.4	●	1
VSDD1150	11.5	95.5	146.5	143	3.5	11.5	●	1
VSDD1160	11.6	95.5	149.5	146	3.5	11.6	●	1
VSDD1170	11.7	95.5	149.5	146	3.5	11.7	●	1
VSDD1180	11.8	95.5	149.5	146	3.5	11.8	●	1
VSDD1190	11.9	102.6	149.6	146	3.6	11.9	●	1
VSDD1200	12.0	102.6	152.6	149	3.6	12.0	●	1
VSDD1210	12.1	102.6	152.6	149	3.6	12.1	●	1
VSDD1220	12.2	102.7	152.7	149	3.7	12.2	●	1
VSDD1230	12.3	102.7	152.7	149	3.7	12.3	●	1
VSDD1240	12.4	102.7	155.7	152	3.7	12.4	●	1
VSDD1250	12.5	102.8	155.8	152	3.8	12.5	●	1
VSDD1260	12.6	102.8	155.8	152	3.8	12.6	●	1
VSDD1270	12.7	102.8	155.8	152	3.8	12.7	●	1
VSDD1280	12.8	102.8	155.8	152	3.8	12.8	●	1
VSDD1290	12.9	102.9	155.9	152	3.9	12.9	●	1
VSDD1300	13.0	102.9	155.9	152	3.9	13.0	●	1

VSD

Recommended cutting condition

Work material	Structural steel			Carbon steel AISI 1049			Stainless steel AISI 420			Stainless steel AISI 304 Tool steel AISID2(Low-hardness materials) Heat-treated steelAISI H13 (—40HRC)		
Dia. DC(mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (mm/rev)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (mm/rev)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (mm/rev)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (mm/rev)
0.5	40	15000	0.01	30	11250	0.01	20	7500	0.01	10—14	5620	0.01
1.0	40	10000	0.02	30	7500	0.02	20	5000	0.02	10—14	3750	0.02
1.5	40	8200	0.03	30	6150	0.03	20	4100	0.03	10—14	2800	0.03
2.0	40	6370	0.05	30	4780	0.05	20	3180	0.05	10—14	2200	0.04
3.0	40	4250	0.10	30	3180	0.10	20	2120	0.07	10—14	1400	0.06
4.0	40	3180	0.13	30	2390	0.13	20	1590	0.09	10—14	1100	0.08
5.0	40	2550	0.15	30	1910	0.15	20	1270	0.11	10—14	860	0.10
6.0	40	2120	0.18	30	1590	0.18	20	1060	0.13	10—14	720	0.11
7.0	40	1820	0.20	30	1360	0.20	20	910	0.14	10—14	610	0.12
8.0	40	1590	0.22	30	1190	0.21	20	800	0.15	10—14	540	0.13
9.0	40	1420	0.24	30	1060	0.22	20	710	0.17	10—14	480	0.14
10.0	40	1270	0.26	30	960	0.23	20	640	0.18	10—14	430	0.15
11.0	40	1160	0.28	30	870	0.24	20	580	0.19	10—14	390	0.16
12.0	40	1060	0.30	30	800	0.25	20	530	0.20	10—14	360	0.17
13.0	40	980	0.30	30	730	0.26	20	490	0.20	10—14	330	0.17

- Please reduce the revolution depending on drilling situation when the application lacks rigidity.
- Please use step drilling and reduce the cutting conditions in the case when the drilling depth exceeds 3DC(DC:drill diameter).
- The above-mentioned cutting condition is standard when using water-soluble cutting fluid. Please reduce the revolution when using non-water-soluble cutting fluid.

VTDS

VIOLET DRILLS

Short, Taper shank

Product Information

HSS V 118° SIG XR Thinning

Work Material

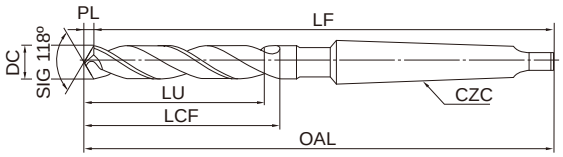
P M K

TECHNICAL INFO >> 1997

ISO13399 PROPERTY >> 1966

SYMBOL DESCRIPTIONS >> 1623

DRILLS SELECTION CHART >> 1636



Type1

	DC=6	6<DC≦10	10<DC≦18	18<DC≦30	30<DC≦32
	0 −0.018	0 −0.022	0 −0.027	0 −0.033	0 −0.039

Standard drill depth : LU=LCF-3DC

●Inventory maintained in Japan. Unit:mm

Order Number	DC	LCF	OAL	LF	PL	CZC	Stock	Type
VTDSD0600M1	6.0	45.8	127.8	126	1.8	MT.1	●	1
VTDSD0650M1	6.5	46.0	128.0	126	2.0	MT.1	●	1
VTDSD0660M1	6.6	46.0	128.0	126	2.0	MT.1	●	1
VTDSD0680M1	6.8	46.0	128.0	126	2.0	MT.1	●	1
VTDSD0700M1	7.0	46.1	128.1	126	2.1	MT.1	●	1
VTDSD0720M1	7.2	46.2	128.2	126	2.2	MT.1	●	1
VTDSD0750M1	7.5	46.3	128.3	126	2.3	MT.1	●	1
VTDSD0770M1	7.7	50.3	132.3	130	2.3	MT.1	●	1
VTDSD0780M1	7.8	50.3	132.3	130	2.3	MT.1	●	1
VTDSD0800M1	8.0	50.4	132.4	130	2.4	MT.1	●	1
VTDSD0820M1	8.2	50.5	132.5	130	2.5	MT.1	●	1
VTDSD0850M1	8.5	50.6	132.6	130	2.6	MT.1	●	1
VTDSD0880M1	8.8	54.6	135.6	133	2.6	MT.1	●	1
VTDSD0900M1	9.0	54.7	135.7	133	2.7	MT.1	●	1
VTDSD0950M1	9.5	54.9	135.9	133	2.9	MT.1	●	1
VTDSD0970M1	9.7	58.9	139.9	137	2.9	MT.1	●	1
VTDSD0980M1	9.8	58.9	139.9	137	2.9	MT.1	●	1
VTDSD1000M1	10.0	59.0	140.0	137	3.0	MT.1	●	1
VTDSD1030M1	10.3	59.1	140.1	137	3.1	MT.1	●	1
VTDSD1050M1	10.5	59.2	140.2	137	3.2	MT.1	●	1
VTDSD1080M1	10.8	64.2	145.2	142	3.2	MT.1	●	1
VTDSD1100M1	11.0	64.3	145.3	142	3.3	MT.1	●	1
VTDSD1150M1	11.5	64.5	145.5	142	3.5	MT.1	●	1
VTDSD1200M1	12.0	69.6	149.6	146	3.6	MT.1	●	1
VTDSD1250M2	12.5	69.8	166.8	163	3.8	MT.2	●	1
VTDSD1300M2	13.0	69.9	166.9	163	3.9	MT.2	●	1
VTDSD1350M2	13.5	74.1	172.1	168	4.1	MT.2	●	1
VTDSD1400M2	14.0	74.2	172.2	168	4.2	MT.2	●	1
VTDSD1450M2	14.5	77.4	175.4	171	4.4	MT.2	●	1
VTDSD1500M2	15.0	77.5	175.5	171	4.5	MT.2	●	1
VTDSD1550M2	15.5	81.7	179.7	175	4.7	MT.2	●	1
VTDSD1600M2	16.0	81.8	179.8	175	4.8	MT.2	●	1

Order Number	DC	LCF	OAL	LF	PL	CZC	Stock	Type
VTDSD1650M2	16.5	85.0	183.0	178	5.0	MT.2	●	1
VTDSD1700M2	17.0	85.1	183.1	178	5.1	MT.2	●	1
VTDSD1750M2	17.5	89.3	187.3	182	5.3	MT.2	●	1
VTDSD1800M2	18.0	89.4	187.4	182	5.4	MT.2	●	1
VTDSD1850M2	18.5	91.6	189.6	184	5.6	MT.2	●	1
VTDSD1900M2	19.0	91.7	189.7	184	5.7	MT.2	●	1
VTDSD1950M2	19.5	95.9	193.9	188	5.9	MT.2	●	1
VTDSD2000M2	20.0	96.0	194.0	188	6.0	MT.2	●	1
VTDSD2050M2	20.5	99.2	197.2	191	6.2	MT.2	●	1
VTDSD2100M2	21.0	99.3	197.3	191	6.3	MT.2	●	1
VTDSD2150M2	21.5	102.5	200.5	194	6.5	MT.2	●	1
VTDSD2200M2	22.0	102.6	200.6	194	6.6	MT.2	●	1
VTDSD2250M2	22.5	106.8	204.8	198	6.8	MT.2	●	1
VTDSD2300M2	23.0	106.9	204.9	198	6.9	MT.2	●	1
VTDSD2350M3	23.5	109.1	231.1	224	7.1	MT.3	●	1
VTDSD2400M3	24.0	109.2	231.2	224	7.2	MT.3	●	1
VTDSD2450M3	24.5	109.4	231.4	224	7.4	MT.3	●	1
VTDSD2500M3	25.0	109.5	231.5	224	7.5	MT.3	●	1
VTDSD2550M3	25.5	112.7	233.7	226	7.7	MT.3	●	1
VTDSD2600M3	26.0	112.8	233.8	226	7.8	MT.3	●	1
VTDSD2650M3	26.5	113.0	234.0	226	8.0	MT.3	●	1
VTDSD2700M3	27.0	116.1	238.1	230	8.1	MT.3	●	1
VTDSD2750M3	27.5	116.3	238.3	230	8.3	MT.3	●	1
VTDSD2800M3	28.0	116.4	238.4	230	8.4	MT.3	●	1
VTDSD2850M3	28.5	119.6	240.6	232	8.6	MT.3	●	1
VTDSD2900M3	29.0	119.7	240.7	232	8.7	MT.3	●	1
VTDSD2950M3	29.5	119.9	240.9	232	8.9	MT.3	●	1
VTDSD3000M3	30.0	120.0	241.0	232	9.0	MT.3	●	1
VTDSD3050M3	30.5	123.2	244.2	235	9.2	MT.3	●	1
VTDSD3100M3	31.0	123.3	244.3	235	9.3	MT.3	●	1
VTDSD3150M3	31.5	123.5	244.5	235	9.5	MT.3	●	1
VTDSD3200M3	32.0	123.6	244.6	235	9.6	MT.3	●	1

VTDS

Recommended cutting condition

Work material	Structural steel			Carbon steel AISI 1049			Stainless steel AISI 420 Copper alloy, Brass			Stainless steel AISI 304 Tool steel AISID2(Low-hardness materials)			Heat-treated steelAISI H13 (35— 40HRC)		
Dia. DC(mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (mm/rev)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (mm/rev)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (mm/rev)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (mm/rev)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (mm/rev)
6.0	33—38	2000	0.18	28—33	1750	0.18	20	1060	0.15	15	800	0.12	18	950	0.12
8.0	33—38	1400	0.22	28—33	1270	0.22	20	800	0.20	15	600	0.15	18	720	0.15
10.0	33—38	1100	0.25	28—33	960	0.25	20	640	0.22	15	480	0.18	18	570	0.18
14.0	33—38	790	0.30	28—33	680	0.28	20	450	0.25	15	340	0.23	18	410	0.23
18.0	33—38	610	0.35	28—33	530	0.34	20	350	0.30	15	270	0.27	18	320	0.27
20.0	33—38	540	0.40	28—33	480	0.38	20	320	0.33	15	240	0.30	18	280	0.30
22.0	33—38	480	0.42	28—33	430	0.40	20	290	0.35	15	220	0.30	18	260	0.30
24.0	33—38	430	0.42	28—33	380	0.40	20	260	0.35	15	200	0.30	18	240	0.30
28.0	33—38	370	0.45	28—33	330	0.42	20	220	0.38	15	170	0.33	18	200	0.33
32.0	33—38	320	0.45	28—33	280	0.42	20	200	0.38	15	150	0.33	18	180	0.33

- The above-mentioned cutting condition is standard when using water-soluble cutting fluid. Please reduce the revolution when using non-water-soluble cutting fluid.

GSD

TiN, Straight shank

STRAIGHT SHANK DRILLS

Product Information

HSS G 110° SIG 118° SIG X Thinning XR Thinning

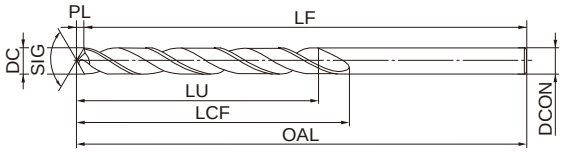
DC<0.7 DC≧0.7 DC<2 DC≧2

TECHNICAL INFO >> 1997 ISO13399 PROPERTY >> 1966

Work Material

P M K N

SYMBOL DESCRIPTIONS >> 1623 DRILLS SELECTION CHART >> 1636



Type1

	0.5≦D C<1	1≦D C≦3	3<DC≦6	6<D C≦10	10<D C≦13
	0 −0.010	0 −0.014	0 −0.018	0 −0.022	0 −0.027

Standard drill depth : LU=LCF-3DC

●Inventory maintained in Japan. Unit:mm

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
GSDD0050	0.5	6.2	27.2	27	0.18	0.5	●	1
GSDD0060	0.6	7.2	30.2	30	0.21	0.6	●	1
GSDD0070	0.7	9.2	32.2	32	0.21	0.7	●	1
GSDD0080	0.8	10.2	34.2	34	0.24	0.8	●	1
GSDD0090	0.9	11.3	36.3	36	0.27	0.9	●	1
GSDD0100	1.0	12.3	40.3	40	0.3	1.0	●	1
GSDD0110	1.1	14.3	42.3	42	0.3	1.1	●	1
GSDD0120	1.2	16.4	42.4	42	0.4	1.2	●	1
GSDD0130	1.3	16.4	45.4	45	0.4	1.3	●	1
GSDD0140	1.4	18.4	48.4	48	0.4	1.4	●	1
GSDD0150	1.5	18.5	48.5	48	0.5	1.5	●	1
GSDD0160	1.6	20.5	50.5	50	0.5	1.6	●	1
GSDD0170	1.7	20.5	50.5	50	0.5	1.7	●	1
GSDD0180	1.8	22.5	52.5	52	0.5	1.8	●	1
GSDD0190	1.9	22.6	52.6	52	0.6	1.9	●	1
GSDD0200	2.0	23.6	55.6	55	0.6	2.0	●	1
GSDD0210	2.1	23.6	55.6	55	0.6	2.1	●	1
GSDD0220	2.2	26.7	58.7	58	0.7	2.2	●	1
GSDD0230	2.3	26.7	58.7	58	0.7	2.3	●	1
GSDD0240	2.4	29.7	61.7	61	0.7	2.4	●	1
GSDD0250	2.5	29.8	61.8	61	0.8	2.5	●	1
GSDD0260	2.6	29.8	64.8	64	0.8	2.6	●	1
GSDD0270	2.7	32.8	64.8	64	0.8	2.7	●	1
GSDD0280	2.8	32.8	67.8	67	0.8	2.8	●	1
GSDD0290	2.9	32.9	71.9	71	0.9	2.9	●	1
GSDD0300	3.0	32.9	71.9	71	0.9	3.0	●	1
GSDD0310	3.1	35.9	71.9	71	0.9	3.1	●	1
GSDD0320	3.2	36.0	72.0	71	1.0	3.2	●	1
GSDD0330	3.3	36.0	74.0	73	1.0	3.3	●	1
GSDD0340	3.4	39.0	74.0	73	1.0	3.4	●	1
GSDD0350	3.5	39.1	74.1	73	1.1	3.5	●	1
GSDD0360	3.6	39.1	77.1	76	1.1	3.6	●	1
GSDD0370	3.7	39.1	77.1	76	1.1	3.7	●	1
GSDD0380	3.8	43.1	77.1	76	1.1	3.8	●	1

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
GSDD0390	3.9	43.2	80.2	79	1.2	3.9	●	1
GSDD0400	4.0	43.2	84.2	83	1.2	4.0	●	1
GSDD0410	4.1	43.2	84.2	83	1.2	4.1	●	1
GSDD0420	4.2	43.3	84.3	83	1.3	4.2	●	1
GSDD0430	4.3	47.3	84.3	83	1.3	4.3	●	1
GSDD0440	4.4	47.3	87.3	86	1.3	4.4	●	1
GSDD0450	4.5	47.4	87.4	86	1.4	4.5	●	1
GSDD0460	4.6	47.4	87.4	86	1.4	4.6	●	1
GSDD0470	4.7	47.4	90.4	89	1.4	4.7	●	1
GSDD0480	4.8	52.4	90.4	89	1.4	4.8	●	1
GSDD0490	4.9	52.5	93.5	92	1.5	4.9	●	1
GSDD0500	5.0	52.5	93.5	92	1.5	5.0	●	1
GSDD0510	5.1	52.5	93.5	92	1.5	5.1	●	1
GSDD0520	5.2	52.6	96.6	95	1.6	5.2	●	1
GSDD0530	5.3	52.6	96.6	95	1.6	5.3	●	1
GSDD0540	5.4	57.6	96.6	95	1.6	5.4	●	1
GSDD0550	5.5	57.7	96.7	95	1.7	5.5	●	1
GSDD0560	5.6	57.7	99.7	98	1.7	5.6	●	1
GSDD0570	5.7	57.7	99.7	98	1.7	5.7	●	1
GSDD0580	5.8	57.7	99.7	98	1.7	5.8	●	1
GSDD0590	5.9	57.8	99.8	98	1.8	5.9	●	1
GSDD0600	6.0	57.8	103.8	102	1.8	6.0	●	1
GSDD0610	6.1	63.8	103.8	102	1.8	6.1	●	1
GSDD0620	6.2	63.9	103.9	102	1.9	6.2	●	1
GSDD0630	6.3	63.9	103.9	102	1.9	6.3	●	1
GSDD0640	6.4	63.9	106.9	105	1.9	6.4	●	1
GSDD0650	6.5	64.0	107.0	105	2.0	6.5	●	1
GSDD0660	6.6	64.0	107.0	105	2.0	6.6	●	1
GSDD0670	6.7	64.0	107.0	105	2.0	6.7	●	1
GSDD0680	6.8	69.0	107.0	105	2.0	6.8	●	1
GSDD0690	6.9	69.1	107.1	105	2.1	6.9	●	1
GSDD0700	7.0	69.1	107.1	105	2.1	7.0	●	1
GSDD0710	7.1	69.1	110.1	108	2.1	7.1	●	1
GSDD0720	7.2	69.2	110.2	108	2.2	7.2	●	1

GSD

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
GSDD0730	7.3	69.2	110.2	108	2.2	7.3	●	1
GSDD0740	7.4	69.2	113.2	111	2.2	7.4	●	1
GSDD0750	7.5	69.3	113.3	111	2.3	7.5	●	1
GSDD0760	7.6	75.3	113.3	111	2.3	7.6	●	1
GSDD0770	7.7	75.3	116.3	114	2.3	7.7	●	1
GSDD0780	7.8	75.3	116.3	114	2.3	7.8	●	1
GSDD0790	7.9	75.4	116.4	114	2.4	7.9	●	1
GSDD0800	8.0	75.4	116.4	114	2.4	8.0	●	1
GSDD0810	8.1	75.4	119.4	117	2.4	8.1	●	1
GSDD0820	8.2	75.5	119.5	117	2.5	8.2	●	1
GSDD0830	8.3	75.5	119.5	117	2.5	8.3	●	1
GSDD0840	8.4	75.5	123.5	121	2.5	8.4	●	1
GSDD0850	8.5	75.6	123.6	121	2.6	8.5	●	1
GSDD0860	8.6	81.6	123.6	121	2.6	8.6	●	1
GSDD0870	8.7	81.6	123.6	121	2.6	8.7	●	1
GSDD0880	8.8	81.6	126.6	124	2.6	8.8	●	1
GSDD0890	8.9	81.7	126.7	124	2.7	8.9	●	1
GSDD0900	9.0	81.7	126.7	124	2.7	9.0	●	1
GSDD0910	9.1	81.7	126.7	124	2.7	9.1	●	1
GSDD0920	9.2	81.8	129.8	127	2.8	9.2	●	1
GSDD0930	9.3	81.8	129.8	127	2.8	9.3	●	1
GSDD0940	9.4	81.8	129.8	127	2.8	9.4	●	1
GSDD0950	9.5	81.9	129.9	127	2.9	9.5	●	1
GSDD0960	9.6	87.9	132.9	130	2.9	9.6	●	1
GSDD0970	9.7	87.9	132.9	130	2.9	9.7	●	1
GSDD0980	9.8	87.9	132.9	130	2.9	9.8	●	1
GSDD0990	9.9	88.0	133.0	130	3.0	9.9	●	1
GSDD1000	10.0	88.0	133.0	130	3.0	10.0	●	1
GSDD1010	10.1	88.0	136.0	133	3.0	10.1	●	1

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
GSDD1020	10.2	88.1	136.1	133	3.1	10.2	●	1
GSDD1030	10.3	88.1	136.1	133	3.1	10.3	●	1
GSDD1040	10.4	88.1	136.1	133	3.1	10.4	●	1
GSDD1050	10.5	88.2	140.2	137	3.2	10.5	●	1
GSDD1060	10.6	88.2	140.2	137	3.2	10.6	●	1
GSDD1070	10.7	95.2	140.2	137	3.2	10.7	●	1
GSDD1080	10.8	95.2	143.2	140	3.2	10.8	●	1
GSDD1090	10.9	95.3	143.3	140	3.3	10.9	●	1
GSDD1100	11.0	95.3	143.3	140	3.3	11.0	●	1
GSDD1110	11.1	95.3	143.3	140	3.3	11.1	●	1
GSDD1120	11.2	95.4	146.4	143	3.4	11.2	●	1
GSDD1130	11.3	95.4	146.4	143	3.4	11.3	●	1
GSDD1140	11.4	95.4	146.4	143	3.4	11.4	●	1
GSDD1150	11.5	95.5	146.5	143	3.5	11.5	●	1
GSDD1160	11.6	95.5	149.5	146	3.5	11.6	●	1
GSDD1170	11.7	95.5	149.5	146	3.5	11.7	●	1
GSDD1180	11.8	95.6	149.6	146	3.6	11.8	●	1
GSDD1190	11.9	102.6	149.6	146	3.6	11.9	●	1
GSDD1200	12.0	102.6	152.6	149	3.6	12.0	●	1
GSDD1210	12.1	102.6	152.6	149	3.6	12.1	●	1
GSDD1220	12.2	102.7	152.7	149	3.7	12.2	●	1
GSDD1230	12.3	102.7	152.7	149	3.7	12.3	●	1
GSDD1240	12.4	102.7	155.7	152	3.7	12.4	●	1
GSDD1250	12.5	102.8	155.8	152	3.8	12.5	●	1
GSDD1260	12.6	102.8	155.8	152	3.8	12.6	●	1
GSDD1270	12.7	102.8	155.8	152	3.8	12.7	●	1
GSDD1280	12.8	102.9	155.9	152	3.9	12.8	●	1
GSDD1290	12.9	102.9	155.9	152	3.9	12.9	●	1
GSDD1300	13.0	102.9	155.9	152	3.9	13.0	●	1

GSD

Recommended cutting condition

Work material	Structural steel SS Carbon steel S-C (—25HRC)		Alloy steel SCM Tool steel SK (—35HRC)		Alloy steel SCM Die steel SKD (—40HRC)		Cast iron FC	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)
0.5	8000	0.01	7000	0.008	6000	0.005	8000	0.01
1.0	6000	0.02	5500	0.01	4500	0.008	6000	0.02
2.0	4700	0.05	3600	0.03	2400	0.02	4700	0.05
3.0	3200	0.10	2400	0.08	1800	0.05	3500	0.10
6.0	1600	0.18	1200	0.15	900	0.13	1750	0.18
8.0	1200	0.20	900	0.18	680	0.15	1300	0.20
10.0	960	0.22	720	0.20	550	0.18	1100	0.22
12.0	800	0.24	600	0.22	450	0.20	880	0.24
15.0	630	0.28	480	0.24	350	0.22	700	0.28
20.0	470	0.33	360	0.26	260	0.24	530	0.33
25.0	380	0.36	290	0.28	210	0.26	420	0.36
30.0	310	0.40	240	0.30	180	0.28	330	0.40

Work material	Martensitic stainless steel AISI 420 Ferritic stainless steel AISI 430		Austenitic stainless steel AISI 304 Precipitation hardening ASTM 630		Copper alloy, Brass		Aluminium alloy	
Dia. DC(mm)	Revolution (min-1)	Feed rate (mm/rev)	Revolution (min-1)	Feed rate (mm/rev)	Revolution (min-1)	Feed rate (mm/rev)	Revolution (min-1)	Feed rate (mm/rev)
0.5	8000	0.01	6000	0.01	8000	0.01	10000	0.02
1.0	5000	0.02	4000	0.02	6000	0.02	7000	0.04
2.0	2500	0.05	2300	0.04	4700	0.05	6000	0.08
3.0	1900	0.10	1500	0.07	3200	0.10	5500	0.13
6.0	950	0.18	750	0.10	1600	0.18	3100	0.23
8.0	700	0.20	530	0.13	1200	0.20	2300	0.28
10.0	560	0.22	420	0.15	960	0.22	1900	0.33
12.0	460	0.24	340	0.17	800	0.24	1600	0.38
15.0	360	0.26	270	0.20	630	0.26	1300	0.42
20.0	270	0.28	200	0.23	470	0.28	950	0.45
25.0	210	0.32	160	0.24	380	0.32	750	0.48
30.0	180	0.35	135	0.25	310	0.35	630	0.50

- Please reduce the cutting conditions when drilling a deep hole.
- This table only shows standard cutting conditions with water-soluble cutting fluids. Please make corrections or adjustments depending on the application.

Reduction rate of cutting conditions for hole drilling

Drilling depth	Reduction rate of cutting speed	Reduction rate of feed
4DC	10%	10%
5DC	10%	15%
6DC	20%	20%
7DC	20%	20%

Drilling depth	Reduction rate of cutting speed	Reduction rate of feed
8DC	30%	20%
10DC	30%	25%
15DC	40%	30%
20DC	40%	45%

- DC:Drill dia.

SD

STRAIGHT SHANK DRILLS

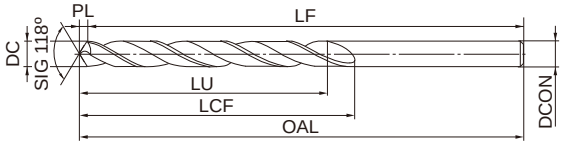
Product Information

HSS 118° SIG

Work Material

P M K N

TECHNICAL INFO >> 1997 ISO13399 PROPERTY >> 1966 SYMBOL DESCRIPTIONS >> 1623 DRILLS SELECTION CHART >> 1636



Type1

	0.2≦D C<1	1≦D C≦3	3<DC≦6	6<D C≦10	10<D C≦17.5
	0 −0.012	0 −0.014	0 −0.018	0 −0.022	0 −0.027

Standard drill depth : LU=LCF-3DC

●Inventory maintained in Japan. Unit:mm

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
SDD0020	0.2	2.6	19.1	19	0.06	0.2	●	1
SDD0030	0.3	3.1	19.1	19	0.09	0.3	●	1
SDD0040	0.4	5.1	20.1	20	0.12	0.4	●	1
SDD0050	0.5	6.2	22.2	22	0.15	0.5	●	1
SDD0060	0.6	7.2	24.2	24	0.18	0.6	●	1
SDD0070	0.7	10.2	32.2	32	0.21	0.7	●	1
SDD0080	0.8	11.2	34.2	34	0.24	0.8	●	1
SDD0090	0.9	13.3	36.3	36	0.27	0.9	●	1
SDD0100	1.0	18.3	40.3	40	0.3	1.0	●	1
SDD0110	1.1	20.3	42.3	42	0.3	1.1	●	1
SDD0120	1.2	20.4	42.4	42	0.4	1.2	●	1
SDD0130	1.3	22.4	45.4	45	0.4	1.3	●	1
SDD0140	1.4	23.4	48.4	48	0.4	1.4	●	1
SDD0150	1.5	23.5	48.5	48	0.5	1.5	●	1
SDD0160	1.6	25.5	50.5	50	0.5	1.6	●	1
SDD0170	1.7	25.5	50.5	50	0.5	1.7	●	1
SDD0180	1.8	28.5	52.5	52	0.5	1.8	●	1
SDD0190	1.9	28.6	52.6	52	0.6	1.9	●	1
SDD0200	2.0	29.6	55.6	55	0.6	2.0	●	1
SDD0210	2.1	29.6	55.6	55	0.6	2.1	●	1
SDD0220	2.2	33.7	58.7	58	0.7	2.2	●	1
SDD0230	2.3	33.7	58.7	58	0.7	2.3	●	1
SDD0240	2.4	35.7	61.7	61	0.7	2.4	●	1
SDD0250	2.5	35.8	61.8	61	0.8	2.5	●	1
SDD0260	2.6	37.8	64.8	64	0.8	2.6	●	1
SDD0270	2.7	37.8	64.8	64	0.8	2.7	●	1
SDD0280	2.8	39.8	67.8	67	0.8	2.8	●	1
SDD0290	2.9	42.9	71.9	71	0.9	2.9	●	1
SDD0300	3.0	42.9	71.9	71	0.9	3.0	●	1
SDD0310	3.1	42.9	71.9	71	0.9	3.1	●	1
SDD0320	3.2	43.0	72.0	71	1.0	3.2	●	1
SDD0330	3.3	46.0	74.0	73	1.0	3.3	●	1
SDD0340	3.4	46.0	74.0	73	1.0	3.4	●	1
SDD0350	3.5	46.1	74.1	73	1.1	3.5	●	1

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
SDD0360	3.6	49.1	77.1	76	1.1	3.6	●	1
SDD0370	3.7	49.1	77.1	76	1.1	3.7	●	1
SDD0380	3.8	49.1	77.1	76	1.1	3.8	●	1
SDD0390	3.9	52.2	80.2	79	1.2	3.9	●	1
SDD0400	4.0	55.2	84.2	83	1.2	4.0	●	1
SDD0410	4.1	55.2	84.2	83	1.2	4.1	●	1
SDD0420	4.2	55.3	84.3	83	1.3	4.2	●	1
SDD0430	4.3	55.3	84.3	83	1.3	4.3	●	1
SDD0440	4.4	57.3	87.3	86	1.3	4.4	●	1
SDD0450	4.5	57.4	87.4	86	1.4	4.5	●	1
SDD0460	4.6	57.4	87.4	86	1.4	4.6	●	1
SDD0470	4.7	60.4	90.4	89	1.4	4.7	●	1
SDD0480	4.8	60.4	90.4	89	1.4	4.8	●	1
SDD0490	4.9	63.5	93.5	92	1.5	4.9	●	1
SDD0500	5.0	63.5	93.5	92	1.5	5.0	●	1
SDD0510	5.1	63.5	93.5	92	1.5	5.1	●	1
SDD0520	5.2	65.6	96.6	95	1.6	5.2	●	1
SDD0530	5.3	65.6	96.6	95	1.6	5.3	●	1
SDD0540	5.4	65.6	96.6	95	1.6	5.4	●	1
SDD0550	5.5	65.7	96.7	95	1.7	5.5	●	1
SDD0560	5.6	68.7	99.7	98	1.7	5.6	●	1
SDD0570	5.7	68.7	99.7	98	1.7	5.7	●	1
SDD0580	5.8	68.7	99.7	98	1.7	5.8	●	1
SDD0590	5.9	68.8	99.8	98	1.8	5.9	●	1
SDD0600	6.0	71.8	103.8	102	1.8	6.0	●	1
SDD0610	6.1	71.8	103.8	102	1.8	6.1	●	1
SDD0620	6.2	71.9	103.9	102	1.9	6.2	●	1
SDD0630	6.3	71.9	103.9	102	1.9	6.3	●	1
SDD0640	6.4	74.9	106.9	105	1.9	6.4	●	1
SDD0650	6.5	75.0	107.0	105	2.0	6.5	●	1
SDD0660	6.6	75.0	107.0	105	2.0	6.6	●	1
SDD0670	6.7	75.0	107.0	105	2.0	6.7	●	1
SDD0680	6.8	75.0	107.0	105	2.0	6.8	●	1
SDD0690	6.9	75.1	107.1	105	2.1	6.9	●	1

SD

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
SDD0700	7.0	75.1	107.1	105	2.1	7.0	●	1
SDD0710	7.1	77.1	110.1	108	2.1	7.1	●	1
SDD0720	7.2	77.2	110.2	108	2.2	7.2	●	1
SDD0730	7.3	77.2	110.2	108	2.2	7.3	●	1
SDD0740	7.4	80.2	113.2	111	2.2	7.4	●	1
SDD0750	7.5	80.3	113.3	111	2.3	7.5	●	1
SDD0760	7.6	80.3	113.3	111	2.3	7.6	●	1
SDD0770	7.7	83.3	116.3	114	2.3	7.7	●	1
SDD0780	7.8	83.3	116.3	114	2.3	7.8	●	1
SDD0790	7.9	83.4	116.4	114	2.4	7.9	●	1
SDD0800	8.0	83.4	116.4	114	2.4	8.0	●	1
SDD0810	8.1	86.4	119.4	117	2.4	8.1	●	1
SDD0820	8.2	86.5	119.5	117	2.5	8.2	●	1
SDD0830	8.3	86.5	119.5	117	2.5	8.3	●	1
SDD0840	8.4	89.5	123.5	121	2.5	8.4	●	1
SDD0850	8.5	89.6	123.6	121	2.6	8.5	●	1
SDD0860	8.6	89.6	123.6	121	2.6	8.6	●	1
SDD0870	8.7	89.6	123.6	121	2.6	8.7	●	1
SDD0880	8.8	91.6	126.6	124	2.6	8.8	●	1
SDD0890	8.9	91.7	126.7	124	2.7	8.9	●	1
SDD0900	9.0	91.7	126.7	124	2.7	9.0	●	1
SDD0910	9.1	91.7	126.7	124	2.7	9.1	●	1
SDD0920	9.2	94.8	129.8	127	2.8	9.2	●	1
SDD0930	9.3	94.8	129.8	127	2.8	9.3	●	1
SDD0940	9.4	94.8	129.8	127	2.8	9.4	●	1
SDD0950	9.5	94.9	129.9	127	2.9	9.5	●	1
SDD0960	9.6	97.9	132.9	130	2.9	9.6	●	1
SDD0970	9.7	97.9	132.9	130	2.9	9.7	●	1
SDD0980	9.8	97.9	132.9	130	2.9	9.8	●	1
SDD0990	9.9	98.0	133.0	130	3.0	9.9	●	1
SDD1000	10.0	98.0	133.0	130	3.0	10.0	●	1
SDD1010	10.1	101.0	136.0	133	3.0	10.1	●	1
SDD1020	10.2	101.1	136.1	133	3.1	10.2	●	1
SDD1030	10.3	101.1	136.1	133	3.1	10.3	●	1
SDD1040	10.4	101.1	136.1	133	3.1	10.4	●	1

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
SDD1050	10.5	103.2	140.2	137	3.2	10.5	●	1
SDD1060	10.6	103.2	140.2	137	3.2	10.6	●	1
SDD1070	10.7	103.2	140.2	137	3.2	10.7	●	1
SDD1080	10.8	106.2	143.2	140	3.2	10.8	●	1
SDD1090	10.9	106.3	143.3	140	3.3	10.9	●	1
SDD1100	11.0	106.3	143.3	140	3.3	11.0	●	1
SDD1110	11.1	106.3	143.3	140	3.3	11.1	●	1
SDD1120	11.2	109.4	146.4	143	3.4	11.2	●	1
SDD1130	11.3	109.4	146.4	143	3.4	11.3	●	1
SDD1140	11.4	109.4	146.4	143	3.4	11.4	●	1
SDD1150	11.5	109.5	146.5	143	3.5	11.5	●	1
SDD1160	11.6	112.5	149.5	146	3.5	11.6	●	1
SDD1170	11.7	112.5	149.5	146	3.5	11.7	●	1
SDD1180	11.8	112.6	149.6	146	3.6	11.8	●	1
SDD1190	11.9	112.6	149.6	146	3.6	11.9	●	1
SDD1200	12.0	114.6	152.6	149	3.6	12.0	●	1
SDD1210	12.1	114.6	152.6	149	3.6	12.1	●	1
SDD1220	12.2	114.7	152.7	149	3.7	12.2	●	1
SDD1230	12.3	114.7	152.7	149	3.7	12.3	●	1
SDD1240	12.4	117.7	155.7	152	3.7	12.4	●	1
SDD1250	12.5	117.8	155.8	152	3.8	12.5	●	1
SDD1260	12.6	117.8	155.8	152	3.8	12.6	●	1
SDD1270	12.7	117.8	155.8	152	3.8	12.7	●	1
SDD1280	12.8	117.9	155.9	152	3.9	12.8	●	1
SDD1290	12.9	117.9	155.9	152	3.9	12.9	●	1
SDD1300	13.0	117.9	155.9	152	3.9	13.0	●	1
SDD1350	13.5	126.1	172.1	168	4.1	13.5	●	1
SDD1400	14.0	126.2	172.2	168	4.2	14.0	●	1
SDD1450	14.5	126.4	172.4	168	4.4	14.5	●	1
SDD1500	15.0	136.5	185.5	181	4.5	15.0	●	1
SDD1550	15.5	136.7	185.7	181	4.7	15.5	●	1
SDD1600	16.0	136.8	185.8	181	4.8	16.0	●	1
SDD1650	16.5	137.0	186.0	181	5.0	16.5	●	1
SDD1700	17.0	148.1	199.1	194	5.1	17.0	●	1
SDD1750	17.5	148.3	199.3	194	5.3	17.5	●	1

SD

Recommended cutting condition

Work material	Structural steel SS Carbon steel S-C (—25HRC)		Alloy steel SCM Tool steel SK (—35HRC)		Alloy steel SCM Die steel SKD (—40HRC)		Cast iron FC	
Dia. DC(mm)	Revolution (min-1)	Feed rate (mm/rev)	Revolution (min-1)	Feed rate (mm/rev)	Revolution (min-1)	Feed rate (mm/rev)	Revolution (min-1)	Feed rate (mm/rev)
0.5	6000	0.01	5000	0.008	4000	0.005	6000	0.01
1.0	5000	0.02	4000	0.01	2800	0.008	5000	0.02
2.0	3000	0.05	2500	0.03	1800	0.02	3000	0.05
3.0	2100	0.10	1800	0.08	1200	0.05	2300	0.10
6.0	1100	0.18	900	0.15	600	0.13	1100	0.18
8.0	800	0.20	670	0.18	450	0.15	900	0.20
10.0	650	0.22	540	0.20	350	0.18	700	0.22
12.0	520	0.24	450	0.22	300	0.20	600	0.24
15.0	420	0.28	360	0.24	240	0.22	470	0.28
20.0	320	0.33	270	0.26	180	0.24	350	0.33
25.0	250	0.36	210	0.28	145	0.26	280	0.36
30.0	210	0.40	180	0.30	120	0.28	230	0.40
40.0	160	0.42	130	0.32	90	0.30	180	0.42

Work material	Martensitic stainless steel AISI 420 Ferritic stainless steel AISI 430		Austenitic stainless steel AISI 304 Precipitation hardening ASTM 630		Copper alloy, Brass		Aluminium alloy	
Dia. DC(mm)	Revolution (min-1)	Feed rate (mm/rev)	Revolution (min-1)	Feed rate (mm/rev)	Revolution (min-1)	Feed rate (mm/rev)	Revolution (min-1)	Feed rate (mm/rev)
0.5	5000	0.01	4000	0.01	6000	0.01	10000	0.02
1.0	4000	0.02	3000	0.02	5000	0.02	7000	0.04
2.0	2200	0.05	1500	0.04	3000	0.05	5000	0.08
3.0	1600	0.10	1000	0.07	2100	0.10	4200	0.13
6.0	800	0.18	530	0.10	1100	0.18	2100	0.23
8.0	600	0.20	400	0.13	800	0.20	1600	0.28
10.0	480	0.22	310	0.15	650	0.22	1200	0.33
12.0	400	0.24	250	0.17	520	0.24	1000	0.38
15.0	320	0.26	170	0.20	420	0.26	850	0.42
20.0	240	0.28	130	0.23	320	0.28	630	0.45
25.0	190	0.32	100	0.24	250	0.32	500	0.48
30.0	160	0.35	85	0.25	210	0.35	400	0.50
40.0	120	0.38	65	0.28	160	0.38	300	0.52

- Please reduce the cutting conditions when drilling a deep hole.
- This table only shows standard cutting conditions with water-soluble cutting fluids. Please make corrections or adjustments depending on the application.

Reduction rate of cutting conditions for hole drilling

Drilling depth	Reduction rate of cutting speed	Reduction rate of feed	Drilling depth	Reduction rate of cutting speed	Reduction rate of feed
4DC	10%	10%	8DC	30%	20%
5DC	10%	15%	10DC	30%	25%
6DC	20%	20%	15DC	40%	30%
7DC	20%	20%	20DC	40%	45%

- DC:Drill dia.

SD

Straight shank, 1/100mm

STRAIGHT SHANK DRILLS

Product Information

HSS 118° SIG

Work Material

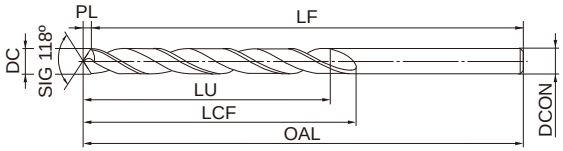
P M K N

TECHNICAL INFO >> 1997

ISO13399 PROPERTY >> 1966

SYMBOL DESCRIPTIONS >> 1623

DRILLS SELECTION CHART >> 1636



Type1

0.25≦D C≦5.95
0 −0.007

Standard drill depth : LU=LCF-3DC

●Inventory maintained in Japan. Unit:mm

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
SDD0025	0.25	3.1	19.1	19	0.08	0.25	●	1
SDD0035	0.35	4.1	19.1	19	0.11	0.35	●	1
SDD0045	0.45	5.1	20.1	20	0.14	0.45	●	1
SDD0055	0.55	7.2	24.2	24	0.17	0.55	●	1
SDD0065	0.65	8.2	26.2	26	0.20	0.65	●	1
SDD0075	0.75	11.2	34.2	34	0.23	0.75	●	1
SDD0085	0.85	13.3	36.3	36	0.26	0.85	●	1
SDD0095	0.95	18.3	40.3	40	0.29	0.95	●	1
SDD0105	1.05	20.3	42.3	42	0.3	1.05	●	1
SDD0115	1.15	20.4	42.4	42	0.4	1.15	●	1
SDD0125	1.25	22.4	45.4	45	0.4	1.25	●	1
SDD0135	1.35	23.4	48.4	48	0.4	1.35	●	1
SDD0145	1.45	23.4	48.4	48	0.4	1.45	●	1
SDD0155	1.55	25.5	50.5	50	0.5	1.55	●	1
SDD0165	1.65	25.5	50.5	50	0.5	1.65	●	1
SDD0175	1.75	28.5	52.5	52	0.5	1.75	●	1
SDD0185	1.85	28.6	52.6	52	0.6	1.85	●	1
SDD0195	1.95	29.6	55.6	55	0.6	1.95	●	1
SDD0205	2.05	29.6	55.6	55	0.6	2.05	●	1
SDD0215	2.15	29.7	55.7	55	0.7	2.15	●	1
SDD0225	2.25	33.7	58.7	58	0.7	2.25	●	1
SDD0235	2.35	33.7	58.7	58	0.7	2.35	●	1
SDD0245	2.45	35.7	61.7	61	0.7	2.45	●	1
SDD0255	2.55	37.8	64.8	64	0.8	2.55	●	1
SDD0265	2.65	37.8	64.8	64	0.8	2.65	●	1
SDD0275	2.75	39.8	67.8	67	0.8	2.75	●	1
SDD0285	2.85	39.9	67.9	67	0.9	2.85	●	1
SDD0295	2.95	42.9	71.9	71	0.9	2.95	●	1
SDD0305	3.05	42.9	71.9	71	0.9	3.05	●	1

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
SDD0315	3.15	43.0	72.0	71	1.0	3.15	●	1
SDD0325	3.25	43.0	72.0	71	1.0	3.25	●	1
SDD0335	3.35	46.0	74.0	73	1.0	3.35	●	1
SDD0345	3.45	46.0	74.0	73	1.0	3.45	●	1
SDD0355	3.55	46.1	74.1	73	1.1	3.55	●	1
SDD0365	3.65	49.1	77.1	76	1.1	3.65	●	1
SDD0375	3.75	49.1	77.1	76	1.1	3.75	●	1
SDD0385	3.85	52.2	80.2	79	1.2	3.85	●	1
SDD0395	3.95	52.2	80.2	79	1.2	3.95	●	1
SDD0405	4.05	55.2	84.2	83	1.2	4.05	●	1
SDD0415	4.15	55.3	84.3	83	1.3	4.15	●	1
SDD0425	4.25	55.3	84.3	83	1.3	4.25	●	1
SDD0435	4.35	55.3	84.3	83	1.3	4.35	●	1
SDD0445	4.45	57.3	87.3	86	1.3	4.45	●	1
SDD0455	4.55	57.4	87.4	86	1.4	4.55	●	1
SDD0465	4.65	60.4	90.4	89	1.4	4.65	●	1
SDD0475	4.75	60.4	90.4	89	1.4	4.75	●	1
SDD0485	4.85	60.5	90.5	89	1.5	4.85	●	1
SDD0495	4.95	63.5	93.5	92	1.5	4.95	●	1
SDD0505	5.05	63.5	93.5	92	1.5	5.05	●	1
SDD0515	5.15	63.6	93.6	92	1.6	5.15	●	1
SDD0525	5.25	65.6	96.6	95	1.6	5.25	●	1
SDD0535	5.35	65.6	96.6	95	1.6	5.35	●	1
SDD0545	5.45	65.6	96.6	95	1.6	5.45	●	1
SDD0555	5.55	65.7	96.7	95	1.7	5.55	●	1
SDD0565	5.65	68.7	99.7	98	1.7	5.65	●	1
SDD0575	5.75	68.7	99.7	98	1.7	5.75	●	1
SDD0585	5.85	68.8	99.8	98	1.8	5.85	●	1
SDD0595	5.95	68.8	99.8	98	1.8	5.95	●	1

SD

Recommended cutting condition

Work material	Structural steel SS Carbon steel S-C (—25HRC)		Alloy steel SCM Tool steel SK (—35HRC)		Alloy steel SCM Die steel SKD (—40HRC)		Cast iron FC	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)
0.5	6000	0.01	5000	0.008	4000	0.005	6000	0.01
1.0	5000	0.02	4000	0.01	2800	0.008	5000	0.02
2.0	3000	0.05	2500	0.03	1800	0.02	3000	0.05
3.0	2100	0.10	1800	0.08	1200	0.05	2300	0.10
6.0	1100	0.18	900	0.15	600	0.13	1100	0.18
8.0	800	0.20	670	0.18	450	0.15	900	0.20
10.0	650	0.22	540	0.20	350	0.18	700	0.22
12.0	520	0.24	450	0.22	300	0.20	600	0.24
15.0	420	0.28	360	0.24	240	0.22	470	0.28
20.0	320	0.33	270	0.26	180	0.24	350	0.33
25.0	250	0.36	210	0.28	145	0.26	280	0.36
30.0	210	0.40	180	0.30	120	0.28	230	0.40
40.0	160	0.42	130	0.32	90	0.30	180	0.42

Work material	Martensitic stainless steel AISI 420 Ferritic stainless steel AISI 430		Austenitic stainless steel AISI 304 Precipitation hardening ASTM 630		Copper alloy, Brass		Aluminium alloy	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)
0.5	5000	0.01	4000	0.01	6000	0.01	10000	0.02
1.0	4000	0.02	3000	0.02	5000	0.02	7000	0.04
2.0	2200	0.05	1500	0.04	3000	0.05	5000	0.08
3.0	1600	0.10	1000	0.07	2100	0.10	4200	0.13
6.0	800	0.18	530	0.10	1100	0.18	2100	0.23
8.0	600	0.20	400	0.13	800	0.20	1600	0.28
10.0	480	0.22	310	0.15	650	0.22	1200	0.33
12.0	400	0.24	250	0.17	520	0.24	1000	0.38
15.0	320	0.26	170	0.20	420	0.26	850	0.42
20.0	240	0.28	130	0.23	320	0.28	630	0.45
25.0	190	0.32	100	0.24	250	0.32	500	0.48
30.0	160	0.35	85	0.25	210	0.35	400	0.50
40.0	120	0.38	65	0.28	160	0.38	300	0.52

- Please reduce the cutting conditions when drilling a deep hole.
- This table only shows standard cutting conditions with water-soluble cutting fluids. Please make corrections or adjustments depending on the application.

Reduction rate of cutting conditions for hole drilling

Drilling depth	Reduction rate of cutting speed	Reduction rate of feed
4DC	10%	10%
5DC	10%	15%
6DC	20%	20%
7DC	20%	20%

Drilling depth	Reduction rate of cutting speed	Reduction rate of feed
8DC	30%	20%
10DC	30%	25%
15DC	40%	30%
20DC	40%	45%

- DC:Drill dia.

SDLS

STRAIGHT SHANK DRILLS

Long shank straight drill

Product Information

HSS 118° SIG X Thinning

DC≧2

Work Material

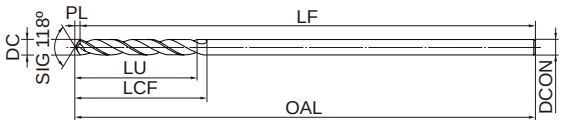
P K N S

TECHNICAL INFO >> 1997

ISO13399 PROPERTY >> 1966

SYMBOL DESCRIPTIONS >> 1623

DRILLS SELECTION CHART >> 1636



Type1

	1≦DC≦3	3<DC≦6	6<DC≦10
	0 −0.014	0 −0.018	0 −0.022

Standard drill depth : LU=LCF-3DC

●Inventory maintained in Japan. Unit:mm

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
SDLSD0100A100	1.0	12.3	100.3	100	0.3	1.0	●	1
SDLSD0110A100	1.1	14.3	100.3	100	0.3	1.1	●	1
SDLSD0120A100	1.2	16.4	100.4	100	0.4	1.2	●	1
SDLSD0130A100	1.3	16.4	100.4	100	0.4	1.3	●	1
SDLSD0140A100	1.4	18.4	100.4	100	0.4	1.4	●	1
SDLSD0150A100	1.5	18.5	100.5	100	0.5	1.5	●	1
SDLSD0160A100	1.6	20.5	100.5	100	0.5	1.6	●	1
SDLSD0170A100	1.7	20.5	100.5	100	0.5	1.7	●	1
SDLSD0180A100	1.8	22.5	100.5	100	0.5	1.8	●	1
SDLSD0190A100	1.9	22.6	100.6	100	0.6	1.9	●	1
SDLSD0200A100	2.0	23.6	100.6	100	0.6	2.0	●	1
SDLSD0210A150	2.1	23.6	150.6	150	0.6	2.1	●	1
SDLSD0220A150	2.2	26.7	150.7	150	0.7	2.2	●	1
SDLSD0230A150	2.3	26.7	150.7	150	0.7	2.3	●	1
SDLSD0240A150	2.4	29.7	150.7	150	0.7	2.4	●	1
SDLSD0250A150	2.5	29.8	150.8	150	0.8	2.5	●	1
SDLSD0260A150	2.6	29.8	150.8	150	0.8	2.6	●	1
SDLSD0270A150	2.7	32.8	150.8	150	0.8	2.7	●	1
SDLSD0280A150	2.8	32.8	150.8	150	0.8	2.8	●	1
SDLSD0290A150	2.9	32.9	150.9	150	0.9	2.9	●	1
SDLSD0300A150	3.0	32.9	150.9	150	0.9	3.0	●	1
SDLSD0310A150	3.1	35.9	150.9	150	0.9	3.1	●	1
SDLSD0320A150	3.2	36.0	151.0	150	1.0	3.2	●	1
SDLSD0330A150	3.3	36.0	151.0	150	1.0	3.3	●	1
SDLSD0340A150	3.4	39.0	151.0	150	1.0	3.4	●	1
SDLSD0350A150	3.5	39.1	151.1	150	1.1	3.5	●	1
SDLSD0360A200	3.6	39.1	201.1	200	1.1	3.6	●	1
SDLSD0370A200	3.7	39.1	201.1	200	1.1	3.7	●	1
SDLSD0380A200	3.8	43.1	201.1	200	1.1	3.8	●	1
SDLSD0390A200	3.9	43.2	201.2	200	1.2	3.9	●	1
SDLSD0400A200	4.0	43.2	201.2	200	1.2	4.0	●	1
SDLSD0410A200	4.1	43.2	201.2	200	1.2	4.1	●	1
SDLSD0420A200	4.2	43.3	201.3	200	1.3	4.2	●	1
SDLSD0430A200	4.3	47.3	201.3	200	1.3	4.3	●	1

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
SDLSD0440A200	4.4	47.3	201.3	200	1.3	4.4	●	1
SDLSD0450A200	4.5	47.4	201.4	200	1.4	4.5	●	1
SDLSD0460A200	4.6	47.4	201.4	200	1.4	4.6	●	1
SDLSD0470A200	4.7	47.4	201.4	200	1.4	4.7	●	1
SDLSD0480A200	4.8	52.4	201.4	200	1.4	4.8	●	1
SDLSD0490A200	4.9	52.5	201.5	200	1.5	4.9	●	1
SDLSD0500A200	5.0	52.5	201.5	200	1.5	5.0	●	1
SDLSD0510A200	5.1	52.5	201.5	200	1.5	5.1	●	1
SDLSD0520A200	5.2	52.6	201.6	200	1.6	5.2	●	1
SDLSD0530A200	5.3	52.6	201.6	200	1.6	5.3	●	1
SDLSD0540A200	5.4	57.6	201.6	200	1.6	5.4	●	1
SDLSD0550A200	5.5	57.7	201.7	200	1.7	5.5	●	1
SDLSD0560A200	5.6	57.7	201.7	200	1.7	5.6	●	1
SDLSD0570A200	5.7	57.7	201.7	200	1.7	5.7	●	1
SDLSD0580A200	5.8	57.7	201.7	200	1.7	5.8	●	1
SDLSD0590A200	5.9	57.8	201.8	200	1.8	5.9	●	1
SDLSD0600A200	6.0	57.8	201.8	200	1.8	6.0	●	1
SDLSD0610A250	6.1	63.8	251.8	250	1.8	6.1	●	1
SDLSD0620A250	6.2	63.9	251.9	250	1.9	6.2	●	1
SDLSD0630A250	6.3	63.9	251.9	250	1.9	6.3	●	1
SDLSD0640A250	6.4	63.9	251.9	250	1.9	6.4	●	1
SDLSD0650A250	6.5	64.0	252.0	250	2.0	6.5	●	1
SDLSD0660A250	6.6	64.0	252.0	250	2.0	6.6	●	1
SDLSD0670A250	6.7	64.0	252.0	250	2.0	6.7	●	1
SDLSD0680A250	6.8	69.0	252.0	250	2.0	6.8	●	1
SDLSD0690A250	6.9	69.1	252.1	250	2.1	6.9	●	1
SDLSD0700A250	7.0	69.1	252.1	250	2.1	7.0	●	1
SDLSD0710A250	7.1	69.1	252.1	250	2.1	7.1	●	1
SDLSD0720A250	7.2	69.2	252.2	250	2.2	7.2	●	1
SDLSD0730A250	7.3	69.2	252.2	250	2.2	7.3	●	1
SDLSD0740A250	7.4	69.2	252.2	250	2.2	7.4	●	1
SDLSD0750A250	7.5	69.3	252.3	250	2.3	7.5	●	1
SDLSD0760A250	7.6	75.3	252.3	250	2.3	7.6	●	1
SDLSD0770A250	7.7	75.3	252.3	250	2.3	7.7	●	1

SDLS

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
SDLSD0780A250	7.8	75.3	252.3	250	2.3	7.8	●	1
SDLSD0790A250	7.9	75.4	252.4	250	2.4	7.9	●	1
SDLSD0800A250	8.0	75.4	252.4	250	2.4	8.0	●	1
SDLSD0810A250	8.1	75.4	252.4	250	2.4	8.1	●	1
SDLSD0820A250	8.2	75.5	252.5	250	2.5	8.2	●	1
SDLSD0830A250	8.3	75.5	252.5	250	2.5	8.3	●	1
SDLSD0840A250	8.4	75.5	252.5	250	2.5	8.4	●	1
SDLSD0850A250	8.5	75.6	252.6	250	2.6	8.5	●	1
SDLSD0860A250	8.6	81.6	252.6	250	2.6	8.6	●	1
SDLSD0870A250	8.7	81.6	252.6	250	2.6	8.7	●	1
SDLSD0880A250	8.8	81.6	252.6	250	2.6	8.8	●	1
SDLSD0890A250	8.9	81.7	252.7	250	2.7	8.9	●	1

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
SDLSD0900A250	9.0	81.7	252.7	250	2.7	9.0	●	1
SDLSD0910A250	9.1	81.7	252.7	250	2.7	9.1	●	1
SDLSD0920A250	9.2	81.8	252.8	250	2.8	9.2	●	1
SDLSD0930A250	9.3	81.8	252.8	250	2.8	9.3	●	1
SDLSD0940A250	9.4	81.8	252.8	250	2.8	9.4	●	1
SDLSD0950A250	9.5	81.9	252.9	250	2.9	9.5	●	1
SDLSD0960A250	9.6	87.9	252.9	250	2.9	9.6	●	1
SDLSD0970A250	9.7	87.9	252.9	250	2.9	9.7	●	1
SDLSD0980A250	9.8	87.9	252.9	250	2.9	9.8	●	1
SDLSD0990A250	9.9	88.0	253.0	250	3.0	9.9	●	1
SDLSD1000A250	10.0	88.0	253.0	250	3.0	10.0	●	1

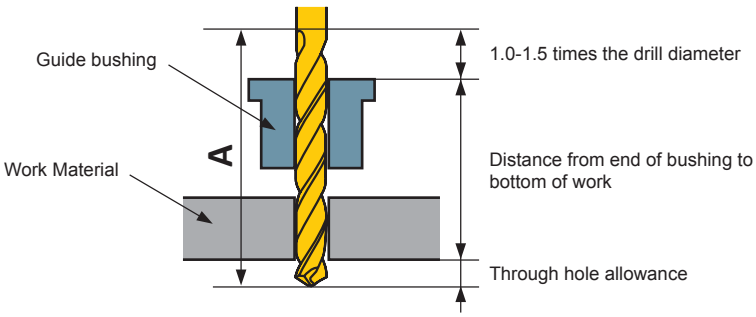
SDLS

Recommended cutting condition

Work material	Mild Steel(≦180HB), Carbon Steel, Alloy Steel (180—250HB) ASTM A36, AISI 1010, AISI 1045, AISI 4140 etc				Alloy tool steel(≦30HRC) AISI H13, L6 etc				Alloy tool steel(<40HRC) AISI H13, L6 etc				Gray Cast Iron(<350MPa) No 45 B etc			
Dia. DC(mm)	Cutting Speed (m/min)	Revolution (min-1)	Feed rate (mm/rev)	Feed rate (mm/min)	Cutting Speed (m/min)	Revolution (min-1)	Feed rate (mm/rev)	Feed rate (mm/min)	Cutting Speed (m/min)	Revolution (min-1)	Feed rate (mm/rev)	Feed rate (mm/min)	Cutting Speed (m/min)	Revolution (min-1)	Feed rate (mm/rev)	Feed rate (mm/min)
1.0	16	5000	0.02	100	13	4000	0.01	40	9	2800	0.007	15	16	5000	0.02	100
1.5	20	4200	0.03	125	15	3200	0.02	60	10	2100	0.01	20	20	4200	0.03	125
2.0	20	3200	0.05	160	16	2500	0.03	75	11	1800	0.02	35	20	3200	0.05	160
3.0	20	2100	0.1	210	17	1800	0.06	105	11	1200	0.04	45	22	2300	0.1	230
4.0	20	1600	0.12	190	17	1350	0.08	105	11	900	0.06	50	22	1750	0.12	210
5.0	20	1300	0.14	180	17	1100	0.1	110	11	700	0.08	55	22	1400	0.14	195
6.0	20	1050	0.17	175	17	900	0.12	105	11	600	0.1	60	22	1150	0.18	205
7.0	20	900	0.19	170	17	780	0.14	105	11	500	0.11	55	22	1000	0.19	190
8.0	20	800	0.2	160	17	670	0.15	100	11	450	0.12	50	22	890	0.2	175
9.0	20	700	0.21	145	17	600	0.16	95	11	400	0.13	50	22	780	0.21	160
10.0	20	650	0.22	140	17	540	0.17	90	11	350	0.14	45	22	700	0.22	150

Work material	Ferritic and Martensitic stainless steel (≦200HB) AISI 410, AISI 430 etc				Austenitic stainless steel (≦200HB) AISI 304,AISI 316 etc				Copper, Copper alloy				Aluminium Alloy(Si<5%) A6061, A7075			
Dia. DC(mm)	Cutting Speed (m/min)	Revolution (min-1)	Feed rate (mm/rev)	Feed rate (mm/min)	Cutting Speed (m/min)	Revolution (min-1)	Feed rate (mm/rev)	Feed rate (mm/min)	Cutting Speed (m/min)	Revolution (min-1)	Feed rate (mm/rev)	Feed rate (mm/min)	Cutting Speed (m/min)	Revolution (min-1)	Feed rate (mm/rev)	Feed rate (mm/min)
1.0	13	4000	0.02	80	9	3000	0.02	60	16	5000	0.02	100	22	7000	0.04	280
1.5	14	3000	0.03	90	9	2000	0.03	60	20	4200	0.03	125	28	6000	0.06	360
2.0	14	2200	0.05	110	9	1500	0.04	60	20	3200	0.05	160	30	4800	0.08	380
3.0	15	1600	0.07	110	9	1000	0.06	60	20	2100	0.1	210	40	4200	0.13	545
4.0	15	1200	0.11	130	9	700	0.08	55	20	1600	0.12	190	40	3200	0.16	510
5.0	15	950	0.13	120	9	600	0.09	50	20	1300	0.14	180	40	2550	0.2	510
6.0	15	800	0.14	110	10	530	0.1	50	20	1050	0.18	185	40	2100	0.23	480
7.0	15	700	0.15	105	10	450	0.11	45	20	900	0.19	170	40	1800	0.25	450
8.0	15	600	0.16	95	10	400	0.13	50	20	800	0.2	160	40	1600	0.28	445
9.0	15	520	0.17	85	10	360	0.14	50	20	700	0.21	145	40	1400	0.3	420
10.0	15	480	0.18	85	10	310	0.15	45	20	650	0.22	140	40	1280	0.33	420

- The intermediate diameter revolution is not tabulated. It is matched to the large diameter side and closest drill diameter conditions or by calculating the cutting speed of the closest drill diameter. Set the feedrate per revolution to a suitable value with the recommended feedrate of the closest drill diameter as the standard.
- Lower the revolution and feedrate accordingly, when the work material is not rigid or there are restrictions on the machine.
- When drilling holes greater than 3 x drill diameter hole depths, please use a peck feed.
- The cutting conditions mentioned above are standard with the tool protrusion length was made 2 times the flute length.
- Use of water-soluble cutting fluid is recommended. Please reduce the revolution when using non-water-soluble cutting fluid.
- Use sufficient cutting fluid. Please reduce the revolution when insufficient cutting fluid.
- When using a guide bush, please confirm the flute length > A. In case of short flute length, please conduct machining without the bush. And, when not being able to dismount the bush, please use LSD or GWSL.



KSD

Cobalt HSS, For stainless steel

Product Information

CO HSS | 118° SIG | 125° SIG | XR Thinning

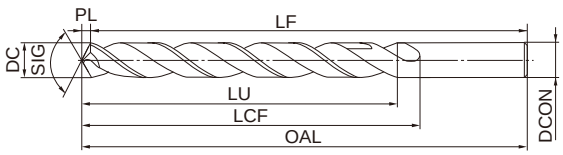
DC≧2 DC<2 DC≧2

TECHNICAL INFO >> 1997 ISO13399 PROPERTY >> 1966

Work Material

P M N

SYMBOL DESCRIPTIONS >> 1623 DRILLS SELECTION CHART >> 1636



Type1

	1≦DC≦3	3<DC≦6	6<DC≦10	10<DC≦13
	0 −0.014	0 −0.018	0 −0.022	0 −0.027

Standard drill depth : LU=LCF-3DC

●Inventory maintained in Japan. Unit:mm

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
KSDD0100	1.0	12.3	40.3	40	0.3	1.0	●	1
KSDD0110	1.1	14.3	42.3	42	0.3	1.1	●	1
KSDD0120	1.2	16.3	42.3	42	0.3	1.2	●	1
KSDD0130	1.3	16.3	45.3	45	0.3	1.3	●	1
KSDD0140	1.4	18.4	48.4	48	0.4	1.4	●	1
KSDD0150	1.5	18.4	48.4	48	0.4	1.5	●	1
KSDD0160	1.6	20.4	50.4	50	0.4	1.6	●	1
KSDD0170	1.7	20.4	50.4	50	0.4	1.7	●	1
KSDD0180	1.8	22.5	52.5	52	0.5	1.8	●	1
KSDD0190	1.9	22.5	52.5	52	0.5	1.9	●	1
KSDD0200	2.0	29.6	55.6	55	0.6	2.0	●	1
KSDD0210	2.1	29.6	55.6	55	0.6	2.1	●	1
KSDD0220	2.2	33.7	58.7	58	0.7	2.2	●	1
KSDD0230	2.3	33.7	58.7	58	0.7	2.3	●	1
KSDD0240	2.4	35.7	61.7	61	0.7	2.4	●	1
KSDD0250	2.5	35.8	61.8	61	0.8	2.5	●	1
KSDD0260	2.6	37.8	64.8	64	0.8	2.6	●	1
KSDD0270	2.7	37.8	64.8	64	0.8	2.7	●	1
KSDD0280	2.8	39.8	67.8	67	0.8	2.8	●	1
KSDD0290	2.9	42.9	71.9	71	0.9	2.9	●	1
KSDD0300	3.0	42.9	71.9	71	0.9	3.0	●	1
KSDD0310	3.1	42.9	71.9	71	0.9	3.1	●	1
KSDD0320	3.2	43.0	72.0	71	1.0	3.2	●	1
KSDD0330	3.3	46.0	74.0	73	1.0	3.3	●	1
KSDD0340	3.4	46.0	74.0	73	1.0	3.4	●	1
KSDD0350	3.5	46.1	74.1	73	1.1	3.5	●	1
KSDD0360	3.6	49.1	77.1	76	1.1	3.6	●	1
KSDD0370	3.7	49.1	77.1	76	1.1	3.7	●	1
KSDD0380	3.8	49.1	77.1	76	1.1	3.8	●	1
KSDD0390	3.9	52.2	80.2	79	1.2	3.9	●	1
KSDD0400	4.0	55.2	84.2	83	1.2	4.0	●	1
KSDD0410	4.1	55.2	84.2	83	1.2	4.1	●	1
KSDD0420	4.2	55.3	84.3	83	1.3	4.2	●	1
KSDD0430	4.3	55.3	84.3	83	1.3	4.3	●	1

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
KSDD0440	4.4	57.3	87.3	86	1.3	4.4	●	1
KSDD0450	4.5	57.4	87.4	86	1.4	4.5	●	1
KSDD0460	4.6	57.4	87.4	86	1.4	4.6	●	1
KSDD0470	4.7	60.4	90.4	89	1.4	4.7	●	1
KSDD0480	4.8	60.4	90.4	89	1.4	4.8	●	1
KSDD0490	4.9	63.5	93.5	92	1.5	4.9	●	1
KSDD0500	5.0	63.5	93.5	92	1.5	5.0	●	1
KSDD0510	5.1	63.5	93.5	92	1.5	5.1	●	1
KSDD0520	5.2	65.6	96.6	95	1.6	5.2	●	1
KSDD0530	5.3	65.6	96.6	95	1.6	5.3	●	1
KSDD0540	5.4	65.6	96.6	95	1.6	5.4	●	1
KSDD0550	5.5	65.7	96.7	95	1.7	5.5	●	1
KSDD0560	5.6	68.7	99.7	98	1.7	5.6	●	1
KSDD0570	5.7	68.7	99.7	98	1.7	5.7	●	1
KSDD0580	5.8	68.7	99.7	98	1.7	5.8	●	1
KSDD0590	5.9	68.8	99.8	98	1.8	5.9	●	1
KSDD0600	6.0	71.8	103.8	102	1.8	6.0	●	1
KSDD0610	6.1	71.8	103.8	102	1.8	6.1	●	1
KSDD0620	6.2	71.9	103.9	102	1.9	6.2	●	1
KSDD0630	6.3	71.9	103.9	102	1.9	6.3	●	1
KSDD0640	6.4	74.9	106.9	105	1.9	6.4	●	1
KSDD0650	6.5	75.0	107.0	105	2.0	6.5	●	1
KSDD0660	6.6	75.0	107.0	105	2.0	6.6	●	1
KSDD0670	6.7	75.0	107.0	105	2.0	6.7	●	1
KSDD0680	6.8	75.0	107.0	105	2.0	6.8	●	1
KSDD0690	6.9	75.1	107.1	105	2.1	6.9	●	1
KSDD0700	7.0	75.1	107.1	105	2.1	7.0	●	1
KSDD0710	7.1	77.1	110.1	108	2.1	7.1	●	1
KSDD0720	7.2	77.2	110.2	108	2.2	7.2	●	1
KSDD0730	7.3	77.2	110.2	108	2.2	7.3	●	1
KSDD0740	7.4	80.2	113.2	111	2.2	7.4	●	1
KSDD0750	7.5	80.3	113.3	111	2.3	7.5	●	1
KSDD0760	7.6	80.3	113.3	111	2.3	7.6	●	1
KSDD0770	7.7	83.3	116.3	114	2.3	7.7	●	1

KSD

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
KSDD0780	7.8	83.3	116.3	114	2.3	7.8	●	1
KSDD0790	7.9	83.4	116.4	114	2.4	7.9	●	1
KSDD0800	8.0	83.4	116.4	114	2.4	8.0	●	1
KSDD0810	8.1	86.4	119.4	117	2.4	8.1	●	1
KSDD0820	8.2	86.5	119.5	117	2.5	8.2	●	1
KSDD0830	8.3	86.5	119.5	117	2.5	8.3	●	1
KSDD0840	8.4	89.5	123.5	121	2.5	8.4	●	1
KSDD0850	8.5	89.6	123.6	121	2.6	8.5	●	1
KSDD0860	8.6	89.6	123.6	121	2.6	8.6	●	1
KSDD0870	8.7	89.6	123.6	121	2.6	8.7	●	1
KSDD0880	8.8	91.6	126.6	124	2.6	8.8	●	1
KSDD0890	8.9	91.7	126.7	124	2.7	8.9	●	1
KSDD0900	9.0	91.7	126.7	124	2.7	9.0	●	1
KSDD0910	9.1	91.7	126.7	124	2.7	9.1	●	1
KSDD0920	9.2	94.8	129.8	127	2.8	9.2	●	1
KSDD0930	9.3	94.8	129.8	127	2.8	9.3	●	1
KSDD0940	9.4	94.8	129.8	127	2.8	9.4	●	1
KSDD0950	9.5	94.9	129.9	127	2.9	9.5	●	1
KSDD0960	9.6	97.9	132.9	130	2.9	9.6	●	1
KSDD0970	9.7	97.9	132.9	130	2.9	9.7	●	1
KSDD0980	9.8	97.9	132.9	130	2.9	9.8	●	1
KSDD0990	9.9	98.0	133.0	130	3.0	9.9	●	1
KSDD1000	10.0	98.0	133.0	130	3.0	10.0	●	1
KSDD1010	10.1	101.0	136.0	133	3.0	10.1	●	1
KSDD1020	10.2	101.1	136.1	133	3.1	10.2	●	1
KSDD1030	10.3	101.1	136.1	133	3.1	10.3	●	1
KSDD1040	10.4	101.1	136.1	133	3.1	10.4	●	1

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
KSDD1050	10.5	103.2	140.2	137	3.2	10.5	●	1
KSDD1060	10.6	103.2	140.2	137	3.2	10.6	●	1
KSDD1070	10.7	103.2	140.2	137	3.2	10.7	●	1
KSDD1080	10.8	106.2	143.2	140	3.2	10.8	●	1
KSDD1090	10.9	106.3	143.3	140	3.3	10.9	●	1
KSDD1100	11.0	106.3	143.3	140	3.3	11.0	●	1
KSDD1110	11.1	106.3	143.3	140	3.3	11.1	●	1
KSDD1120	11.2	109.4	146.4	143	3.4	11.2	●	1
KSDD1130	11.3	109.4	146.4	143	3.4	11.3	●	1
KSDD1140	11.4	109.4	146.4	143	3.4	11.4	●	1
KSDD1150	11.5	109.5	146.5	143	3.5	11.5	●	1
KSDD1160	11.6	112.5	149.5	146	3.5	11.6	●	1
KSDD1170	11.7	112.5	149.5	146	3.5	11.7	●	1
KSDD1180	11.8	112.5	149.5	146	3.5	11.8	●	1
KSDD1190	11.9	112.6	149.6	146	3.6	11.9	●	1
KSDD1200	12.0	114.6	152.6	149	3.6	12.0	●	1
KSDD1210	12.1	114.6	152.6	149	3.6	12.1	●	1
KSDD1220	12.2	114.7	152.7	149	3.7	12.2	●	1
KSDD1230	12.3	114.7	152.7	149	3.7	12.3	●	1
KSDD1240	12.4	117.7	155.7	152	3.7	12.4	●	1
KSDD1250	12.5	117.8	155.8	152	3.8	12.5	●	1
KSDD1260	12.6	117.8	155.8	152	3.8	12.6	●	1
KSDD1270	12.7	117.8	155.8	152	3.8	12.7	●	1
KSDD1280	12.8	117.8	155.8	152	3.8	12.8	●	1
KSDD1290	12.9	117.9	155.9	152	3.9	12.9	●	1
KSDD1300	13.0	117.9	155.9	152	3.9	13.0	●	1

KSD

Recommended cutting condition

Work material	Structural steel SS Carbon steel S-C (—25HRC)		Alloy steel SCM Tool steel SK (—35HRC)		Alloy steel SCM Die steel SKD (—40HRC)		Cast iron FC	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)
0.5	6000	0.01	5000	0.008	4000	0.005	6000	0.01
1.0	5000	0.02	4000	0.01	2800	0.008	5000	0.02
2.0	3000	0.05	2500	0.03	1800	0.02	3000	0.05
3.0	2100	0.10	1800	0.08	1200	0.05	2300	0.10
6.0	1100	0.18	900	0.15	600	0.13	1100	0.18
8.0	800	0.20	670	0.18	450	0.15	900	0.20
10.0	650	0.22	540	0.20	350	0.18	700	0.22
12.0	520	0.24	450	0.22	300	0.20	600	0.24
15.0	420	0.28	360	0.24	240	0.22	470	0.28
20.0	320	0.33	270	0.26	180	0.24	350	0.33
25.0	250	0.36	210	0.28	145	0.26	280	0.36
30.0	210	0.40	180	0.30	120	0.28	230	0.40
40.0	160	0.42	130	0.32	90	0.30	180	0.42

Work material	Martensitic stainless steel AISI 420 Ferritic stainless steel AISI 430		Austenitic stainless steel AISI 304 Precipitation hardening ASTM 630		Copper alloy, Brass		Aluminium alloy	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)
0.5	5000	0.01	4000	0.01	6000	0.01	10000	0.02
1.0	4000	0.02	3000	0.02	5000	0.02	7000	0.04
2.0	2200	0.05	1500	0.04	3000	0.05	5000	0.08
3.0	1600	0.10	1000	0.07	2100	0.10	4200	0.13
6.0	800	0.18	530	0.10	1100	0.18	2100	0.23
8.0	600	0.20	400	0.13	800	0.20	1600	0.28
10.0	480	0.22	310	0.15	650	0.22	1200	0.33
12.0	400	0.24	250	0.17	520	0.24	1000	0.38
15.0	320	0.26	170	0.20	420	0.26	850	0.42
20.0	240	0.28	130	0.23	320	0.28	630	0.45
25.0	190	0.32	100	0.24	250	0.32	500	0.48
30.0	160	0.35	85	0.25	210	0.35	400	0.50
40.0	120	0.38	65	0.28	160	0.38	300	0.52

- Please reduce the cutting conditions when drilling a deep hole.
- This table only shows standard cutting conditions with water-soluble cutting fluids. Please make corrections or adjustments depending on the application.

Reduction rate of cutting conditions for hole drilling

Drilling depth	Reduction rate of cutting speed	Reduction rate of feed
4DC	10%	10%
5DC	10%	15%
6DC	20%	20%
7DC	20%	20%

Drilling depth	Reduction rate of cutting speed	Reduction rate of feed
8DC	30%	20%
10DC	30%	25%
15DC	40%	30%
20DC	40%	45%

GWSS

TiN, For deep hole, Convolute flute

STRAIGHT SHANK DRILLS

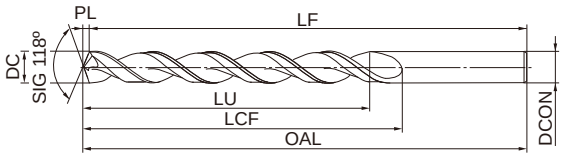
Product Information

CO HSS G 118° SIG X Thinning

Work Material

P M K N

TECHNICAL INFO >> 1997 ISO13399 PROPERTY >> 1966 SYMBOL DESCRIPTIONS >> 1623 DRILLS SELECTION CHART >> 1636



Type1

	1≦DC≦3	3<DC≦6	6<DC≦10	10<DC≦13
	0 −0.014	0 −0.018	0 −0.022	0 −0.027

Standard drill depth : LU=LCF-3DC

●Inventory maintained in Japan. Unit:mm

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
GWSSD0100	1.0	18.3	40.3	40	0.3	1.0	●	1
GWSSD0110	1.1	20.3	42.3	42	0.3	1.1	●	1
GWSSD0120	1.2	20.4	42.4	42	0.4	1.2	●	1
GWSSD0130	1.3	22.4	45.4	45	0.4	1.3	●	1
GWSSD0140	1.4	23.4	48.4	48	0.4	1.4	●	1
GWSSD0150	1.5	23.5	48.5	48	0.5	1.5	●	1
GWSSD0160	1.6	25.5	50.5	50	0.5	1.6	●	1
GWSSD0170	1.7	25.5	50.5	50	0.5	1.7	●	1
GWSSD0180	1.8	28.5	52.5	52	0.5	1.8	●	1
GWSSD0190	1.9	28.6	52.6	52	0.6	1.9	●	1
GWSSD0200	2.0	29.6	55.6	55	0.6	2.0	●	1
GWSSD0210	2.1	29.6	55.6	55	0.6	2.1	●	1
GWSSD0220	2.2	33.7	58.7	58	0.7	2.2	●	1
GWSSD0230	2.3	33.7	58.7	58	0.7	2.3	●	1
GWSSD0240	2.4	35.7	61.7	61	0.7	2.4	●	1
GWSSD0250	2.5	35.8	61.8	61	0.8	2.5	●	1
GWSSD0260	2.6	37.8	64.8	64	0.8	2.6	●	1
GWSSD0270	2.7	37.8	64.8	64	0.8	2.7	●	1
GWSSD0280	2.8	39.8	67.8	67	0.8	2.8	●	1
GWSSD0290	2.9	42.9	71.9	71	0.9	2.9	●	1
GWSSD0300	3.0	42.9	71.9	71	0.9	3.0	●	1
GWSSD0310	3.1	42.9	71.9	71	0.9	3.1	●	1
GWSSD0320	3.2	43.0	72.0	71	1.0	3.2	●	1
GWSSD0330	3.3	46.0	74.0	73	1.0	3.3	●	1
GWSSD0340	3.4	46.0	74.0	73	1.0	3.4	●	1
GWSSD0350	3.5	46.1	74.1	73	1.1	3.5	●	1
GWSSD0360	3.6	49.1	77.1	76	1.1	3.6	●	1
GWSSD0370	3.7	49.1	77.1	76	1.1	3.7	●	1
GWSSD0380	3.8	49.1	77.1	76	1.1	3.8	●	1
GWSSD0390	3.9	52.2	80.2	79	1.2	3.9	●	1
GWSSD0400	4.0	55.2	84.2	83	1.2	4.0	●	1
GWSSD0410	4.1	55.2	84.2	83	1.2	4.1	●	1
GWSSD0420	4.2	55.3	84.3	83	1.3	4.2	●	1
GWSSD0430	4.3	55.3	84.3	83	1.3	4.3	●	1

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
GWSSD0440	4.4	57.3	87.3	86	1.3	4.4	●	1
GWSSD0450	4.5	57.4	87.4	86	1.4	4.5	●	1
GWSSD0460	4.6	57.4	87.4	86	1.4	4.6	●	1
GWSSD0470	4.7	60.4	90.4	89	1.4	4.7	●	1
GWSSD0480	4.8	60.4	90.4	89	1.4	4.8	●	1
GWSSD0490	4.9	63.5	93.5	92	1.5	4.9	●	1
GWSSD0500	5.0	63.5	93.5	92	1.5	5.0	●	1
GWSSD0510	5.1	63.5	93.5	92	1.5	5.1	●	1
GWSSD0520	5.2	65.6	96.6	95	1.6	5.2	●	1
GWSSD0530	5.3	65.6	96.6	95	1.6	5.3	●	1
GWSSD0540	5.4	65.6	96.6	95	1.6	5.4	●	1
GWSSD0550	5.5	65.7	96.7	95	1.7	5.5	●	1
GWSSD0560	5.6	68.7	99.7	98	1.7	5.6	●	1
GWSSD0570	5.7	68.7	99.7	98	1.7	5.7	●	1
GWSSD0580	5.8	68.7	99.7	98	1.7	5.8	●	1
GWSSD0590	5.9	68.8	99.8	98	1.8	5.9	●	1
GWSSD0600	6.0	71.8	103.8	102	1.8	6.0	●	1
GWSSD0610	6.1	71.8	103.8	102	1.8	6.1	●	1
GWSSD0620	6.2	71.9	103.9	102	1.9	6.2	●	1
GWSSD0630	6.3	71.9	103.9	102	1.9	6.3	●	1
GWSSD0640	6.4	74.9	106.9	105	1.9	6.4	●	1
GWSSD0650	6.5	75.0	107.0	105	2.0	6.5	●	1
GWSSD0660	6.6	75.0	107.0	105	2.0	6.6	●	1
GWSSD0670	6.7	75.0	107.0	105	2.0	6.7	●	1
GWSSD0680	6.8	75.0	107.0	105	2.0	6.8	●	1
GWSSD0690	6.9	75.1	107.1	105	2.1	6.9	●	1
GWSSD0700	7.0	75.1	107.1	105	2.1	7.0	●	1
GWSSD0710	7.1	77.1	110.1	108	2.1	7.1	●	1
GWSSD0720	7.2	77.2	110.2	108	2.2	7.2	●	1
GWSSD0730	7.3	77.2	110.2	108	2.2	7.3	●	1
GWSSD0740	7.4	80.2	113.2	111	2.2	7.4	●	1
GWSSD0750	7.5	80.3	113.3	111	2.3	7.5	●	1
GWSSD0760	7.6	80.3	113.3	111	2.3	7.6	●	1
GWSSD0770	7.7	83.3	116.3	114	2.3	7.7	●	1

GWSS

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
GWSSD0780	7.8	83.3	116.3	114	2.3	7.8	●	1
GWSSD0790	7.9	83.4	116.4	114	2.4	7.9	●	1
GWSSD0800	8.0	83.4	116.4	114	2.4	8.0	●	1
GWSSD0810	8.1	86.4	119.4	117	2.4	8.1	●	1
GWSSD0820	8.2	86.5	119.5	117	2.5	8.2	●	1
GWSSD0830	8.3	86.5	119.5	117	2.5	8.3	●	1
GWSSD0840	8.4	89.5	123.5	121	2.5	8.4	●	1
GWSSD0850	8.5	89.6	123.6	121	2.6	8.5	●	1
GWSSD0860	8.6	89.6	123.6	121	2.6	8.6	●	1
GWSSD0870	8.7	89.6	123.6	121	2.6	8.7	●	1
GWSSD0880	8.8	91.6	126.6	124	2.6	8.8	●	1
GWSSD0890	8.9	91.7	126.7	124	2.7	8.9	●	1
GWSSD0900	9.0	91.7	126.7	124	2.7	9.0	●	1
GWSSD0910	9.1	91.7	126.7	124	2.7	9.1	●	1
GWSSD0920	9.2	94.8	129.8	127	2.8	9.2	●	1
GWSSD0930	9.3	94.8	129.8	127	2.8	9.3	●	1
GWSSD0940	9.4	94.8	129.8	127	2.8	9.4	●	1
GWSSD0950	9.5	94.9	129.9	127	2.9	9.5	●	1
GWSSD0960	9.6	97.9	132.9	130	2.9	9.6	●	1
GWSSD0970	9.7	97.9	132.9	130	2.9	9.7	●	1
GWSSD0980	9.8	97.9	132.9	130	2.9	9.8	●	1
GWSSD0990	9.9	98.0	133.0	130	3.0	9.9	●	1
GWSSD1000	10.0	98.0	133.0	130	3.0	10.0	●	1
GWSSD1010	10.1	101.0	136.0	133	3.0	10.1	●	1
GWSSD1020	10.2	101.1	136.1	133	3.1	10.2	●	1
GWSSD1030	10.3	101.1	136.1	133	3.1	10.3	●	1
GWSSD1040	10.4	101.1	136.1	133	3.1	10.4	●	1

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
GWSSD1050	10.5	103.2	140.2	137	3.2	10.5	●	1
GWSSD1060	10.6	103.2	140.2	137	3.2	10.6	●	1
GWSSD1070	10.7	103.2	140.2	137	3.2	10.7	●	1
GWSSD1080	10.8	106.2	143.2	140	3.2	10.8	●	1
GWSSD1090	10.9	106.3	143.3	140	3.3	10.9	●	1
GWSSD1100	11.0	106.3	143.3	140	3.3	11.0	●	1
GWSSD1110	11.1	106.3	143.3	140	3.3	11.1	●	1
GWSSD1120	11.2	109.4	146.4	143	3.4	11.2	●	1
GWSSD1130	11.3	109.4	146.4	143	3.4	11.3	●	1
GWSSD1140	11.4	109.4	146.4	143	3.4	11.4	●	1
GWSSD1150	11.5	109.5	146.5	143	3.5	11.5	●	1
GWSSD1160	11.6	112.5	149.5	146	3.5	11.6	●	1
GWSSD1170	11.7	112.5	149.5	146	3.5	11.7	●	1
GWSSD1180	11.8	112.5	149.5	146	3.5	11.8	●	1
GWSSD1190	11.9	112.6	149.6	146	3.6	11.9	●	1
GWSSD1200	12.0	114.6	152.6	149	3.6	12.0	●	1
GWSSD1210	12.1	114.6	152.6	149	3.6	12.1	●	1
GWSSD1220	12.2	114.7	152.7	149	3.7	12.2	●	1
GWSSD1230	12.3	114.7	152.7	149	3.7	12.3	●	1
GWSSD1240	12.4	117.7	155.7	152	3.7	12.4	●	1
GWSSD1250	12.5	117.8	155.8	152	3.8	12.5	●	1
GWSSD1260	12.6	117.8	155.8	152	3.8	12.6	●	1
GWSSD1270	12.7	117.8	155.8	152	3.8	12.7	●	1
GWSSD1280	12.8	117.8	155.8	152	3.8	12.8	●	1
GWSSD1290	12.9	117.9	155.9	152	3.9	12.9	●	1
GWSSD1300	13.0	117.9	155.9	152	3.9	13.0	●	1

GWSS

Recommended cutting condition

Work material	Structural steel SS Carbon steel S-C (—25HRC)		Alloy steel SCM Tool steel SK (—35HRC)		Alloy steel SCM Die steel SKD (—40HRC)		Cast iron FC	
Dia. DC(mm)	Revolution (min-1)	Feed rate (mm/rev)	Revolution (min-1)	Feed rate (mm/rev)	Revolution (min-1)	Feed rate (mm/rev)	Revolution (min-1)	Feed rate (mm/rev)
0.5	8000	0.01	7000	0.008	6000	0.005	8000	0.01
1.0	6000	0.02	5500	0.01	4500	0.008	6000	0.02
2.0	4700	0.05	3600	0.03	2400	0.02	4700	0.05
3.0	3200	0.10	2400	0.08	1800	0.05	3500	0.10
6.0	1600	0.18	1200	0.15	900	0.13	1750	0.18
8.0	1200	0.20	900	0.18	680	0.15	1300	0.20
10.0	960	0.22	720	0.20	550	0.18	1100	0.22
12.0	800	0.24	600	0.22	450	0.20	880	0.24
15.0	630	0.28	480	0.24	350	0.22	700	0.28
20.0	470	0.33	360	0.26	260	0.24	530	0.33
25.0	380	0.36	290	0.28	210	0.26	420	0.36
30.0	310	0.40	240	0.30	180	0.28	330	0.40

Work material	Martensitic stainless steel AISI 420 Ferritic stainless steel AISI 430		Austenitic stainless steel AISI 304 Precipitation hardening ASTM 630		Copper alloy, Brass		Aluminium alloy	
Dia. DC(mm)	Revolution (min-1)	Feed rate (mm/rev)	Revolution (min-1)	Feed rate (mm/rev)	Revolution (min-1)	Feed rate (mm/rev)	Revolution (min-1)	Feed rate (mm/rev)
0.5	8000	0.01	6000	0.01	8000	0.01	10000	0.02
1.0	5000	0.02	4000	0.02	6000	0.02	7000	0.04
2.0	2500	0.05	2300	0.04	4700	0.05	6000	0.08
3.0	1900	0.10	1500	0.07	3200	0.10	5500	0.13
6.0	950	0.18	750	0.10	1600	0.18	3100	0.23
8.0	700	0.20	530	0.13	1200	0.20	2300	0.28
10.0	560	0.22	420	0.15	960	0.22	1900	0.33
12.0	460	0.24	340	0.17	800	0.24	1600	0.38
15.0	360	0.26	270	0.20	630	0.26	1300	0.42
20.0	270	0.28	200	0.23	470	0.28	950	0.45
25.0	210	0.32	160	0.24	380	0.32	750	0.48
30.0	180	0.35	135	0.25	310	0.35	630	0.50

- Please reduce the cutting conditions when drilling a deep hole.
- This table only shows standard cutting conditions with water-soluble cutting fluids. Please make corrections or adjustments depending on the application.

Reduction rate of cutting conditions for hole drilling

Drilling depth	Reduction rate of cutting speed	Reduction rate of feed	Drilling depth	Reduction rate of cutting speed	Reduction rate of feed
4DC	10%	10%	8DC	30%	20%
5DC	10%	15%	10DC	30%	25%
6DC	20%	20%	15DC	40%	30%
7DC	20%	20%	20DC	40%	45%

- DC:Drill dia.

GWSL

TiN, Extra long

STRAIGHT SHANK DRILLS

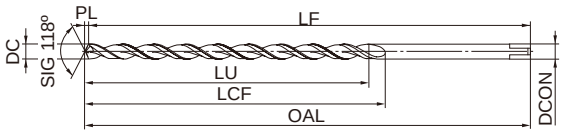
Product Information

CO HSS G 118° SIG X Thinning

Work Material

P M K N

TECHNICAL INFO >> 1997 ISO13399 PROPERTY >> 1966 SYMBOL DESCRIPTIONS >> 1623 DRILLS SELECTION CHART >> 1636



Type1

	2≦DC≦3	3<DC≦6	6<DC≦10	10<DC≦13
	0 −0.014	0 −0.018	0 −0.022	0 −0.027

Standard drill depth : LU=LCF-3DC

●Inventory maintained in Japan. Unit:mm

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
GWSLD0200A125	2.0	80.6	125.6	125	0.6	2.0	●	1
GWSLD0200A160	2.0	100.6	160.6	160	0.6	2.0	●	1
GWSLD0210A125	2.1	80.6	125.6	125	0.6	2.1	●	1
GWSLD0210A160	2.1	100.6	160.6	160	0.6	2.1	●	1
GWSLD0220A125	2.2	80.7	125.7	125	0.7	2.2	●	1
GWSLD0220A160	2.2	100.7	160.7	160	0.7	2.2	●	1
GWSLD0230A125	2.3	80.7	125.7	125	0.7	2.3	●	1
GWSLD0230A160	2.3	100.7	160.7	160	0.7	2.3	●	1
GWSLD0240A125	2.4	80.7	125.7	125	0.7	2.4	●	1
GWSLD0240A160	2.4	100.7	160.7	160	0.7	2.4	●	1
GWSLD0250A125	2.5	80.8	125.8	125	0.8	2.5	●	1
GWSLD0250A160	2.5	100.8	160.8	160	0.8	2.5	●	1
GWSLD0260A125	2.6	80.8	125.8	125	0.8	2.6	●	1
GWSLD0260A160	2.6	100.8	160.8	160	0.8	2.6	●	1
GWSLD0270A125	2.7	80.8	125.8	125	0.8	2.7	●	1
GWSLD0270A160	2.7	100.8	160.8	160	0.8	2.7	●	1
GWSLD0280A125	2.8	80.8	125.8	125	0.8	2.8	●	1
GWSLD0280A160	2.8	100.8	160.8	160	0.8	2.8	●	1
GWSLD0290A125	2.9	80.9	125.9	125	0.9	2.9	●	1
GWSLD0290A160	2.9	100.9	160.9	160	0.9	2.9	●	1
GWSLD0300A125	3.0	80.9	125.9	125	0.9	3.0	●	1
GWSLD0300A160	3.0	100.9	160.9	160	0.9	3.0	●	1
GWSLD0300A200	3.0	125.9	200.9	200	0.9	3.0	●	1
GWSLD0310A160	3.1	100.9	160.9	160	0.9	3.1	●	1
GWSLD0310A200	3.1	125.9	200.9	200	0.9	3.1	●	1
GWSLD0320A160	3.2	101.0	161.0	160	1.0	3.2	●	1
GWSLD0320A200	3.2	126.0	201.0	200	1.0	3.2	●	1
GWSLD0330A160	3.3	101.0	161.0	160	1.0	3.3	●	1
GWSLD0330A200	3.3	126.0	201.0	200	1.0	3.3	●	1
GWSLD0340A160	3.4	101.0	161.0	160	1.0	3.4	●	1
GWSLD0340A200	3.4	126.0	201.0	200	1.0	3.4	●	1
GWSLD0350A160	3.5	101.1	161.1	160	1.1	3.5	●	1
GWSLD0350A200	3.5	126.1	201.1	200	1.1	3.5	●	1
GWSLD0360A160	3.6	101.1	161.1	160	1.1	3.6	●	1

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
GWSLD0360A200	3.6	126.1	201.1	200	1.1	3.6	●	1
GWSLD0370A160	3.7	101.1	161.1	160	1.1	3.7	●	1
GWSLD0370A200	3.7	126.1	201.1	200	1.1	3.7	●	1
GWSLD0380A160	3.8	101.1	161.1	160	1.1	3.8	●	1
GWSLD0380A200	3.8	126.1	201.1	200	1.1	3.8	●	1
GWSLD0390A160	3.9	101.2	161.2	160	1.2	3.9	●	1
GWSLD0390A200	3.9	126.2	201.2	200	1.2	3.9	●	1
GWSLD0400A160	4.0	101.2	161.2	160	1.2	4.0	●	1
GWSLD0400A200	4.0	126.2	201.2	200	1.2	4.0	●	1
GWSLD0400A250	4.0	161.2	251.2	250	1.2	4.0	●	1
GWSLD0410A160	4.1	101.2	161.2	160	1.2	4.1	●	1
GWSLD0410A200	4.1	126.2	201.2	200	1.2	4.1	●	1
GWSLD0410A250	4.1	161.2	251.2	250	1.2	4.1	●	1
GWSLD0420A160	4.2	101.3	161.3	160	1.3	4.2	●	1
GWSLD0420A200	4.2	126.3	201.3	200	1.3	4.2	●	1
GWSLD0420A250	4.2	161.3	251.3	250	1.3	4.2	●	1
GWSLD0430A160	4.3	101.3	161.3	160	1.3	4.3	●	1
GWSLD0430A200	4.3	126.3	201.3	200	1.3	4.3	●	1
GWSLD0430A250	4.3	161.3	251.3	250	1.3	4.3	●	1
GWSLD0440A160	4.4	101.3	161.3	160	1.3	4.4	●	1
GWSLD0440A200	4.4	126.3	201.3	200	1.3	4.4	●	1
GWSLD0440A250	4.4	161.3	251.3	250	1.3	4.4	●	1
GWSLD0450A160	4.5	101.4	161.4	160	1.4	4.5	●	1
GWSLD0450A200	4.5	126.4	201.4	200	1.4	4.5	●	1
GWSLD0450A250	4.5	161.4	251.4	250	1.4	4.5	●	1
GWSLD0460A160	4.6	101.4	161.4	160	1.4	4.6	●	1
GWSLD0460A200	4.6	126.4	201.4	200	1.4	4.6	●	1
GWSLD0460A250	4.6	161.4	251.4	250	1.4	4.6	●	1
GWSLD0470A160	4.7	101.4	161.4	160	1.4	4.7	●	1
GWSLD0470A200	4.7	126.4	201.4	200	1.4	4.7	●	1
GWSLD0470A250	4.7	161.4	251.4	250	1.4	4.7	●	1
GWSLD0480A160	4.8	101.4	161.4	160	1.4	4.8	●	1
GWSLD0480A200	4.8	126.4	201.4	200	1.4	4.8	●	1
GWSLD0480A250	4.8	161.4	251.4	250	1.4	4.8	●	1

GWSL

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
GWSLD0490A160	4.9	101.5	161.5	160	1.5	4.9	●	1
GWSLD0490A200	4.9	126.5	201.5	200	1.5	4.9	●	1
GWSLD0490A250	4.9	161.5	251.5	250	1.5	4.9	●	1
GWSLD0500A160	5.0	101.5	161.5	160	1.5	5.0	●	1
GWSLD0500A200	5.0	126.5	201.5	200	1.5	5.0	●	1
GWSLD0500A250	5.0	161.5	251.5	250	1.5	5.0	●	1
GWSLD0510A160	5.1	101.5	161.5	160	1.5	5.1	●	1
GWSLD0510A200	5.1	126.5	201.5	200	1.5	5.1	●	1
GWSLD0510A250	5.1	161.5	251.5	250	1.5	5.1	●	1
GWSLD0520A160	5.2	101.6	161.6	160	1.6	5.2	●	1
GWSLD0520A200	5.2	126.6	201.6	200	1.6	5.2	●	1
GWSLD0520A250	5.2	161.6	251.6	250	1.6	5.2	●	1
GWSLD0530A160	5.3	101.6	161.6	160	1.6	5.3	●	1
GWSLD0530A200	5.3	126.6	201.6	200	1.6	5.3	●	1
GWSLD0530A250	5.3	161.6	251.6	250	1.6	5.3	●	1
GWSLD0540A160	5.4	101.6	161.6	160	1.6	5.4	●	1
GWSLD0540A200	5.4	126.6	201.6	200	1.6	5.4	●	1
GWSLD0540A250	5.4	161.6	251.6	250	1.6	5.4	●	1
GWSLD0550A160	5.5	101.7	161.7	160	1.7	5.5	●	1
GWSLD0550A200	5.5	126.7	201.7	200	1.7	5.5	●	1
GWSLD0550A250	5.5	161.7	251.7	250	1.7	5.5	●	1
GWSLD0560A160	5.6	101.7	161.7	160	1.7	5.6	●	1
GWSLD0560A200	5.6	126.7	201.7	200	1.7	5.6	●	1
GWSLD0560A250	5.6	161.7	251.7	250	1.7	5.6	●	1
GWSLD0570A160	5.7	101.7	161.7	160	1.7	5.7	●	1
GWSLD0570A200	5.7	126.7	201.7	200	1.7	5.7	●	1
GWSLD0570A250	5.7	161.7	251.7	250	1.7	5.7	●	1
GWSLD0580A160	5.8	101.7	161.7	160	1.7	5.8	●	1
GWSLD0580A200	5.8	126.7	201.7	200	1.7	5.8	●	1
GWSLD0580A250	5.8	161.7	251.7	250	1.7	5.8	●	1
GWSLD0590A160	5.9	101.8	161.8	160	1.8	5.9	●	1
GWSLD0590A200	5.9	126.8	201.8	200	1.8	5.9	●	1
GWSLD0590A250	5.9	161.8	251.8	250	1.8	5.9	●	1
GWSLD0600A160	6.0	101.8	161.8	160	1.8	6.0	●	1
GWSLD0600A200	6.0	126.8	201.8	200	1.8	6.0	●	1
GWSLD0600A250	6.0	161.8	251.8	250	1.8	6.0	●	1
GWSLD0600A315	6.0	201.8	316.8	315	1.8	6.0	●	1
GWSLD0650A160	6.5	102.0	162.0	160	2.0	6.5	●	1
GWSLD0650A200	6.5	127.0	202.0	200	2.0	6.5	●	1
GWSLD0650A250	6.5	162.0	252.0	250	2.0	6.5	●	1

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
GWSLD0650A315	6.5	202.0	317.0	315	2.0	6.5	●	1
GWSLD0680A160	6.8	102.0	162.0	160	2.0	6.8	●	1
GWSLD0680A200	6.8	127.0	202.0	200	2.0	6.8	●	1
GWSLD0680A250	6.8	162.0	252.0	250	2.0	6.8	●	1
GWSLD0680A315	6.8	202.0	317.0	315	2.0	6.8	●	1
GWSLD0700A160	7.0	102.1	162.1	160	2.1	7.0	●	1
GWSLD0700A200	7.0	127.1	202.1	200	2.1	7.0	●	1
GWSLD0700A250	7.0	162.1	252.1	250	2.1	7.0	●	1
GWSLD0700A315	7.0	202.1	317.1	315	2.1	7.0	●	1
GWSLD0750A200	7.5	127.3	202.3	200	2.3	7.5	●	1
GWSLD0750A250	7.5	162.3	252.3	250	2.3	7.5	●	1
GWSLD0750A315	7.5	202.3	317.3	315	2.3	7.5	●	1
GWSLD0800A200	8.0	127.4	202.4	200	2.4	8.0	●	1
GWSLD0800A250	8.0	162.4	252.4	250	2.4	8.0	●	1
GWSLD0800A315	8.0	202.4	317.4	315	2.4	8.0	●	1
GWSLD0850A200	8.5	142.6	202.6	200	2.6	8.5	●	1
GWSLD0850A250	8.5	162.6	252.6	250	2.6	8.5	●	1
GWSLD0850A315	8.5	202.6	317.6	315	2.6	8.5	●	1
GWSLD0900A200	9.0	142.7	202.7	200	2.7	9.0	●	1
GWSLD0900A250	9.0	162.7	252.7	250	2.7	9.0	●	1
GWSLD0900A315	9.0	202.7	317.7	315	2.7	9.0	●	1
GWSLD0950A200	9.5	142.9	202.9	200	2.9	9.5	●	1
GWSLD0950A250	9.5	162.9	252.9	250	2.9	9.5	●	1
GWSLD0950A315	9.5	202.9	317.9	315	2.9	9.5	●	1
GWSLD1000A200	10.0	143.0	203.0	200	3.0	10.0	●	1
GWSLD1000A250	10.0	163.0	253.0	250	3.0	10.0	●	1
GWSLD1000A315	10.0	203.0	318.0	315	3.0	10.0	●	1
GWSLD1050A250	10.5	163.2	253.2	250	3.2	10.5	●	1
GWSLD1050A315	10.5	203.2	318.2	315	3.2	10.5	●	1
GWSLD1100A250	11.0	163.3	253.3	250	3.3	11.0	●	1
GWSLD1100A315	11.0	203.3	318.3	315	3.3	11.0	●	1
GWSLD1150A250	11.5	163.5	253.5	250	3.5	11.5	●	1
GWSLD1150A315	11.5	203.5	318.5	315	3.5	11.5	●	1
GWSLD1200A250	12.0	163.6	253.6	250	3.6	12.0	●	1
GWSLD1200A315	12.0	203.6	318.6	315	3.6	12.0	●	1
GWSLD1250A250	12.5	163.8	253.8	250	3.8	12.5	●	1
GWSLD1250A315	12.5	203.8	318.8	315	3.8	12.5	●	1
GWSLD1300A250	13.0	163.9	253.9	250	3.9	13.0	●	1
GWSLD1300A315	13.0	203.9	318.9	315	3.9	13.0	●	1

GWSL

Recommended cutting condition

Work material	Structural steel SS Carbon steel S-C (—25HRC)		Alloy steel SCM Tool steel SK (—35HRC)		Alloy steel SCM Die steel SKD (—40HRC)		Cast iron FC	
Dia. DC(mm)	Revolution (min-1)	Feed rate (mm/rev)	Revolution (min-1)	Feed rate (mm/rev)	Revolution (min-1)	Feed rate (mm/rev)	Revolution (min-1)	Feed rate (mm/rev)
0.5	8000	0.01	7000	0.008	6000	0.005	8000	0.01
1.0	6000	0.02	5500	0.01	4500	0.008	6000	0.02
2.0	4700	0.05	3600	0.03	2400	0.02	4700	0.05
3.0	3200	0.10	2400	0.08	1800	0.05	3500	0.10
6.0	1600	0.18	1200	0.15	900	0.13	1750	0.18
8.0	1200	0.20	900	0.18	680	0.15	1300	0.20
10.0	960	0.22	720	0.20	550	0.18	1100	0.22
12.0	800	0.24	600	0.22	450	0.20	880	0.24
15.0	630	0.28	480	0.24	350	0.22	700	0.28
20.0	470	0.33	360	0.26	260	0.24	530	0.33
25.0	380	0.36	290	0.28	210	0.26	420	0.36
30.0	310	0.40	240	0.30	180	0.28	330	0.40

Work material	Martensitic stainless steel AISI 420 Ferritic stainless steel AISI 430		Austenitic stainless steel AISI 304 Precipitation hardening ASTM 630		Copper alloy, Brass		Aluminium alloy	
Dia. DC(mm)	Revolution (min-1)	Feed rate (mm/rev)	Revolution (min-1)	Feed rate (mm/rev)	Revolution (min-1)	Feed rate (mm/rev)	Revolution (min-1)	Feed rate (mm/rev)
0.5	8000	0.01	6000	0.01	8000	0.01	10000	0.02
1.0	5000	0.02	4000	0.02	6000	0.02	7000	0.04
2.0	2500	0.05	2300	0.04	4700	0.05	6000	0.08
3.0	1900	0.10	1500	0.07	3200	0.10	5500	0.13
6.0	950	0.18	750	0.10	1600	0.18	3100	0.23
8.0	700	0.20	530	0.13	1200	0.20	2300	0.28
10.0	560	0.22	420	0.15	960	0.22	1900	0.33
12.0	460	0.24	340	0.17	800	0.24	1600	0.38
15.0	360	0.26	270	0.20	630	0.26	1300	0.42
20.0	270	0.28	200	0.23	470	0.28	950	0.45
25.0	210	0.32	160	0.24	380	0.32	750	0.48
30.0	180	0.35	135	0.25	310	0.35	630	0.50

- Please reduce the cutting conditions when drilling a deep hole.
- This table only shows standard cutting conditions with water-soluble cutting fluids. Please make corrections or adjustments depending on the application.

Reduction rate of cutting conditions for hole drilling

Drilling depth	Reduction rate of cutting speed	Reduction rate of feed
4DC	10%	10%
5DC	10%	15%
6DC	20%	20%
7DC	20%	20%

Drilling depth	Reduction rate of cutting speed	Reduction rate of feed
8DC	30%	20%
10DC	30%	25%
15DC	40%	30%
20DC	40%	45%

- DC:Drill dia.

LSD

Extra long

STRAIGHT SHANK DRILLS

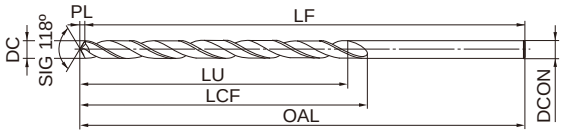
Product Information

HSS 118° SIG X Thinning

Work Material

P K N

TECHNICAL INFO >> 1997 ISO13399 PROPERTY >> 1966 SYMBOL DESCRIPTIONS >> 1623 DRILLS SELECTION CHART >> 1636



Type1

	1≦DC≦3	3<DC≦6	6<DC≦10	10<DC≦13
	0 −0.014	0 −0.018	0 −0.022	0 −0.027

Standard drill depth : LU=LCF-3DC

●Inventory maintained in Japan. Unit:mm

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
LSDD0100A100	1.0	25.3	100.3	100	0.3	1.0	●	1
LSDD0100A150	1.0	25.3	150.3	150	0.3	1.0	●	1
LSDD0110A100	1.1	25.3	100.3	100	0.3	1.1	●	1
LSDD0110A150	1.1	25.3	150.3	150	0.3	1.1	●	1
LSDD0120A100	1.2	25.4	100.4	100	0.4	1.2	●	1
LSDD0120A150	1.2	25.4	150.4	150	0.4	1.2	●	1
LSDD0130A100	1.3	30.4	100.4	100	0.4	1.3	●	1
LSDD0130A150	1.3	30.4	150.4	150	0.4	1.3	●	1
LSDD0140A100	1.4	30.4	100.4	100	0.4	1.4	●	1
LSDD0140A150	1.4	30.4	150.4	150	0.4	1.4	●	1
LSDD0150A100	1.5	30.5	100.5	100	0.5	1.5	●	1
LSDD0150A150	1.5	30.5	150.5	150	0.5	1.5	●	1
LSDD0160A100	1.6	40.5	100.5	100	0.5	1.6	●	1
LSDD0160A150	1.6	40.5	150.5	150	0.5	1.6	●	1
LSDD0170A100	1.7	40.5	100.5	100	0.5	1.7	●	1
LSDD0170A150	1.7	40.5	150.5	150	0.5	1.7	●	1
LSDD0180A100	1.8	40.5	100.5	100	0.5	1.8	●	1
LSDD0180A150	1.8	40.5	150.5	150	0.5	1.8	●	1
LSDD0190A100	1.9	40.6	100.6	100	0.6	1.9	●	1
LSDD0190A150	1.9	40.6	150.6	150	0.6	1.9	●	1
LSDD0200A100	2.0	50.6	100.6	100	0.6	2.0	●	1
LSDD0200A125	2.0	65.6	125.6	125	0.6	2.0	●	1
LSDD0200A150	2.0	75.6	150.6	150	0.6	2.0	●	1
LSDD0210A100	2.1	50.6	100.6	100	0.6	2.1	●	1
LSDD0210A150	2.1	75.6	150.6	150	0.6	2.1	●	1
LSDD0220A100	2.2	50.7	100.7	100	0.7	2.2	●	1
LSDD0220A150	2.2	75.7	150.7	150	0.7	2.2	●	1
LSDD0230A100	2.3	50.7	100.7	100	0.7	2.3	●	1
LSDD0230A150	2.3	75.7	150.7	150	0.7	2.3	●	1
LSDD0240A100	2.4	50.7	100.7	100	0.7	2.4	●	1
LSDD0240A150	2.4	75.7	150.7	150	0.7	2.4	●	1
LSDD0250A100	2.5	50.8	100.8	100	0.8	2.5	●	1
LSDD0250A125	2.5	65.8	125.8	125	0.8	2.5	●	1
LSDD0250A150	2.5	75.8	150.8	150	0.8	2.5	●	1

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
LSDD0260A100	2.6	50.8	100.8	100	0.8	2.6	●	1
LSDD0260A150	2.6	75.8	150.8	150	0.8	2.6	●	1
LSDD0270A100	2.7	50.8	100.8	100	0.8	2.7	●	1
LSDD0270A150	2.7	75.8	150.8	150	0.8	2.7	●	1
LSDD0280A100	2.8	50.8	100.8	100	0.8	2.8	●	1
LSDD0280A150	2.8	75.8	150.8	150	0.8	2.8	●	1
LSDD0290A100	2.9	50.9	100.9	100	0.9	2.9	●	1
LSDD0290A150	2.9	75.9	150.9	150	0.9	2.9	●	1
LSDD0300A100	3.0	50.9	100.9	100	0.9	3.0	●	1
LSDD0300A125	3.0	65.9	125.9	125	0.9	3.0	●	1
LSDD0300A150	3.0	75.9	150.9	150	0.9	3.0	●	1
LSDD0300A200	3.0	100.9	200.9	200	0.9	3.0	●	1
LSDD0310A150	3.1	75.9	150.9	150	0.9	3.1	●	1
LSDD0310A200	3.1	100.9	200.9	200	0.9	3.1	●	1
LSDD0320A125	3.2	66.0	126.0	125	1.0	3.2	●	1
LSDD0320A150	3.2	76.0	151.0	150	1.0	3.2	●	1
LSDD0320A200	3.2	101.0	201.0	200	1.0	3.2	●	1
LSDD0320A250	3.2	131.0	251.0	250	1.0	3.2	●	1
LSDD0330A150	3.3	76.0	151.0	150	1.0	3.3	●	1
LSDD0330A200	3.3	101.0	201.0	200	1.0	3.3	●	1
LSDD0340A150	3.4	76.0	151.0	150	1.0	3.4	●	1
LSDD0340A200	3.4	101.0	201.0	200	1.0	3.4	●	1
LSDD0350A125	3.5	66.1	126.1	125	1.1	3.5	●	1
LSDD0350A150	3.5	76.1	151.1	150	1.1	3.5	●	1
LSDD0350A200	3.5	101.1	201.1	200	1.1	3.5	●	1
LSDD0350A250	3.5	131.1	251.1	250	1.1	3.5	●	1
LSDD0360A150	3.6	76.1	151.1	150	1.1	3.6	●	1
LSDD0360A200	3.6	101.1	201.1	200	1.1	3.6	●	1
LSDD0370A150	3.7	76.1	151.1	150	1.1	3.7	●	1
LSDD0370A200	3.7	101.1	201.1	200	1.1	3.7	●	1
LSDD0380A150	3.8	76.1	151.1	150	1.1	3.8	●	1
LSDD0380A200	3.8	101.1	201.1	200	1.1	3.8	●	1
LSDD0390A150	3.9	76.2	151.2	150	1.2	3.9	●	1
LSDD0390A200	3.9	101.2	201.2	200	1.2	3.9	●	1

LSD

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
LSDD0400A125	4.0	71.2	126.2	125	1.2	4.0	●	1
LSDD0400A150	4.0	76.2	151.2	150	1.2	4.0	●	1
LSDD0400A200	4.0	101.2	201.2	200	1.2	4.0	●	1
LSDD0400A250	4.0	131.2	251.2	250	1.2	4.0	●	1
LSDD0410A150	4.1	76.2	151.2	150	1.2	4.1	●	1
LSDD0410A200	4.1	101.2	201.2	200	1.2	4.1	●	1
LSDD0420A150	4.2	76.3	151.3	150	1.3	4.2	●	1
LSDD0420A200	4.2	101.3	201.3	200	1.3	4.2	●	1
LSDD0430A150	4.3	76.3	151.3	150	1.3	4.3	●	1
LSDD0430A200	4.3	101.3	201.3	200	1.3	4.3	●	1
LSDD0440A150	4.4	76.3	151.3	150	1.3	4.4	●	1
LSDD0440A200	4.4	101.3	201.3	200	1.3	4.4	●	1
LSDD0450A125	4.5	71.4	126.4	125	1.4	4.5	●	1
LSDD0450A150	4.5	76.4	151.4	150	1.4	4.5	●	1
LSDD0450A200	4.5	101.4	201.4	200	1.4	4.5	●	1
LSDD0450A250	4.5	131.4	251.4	250	1.4	4.5	●	1
LSDD0460A150	4.6	91.4	151.4	150	1.4	4.6	●	1
LSDD0460A200	4.6	101.4	201.4	200	1.4	4.6	●	1
LSDD0470A150	4.7	91.4	151.4	150	1.4	4.7	●	1
LSDD0470A200	4.7	101.4	201.4	200	1.4	4.7	●	1
LSDD0480A150	4.8	91.4	151.4	150	1.4	4.8	●	1
LSDD0480A200	4.8	101.4	201.4	200	1.4	4.8	●	1
LSDD0490A150	4.9	91.5	151.5	150	1.5	4.9	●	1
LSDD0490A200	4.9	101.5	201.5	200	1.5	4.9	●	1
LSDD0500A150	5.0	91.5	151.5	150	1.5	5.0	●	1
LSDD0500A200	5.0	101.5	201.5	200	1.5	5.0	●	1
LSDD0500A250	5.0	131.5	251.5	250	1.5	5.0	●	1
LSDD0500A300	5.0	151.5	301.5	300	1.5	5.0	●	1
LSDD0510A200	5.1	101.5	201.5	200	1.5	5.1	●	1
LSDD0510A250	5.1	131.5	251.5	250	1.5	5.1	●	1
LSDD0520A200	5.2	101.6	201.6	200	1.6	5.2	●	1
LSDD0520A250	5.2	131.6	251.6	250	1.6	5.2	●	1
LSDD0530A200	5.3	101.6	201.6	200	1.6	5.3	●	1
LSDD0530A250	5.3	131.6	251.6	250	1.6	5.3	●	1
LSDD0540A200	5.4	101.6	201.6	200	1.6	5.4	●	1
LSDD0540A250	5.4	131.6	251.6	250	1.6	5.4	●	1
LSDD0550A150	5.5	91.7	151.7	150	1.7	5.5	●	1
LSDD0550A200	5.5	101.7	201.7	200	1.7	5.5	●	1
LSDD0550A250	5.5	131.7	251.7	250	1.7	5.5	●	1
LSDD0550A300	5.5	151.7	301.7	300	1.7	5.5	●	1
LSDD0560A200	5.6	101.7	201.7	200	1.7	5.6	●	1
LSDD0560A250	5.6	131.7	251.7	250	1.7	5.6	●	1
LSDD0570A200	5.7	101.7	201.7	200	1.7	5.7	●	1
LSDD0570A250	5.7	131.7	251.7	250	1.7	5.7	●	1
LSDD0580A200	5.8	101.7	201.7	200	1.7	5.8	●	1
LSDD0580A250	5.8	131.7	251.7	250	1.7	5.8	●	1
LSDD0590A200	5.9	101.8	201.8	200	1.8	5.9	●	1
LSDD0590A250	5.9	131.8	251.8	250	1.8	5.9	●	1
LSDD0600A150	6.0	91.8	151.8	150	1.8	6.0	●	1
LSDD0600A200	6.0	101.8	201.8	200	1.8	6.0	●	1
LSDD0600A250	6.0	131.8	251.8	250	1.8	6.0	●	1
LSDD0600A300	6.0	151.8	301.8	300	1.8	6.0	●	1
LSDD0640A200	6.4	121.9	201.9	200	1.9	6.4	●	1
LSDD0650A150	6.5	92.0	152.0	150	2.0	6.5	●	1

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
LSDD0650A200	6.5	122.0	202.0	200	2.0	6.5	●	1
LSDD0650A250	6.5	132.0	252.0	250	2.0	6.5	●	1
LSDD0650A300	6.5	152.0	302.0	300	2.0	6.5	●	1
LSDD0700A150	7.0	92.1	152.1	150	2.1	7.0	●	1
LSDD0700A200	7.0	122.1	202.1	200	2.1	7.0	●	1
LSDD0700A250	7.0	132.1	252.1	250	2.1	7.0	●	1
LSDD0700A300	7.0	152.1	302.1	300	2.1	7.0	●	1
LSDD0750A150	7.5	92.3	152.3	150	2.3	7.5	●	1
LSDD0750A200	7.5	122.3	202.3	200	2.3	7.5	●	1
LSDD0750A250	7.5	132.3	252.3	250	2.3	7.5	●	1
LSDD0750A300	7.5	152.3	302.3	300	2.3	7.5	●	1
LSDD0800A150	8.0	92.4	152.4	150	2.4	8.0	●	1
LSDD0800A200	8.0	122.4	202.4	200	2.4	8.0	●	1
LSDD0800A250	8.0	132.4	252.4	250	2.4	8.0	●	1
LSDD0800A300	8.0	152.4	302.4	300	2.4	8.0	●	1
LSDD0850A200	8.5	122.6	202.6	200	2.6	8.5	●	1
LSDD0850A250	8.5	132.6	252.6	250	2.6	8.5	●	1
LSDD0850A300	8.5	182.6	302.6	300	2.6	8.5	●	1
LSDD0850A350	8.5	202.6	352.6	350	2.6	8.5	●	1
LSDD0900A200	9.0	122.7	202.7	200	2.7	9.0	●	1
LSDD0900A250	9.0	132.7	252.7	250	2.7	9.0	●	1
LSDD0900A300	9.0	182.7	302.7	300	2.7	9.0	●	1
LSDD0900A350	9.0	202.7	352.7	350	2.7	9.0	●	1
LSDD0950A200	9.5	122.9	202.9	200	2.9	9.5	●	1
LSDD0950A250	9.5	132.9	252.9	250	2.9	9.5	●	1
LSDD0950A300	9.5	182.9	302.9	300	2.9	9.5	●	1
LSDD0950A350	9.5	202.9	352.9	350	2.9	9.5	●	1
LSDD1000A200	10.0	123.0	203.0	200	3.0	10.0	●	1
LSDD1000A250	10.0	133.0	253.0	250	3.0	10.0	●	1
LSDD1000A300	10.0	183.0	303.0	300	3.0	10.0	●	1
LSDD1000A350	10.0	203.0	353.0	350	3.0	10.0	●	1
LSDD1050A200	10.5	123.2	203.2	200	3.2	10.5	●	1
LSDD1050A250	10.5	133.2	253.2	250	3.2	10.5	●	1
LSDD1050A300	10.5	183.2	303.2	300	3.2	10.5	●	1
LSDD1050A350	10.5	203.2	353.2	350	3.2	10.5	●	1
LSDD1100A200	11.0	123.3	203.3	200	3.3	11.0	●	1
LSDD1100A250	11.0	133.3	253.3	250	3.3	11.0	●	1
LSDD1100A300	11.0	183.3	303.3	300	3.3	11.0	●	1
LSDD1100A350	11.0	203.3	353.3	350	3.3	11.0	●	1
LSDD1150A200	11.5	123.5	203.5	200	3.5	11.5	●	1
LSDD1150A250	11.5	133.5	253.5	250	3.5	11.5	●	1
LSDD1150A300	11.5	183.5	303.5	300	3.5	11.5	●	1
LSDD1150A350	11.5	203.5	353.5	350	3.5	11.5	●	1
LSDD1200A200	12.0	123.6	203.6	200	3.6	12.0	●	1
LSDD1200A250	12.0	133.6	253.6	250	3.6	12.0	●	1
LSDD1200A300	12.0	183.6	303.6	300	3.6	12.0	●	1
LSDD1200A350	12.0	203.6	353.6	350	3.6	12.0	●	1
LSDD1250A200	12.5	123.8	203.8	200	3.8	12.5	●	1
LSDD1250A250	12.5	133.8	253.8	250	3.8	12.5	●	1
LSDD1250A300	12.5	183.8	303.8	300	3.8	12.5	●	1
LSDD1250A350	12.5	203.8	353.8	350	3.8	12.5	●	1
LSDD1300A200	13.0	123.9	203.9	200	3.9	13.0	●	1
LSDD1300A250	13.0	133.9	253.9	250	3.9	13.0	●	1

LSD

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
LSDD1300A300	13.0	183.9	303.9	300	3.9	13.0	●	1

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
LSDD1300A350	13.0	203.9	353.9	350	3.9	13.0	●	1

LSD

Recommended cutting condition

Work material	Structural steel SS Carbon steel S-C (—25HRC)		Alloy steel SCM Tool steel SK (—35HRC)		Alloy steel SCM Die steel SKD (—40HRC)		Cast iron FC	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)
0.5	6000	0.01	5000	0.008	4000	0.005	6000	0.01
1.0	5000	0.02	4000	0.01	2800	0.008	5000	0.02
2.0	3000	0.05	2500	0.03	1800	0.02	3000	0.05
3.0	2100	0.10	1800	0.08	1200	0.05	2300	0.10
6.0	1100	0.18	900	0.15	600	0.13	1100	0.18
8.0	800	0.20	670	0.18	450	0.15	900	0.20
10.0	650	0.22	540	0.20	350	0.18	700	0.22
12.0	520	0.24	450	0.22	300	0.20	600	0.24
15.0	420	0.28	360	0.24	240	0.22	470	0.28
20.0	320	0.33	270	0.26	180	0.24	350	0.33
25.0	250	0.36	210	0.28	145	0.26	280	0.36
30.0	210	0.40	180	0.30	120	0.28	230	0.40
40.0	160	0.42	130	0.32	90	0.30	180	0.42

Work material	Martensitic stainless steel AISI 420 Ferritic stainless steel AISI 430		Austenitic stainless steel AISI 304 Precipitation hardening ASTM 630		Copper alloy, Brass		Aluminium alloy	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)
0.5	5000	0.01	4000	0.01	6000	0.01	10000	0.02
1.0	4000	0.02	3000	0.02	5000	0.02	7000	0.04
2.0	2200	0.05	1500	0.04	3000	0.05	5000	0.08
3.0	1600	0.10	1000	0.07	2100	0.10	4200	0.13
6.0	800	0.18	530	0.10	1100	0.18	2100	0.23
8.0	600	0.20	400	0.13	800	0.20	1600	0.28
10.0	480	0.22	310	0.15	650	0.22	1200	0.33
12.0	400	0.24	250	0.17	520	0.24	1000	0.38
15.0	320	0.26	170	0.20	420	0.26	850	0.42
20.0	240	0.28	130	0.23	320	0.28	630	0.45
25.0	190	0.32	100	0.24	250	0.32	500	0.48
30.0	160	0.35	85	0.25	210	0.35	400	0.50
40.0	120	0.38	65	0.28	160	0.38	300	0.52

- Please reduce the cutting conditions when drilling a deep hole.
- This table only shows standard cutting conditions with water-soluble cutting fluids. Please make corrections or adjustments depending on the application.

Reduction rate of cutting conditions for hole drilling

Drilling depth	Reduction rate of cutting speed	Reduction rate of feed
4DC	10%	10%
5DC	10%	15%
6DC	20%	20%
7DC	20%	20%

Drilling depth	Reduction rate of cutting speed	Reduction rate of feed
8DC	30%	20%
10DC	30%	25%
15DC	40%	30%
20DC	40%	45%

- DC:Drill dia.

EPSS

Plate pal

STRAIGHT SHANK DRILLS

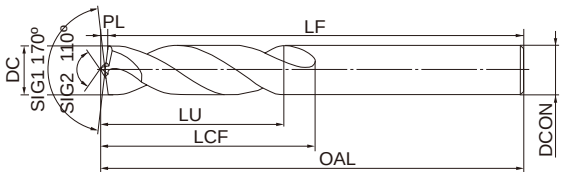
Product Information

HSS 170° SIG 110° X Thinning

Work Material

P M K N

TECHNICAL INFO >> 1997 ISO13399 PROPERTY >> 1966 SYMBOL DESCRIPTIONS >> 1623 DRILLS SELECTION CHART >> 1636



Type1

	2≦DC≦3	3<DC≦6	6<DC≦10	10<DC≦13
	0 −0.014	0 −0.018	0 −0.022	0 −0.027

Standard drill depth : LU=LCF-3DC

●Inventory maintained in Japan. Unit:mm

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
EPSSD0200	2.0	17.0	48.3	48	0.3	2.0	●	1
EPSSD0210	2.1	17.0	48.3	48	0.3	2.1	●	1
EPSSD0220	2.2	17.0	48.3	48	0.3	2.2	●	1
EPSSD0230	2.3	17.0	48.3	48	0.3	2.3	●	1
EPSSD0240	2.4	17.0	48.3	48	0.3	2.4	●	1
EPSSD0250	2.5	17.0	48.4	48	0.4	2.5	●	1
EPSSD0260	2.6	17.0	48.4	48	0.4	2.6	●	1
EPSSD0270	2.7	17.0	48.4	48	0.4	2.7	●	1
EPSSD0280	2.8	17.0	48.4	48	0.4	2.8	●	1
EPSSD0290	2.9	17.0	48.4	48	0.4	2.9	●	1
EPSSD0300	3.0	17.0	48.5	48	0.5	3.0	●	1
EPSSD0310	3.1	17.0	48.5	48	0.5	3.1	●	1
EPSSD0320	3.2	17.0	48.5	48	0.5	3.2	●	1
EPSSD0330	3.3	17.0	48.5	48	0.5	3.3	●	1
EPSSD0340	3.4	19.0	51.5	51	0.5	3.4	●	1
EPSSD0350	3.5	19.0	51.6	51	0.6	3.5	●	1
EPSSD0360	3.6	19.0	51.6	51	0.6	3.6	●	1
EPSSD0370	3.7	19.0	51.6	51	0.6	3.7	●	1
EPSSD0380	3.8	21.0	54.6	54	0.6	3.8	●	1
EPSSD0390	3.9	21.0	54.6	54	0.6	3.9	●	1
EPSSD0400	4.0	21.0	54.6	54	0.6	4.0	●	1
EPSSD0410	4.1	21.0	54.6	54	0.6	4.1	●	1
EPSSD0420	4.2	21.0	54.6	54	0.6	4.2	●	1
EPSSD0430	4.3	23.0	57.6	57	0.6	4.3	●	1
EPSSD0440	4.4	23.0	57.6	57	0.6	4.4	●	1
EPSSD0450	4.5	23.0	57.7	57	0.7	4.5	●	1
EPSSD0460	4.6	23.0	57.7	57	0.7	4.6	●	1
EPSSD0470	4.7	23.0	57.7	57	0.7	4.7	●	1

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
EPSSD0480	4.8	24.0	60.7	60	0.7	4.8	●	1
EPSSD0490	4.9	24.0	60.7	60	0.7	4.9	●	1
EPSSD0500	5.0	24.0	60.8	60	0.8	5.0	●	1
EPSSD0510	5.1	24.0	60.8	60	0.8	5.1	●	1
EPSSD0520	5.2	24.0	60.8	60	0.8	5.2	●	1
EPSSD0530	5.3	24.0	60.8	60	0.8	5.3	●	1
EPSSD0540	5.4	26.0	64.8	64	0.8	5.4	●	1
EPSSD0550	5.5	26.0	64.9	64	0.9	5.5	●	1
EPSSD0600	6.0	26.0	65.0	64	1.0	6.0	●	1
EPSSD0650	6.5	29.0	69.0	68	1.0	6.5	●	1
EPSSD0680	6.8	32.0	73.1	72	1.1	6.8	●	1
EPSSD0700	7.0	32.0	73.1	72	1.1	7.0	●	1
EPSSD0750	7.5	32.0	73.2	72	1.2	7.5	●	1
EPSSD0800	8.0	34.0	77.3	76	1.3	8.0	●	1
EPSSD0820	8.2	34.0	77.3	76	1.3	8.2	●	1
EPSSD0850	8.5	34.0	77.4	76	1.4	8.5	●	1
EPSSD0900	9.0	37.0	82.5	81	1.5	9.0	●	1
EPSSD0950	9.5	37.0	82.6	81	1.6	9.5	●	1
EPSSD1000	10.0	40.0	87.6	86	1.6	10.0	●	1
EPSSD1020	10.2	40.0	87.6	86	1.6	10.2	●	1
EPSSD1030	10.3	40.0	87.6	86	1.6	10.3	●	1
EPSSD1050	10.5	40.0	87.7	86	1.7	10.5	●	1
EPSSD1100	11.0	43.0	92.8	91	1.8	11.0	●	1
EPSSD1150	11.5	43.0	92.9	91	1.9	11.5	●	1
EPSSD1200	12.0	47.0	100.0	98	2.0	12.0	●	1
EPSSD1250	12.5	47.0	100.0	98	2.0	12.5	●	1
EPSSD1300	13.0	47.0	100.2	98	2.2	13.0	●	1

GTD

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TAPER SHANK DRILLS

Product Information

HSS G 118° SIG XR Thinning

Work Material

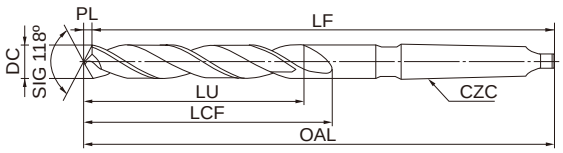
P M K N

TECHNICAL INFO >> 1997

ISO13399 PROPERTY >> 1966

SYMBOL DESCRIPTIONS >> 1623

DRILLS SELECTION CHART >> 1636



Type1

	DC=6	6<DC≦10	10<DC≦18	18<DC≦30	30<DC≦40
	0 −0.018	0 −0.022	0 −0.027	0 −0.033	0 −0.039

Standard drill depth : LU=LCF-3DC

●Inventory maintained in Japan. Unit:mm

Order Number	DC	LCF	OAL	LF	PL	CZC	Stock	Type
GTDD0600M1	6.0	56.8	149.8	148	1.8	MT.1	●	1
GTDD0650M1	6.5	63.0	154.0	152	2.0	MT.1	●	1
GTDD0660M1	6.6	63.0	157.0	155	2.0	MT.1	●	1
GTDD0680M1	6.8	69.0	157.0	155	2.0	MT.1	●	1
GTDD0700M1	7.0	69.1	157.1	155	2.1	MT.1	●	1
GTDD0720M1	7.2	69.2	160.2	158	2.2	MT.1	●	1
GTDD0750M1	7.5	69.3	160.3	158	2.3	MT.1	●	1
GTDD0770M1	7.7	74.3	164.3	162	2.3	MT.1	●	1
GTDD0780M1	7.8	74.3	164.3	162	2.3	MT.1	●	1
GTDD0800M1	8.0	74.4	164.4	162	2.4	MT.1	●	1
GTDD0820M1	8.2	74.5	170.5	168	2.5	MT.1	●	1
GTDD0850M1	8.5	74.6	170.6	168	2.6	MT.1	●	1
GTDD0880M1	8.8	80.6	174.6	172	2.6	MT.1	●	1
GTDD0900M1	9.0	80.7	174.7	172	2.7	MT.1	●	1
GTDD0950M1	9.5	80.9	177.9	175	2.9	MT.1	●	1
GTDD0970M1	9.7	86.9	180.9	178	2.9	MT.1	●	1
GTDD0980M1	9.8	86.9	180.9	178	2.9	MT.1	●	1
GTDD1000M1	10.0	87.0	181.0	178	3.0	MT.1	●	1
GTDD1030M1	10.3	87.1	185.1	182	3.1	MT.1	●	1
GTDD1050M1	10.5	87.2	185.2	182	3.2	MT.1	●	1
GTDD1080M1	10.8	93.2	188.2	185	3.2	MT.1	●	1
GTDD1100M1	11.0	93.3	188.3	185	3.3	MT.1	●	1
GTDD1150M1	11.5	93.5	191.5	188	3.5	MT.1	●	1
GTDD1200M1	12.0	100.6	195.6	192	3.6	MT.1	●	1
GTDD1250M1	12.5	100.8	198.8	195	3.8	MT.1	●	1
GTDD1300M1	13.0	100.9	201.9	198	3.9	MT.1	●	1
GTDD1350M1	13.5	107.1	206.1	202	4.1	MT.1	●	1
GTDD1400M1	14.0	107.2	209.2	205	4.2	MT.1	●	1
GTDD1450M2	14.5	113.4	226.4	222	4.4	MT.2	●	1
GTDD1500M2	15.0	113.5	229.5	225	4.5	MT.2	●	1
GTDD1550M2	15.5	119.7	232.7	228	4.7	MT.2	●	1
GTDD1600M2	16.0	119.8	234.8	230	4.8	MT.2	●	1
GTDD1650M2	16.5	124.0	237.0	232	5.0	MT.2	●	1
GTDD1700M2	17.0	124.1	240.1	235	5.1	MT.2	●	1
GTDD1750M2	17.5	129.3	245.3	240	5.3	MT.2	●	1
GTDD1800M2	18.0	129.4	245.4	240	5.4	MT.2	●	1
GTDD1850M2	18.5	134.6	250.6	245	5.6	MT.2	●	1
GTDD1900M2	19.0	134.7	250.7	245	5.7	MT.2	●	1

Order Number	DC	LCF	OAL	LF	PL	CZC	Stock	Type
GTDD1950M2	19.5	138.9	255.9	250	5.9	MT.2	●	1
GTDD2000M2	20.0	139.0	256.0	250	6.0	MT.2	●	1
GTDD2050M2	20.5	144.2	261.2	255	6.2	MT.2	●	1
GTDD2100M2	21.0	144.3	261.3	255	6.3	MT.2	●	1
GTDD2150M2	21.5	149.5	266.5	260	6.5	MT.2	●	1
GTDD2150M3	21.5	149.5	286.5	280	6.5	MT.3	●	1
GTDD2200M2	22.0	149.6	266.6	260	6.6	MT.2	●	1
GTDD2200M3	22.0	149.6	286.6	280	6.6	MT.3	●	1
GTDD2250M2	22.5	153.8	271.8	265	6.8	MT.2	●	1
GTDD2250M3	22.5	153.8	291.8	285	6.8	MT.3	●	1
GTDD2300M2	23.0	153.9	271.9	265	6.9	MT.2	●	1
GTDD2300M3	23.0	153.9	291.9	285	6.9	MT.3	●	1
GTDD2350M3	23.5	154.1	292.1	285	7.1	MT.3	●	1
GTDD2400M3	24.0	159.2	292.2	285	7.2	MT.3	●	1
GTDD2450M3	24.5	159.4	292.4	285	7.4	MT.3	●	1
GTDD2500M3	25.0	159.5	292.5	285	7.5	MT.3	●	1
GTDD2550M3	25.5	163.7	292.7	285	7.7	MT.3	●	1
GTDD2600M3	26.0	163.8	292.8	285	7.8	MT.3	●	1
GTDD2650M3	26.5	164.0	298.0	290	8.0	MT.3	●	1
GTDD2700M3	27.0	169.1	298.1	290	8.1	MT.3	●	1
GTDD2750M3	27.5	169.3	303.3	295	8.3	MT.3	●	1
GTDD2800M3	28.0	169.4	303.4	295	8.4	MT.3	●	1
GTDD2850M3	28.5	173.6	308.6	300	8.6	MT.3	●	1
GTDD2900M3	29.0	173.7	308.7	300	8.7	MT.3	●	1
GTDD2950M3	29.5	173.9	313.9	305	8.9	MT.3	●	1
GTDD3000M3	30.0	174.0	314.0	305	9.0	MT.3	●	1
GTDD3050M3	30.5	179.2	319.2	310	9.2	MT.3	●	1
GTDD3100M3	31.0	179.3	319.3	310	9.3	MT.3	●	1
GTDD3150M3	31.5	179.5	324.5	315	9.5	MT.3	●	1
GTDD3200M3	32.0	183.6	324.6	315	9.6	MT.3	●	1
GTDD3300M4	33.0	183.9	354.9	345	9.9	MT.4	●	1
GTDD3400M4	34.0	189.2	360.2	350	10.2	MT.4	●	1
GTDD3500M4	35.0	189.5	360.5	350	10.5	MT.4	●	1
GTDD3600M4	36.0	193.8	365.8	355	10.8	MT.4	●	1
GTDD3700M4	37.0	194.1	366.1	355	11.1	MT.4	●	1
GTDD3800M4	38.0	198.4	371.4	360	11.4	MT.4	●	1
GTDD3900M4	39.0	198.7	371.7	360	11.7	MT.4	●	1
GTDD4000M4	40.0	199.0	377.0	365	12.0	MT.4	●	1

GTD

Recommended cutting condition

Work material	Structural steel SS Carbon steel S-C (—25HRC)		Alloy steel SCM Tool steel SK (—35HRC)		Alloy steel SCM Die steel SKD (—40HRC)		Cast iron FC	
Dia. DC(mm)	Revolution (min-1)	Feed rate (mm/rev)	Revolution (min-1)	Feed rate (mm/rev)	Revolution (min-1)	Feed rate (mm/rev)	Revolution (min-1)	Feed rate (mm/rev)
0.5	8000	0.01	7000	0.008	6000	0.005	8000	0.01
1.0	6000	0.02	5500	0.01	4500	0.008	6000	0.02
2.0	4700	0.05	3600	0.03	2400	0.02	4700	0.05
3.0	3200	0.10	2400	0.08	1800	0.05	3500	0.10
6.0	1600	0.18	1200	0.15	900	0.13	1750	0.18
8.0	1200	0.20	900	0.18	680	0.15	1300	0.20
10.0	960	0.22	720	0.20	550	0.18	1100	0.22
12.0	800	0.24	600	0.22	450	0.20	880	0.24
15.0	630	0.28	480	0.24	350	0.22	700	0.28
20.0	470	0.33	360	0.26	260	0.24	530	0.33
25.0	380	0.36	290	0.28	210	0.26	420	0.36
30.0	310	0.40	240	0.30	180	0.28	330	0.40

Work material	Martensitic stainless steel AISI 420 Ferritic stainless steel AISI 430		Austenitic stainless steel AISI 304 Precipitation hardening ASTM 630		Copper alloy, Brass		Aluminium alloy	
Dia. DC(mm)	Revolution (min-1)	Feed rate (mm/rev)	Revolution (min-1)	Feed rate (mm/rev)	Revolution (min-1)	Feed rate (mm/rev)	Revolution (min-1)	Feed rate (mm/rev)
0.5	8000	0.01	6000	0.01	8000	0.01	10000	0.02
1.0	5000	0.02	4000	0.02	6000	0.02	7000	0.04
2.0	2500	0.05	2300	0.04	4700	0.05	6000	0.08
3.0	1900	0.10	1500	0.07	3200	0.10	5500	0.13
6.0	950	0.18	750	0.10	1600	0.18	3100	0.23
8.0	700	0.20	530	0.13	1200	0.20	2300	0.28
10.0	560	0.22	420	0.15	960	0.22	1900	0.33
12.0	460	0.24	340	0.17	800	0.24	1600	0.38
15.0	360	0.26	270	0.20	630	0.26	1300	0.42
20.0	270	0.28	200	0.23	470	0.28	950	0.45
25.0	210	0.32	160	0.24	380	0.32	750	0.48
30.0	180	0.35	135	0.25	310	0.35	630	0.50

- Please reduce the cutting conditions when drilling a deep hole.
- This table only shows standard cutting conditions with water-soluble cutting fluids. Please make corrections or adjustments depending on the application.

Reduction rate of cutting conditions for hole drilling

Drilling depth	Reduction rate of cutting speed	Reduction rate of feed	Drilling depth	Reduction rate of cutting speed	Reduction rate of feed
4DC	10%	10%	8DC	30%	20%
5DC	10%	15%	10DC	30%	25%
6DC	20%	20%	15DC	40%	30%
7DC	20%	20%	20DC	40%	45%

- DC:Drill dia.

TD

TAPER SHANK DRILLS

Product Information

HSS 118° SIG S Thinning

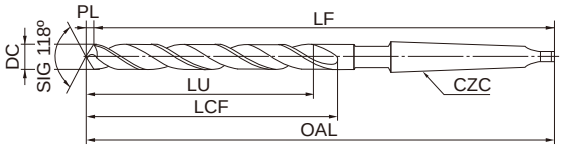
DC>40

TECHNICAL INFO >> 1997 ISO13399 PROPERTY >> 1966

Work Material

P M K N

SYMBOL DESCRIPTIONS >> 1623 DRILLS SELECTION CHART >> 1636



Type1

	DC=3	3<DC≦6	6<DC≦10	10<D C≦18	18<D C≦30	30<D C≦50	50<D C≦75
	0 −0.014	0 −0.018	0 −0.022	0 −0.027	0 −0.033	0 −0.039	0 −0.046

Standard drill depth : LU=LCF-3DC

●Inventory maintained in Japan. Unit:mm

Order Number	DC	LCF	OAL	LF	PL	CZC	Stock	Type
TDD0300M1	3.0	38.9	115.9	115	0.9	MT.1	●	1
TDD0310M1	3.1	45.9	122.9	122	0.9	MT.1	●	1
TDD0320M1	3.2	46.0	123.0	122	1.0	MT.1	●	1
TDD0330M1	3.3	46.0	123.0	122	1.0	MT.1	●	1
TDD0340M1	3.4	46.0	123.0	122	1.0	MT.1	●	1
TDD0350M1	3.5	46.1	123.1	122	1.1	MT.1	●	1
TDD0360M1	3.6	51.1	129.1	128	1.1	MT.1	●	1
TDD0370M1	3.7	51.1	129.1	128	1.1	MT.1	●	1
TDD0380M1	3.8	51.1	129.1	128	1.1	MT.1	●	1
TDD0390M1	3.9	51.2	129.2	128	1.2	MT.1	●	1
TDD0400M1	4.0	51.2	129.2	128	1.2	MT.1	●	1
TDD0410M1	4.1	56.2	136.2	135	1.2	MT.1	●	1
TDD0420M1	4.2	56.3	136.3	135	1.3	MT.1	●	1
TDD0430M1	4.3	56.3	136.3	135	1.3	MT.1	●	1
TDD0440M1	4.4	56.3	136.3	135	1.3	MT.1	●	1
TDD0450M1	4.5	56.4	136.4	135	1.4	MT.1	●	1
TDD0460M1	4.6	61.4	141.4	140	1.4	MT.1	●	1
TDD0470M1	4.7	61.4	141.4	140	1.4	MT.1	●	1
TDD0480M1	4.8	61.4	141.4	140	1.4	MT.1	●	1
TDD0490M1	4.9	61.5	141.5	140	1.5	MT.1	●	1
TDD0500M1	5.0	61.5	141.5	140	1.5	MT.1	●	1
TDD0510M1	5.1	66.5	146.5	145	1.5	MT.1	●	1
TDD0520M1	5.2	66.6	146.6	145	1.6	MT.1	●	1
TDD0530M1	5.3	66.6	146.6	145	1.6	MT.1	●	1
TDD0540M1	5.4	66.6	146.6	145	1.6	MT.1	●	1
TDD0550M1	5.5	66.7	146.7	145	1.7	MT.1	●	1
TDD0560M1	5.6	69.7	149.7	148	1.7	MT.1	●	1
TDD0570M1	5.7	69.7	149.7	148	1.7	MT.1	●	1
TDD0580M1	5.8	69.7	149.7	148	1.7	MT.1	●	1
TDD0590M1	5.9	69.8	149.8	148	1.8	MT.1	●	1
TDD0600M1	6.0	69.8	149.8	148	1.8	MT.1	●	1
TDD0610M1	6.1	73.8	153.8	152	1.8	MT.1	●	1
TDD0620M1	6.2	73.9	153.9	152	1.9	MT.1	●	1
TDD0630M1	6.3	73.9	153.9	152	1.9	MT.1	●	1

Order Number	DC	LCF	OAL	LF	PL	CZC	Stock	Type
TDD0640M1	6.4	73.9	153.9	152	1.9	MT.1	●	1
TDD0650M1	6.5	74.0	154.0	152	2.0	MT.1	●	1
TDD0660M1	6.6	77.0	157.0	155	2.0	MT.1	●	1
TDD0670M1	6.7	77.0	157.0	155	2.0	MT.1	●	1
TDD0680M1	6.8	77.0	157.0	155	2.0	MT.1	●	1
TDD0690M1	6.9	77.1	157.1	155	2.1	MT.1	●	1
TDD0700M1	7.0	77.1	157.1	155	2.1	MT.1	●	1
TDD0710M1	7.1	80.1	160.1	158	2.1	MT.1	●	1
TDD0720M1	7.2	80.2	160.2	158	2.2	MT.1	●	1
TDD0730M1	7.3	80.2	160.2	158	2.2	MT.1	●	1
TDD0740M1	7.4	80.2	160.2	158	2.2	MT.1	●	1
TDD0750M1	7.5	80.3	160.3	158	2.3	MT.1	●	1
TDD0760M1	7.6	84.3	164.3	162	2.3	MT.1	●	1
TDD0770M1	7.7	84.3	164.3	162	2.3	MT.1	●	1
TDD0780M1	7.8	84.3	164.3	162	2.3	MT.1	●	1
TDD0790M1	7.9	84.4	164.4	162	2.4	MT.1	●	1
TDD0800M1	8.0	84.4	164.4	162	2.4	MT.1	●	1
TDD0810M1	8.1	87.4	170.4	168	2.4	MT.1	●	1
TDD0820M1	8.2	87.5	170.5	168	2.5	MT.1	●	1
TDD0830M1	8.3	87.5	170.5	168	2.5	MT.1	●	1
TDD0840M1	8.4	87.5	170.5	168	2.5	MT.1	●	1
TDD0850M1	8.5	87.6	170.6	168	2.6	MT.1	●	1
TDD0860M1	8.6	90.6	174.6	172	2.6	MT.1	●	1
TDD0870M1	8.7	90.6	174.6	172	2.6	MT.1	●	1
TDD0880M1	8.8	90.6	174.6	172	2.6	MT.1	●	1
TDD0890M1	8.9	90.7	174.7	172	2.7	MT.1	●	1
TDD0900M1	9.0	90.7	174.7	172	2.7	MT.1	●	1
TDD0910M1	9.1	94.7	177.7	175	2.7	MT.1	●	1
TDD0920M1	9.2	94.8	177.8	175	2.8	MT.1	●	1
TDD0930M1	9.3	94.8	177.8	175	2.8	MT.1	●	1
TDD0940M1	9.4	94.8	177.8	175	2.8	MT.1	●	1
TDD0950M1	9.5	94.9	177.9	175	2.9	MT.1	●	1
TDD0960M1	9.6	97.9	180.9	178	2.9	MT.1	●	1
TDD0970M1	9.7	97.9	180.9	178	2.9	MT.1	●	1

TD

Order Number	DC	LCF	OAL	LF	PL	CZC	Stock	Type
TDD0980M1	9.8	97.9	180.9	178	2.9	MT.1	●	1
TDD0990M1	9.9	98.0	181.0	178	3.0	MT.1	●	1
TDD1000M1	10.0	98.0	181.0	178	3.0	MT.1	●	1
TDD1010M1	10.1	101.0	185.0	182	3.0	MT.1	●	1
TDD1020M1	10.2	101.1	185.1	182	3.1	MT.1	●	1
TDD1030M1	10.3	101.1	185.1	182	3.1	MT.1	●	1
TDD1040M1	10.4	101.1	185.1	182	3.1	MT.1	●	1
TDD1050M1	10.5	101.2	185.2	182	3.2	MT.1	●	1
TDD1060M1	10.6	105.2	188.2	185	3.2	MT.1	●	1
TDD1070M1	10.7	105.2	188.2	185	3.2	MT.1	●	1
TDD1080M1	10.8	105.2	188.2	185	3.2	MT.1	●	1
TDD1090M1	10.9	105.3	188.3	185	3.3	MT.1	●	1
TDD1100M1	11.0	105.3	188.3	185	3.3	MT.1	●	1
TDD1110M1	11.1	108.3	191.3	188	3.3	MT.1	●	1
TDD1120M1	11.2	108.4	191.4	188	3.4	MT.1	●	1
TDD1130M1	11.3	108.4	191.4	188	3.4	MT.1	●	1
TDD1140M1	11.4	108.4	191.4	188	3.4	MT.1	●	1
TDD1150M1	11.5	108.5	191.5	188	3.5	MT.1	●	1
TDD1160M1	11.6	111.5	195.5	192	3.5	MT.1	●	1
TDD1170M1	11.7	111.5	195.5	192	3.5	MT.1	●	1
TDD1180M1	11.8	111.5	195.5	192	3.5	MT.1	●	1
TDD1190M1	11.9	111.6	195.6	192	3.6	MT.1	●	1
TDD1200M1	12.0	111.6	195.6	192	3.6	MT.1	●	1
TDD1210M1	12.1	115.6	198.6	195	3.6	MT.1	●	1
TDD1220M1	12.2	115.7	198.7	195	3.7	MT.1	●	1
TDD1230M1	12.3	115.7	198.7	195	3.7	MT.1	●	1
TDD1240M1	12.4	115.7	198.7	195	3.7	MT.1	●	1
TDD1250M1	12.5	115.8	198.8	195	3.8	MT.1	●	1
TDD1260M1	12.6	118.8	201.8	198	3.8	MT.1	●	1
TDD1270M1	12.7	118.8	201.8	198	3.8	MT.1	●	1
TDD1280M1	12.8	118.8	201.8	198	3.8	MT.1	●	1
TDD1290M1	12.9	118.9	201.9	198	3.9	MT.1	●	1
TDD1300M1	13.0	118.9	201.9	198	3.9	MT.1	●	1
TDD1310M1	13.1	121.9	205.9	202	3.9	MT.1	●	1
TDD1320M1	13.2	122.0	206.0	202	4.0	MT.1	●	1
TDD1330M1	13.3	122.0	206.0	202	4.0	MT.1	●	1
TDD1340M1	13.4	122.0	206.0	202	4.0	MT.1	●	1
TDD1350M1	13.5	122.1	206.1	202	4.1	MT.1	●	1
TDD1360M1	13.6	126.1	209.1	205	4.1	MT.1	●	1
TDD1370M1	13.7	126.1	209.1	205	4.1	MT.1	●	1
TDD1380M1	13.8	126.1	209.1	205	4.1	MT.1	●	1
TDD1390M1	13.9	126.2	209.2	205	4.2	MT.1	●	1
TDD1400M1	14.0	126.2	209.2	205	4.2	MT.1	●	1
TDD1410M2	14.1	126.2	226.2	222	4.2	MT.2	●	1
TDD1420M2	14.2	126.3	226.3	222	4.3	MT.2	●	1
TDD1430M2	14.3	126.3	226.3	222	4.3	MT.2	●	1
TDD1440M2	14.4	126.3	226.3	222	4.3	MT.2	●	1
TDD1450M2	14.5	126.4	226.4	222	4.4	MT.2	●	1
TDD1460M2	14.6	129.4	229.4	225	4.4	MT.2	●	1
TDD1470M2	14.7	129.4	229.4	225	4.4	MT.2	●	1
TDD1480M2	14.8	129.4	229.4	225	4.4	MT.2	●	1
TDD1490M2	14.9	129.5	229.5	225	4.5	MT.2	●	1
TDD1500M2	15.0	129.5	229.5	225	4.5	MT.2	●	1
TDD1510M2	15.1	132.5	232.5	228	4.5	MT.2	●	1

Order Number	DC	LCF	OAL	LF	PL	CZC	Stock	Type
TDD1520M2	15.2	132.6	232.6	228	4.6	MT.2	●	1
TDD1530M2	15.3	132.6	232.6	228	4.6	MT.2	●	1
TDD1540M2	15.4	132.6	232.6	228	4.6	MT.2	●	1
TDD1550M2	15.5	132.7	232.7	228	4.7	MT.2	●	1
TDD1560M2	15.6	134.7	234.7	230	4.7	MT.2	●	1
TDD1570M2	15.7	134.7	234.7	230	4.7	MT.2	●	1
TDD1580M2	15.8	134.7	234.7	230	4.7	MT.2	●	1
TDD1590M2	15.9	134.8	234.8	230	4.8	MT.2	●	1
TDD1600M2	16.0	134.8	234.8	230	4.8	MT.2	●	1
TDD1610M2	16.1	136.8	236.8	232	4.8	MT.2	●	1
TDD1620M2	16.2	136.9	236.9	232	4.9	MT.2	●	1
TDD1630M2	16.3	136.9	236.9	232	4.9	MT.2	●	1
TDD1640M2	16.4	136.9	236.9	232	4.9	MT.2	●	1
TDD1650M2	16.5	137.0	237.0	232	5.0	MT.2	●	1
TDD1660M2	16.6	140.0	240.0	235	5.0	MT.2	●	1
TDD1670M2	16.7	140.0	240.0	235	5.0	MT.2	●	1
TDD1680M2	16.8	140.0	240.0	235	5.0	MT.2	●	1
TDD1690M2	16.9	140.1	240.1	235	5.1	MT.2	●	1
TDD1700M2	17.0	140.1	240.1	235	5.1	MT.2	●	1
TDD1710M2	17.1	145.1	245.1	240	5.1	MT.2	●	1
TDD1720M2	17.2	145.2	245.2	240	5.2	MT.2	●	1
TDD1730M2	17.3	145.2	245.2	240	5.2	MT.2	●	1
TDD1740M2	17.4	145.2	245.2	240	5.2	MT.2	●	1
TDD1750M2	17.5	145.3	245.3	240	5.3	MT.2	●	1
TDD1760M2	17.6	145.3	245.3	240	5.3	MT.2	●	1
TDD1770M2	17.7	145.3	245.3	240	5.3	MT.2	●	1
TDD1780M2	17.8	145.3	245.3	240	5.3	MT.2	●	1
TDD1790M2	17.9	145.4	245.4	240	5.4	MT.2	●	1
TDD1800M2	18.0	145.4	245.4	240	5.4	MT.2	●	1
TDD1810M2	18.1	150.4	250.4	245	5.4	MT.2	●	1
TDD1820M2	18.2	150.5	250.5	245	5.5	MT.2	●	1
TDD1830M2	18.3	150.5	250.5	245	5.5	MT.2	●	1
TDD1840M2	18.4	150.5	250.5	245	5.5	MT.2	●	1
TDD1850M2	18.5	150.6	250.6	245	5.6	MT.2	●	1
TDD1860M2	18.6	150.6	250.6	245	5.6	MT.2	●	1
TDD1870M2	18.7	150.6	250.6	245	5.6	MT.2	●	1
TDD1880M2	18.8	150.6	250.6	245	5.6	MT.2	●	1
TDD1890M2	18.9	150.7	250.7	245	5.7	MT.2	●	1
TDD1900M2	19.0	150.7	250.7	245	5.7	MT.2	●	1
TDD1910M2	19.1	155.7	255.7	250	5.7	MT.2	●	1
TDD1920M2	19.2	155.8	255.8	250	5.8	MT.2	●	1
TDD1930M2	19.3	155.8	255.8	250	5.8	MT.2	●	1
TDD1940M2	19.4	155.8	255.8	250	5.8	MT.2	●	1
TDD1950M2	19.5	155.9	255.9	250	5.9	MT.2	●	1
TDD1960M2	19.6	155.9	255.9	250	5.9	MT.2	●	1
TDD1970M2	19.7	155.9	255.9	250	5.9	MT.2	●	1
TDD1980M2	19.8	155.9	255.9	250	5.9	MT.2	●	1
TDD1990M2	19.9	156.0	256.0	250	6.0	MT.2	●	1
TDD2000M2	20.0	156.0	256.0	250	6.0	MT.2	●	1
TDD2010M2	20.1	161.0	261.0	255	6.0	MT.2	●	1
TDD2020M2	20.2	161.1	261.1	255	6.1	MT.2	●	1
TDD2030M2	20.3	161.1	261.1	255	6.1	MT.2	●	1
TDD2040M2	20.4	161.1	261.1	255	6.1	MT.2	●	1
TDD2050M2	20.5	161.2	261.2	255	6.2	MT.2	●	1

TD

Order Number	DC	LCF	OAL	LF	PL	CZC	Stock	Type
TDD2060M2	20.6	161.2	261.2	255	6.2	MT.2	●	1
TDD2070M2	20.7	161.2	261.2	255	6.2	MT.2	●	1
TDD2080M2	20.8	161.2	261.2	255	6.2	MT.2	●	1
TDD2090M2	20.9	161.3	261.3	255	6.3	MT.2	●	1
TDD2100M2	21.0	161.3	261.3	255	6.3	MT.2	●	1
TDD2110M2	21.1	166.3	266.3	260	6.3	MT.2	●	1
TDD2120M2	21.2	166.4	266.4	260	6.4	MT.2	●	1
TDD2130M2	21.3	166.4	266.4	260	6.4	MT.2	●	1
TDD2140M2	21.4	166.4	266.4	260	6.4	MT.2	●	1
TDD2150M2	21.5	166.5	266.5	260	6.5	MT.2	●	1
TDD2160M2	21.6	166.5	266.5	260	6.5	MT.2	●	1
TDD2170M2	21.7	166.5	266.5	260	6.5	MT.2	●	1
TDD2180M2	21.8	166.5	266.5	260	6.5	MT.2	●	1
TDD2190M2	21.9	166.6	266.6	260	6.6	MT.2	●	1
TDD2200M2	22.0	166.6	266.6	260	6.6	MT.2	●	1
TDD2210M2	22.1	171.6	271.6	265	6.6	MT.2	●	1
TDD2220M2	22.2	171.7	271.7	265	6.7	MT.2	●	1
TDD2230M2	22.3	171.7	271.7	265	6.7	MT.2	●	1
TDD2240M2	22.4	171.7	271.7	265	6.7	MT.2	●	1
TDD2250M2	22.5	171.8	271.8	265	6.8	MT.2	●	1
TDD2260M2	22.6	171.8	271.8	265	6.8	MT.2	●	1
TDD2270M2	22.7	171.8	271.8	265	6.8	MT.2	●	1
TDD2280M2	22.8	171.8	271.8	265	6.8	MT.2	●	1
TDD2290M2	22.9	171.9	271.9	265	6.9	MT.2	●	1
TDD2300M2	23.0	171.9	271.9	265	6.9	MT.2	●	1
TDD2350M3	23.5	172.1	292.1	285	7.1	MT.3	●	1
TDD2400M3	24.0	172.2	292.2	285	7.2	MT.3	●	1
TDD2450M3	24.5	172.4	292.4	285	7.4	MT.3	●	1
TDD2500M3	25.0	172.5	292.5	285	7.5	MT.3	●	1
TDD2550M3	25.5	172.7	292.7	285	7.7	MT.3	●	1
TDD2600M3	26.0	172.8	292.8	285	7.8	MT.3	●	1
TDD2650M3	26.5	178.0	298.0	290	8.0	MT.3	●	1
TDD2700M3	27.0	178.1	298.1	290	8.1	MT.3	●	1
TDD2750M3	27.5	183.3	303.3	295	8.3	MT.3	●	1
TDD2800M3	28.0	183.4	303.4	295	8.4	MT.3	●	1
TDD2850M3	28.5	188.6	308.6	300	8.6	MT.3	●	1
TDD2900M3	29.0	188.7	308.7	300	8.7	MT.3	●	1
TDD2950M3	29.5	193.9	313.9	305	8.9	MT.3	●	1
TDD3000M3	30.0	194.0	314.0	305	9.0	MT.3	●	1
TDD3050M3	30.5	199.2	319.2	310	9.2	MT.3	●	1
TDD3100M3	31.0	199.3	319.3	310	9.3	MT.3	●	1
TDD3150M3	31.5	204.5	324.5	315	9.5	MT.3	●	1
TDD3200M3	32.0	204.6	324.6	315	9.6	MT.3	●	1
TDD3250M4	32.5	209.8	354.8	345	9.8	MT.4	●	1
TDD3300M4	33.0	209.9	354.9	345	9.9	MT.4	●	1
TDD3350M4	33.5	215.1	360.1	350	10.1	MT.4	●	1
TDD3400M4	34.0	215.2	360.2	350	10.2	MT.4	●	1
TDD3450M4	34.5	215.4	360.4	350	10.4	MT.4	●	1
TDD3500M4	35.0	215.5	360.5	350	10.5	MT.4	●	1
TDD3550M4	35.5	220.7	365.7	355	10.7	MT.4	●	1
TDD3600M4	36.0	220.8	365.8	355	10.8	MT.4	●	1
TDD3650M4	36.5	221.0	366.0	355	11.0	MT.4	●	1

Order Number	DC	LCF	OAL	LF	PL	CZC	Stock	Type
TDD3700M4	37.0	221.1	366.1	355	11.1	MT.4	●	1
TDD3750M4	37.5	226.3	371.3	360	11.3	MT.4	●	1
TDD3800M4	38.0	226.4	371.4	360	11.4	MT.4	●	1
TDD3850M4	38.5	226.6	371.6	360	11.6	MT.4	●	1
TDD3900M4	39.0	226.7	371.7	360	11.7	MT.4	●	1
TDD3950M4	39.5	231.9	376.9	365	11.9	MT.4	●	1
TDD4000M4	40.0	232.0	377.0	365	12.0	MT.4	●	1
TDD4050M4	40.5	232.2	377.2	365	12.2	MT.4	●	1
TDD4100M4	41.0	232.3	377.3	365	12.3	MT.4	●	1
TDD4150M4	41.5	237.5	382.5	370	12.5	MT.4	●	1
TDD4200M4	42.0	237.6	382.6	370	12.6	MT.4	●	1
TDD4250M4	42.5	237.8	382.8	370	12.8	MT.4	●	1
TDD4300M4	43.0	237.9	382.9	370	12.9	MT.4	●	1
TDD4350M4	43.5	243.1	388.1	375	13.1	MT.4	●	1
TDD4400M4	44.0	243.2	388.2	375	13.2	MT.4	●	1
TDD4450M4	44.5	243.4	388.4	375	13.4	MT.4	●	1
TDD4500M4	45.0	243.5	388.5	375	13.5	MT.4	●	1
TDD4550M4	45.5	248.7	393.7	380	13.7	MT.4	●	1
TDD4600M4	46.0	248.8	393.8	380	13.8	MT.4	●	1
TDD4650M4	46.5	249.0	394.0	380	14.0	MT.4	●	1
TDD4700M4	47.0	249.1	394.1	380	14.1	MT.4	●	1
TDD4750M4	47.5	254.3	399.3	385	14.3	MT.4	●	1
TDD4800M4	48.0	254.4	399.4	385	14.4	MT.4	●	1
TDD4850M4	48.5	254.6	399.6	385	14.6	MT.4	●	1
TDD4900M4	49.0	254.7	399.7	385	14.7	MT.4	●	1
TDD4950M4	49.5	259.9	404.9	390	14.9	MT.4	●	1
TDD5000M4	50.0	260.0	405.0	390	15.0	MT.4	●	1
TDD5100M5	51.0	260.3	440.3	425	15.3	MT.5	●	1
TDD5200M5	52.0	265.6	445.6	430	15.6	MT.5	●	1
TDD5300M5	53.0	265.9	445.9	430	15.9	MT.5	●	1
TDD5400M5	54.0	271.2	451.2	435	16.2	MT.5	●	1
TDD5500M5	55.0	271.5	451.5	435	16.5	MT.5	●	1
TDD5600M5	56.0	276.8	456.8	440	16.8	MT.5	●	1
TDD5700M5	57.0	277.1	457.1	440	17.1	MT.5	●	1
TDD5800M5	58.0	282.4	462.4	445	17.4	MT.5	●	1
TDD5900M5	59.0	282.7	462.7	445	17.7	MT.5	●	1
TDD6000M5	60.0	288.0	468.0	450	18.0	MT.5	●	1
TDD6100M5	61.0	288.3	468.3	450	18.3	MT.5	●	1
TDD6200M5	62.0	293.6	473.6	455	18.6	MT.5	●	1
TDD6300M5	63.0	293.9	473.9	455	18.9	MT.5	●	1
TDD6400M5	64.0	299.2	479.2	460	19.2	MT.5	●	1
TDD6500M5	65.0	299.5	479.5	460	19.5	MT.5	●	1
TDD6600M5	66.0	304.8	484.8	465	19.8	MT.5	●	1
TDD6700M5	67.0	305.1	485.1	465	20.1	MT.5	●	1
TDD6800M5	68.0	310.4	490.4	470	20.4	MT.5	●	1
TDD6900M5	69.0	310.7	490.7	470	20.7	MT.5	●	1
TDD7000M5	70.0	316.0	496.0	475	21.0	MT.5	●	1
TDD7100M5	71.0	316.3	496.3	475	21.3	MT.5	●	1
TDD7200M5	72.0	321.6	501.6	480	21.6	MT.5	●	1
TDD7300M5	73.0	321.9	501.9	480	21.9	MT.5	●	1
TDD7400M5	74.0	327.2	507.2	485	22.2	MT.5	●	1
TDD7500M5	75.0	327.5	507.5	485	22.5	MT.5	●	1

TD

Recommended cutting condition

Work material	Structural steel SS Carbon steel S-C (—25HRC)		Alloy steel SCM Tool steel SK (—35HRC)		Alloy steel SCM Die steel SKD (—40HRC)		Cast iron FC	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)
0.5	6000	0.01	5000	0.008	4000	0.005	6000	0.01
1.0	5000	0.02	4000	0.01	2800	0.008	5000	0.02
2.0	3000	0.05	2500	0.03	1800	0.02	3000	0.05
3.0	2100	0.10	1800	0.08	1200	0.05	2300	0.10
6.0	1100	0.18	900	0.15	600	0.13	1100	0.18
8.0	800	0.20	670	0.18	450	0.15	900	0.20
10.0	650	0.22	540	0.20	350	0.18	700	0.22
12.0	520	0.24	450	0.22	300	0.20	600	0.24
15.0	420	0.28	360	0.24	240	0.22	470	0.28
20.0	320	0.33	270	0.26	180	0.24	350	0.33
25.0	250	0.36	210	0.28	145	0.26	280	0.36
30.0	210	0.40	180	0.30	120	0.28	230	0.40
40.0	160	0.42	130	0.32	90	0.30	180	0.42

Work material	Martensitic stainless steel AISI 420 Ferritic stainless steel AISI 430		Austenitic stainless steel AISI 304 Precipitation hardening ASTM 630		Copper alloy, Brass		Aluminium alloy	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)
0.5	5000	0.01	4000	0.01	6000	0.01	10000	0.02
1.0	4000	0.02	3000	0.02	5000	0.02	7000	0.04
2.0	2200	0.05	1500	0.04	3000	0.05	5000	0.08
3.0	1600	0.10	1000	0.07	2100	0.10	4200	0.13
6.0	800	0.18	530	0.10	1100	0.18	2100	0.23
8.0	600	0.20	400	0.13	800	0.20	1600	0.28
10.0	480	0.22	310	0.15	650	0.22	1200	0.33
12.0	400	0.24	250	0.17	520	0.24	1000	0.38
15.0	320	0.26	170	0.20	420	0.26	850	0.42
20.0	240	0.28	130	0.23	320	0.28	630	0.45
25.0	190	0.32	100	0.24	250	0.32	500	0.48
30.0	160	0.35	85	0.25	210	0.35	400	0.50
40.0	120	0.38	65	0.28	160	0.38	300	0.52

- Please reduce the cutting conditions when drilling a deep hole.
- This table only shows standard cutting conditions with water-soluble cutting fluids. Please make corrections or adjustments depending on the application.

Reduction rate of cutting conditions for hole drilling

Drilling depth	Reduction rate of cutting speed	Reduction rate of feed
4DC	10%	10%
5DC	10%	15%
6DC	20%	20%
7DC	20%	20%

Drilling depth	Reduction rate of cutting speed	Reduction rate of feed
8DC	30%	20%
10DC	30%	25%
15DC	40%	30%
20DC	40%	45%

- DC:Drill dia.

KTD

Cobalt HSS

TAPER SHANK DRILLS

Product Information

CO HSS | 118° SIG (DC<10, DC>35) | 128° SIG (10≦DC≦35) | C Thinning (16<DC≦35) | S Thinning (DC>35)

TECHNICAL INFO >> 1997

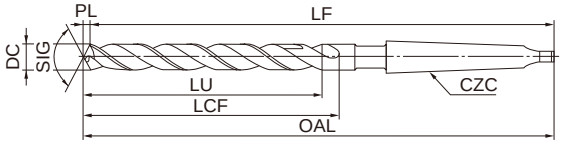
ISO13399 PROPERTY >> 1966

Work Material

P M K N

SYMBOL DESCRIPTIONS >> 1623

DRILLS SELECTION CHART >> 1636



Type1

5≦DC≦6	6<DC≦10	10<DC≦18	18<DC≦30	30<DC≦50
0 −0.018	0 −0.022	0 −0.027	0 −0.033	0 −0.039

Standard drill depth : LU=LCF-3DC

●Inventory maintained in Japan. Unit:mm

Order Number	DC	LCF	OAL	LF	PL	CZC	Stock	Type
KTDD0500M1	5.0	61.5	141.5	140	1.5	MT.1	●	1
KTDD0550M1	5.5	66.7	146.7	145	1.7	MT.1	●	1
KTDD0600M1	6.0	69.8	149.8	148	1.8	MT.1	●	1
KTDD0650M1	6.5	74.0	154.0	152	2.0	MT.1	●	1
KTDD0700M1	7.0	77.1	157.1	155	2.1	MT.1	●	1
KTDD0750M1	7.5	80.3	160.3	158	2.3	MT.1	●	1
KTDD0800M1	8.0	84.4	164.4	162	2.4	MT.1	●	1
KTDD0850M1	8.5	87.6	170.6	168	2.6	MT.1	●	1
KTDD0900M1	9.0	90.7	174.7	172	2.7	MT.1	●	1
KTDD0950M1	9.5	94.9	177.9	175	2.9	MT.1	●	1
KTDD1000M1	10.0	97.4	180.4	178	2.4	MT.1	●	1
KTDD1010M1	10.1	100.5	184.5	182	2.5	MT.1	●	1
KTDD1020M1	10.2	100.5	184.5	182	2.5	MT.1	●	1
KTDD1030M1	10.3	100.5	184.5	182	2.5	MT.1	●	1
KTDD1040M1	10.4	100.5	184.5	182	2.5	MT.1	●	1
KTDD1050M1	10.5	100.6	184.6	182	2.6	MT.1	●	1
KTDD1060M1	10.6	104.6	187.6	185	2.6	MT.1	●	1
KTDD1070M1	10.7	104.6	187.6	185	2.6	MT.1	●	1
KTDD1080M1	10.8	104.6	187.6	185	2.6	MT.1	●	1
KTDD1090M1	10.9	104.7	187.7	185	2.7	MT.1	●	1
KTDD1100M1	11.0	104.7	187.7	185	2.7	MT.1	●	1
KTDD1150M1	11.5	107.8	190.8	188	2.8	MT.1	●	1
KTDD1200M1	12.0	110.9	194.9	192	2.9	MT.1	●	1
KTDD1210M2	12.1	115.0	215.0	212	3.0	MT.2	●	1
KTDD1220M2	12.2	115.0	215.0	212	3.0	MT.2	●	1
KTDD1250M2	12.5	115.0	215.0	212	3.0	MT.2	●	1
KTDD1300M2	13.0	118.2	218.2	215	3.2	MT.2	●	1
KTDD1310M2	13.1	121.2	221.2	218	3.2	MT.2	●	1
KTDD1320M2	13.2	121.2	221.2	218	3.2	MT.2	●	1
KTDD1350M2	13.5	121.3	221.3	218	3.3	MT.2	●	1
KTDD1370M2	13.7	125.3	225.3	222	3.3	MT.2	●	1
KTDD1380M2	13.8	125.4	225.4	222	3.4	MT.2	●	1
KTDD1390M2	13.9	125.4	225.4	222	3.4	MT.2	●	1
KTDD1400M2	14.0	125.4	225.4	222	3.4	MT.2	●	1

Order Number	DC	LCF	OAL	LF	PL	CZC	Stock	Type
KTDD1410M2	14.1	125.4	225.4	222	3.4	MT.2	●	1
KTDD1420M2	14.2	125.5	225.5	222	3.5	MT.2	●	1
KTDD1430M2	14.3	125.5	225.5	222	3.5	MT.2	●	1
KTDD1440M2	14.4	125.5	225.5	222	3.5	MT.2	●	1
KTDD1450M2	14.5	125.5	225.5	222	3.5	MT.2	●	1
KTDD1470M2	14.7	128.6	228.6	225	3.6	MT.2	●	1
KTDD1500M2	15.0	128.7	228.7	225	3.7	MT.2	●	1
KTDD1550M2	15.5	131.8	231.8	228	3.8	MT.2	●	1
KTDD1600M2	16.0	133.9	233.9	230	3.9	MT.2	●	1
KTDD1620M2	16.2	136.0	236.0	232	4.0	MT.2	●	1
KTDD1650M2	16.5	136.0	236.0	232	4.0	MT.2	●	1
KTDD1670M2	16.7	139.1	239.1	235	4.1	MT.2	●	1
KTDD1700M2	17.0	139.1	239.1	235	4.1	MT.2	●	1
KTDD1750M2	17.5	144.3	244.3	240	4.3	MT.2	●	1
KTDD1770M2	17.7	144.3	244.3	240	4.3	MT.2	●	1
KTDD1800M2	18.0	144.4	244.4	240	4.4	MT.2	●	1
KTDD1850M2	18.5	149.5	249.5	245	4.5	MT.2	●	1
KTDD1900M2	19.0	149.6	249.6	245	4.6	MT.2	●	1
KTDD1950M2	19.5	154.8	254.8	250	4.8	MT.2	●	1
KTDD2000M2	20.0	154.9	254.9	250	4.9	MT.2	●	1
KTDD2050M3	20.5	160.0	280.0	275	5.0	MT.3	●	1
KTDD2100M3	21.0	160.1	280.1	275	5.1	MT.3	●	1
KTDD2150M3	21.5	165.2	285.2	280	5.2	MT.3	●	1
KTDD2200M3	22.0	165.4	285.4	280	5.4	MT.3	●	1
KTDD2250M3	22.5	170.5	290.5	285	5.5	MT.3	●	1
KTDD2300M3	23.0	170.6	290.6	285	5.6	MT.3	●	1
KTDD2350M3	23.5	170.7	290.7	285	5.7	MT.3	●	1
KTDD2400M3	24.0	170.9	290.9	285	5.9	MT.3	●	1
KTDD2450M3	24.5	171.0	291.0	285	6.0	MT.3	●	1
KTDD2500M3	25.0	171.1	291.1	285	6.1	MT.3	●	1
KTDD2550M3	25.5	171.2	291.2	285	6.2	MT.3	●	1
KTDD2600M3	26.0	171.3	291.3	285	6.3	MT.3	●	1
KTDD2650M3	26.5	176.5	296.5	290	6.5	MT.3	●	1
KTDD2700M3	27.0	176.6	296.6	290	6.6	MT.3	●	1

KTD

Order Number	DC	LCF	OAL	LF	PL	CZC	Stock	Type
KTDD2750M4	27.5	181.7	326.7	320	6.7	MT.4	●	1
KTDD2800M4	28.0	181.8	326.8	320	6.8	MT.4	●	1
KTDD2850M4	28.5	187.0	332.0	325	7.0	MT.4	●	1
KTDD2900M4	29.0	187.1	332.1	325	7.1	MT.4	●	1
KTDD2950M4	29.5	192.2	337.2	330	7.2	MT.4	●	1
KTDD3000M4	30.0	192.3	337.3	330	7.3	MT.4	●	1
KTDD3050M4	30.5	197.4	342.4	335	7.4	MT.4	●	1
KTDD3100M4	31.0	197.6	342.6	335	7.6	MT.4	●	1
KTDD3150M4	31.5	202.7	347.7	340	7.7	MT.4	●	1
KTDD3200M4	32.0	202.8	347.8	340	7.8	MT.4	●	1
KTDD3300M4	33.0	208.0	353.0	345	8.0	MT.4	●	1
KTDD3400M4	34.0	213.3	358.3	350	8.3	MT.4	●	1
KTDD3500M4	35.0	213.5	358.5	350	8.5	MT.4	●	1
KTDD3600M4	36.0	220.8	365.8	355	10.8	MT.4	●	1

Order Number	DC	LCF	OAL	LF	PL	CZC	Stock	Type
KTDD3700M4	37.0	221.1	366.1	355	11.1	MT.4	●	1
KTDD3800M4	38.0	226.4	371.4	360	11.4	MT.4	●	1
KTDD3900M4	39.0	226.7	371.7	360	11.7	MT.4	●	1
KTDD4000M4	40.0	232.0	377.0	365	12.0	MT.4	●	1
KTDD4100M4	41.0	232.3	377.3	365	12.3	MT.4	●	1
KTDD4200M4	42.0	237.6	382.6	370	12.6	MT.4	●	1
KTDD4300M4	43.0	237.9	382.9	370	12.9	MT.4	●	1
KTDD4400M4	44.0	243.2	388.2	375	13.2	MT.4	●	1
KTDD4500M4	45.0	243.5	388.5	375	13.5	MT.4	●	1
KTDD4600M4	46.0	248.8	393.8	380	13.8	MT.4	●	1
KTDD4700M4	47.0	249.1	394.1	380	14.1	MT.4	●	1
KTDD4800M4	48.0	254.4	399.4	385	14.4	MT.4	●	1
KTDD4900M4	49.0	254.7	399.7	385	14.7	MT.4	●	1
KTDD5000M4	50.0	260.0	405.0	390	15.0	MT.4	●	1

KTD

Recommended cutting condition

Work material	Structural steel SS Carbon steel S-C (—25HRC)		Alloy steel SCM Tool steel SK (—35HRC)		Alloy steel SCM Die steel SKD (—40HRC)		Cast iron FC	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)
0.5	6000	0.01	5000	0.008	4000	0.005	6000	0.01
1.0	5000	0.02	4000	0.01	2800	0.008	5000	0.02
2.0	3000	0.05	2500	0.03	1800	0.02	3000	0.05
3.0	2100	0.10	1800	0.08	1200	0.05	2300	0.10
6.0	1100	0.18	900	0.15	600	0.13	1100	0.18
8.0	800	0.20	670	0.18	450	0.15	900	0.20
10.0	650	0.22	540	0.20	350	0.18	700	0.22
12.0	520	0.24	450	0.22	300	0.20	600	0.24
15.0	420	0.28	360	0.24	240	0.22	470	0.28
20.0	320	0.33	270	0.26	180	0.24	350	0.33
25.0	250	0.36	210	0.28	145	0.26	280	0.36
30.0	210	0.40	180	0.30	120	0.28	230	0.40
40.0	160	0.42	130	0.32	90	0.30	180	0.42

Work material	Martensitic stainless steel AISI 420 Ferritic stainless steel AISI 430		Austenitic stainless steel AISI 304 Precipitation hardening ASTM 630		Copper alloy, Brass		Aluminium alloy	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)
0.5	5000	0.01	4000	0.01	6000	0.01	10000	0.02
1.0	4000	0.02	3000	0.02	5000	0.02	7000	0.04
2.0	2200	0.05	1500	0.04	3000	0.05	5000	0.08
3.0	1600	0.10	1000	0.07	2100	0.10	4200	0.13
6.0	800	0.18	530	0.10	1100	0.18	2100	0.23
8.0	600	0.20	400	0.13	800	0.20	1600	0.28
10.0	480	0.22	310	0.15	650	0.22	1200	0.33
12.0	400	0.24	250	0.17	520	0.24	1000	0.38
15.0	320	0.26	170	0.20	420	0.26	850	0.42
20.0	240	0.28	130	0.23	320	0.28	630	0.45
25.0	190	0.32	100	0.24	250	0.32	500	0.48
30.0	160	0.35	85	0.25	210	0.35	400	0.50
40.0	120	0.38	65	0.28	160	0.38	300	0.52

- Please reduce the cutting conditions when drilling a deep hole.
- This table only shows standard cutting conditions with water-soluble cutting fluids. Please make corrections or adjustments depending on the application.

Reduction rate of cutting conditions for hole drilling

Drilling depth	Reduction rate of cutting speed	Reduction rate of feed
4DC	10%	10%
5DC	10%	15%
6DC	20%	20%
7DC	20%	20%

Drilling depth	Reduction rate of cutting speed	Reduction rate of feed
8DC	30%	20%
10DC	30%	25%
15DC	40%	30%
20DC	40%	45%

- DC:Drill dia.

LTD

Extra long

TAPER SHANK DRILLS

Product Information

HSS 118° SIG S Thinning

DC>6

TECHNICAL INFO >> 1997

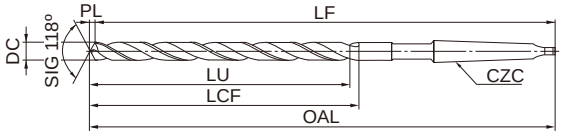
ISO13399 PROPERTY >> 1966

Work Material

P K N

SYMBOL DESCRIPTIONS >> 1623

DRILLS SELECTION CHART >> 1636



Type1

	DC=6	6<DC≦10	10<DC≦18	18<DC≦30	30<DC≦40
	0 −0.018	0 −0.022	0 −0.027	0 −0.033	0 −0.039

Standard drill depth : LU=LCF-3DC

●Inventory maintained in Japan. Unit:mm

Order Number	DC	LCF	OAL	LF	PL	CZC	Stock	Type
LTDD0600A200M1	6.0	101.8	201.8	200	1.8	MT.1	●	1
LTDD0600A250M1	6.0	151.8	251.8	250	1.8	MT.1	●	1
LTDD0600A300M1	6.0	201.8	301.8	300	1.8	MT.1	●	1
LTDD0600A350M1	6.0	226.8	351.8	350	1.8	MT.1	●	1
LTDD0650A250M1	6.5	152.0	252.0	250	2.0	MT.1	●	1
LTDD0650A300M1	6.5	202.0	302.0	300	2.0	MT.1	●	1
LTDD0650A350M1	6.5	227.0	352.0	350	2.0	MT.1	●	1
LTDD0700A250M1	7.0	152.1	252.1	250	2.1	MT.1	●	1
LTDD0700A300M1	7.0	202.1	302.1	300	2.1	MT.1	●	1
LTDD0700A350M1	7.0	227.1	352.1	350	2.1	MT.1	●	1
LTDD0750A250M1	7.5	152.3	252.3	250	2.3	MT.1	●	1
LTDD0750A300M1	7.5	202.3	302.3	300	2.3	MT.1	●	1
LTDD0750A350M1	7.5	227.3	352.3	350	2.3	MT.1	●	1
LTDD0800A250M1	8.0	152.4	252.4	250	2.4	MT.1	●	1
LTDD0800A300M1	8.0	202.4	302.4	300	2.4	MT.1	●	1
LTDD0800A350M1	8.0	227.4	352.4	350	2.4	MT.1	●	1
LTDD0850A250M1	8.5	152.6	252.6	250	2.6	MT.1	●	1
LTDD0850A300M1	8.5	202.6	302.6	300	2.6	MT.1	●	1
LTDD0850A350M1	8.5	227.6	352.6	350	2.6	MT.1	●	1
LTDD0900A250M1	9.0	152.7	252.7	250	2.7	MT.1	●	1
LTDD0900A300M1	9.0	202.7	302.7	300	2.7	MT.1	●	1
LTDD0900A350M1	9.0	227.7	352.7	350	2.7	MT.1	●	1
LTDD0950A250M1	9.5	152.9	252.9	250	2.9	MT.1	●	1
LTDD0950A300M1	9.5	202.9	302.9	300	2.9	MT.1	●	1
LTDD0950A350M1	9.5	227.9	352.9	350	2.9	MT.1	●	1
LTDD0950A400M1	9.5	252.9	402.9	400	2.9	MT.1	●	1
LTDD1000A250M1	10.0	153.0	253.0	250	3.0	MT.1	●	1
LTDD1000A300M1	10.0	203.0	303.0	300	3.0	MT.1	●	1
LTDD1000A350M1	10.0	228.0	353.0	350	3.0	MT.1	●	1
LTDD1000A400M1	10.0	253.0	403.0	400	3.0	MT.1	●	1
LTDD1050A250M1	10.5	153.2	253.2	250	3.2	MT.1	●	1
LTDD1050A300M1	10.5	203.2	303.2	300	3.2	MT.1	●	1
LTDD1050A350M1	10.5	228.2	353.2	350	3.2	MT.1	●	1
LTDD1050A400M1	10.5	253.2	403.2	400	3.2	MT.1	●	1

Order Number	DC	LCF	OAL	LF	PL	CZC	Stock	Type
LTDD1100A250M1	11.0	153.3	253.3	250	3.3	MT.1	●	1
LTDD1100A300M1	11.0	203.3	303.3	300	3.3	MT.1	●	1
LTDD1100A350M1	11.0	228.3	353.3	350	3.3	MT.1	●	1
LTDD1100A400M1	11.0	253.3	403.3	400	3.3	MT.1	●	1
LTDD1150A250M1	11.5	153.5	253.5	250	3.5	MT.1	●	1
LTDD1150A300M1	11.5	203.5	303.5	300	3.5	MT.1	●	1
LTDD1150A350M1	11.5	228.5	353.5	350	3.5	MT.1	●	1
LTDD1150A400M1	11.5	253.5	403.5	400	3.5	MT.1	●	1
LTDD1200A250M1	12.0	153.6	253.6	250	3.6	MT.1	●	1
LTDD1200A300M1	12.0	203.6	303.6	300	3.6	MT.1	●	1
LTDD1200A350M1	12.0	228.6	353.6	350	3.6	MT.1	●	1
LTDD1200A400M1	12.0	253.6	403.6	400	3.6	MT.1	●	1
LTDD1250A250M1	12.5	153.8	253.8	250	3.8	MT.1	●	1
LTDD1250A300M1	12.5	203.8	303.8	300	3.8	MT.1	●	1
LTDD1250A350M1	12.5	228.8	353.8	350	3.8	MT.1	●	1
LTDD1250A400M1	12.5	253.8	403.8	400	3.8	MT.1	●	1
LTDD1300A250M1	13.0	153.9	253.9	250	3.9	MT.1	●	1
LTDD1300A300M1	13.0	203.9	303.9	300	3.9	MT.1	●	1
LTDD1300A350M1	13.0	228.9	353.9	350	3.9	MT.1	●	1
LTDD1300A400M1	13.0	253.9	403.9	400	3.9	MT.1	●	1
LTDD1350A300M1	13.5	204.1	304.1	300	4.1	MT.1	●	1
LTDD1350A350M1	13.5	229.1	354.1	350	4.1	MT.1	●	1
LTDD1350A400M1	13.5	254.1	404.1	400	4.1	MT.1	●	1
LTDD1350A450M1	13.5	304.1	454.1	450	4.1	MT.1	●	1
LTDD1350A500M1	13.5	354.1	504.1	500	4.1	MT.1	●	1
LTDD1350A600M1	13.5	404.1	604.1	600	4.1	MT.1	●	1
LTDD1400A300M1	14.0	204.2	304.2	300	4.2	MT.1	●	1
LTDD1400A350M1	14.0	229.2	354.2	350	4.2	MT.1	●	1
LTDD1400A400M1	14.0	254.2	404.2	400	4.2	MT.1	●	1
LTDD1400A450M1	14.0	304.2	454.2	450	4.2	MT.1	●	1
LTDD1400A500M1	14.0	354.2	504.2	500	4.2	MT.1	●	1
LTDD1400A600M1	14.0	404.2	604.2	600	4.2	MT.1	●	1
LTDD1450A300M2	14.5	179.4	304.4	300	4.4	MT.2	●	1
LTDD1450A350M2	14.5	229.4	354.4	350	4.4	MT.2	●	1

LTD

Order Number	DC	LCF	OAL	LF	PL	CZC	Stock	Type
LTDD1450A400M2	14.5	254.4	404.4	400	4.4	MT.2	●	1
LTDD1450A450M2	14.5	304.4	454.4	450	4.4	MT.2	●	1
LTDD1450A500M2	14.5	354.4	504.4	500	4.4	MT.2	●	1
LTDD1450A600M2	14.5	404.4	604.4	600	4.4	MT.2	●	1
LTDD1500A300M2	15.0	179.5	304.5	300	4.5	MT.2	●	1
LTDD1500A350M2	15.0	229.5	354.5	350	4.5	MT.2	●	1
LTDD1500A400M2	15.0	254.5	404.5	400	4.5	MT.2	●	1
LTDD1500A450M2	15.0	304.5	454.5	450	4.5	MT.2	●	1
LTDD1500A500M2	15.0	354.5	504.5	500	4.5	MT.2	●	1
LTDD1500A600M2	15.0	404.5	604.5	600	4.5	MT.2	●	1
LTDD1550A300M2	15.5	179.7	304.7	300	4.7	MT.2	●	1
LTDD1550A350M2	15.5	229.7	354.7	350	4.7	MT.2	●	1
LTDD1550A400M2	15.5	254.7	404.7	400	4.7	MT.2	●	1
LTDD1550A450M2	15.5	304.7	454.7	450	4.7	MT.2	●	1
LTDD1550A500M2	15.5	354.7	504.7	500	4.7	MT.2	●	1
LTDD1550A600M2	15.5	404.7	604.7	600	4.7	MT.2	●	1
LTDD1600A300M2	16.0	179.8	304.8	300	4.8	MT.2	●	1
LTDD1600A350M2	16.0	229.8	354.8	350	4.8	MT.2	●	1
LTDD1600A400M2	16.0	254.8	404.8	400	4.8	MT.2	●	1
LTDD1600A450M2	16.0	304.8	454.8	450	4.8	MT.2	●	1
LTDD1600A500M2	16.0	354.8	504.8	500	4.8	MT.2	●	1
LTDD1600A600M2	16.0	404.8	604.8	600	4.8	MT.2	●	1
LTDD1650A300M2	16.5	180.0	305.0	300	5.0	MT.2	●	1
LTDD1650A350M2	16.5	230.0	355.0	350	5.0	MT.2	●	1
LTDD1650A400M2	16.5	255.0	405.0	400	5.0	MT.2	●	1
LTDD1650A450M2	16.5	305.0	455.0	450	5.0	MT.2	●	1
LTDD1650A500M2	16.5	355.0	505.0	500	5.0	MT.2	●	1
LTDD1650A600M2	16.5	405.0	605.0	600	5.0	MT.2	●	1
LTDD1700A300M2	17.0	180.1	305.1	300	5.1	MT.2	●	1
LTDD1700A350M2	17.0	230.1	355.1	350	5.1	MT.2	●	1
LTDD1700A400M2	17.0	255.1	405.1	400	5.1	MT.2	●	1
LTDD1700A450M2	17.0	305.1	455.1	450	5.1	MT.2	●	1
LTDD1700A500M2	17.0	355.1	505.1	500	5.1	MT.2	●	1
LTDD1700A600M2	17.0	405.1	605.1	600	5.1	MT.2	●	1
LTDD1750A300M2	17.5	180.3	305.3	300	5.3	MT.2	●	1
LTDD1750A350M2	17.5	230.3	355.3	350	5.3	MT.2	●	1
LTDD1750A400M2	17.5	255.3	405.3	400	5.3	MT.2	●	1
LTDD1750A450M2	17.5	305.3	455.3	450	5.3	MT.2	●	1
LTDD1750A500M2	17.5	355.3	505.3	500	5.3	MT.2	●	1
LTDD1750A600M2	17.5	405.3	605.3	600	5.3	MT.2	●	1
LTDD1800A300M2	18.0	180.4	305.4	300	5.4	MT.2	●	1
LTDD1800A350M2	18.0	230.4	355.4	350	5.4	MT.2	●	1
LTDD1800A400M2	18.0	255.4	405.4	400	5.4	MT.2	●	1
LTDD1800A450M2	18.0	305.4	455.4	450	5.4	MT.2	●	1
LTDD1800A500M2	18.0	355.4	505.4	500	5.4	MT.2	●	1
LTDD1800A600M2	18.0	405.4	605.4	600	5.4	MT.2	●	1
LTDD1900A300M2	19.0	180.7	305.7	300	5.7	MT.2	●	1
LTDD1900A350M2	19.0	230.7	355.7	350	5.7	MT.2	●	1
LTDD1900A400M2	19.0	255.7	405.7	400	5.7	MT.2	●	1
LTDD1900A450M2	19.0	305.7	455.7	450	5.7	MT.2	●	1
LTDD1900A500M2	19.0	355.7	505.7	500	5.7	MT.2	●	1
LTDD1900A600M2	19.0	405.7	605.7	600	5.7	MT.2	●	1
LTDD2000A300M2	20.0	181.0	306.0	300	6.0	MT.2	●	1
LTDD2000A350M2	20.0	231.0	356.0	350	6.0	MT.2	●	1

Order Number	DC	LCF	OAL	LF	PL	CZC	Stock	Type
LTDD2000A400M2	20.0	256.0	406.0	400	6.0	MT.2	●	1
LTDD2000A450M2	20.0	306.0	456.0	450	6.0	MT.2	●	1
LTDD2000A500M2	20.0	356.0	506.0	500	6.0	MT.2	●	1
LTDD2000A600M2	20.0	406.0	606.0	600	6.0	MT.2	●	1
LTDD2100A350M2	21.0	231.3	356.3	350	6.3	MT.2	●	1
LTDD2100A400M2	21.0	256.3	406.3	400	6.3	MT.2	●	1
LTDD2100A450M2	21.0	306.3	456.3	450	6.3	MT.2	●	1
LTDD2100A500M2	21.0	356.3	506.3	500	6.3	MT.2	●	1
LTDD2100A600M2	21.0	406.3	606.3	600	6.3	MT.2	●	1
LTDD2200A350M2	22.0	231.6	356.6	350	6.6	MT.2	●	1
LTDD2200A400M2	22.0	256.6	406.6	400	6.6	MT.2	●	1
LTDD2200A450M2	22.0	306.6	456.6	450	6.6	MT.2	●	1
LTDD2200A500M2	22.0	356.6	506.6	500	6.6	MT.2	●	1
LTDD2200A600M2	22.0	406.6	606.6	600	6.6	MT.2	●	1
LTDD2300A350M2	23.0	231.9	356.9	350	6.9	MT.2	●	1
LTDD2300A400M2	23.0	256.9	406.9	400	6.9	MT.2	●	1
LTDD2300A450M2	23.0	306.9	456.9	450	6.9	MT.2	●	1
LTDD2300A500M2	23.0	356.9	506.9	500	6.9	MT.2	●	1
LTDD2300A600M2	23.0	406.9	606.9	600	6.9	MT.2	●	1
LTDD2400A350M3	24.0	207.2	357.2	350	7.2	MT.3	●	1
LTDD2400A400M3	24.0	257.2	407.2	400	7.2	MT.3	●	1
LTDD2400A450M3	24.0	307.2	457.2	450	7.2	MT.3	●	1
LTDD2400A500M3	24.0	357.2	507.2	500	7.2	MT.3	●	1
LTDD2400A600M3	24.0	407.2	607.2	600	7.2	MT.3	●	1
LTDD2500A350M3	25.0	207.5	357.5	350	7.5	MT.3	●	1
LTDD2500A400M3	25.0	257.5	407.5	400	7.5	MT.3	●	1
LTDD2500A450M3	25.0	307.5	457.5	450	7.5	MT.3	●	1
LTDD2500A500M3	25.0	357.5	507.5	500	7.5	MT.3	●	1
LTDD2500A600M3	25.0	407.5	607.5	600	7.5	MT.3	●	1
LTDD2600A400M3	26.0	257.8	407.8	400	7.8	MT.3	●	1
LTDD2600A450M3	26.0	307.8	457.8	450	7.8	MT.3	●	1
LTDD2600A500M3	26.0	357.8	507.8	500	7.8	MT.3	●	1
LTDD2600A600M3	26.0	407.8	607.8	600	7.8	MT.3	●	1
LTDD2700A400M3	27.0	258.1	408.1	400	8.1	MT.3	●	1
LTDD2700A450M3	27.0	308.1	458.1	450	8.1	MT.3	●	1
LTDD2700A500M3	27.0	358.1	508.1	500	8.1	MT.3	●	1
LTDD2700A600M3	27.0	408.1	608.1	600	8.1	MT.3	●	1
LTDD2800A400M3	28.0	258.4	408.4	400	8.4	MT.3	●	1
LTDD2800A450M3	28.0	308.4	458.4	450	8.4	MT.3	●	1
LTDD2800A500M3	28.0	358.4	508.4	500	8.4	MT.3	●	1
LTDD2800A600M3	28.0	408.4	608.4	600	8.4	MT.3	●	1
LTDD2900A400M3	29.0	258.7	408.7	400	8.7	MT.3	●	1
LTDD2900A450M3	29.0	308.7	458.7	450	8.7	MT.3	●	1
LTDD2900A500M3	29.0	358.7	508.7	500	8.7	MT.3	●	1
LTDD2900A600M3	29.0	408.7	608.7	600	8.7	MT.3	●	1
LTDD3000A400M3	30.0	259.0	409.0	400	9.0	MT.3	●	1
LTDD3000A450M3	30.0	309.0	459.0	450	9.0	MT.3	●	1
LTDD3000A500M3	30.0	359.0	509.0	500	9.0	MT.3	●	1
LTDD3000A600M3	30.0	409.0	609.0	600	9.0	MT.3	●	1
LTDD3100A450M3	31.0	309.3	459.3	450	9.3	MT.3	●	1
LTDD3100A500M3	31.0	359.3	509.3	500	9.3	MT.3	●	1
LTDD3100A600M3	31.0	409.3	609.3	600	9.3	MT.3	●	1
LTDD3200A450M3	32.0	309.6	459.6	450	9.6	MT.3	●	1
LTDD3200A500M3	32.0	359.6	509.6	500	9.6	MT.3	●	1

LTD

Order Number	DC	LCF	OAL	LF	PL	CZC	Stock	Type
LTDD3200A600M3	32.0	409.6	609.6	600	9.6	MT.3	●	1
LTDD3300A500M4	33.0	359.9	509.9	500	9.9	MT.4	●	1
LTDD3300A600M4	33.0	409.9	609.9	600	9.9	MT.4	●	1
LTDD3400A500M4	34.0	360.2	510.2	500	10.2	MT.4	●	1
LTDD3400A600M4	34.0	410.2	610.2	600	10.2	MT.4	●	1
LTDD3500A500M4	35.0	360.5	510.5	500	10.5	MT.4	●	1
LTDD3500A600M4	35.0	410.5	610.5	600	10.5	MT.4	●	1
LTDD3600A500M4	36.0	360.8	510.8	500	10.8	MT.4	●	1
LTDD3600A600M4	36.0	410.8	610.8	600	10.8	MT.4	●	1

Order Number	DC	LCF	OAL	LF	PL	CZC	Stock	Type
LTDD3700A500M4	37.0	361.1	511.1	500	11.1	MT.4	●	1
LTDD3700A600M4	37.0	411.1	611.1	600	11.1	MT.4	●	1
LTDD3800A500M4	38.0	361.4	511.4	500	11.4	MT.4	●	1
LTDD3800A600M4	38.0	411.4	611.4	600	11.4	MT.4	●	1
LTDD3900A500M4	39.0	361.7	511.7	500	11.7	MT.4	●	1
LTDD3900A600M4	39.0	411.7	611.7	600	11.7	MT.4	●	1
LTDD4000A500M4	40.0	362.0	512.0	500	12.0	MT.4	●	1
LTDD4000A600M4	40.0	412.0	612.0	600	12.0	MT.4	●	1

GWTS

TiN, For deep hole, Convolute flute

TAPER SHANK DRILLS

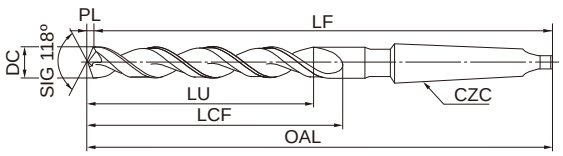
Product Information

CO HSS G 118° SIG XR Thinning

Work Material

P M K N

TECHNICAL INFO >> 1997 ISO13399 PROPERTY >> 1966 SYMBOL DESCRIPTIONS >> 1623 DRILLS SELECTION CHART >> 1636



Type1

	DC=6	6<DC≦10	10<DC≦18	18<DC≦30	30<DC≦32
	0 −0.018	0 −0.022	0 −0.027	0 −0.033	0 −0.039

Standard drill depth : LU=LCF-3DC

●Inventory maintained in Japan. Unit:mm

Order Number	DC	LCF	OAL	LF	PL	CZC	Stock	Type
GWTSD0600M1	6.0	69.8	149.8	148	1.8	MT.1	●	1
GWTSD0620M1	6.2	73.9	153.9	152	1.9	MT.1	●	1
GWTSD0650M1	6.5	74.0	154.0	152	2.0	MT.1	●	1
GWTSD0680M1	6.8	77.0	157.0	155	2.0	MT.1	●	1
GWTSD0690M1	6.9	77.1	157.1	155	2.1	MT.1	●	1
GWTSD0700M1	7.0	77.1	157.1	155	2.1	MT.1	●	1
GWTSD0720M1	7.2	80.2	160.2	158	2.2	MT.1	●	1
GWTSD0750M1	7.5	80.3	160.3	158	2.3	MT.1	●	1
GWTSD0780M1	7.8	84.3	164.3	162	2.3	MT.1	●	1
GWTSD0800M1	8.0	84.4	164.4	162	2.4	MT.1	●	1
GWTSD0820M1	8.2	87.5	170.5	168	2.5	MT.1	●	1
GWTSD0850M1	8.5	87.6	170.6	168	2.6	MT.1	●	1
GWTSD0880M1	8.8	90.6	174.6	172	2.6	MT.1	●	1
GWTSD0900M1	9.0	90.7	174.7	172	2.7	MT.1	●	1
GWTSD0920M1	9.2	94.8	177.8	175	2.8	MT.1	●	1
GWTSD0950M1	9.5	94.9	177.9	175	2.9	MT.1	●	1
GWTSD0980M1	9.8	97.9	180.9	178	2.9	MT.1	●	1
GWTSD1000M1	10.0	98.0	181.0	178	3.0	MT.1	●	1
GWTSD1020M1	10.2	101.1	185.1	182	3.1	MT.1	●	1
GWTSD1030M1	10.3	101.1	185.1	182	3.1	MT.1	●	1
GWTSD1050M1	10.5	101.2	185.2	182	3.2	MT.1	●	1
GWTSD1100M1	11.0	105.3	188.3	185	3.3	MT.1	●	1
GWTSD1150M1	11.5	108.5	191.5	188	3.5	MT.1	●	1
GWTSD1200M1	12.0	111.6	195.6	192	3.6	MT.1	●	1
GWTSD1220M2	12.2	115.7	215.7	212	3.7	MT.2	●	1
GWTSD1230M2	12.3	115.7	215.7	212	3.7	MT.2	●	1
GWTSD1250M2	12.5	115.8	215.8	212	3.8	MT.2	●	1
GWTSD1300M2	13.0	118.9	218.9	215	3.9	MT.2	●	1

Order Number	DC	LCF	OAL	LF	PL	CZC	Stock	Type
GWTSD1350M2	13.5	122.1	222.1	218	4.1	MT.2	●	1
GWTSD1400M2	14.0	126.2	226.2	222	4.2	MT.2	●	1
GWTSD1410M2	14.1	126.2	226.2	222	4.2	MT.2	●	1
GWTSD1420M2	14.2	126.3	226.3	222	4.3	MT.2	●	1
GWTSD1450M2	14.5	126.4	226.4	222	4.4	MT.2	●	1
GWTSD1500M2	15.0	129.5	229.5	225	4.5	MT.2	●	1
GWTSD1550M2	15.5	132.7	232.7	228	4.7	MT.2	●	1
GWTSD1600M2	16.0	134.8	234.8	230	4.8	MT.2	●	1
GWTSD1650M2	16.5	137.0	237.0	232	5.0	MT.2	●	1
GWTSD1700M2	17.0	140.1	240.1	235	5.1	MT.2	●	1
GWTSD1750M2	17.5	145.3	245.3	240	5.3	MT.2	●	1
GWTSD1800M2	18.0	145.4	245.4	240	5.4	MT.2	●	1
GWTSD1850M2	18.5	150.6	250.6	245	5.6	MT.2	●	1
GWTSD1900M2	19.0	150.7	250.7	245	5.7	MT.2	●	1
GWTSD1950M2	19.5	155.9	255.9	250	5.9	MT.2	●	1
GWTSD2000M2	20.0	156.0	256.0	250	6.0	MT.2	●	1
GWTSD2100M3	21.0	161.3	281.3	275	6.3	MT.3	●	1
GWTSD2200M3	22.0	166.6	286.6	280	6.6	MT.3	●	1
GWTSD2300M3	23.0	171.9	291.9	285	6.9	MT.3	●	1
GWTSD2400M3	24.0	172.2	292.2	285	7.2	MT.3	●	1
GWTSD2500M3	25.0	172.5	292.5	285	7.5	MT.3	●	1
GWTSD2600M3	26.0	172.8	292.8	285	7.8	MT.3	●	1
GWTSD2700M3	27.0	178.1	298.1	290	8.1	MT.3	●	1
GWTSD2800M4	28.0	183.4	328.4	320	8.4	MT.4	●	1
GWTSD2900M4	29.0	188.7	333.7	325	8.7	MT.4	●	1
GWTSD3000M4	30.0	194.0	339.0	330	9.0	MT.4	●	1
GWTSD3100M4	31.0	199.3	344.3	335	9.3	MT.4	●	1
GWTSD3200M4	32.0	204.6	349.6	340	9.6	MT.4	●	1

GWTS

Recommended cutting condition

Work material	Structural steel SS Carbon steel S-C (—25HRC)		Alloy steel SCM Tool steel SK (—35HRC)		Alloy steel SCM Die steel SKD (—40HRC)		Cast iron FC	
Dia. DC(mm)	Revolution (min-1)	Feed rate (mm/rev)	Revolution (min-1)	Feed rate (mm/rev)	Revolution (min-1)	Feed rate (mm/rev)	Revolution (min-1)	Feed rate (mm/rev)
0.5	8000	0.01	7000	0.008	6000	0.005	8000	0.01
1.0	6000	0.02	5500	0.01	4500	0.008	6000	0.02
2.0	4700	0.05	3600	0.03	2400	0.02	4700	0.05
3.0	3200	0.10	2400	0.08	1800	0.05	3500	0.10
6.0	1600	0.18	1200	0.15	900	0.13	1750	0.18
8.0	1200	0.20	900	0.18	680	0.15	1300	0.20
10.0	960	0.22	720	0.20	550	0.18	1100	0.22
12.0	800	0.24	600	0.22	450	0.20	880	0.24
15.0	630	0.28	480	0.24	350	0.22	700	0.28
20.0	470	0.33	360	0.26	260	0.24	530	0.33
25.0	380	0.36	290	0.28	210	0.26	420	0.36
30.0	310	0.40	240	0.30	180	0.28	330	0.40

Work material	Martensitic stainless steel AISI 420 Ferritic stainless steel AISI 430		Austenitic stainless steel AISI 304 Precipitation hardening ASTM 630		Copper alloy, Brass		Aluminium alloy	
Dia. DC(mm)	Revolution (min-1)	Feed rate (mm/rev)	Revolution (min-1)	Feed rate (mm/rev)	Revolution (min-1)	Feed rate (mm/rev)	Revolution (min-1)	Feed rate (mm/rev)
0.5	8000	0.01	6000	0.01	8000	0.01	10000	0.02
1.0	5000	0.02	4000	0.02	6000	0.02	7000	0.04
2.0	2500	0.05	2300	0.04	4700	0.05	6000	0.08
3.0	1900	0.10	1500	0.07	3200	0.10	5500	0.13
6.0	950	0.18	750	0.10	1600	0.18	3100	0.23
8.0	700	0.20	530	0.13	1200	0.20	2300	0.28
10.0	560	0.22	420	0.15	960	0.22	1900	0.33
12.0	460	0.24	340	0.17	800	0.24	1600	0.38
15.0	360	0.26	270	0.20	630	0.26	1300	0.42
20.0	270	0.28	200	0.23	470	0.28	950	0.45
25.0	210	0.32	160	0.24	380	0.32	750	0.48
30.0	180	0.35	135	0.25	310	0.35	630	0.50

- Please reduce the cutting conditions when drilling a deep hole.
- This table only shows standard cutting conditions with water-soluble cutting fluids. Please make corrections or adjustments depending on the application.

Reduction rate of cutting conditions for hole drilling

Drilling depth	Reduction rate of cutting speed	Reduction rate of feed
4DC	10%	10%
5DC	10%	15%
6DC	20%	20%
7DC	20%	20%

Drilling depth	Reduction rate of cutting speed	Reduction rate of feed
8DC	30%	20%
10DC	30%	25%
15DC	40%	30%
20DC	40%	45%

- DC:Drill dia.

GTTD

TiN, For steel frame

TAPER SHANK DRILLS

Product Information

HSS G 160° SIG 100° N Thinning

Work Material

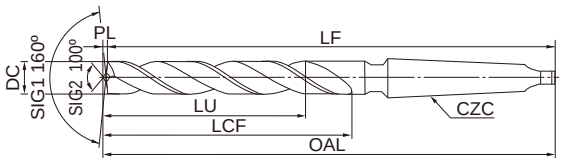
P

TECHNICAL INFO >> 1997

ISO13399 PROPERTY >> 1966

SYMBOL DESCRIPTIONS >> 1623

DRILLS SELECTION CHART >> 1636



Type1

	17≦DC≦18	18<DC≦30	30<DC≦32
	0 -0.027	0 -0.033	0 -0.039

Standard drill depth : LU=LCF-3DC

●Inventory maintained in Japan. Unit:mm

Order Number	DC	LCF	LF	PL	CZC	Stock	Type
GTTDD1700M3	17.0	135.0	255	2.9	MT.3	●	1
GTTDD1750M3	17.5	140.0	260	3.0	MT.3	●	1
GTTDD1800M3	18.0	140.0	260	3.0	MT.3	●	1
GTTDD1900M3	19.0	145.0	265	3.2	MT.3	●	1
GTTDD2000M3	20.0	150.0	270	3.3	MT.3	●	1
GTTDD2150M3	21.5	160.0	280	3.6	MT.3	●	1
GTTDD2200M3	22.0	160.0	280	3.7	MT.3	●	1
GTTDD2250M3	22.5	165.0	285	3.8	MT.3	●	1
GTTDD2300M3	23.0	165.0	285	3.8	MT.3	●	1

Order Number	DC	LCF	LF	PL	CZC	Stock	Type
GTTDD2350M3	23.5	165.0	285	4.0	MT.3	●	1
GTTDD2400M3	24.0	165.0	285	4.0	MT.3	●	1
GTTDD2450M3	24.5	165.0	285	4.1	MT.3	●	1
GTTDD2500M3	25.0	165.0	285	4.1	MT.3	●	1
GTTDD2600M3	26.0	165.0	285	4.3	MT.3	●	1
GTTDD2650M3	26.5	170.0	290	4.4	MT.3	●	1
GTTDD2800M4	28.0	175.0	320	4.5	MT.4	●	1
GTTDD3200M4	32.0	195.0	340	5.0	MT.4	●	1

GTTD

Recommended cutting condition

Work material	Structural steel SS Carbon steel S-C (—25HRC)		Alloy steel SCM Tool steel SK (—35HRC)		Alloy steel SCM Die steel SKD (—40HRC)		Cast iron FC	
Dia. DC(mm)	Revolution (min-1)	Feed rate (mm/rev)	Revolution (min-1)	Feed rate (mm/rev)	Revolution (min-1)	Feed rate (mm/rev)	Revolution (min-1)	Feed rate (mm/rev)
0.5	8000	0.01	7000	0.008	6000	0.005	8000	0.01
1.0	6000	0.02	5500	0.01	4500	0.008	6000	0.02
2.0	4700	0.05	3600	0.03	2400	0.02	4700	0.05
3.0	3200	0.10	2400	0.08	1800	0.05	3500	0.10
6.0	1600	0.18	1200	0.15	900	0.13	1750	0.18
8.0	1200	0.20	900	0.18	680	0.15	1300	0.20
10.0	960	0.22	720	0.20	550	0.18	1100	0.22
12.0	800	0.24	600	0.22	450	0.20	880	0.24
15.0	630	0.28	480	0.24	350	0.22	700	0.28
20.0	470	0.33	360	0.26	260	0.24	530	0.33
25.0	380	0.36	290	0.28	210	0.26	420	0.36
30.0	310	0.40	240	0.30	180	0.28	330	0.40

Work material	Martensitic stainless steel AISI 420 Ferritic stainless steel AISI 430		Austenitic stainless steel AISI 304 Precipitation hardening ASTM 630		Copper alloy, Brass		Aluminium alloy	
Dia. DC(mm)	Revolution (min-1)	Feed rate (mm/rev)	Revolution (min-1)	Feed rate (mm/rev)	Revolution (min-1)	Feed rate (mm/rev)	Revolution (min-1)	Feed rate (mm/rev)
0.5	8000	0.01	6000	0.01	8000	0.01	10000	0.02
1.0	5000	0.02	4000	0.02	6000	0.02	7000	0.04
2.0	2500	0.05	2300	0.04	4700	0.05	6000	0.08
3.0	1900	0.10	1500	0.07	3200	0.10	5500	0.13
6.0	950	0.18	750	0.10	1600	0.18	3100	0.23
8.0	700	0.20	530	0.13	1200	0.20	2300	0.28
10.0	560	0.22	420	0.15	960	0.22	1900	0.33
12.0	460	0.24	340	0.17	800	0.24	1600	0.38
15.0	360	0.26	270	0.20	630	0.26	1300	0.42
20.0	270	0.28	200	0.23	470	0.28	950	0.45
25.0	210	0.32	160	0.24	380	0.32	750	0.48
30.0	180	0.35	135	0.25	310	0.35	630	0.50

- Please reduce the cutting conditions when drilling a deep hole.
- This table only shows standard cutting conditions with water-soluble cutting fluids. Please make corrections or adjustments depending on the application.

Reduction rate of cutting conditions for hole drilling

Drilling depth	Reduction rate of cutting speed	Reduction rate of feed	Drilling depth	Reduction rate of cutting speed	Reduction rate of feed
4DC	10%	10%	8DC	30%	20%
5DC	10%	15%	10DC	30%	25%
6DC	20%	20%	15DC	40%	30%
7DC	20%	20%	20DC	40%	45%

- DC:Drill dia.

TTD

For steel frame

TAPER SHANK DRILLS

Product Information

HSS 160° SIG 100° N Thinning

Work Material

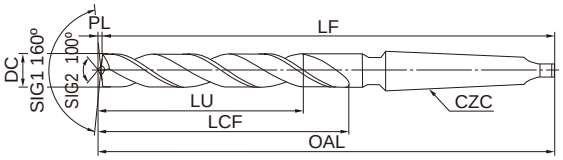
P

TECHNICAL INFO >> 1997

ISO13399 PROPERTY >> 1966

SYMBOL DESCRIPTIONS >> 1623

DRILLS SELECTION CHART >> 1636



Type1

	17≦DC≦18	18<DC≦30	30<DC≦32
	0 −0.027	0 −0.033	0 −0.039

Standard drill depth : LU=LCF-3DC

●Inventory maintained in Japan. Unit:mm

Order Number	DC	LCF	OAL	LF	PL	CZC	Stock	Type
TTDD1700M3	17.0	135	257.9	255	2.9	MT.3	●	1
TTDD1750M3	17.5	140	263.0	260	3.0	MT.3	●	1
TTDD1800M3	18.0	140	263.0	260	3.0	MT.3	●	1
TTDD1900M3	19.0	145	268.2	265	3.2	MT.3	●	1
TTDD2000M3	20.0	150	273.3	270	3.3	MT.3	●	1
TTDD2150M3	21.5	160	283.6	280	3.6	MT.3	●	1
TTDD2200M3	22.0	160	283.7	280	3.7	MT.3	●	1
TTDD2250M3	22.5	165	288.8	285	3.8	MT.3	●	1
TTDD2300M3	23.0	165	288.8	285	3.8	MT.3	●	1

Order Number	DC	LCF	OAL	LF	PL	CZC	Stock	Type
TTDD2350M3	23.5	165	289.0	285	4.0	MT.3	●	1
TTDD2400M3	24.0	165	289.0	285	4.0	MT.3	●	1
TTDD2450M3	24.5	165	289.1	285	4.1	MT.3	●	1
TTDD2500M3	25.0	165	289.1	285	4.1	MT.3	●	1
TTDD2600M3	26.0	165	289.3	285	4.3	MT.3	●	1
TTDD2650M3	26.5	170	294.4	290	4.4	MT.3	●	1
TTDD2800M4	28.0	175	324.5	320	4.5	MT.4	●	1
TTDD3200M4	32.0	195	345.0	340	5.0	MT.4	●	1

TTD

Recommended cutting condition

Work material	Structural steel SS Carbon steel S-C (—25HRC)		Alloy steel SCM Tool steel SK (—35HRC)		Alloy steel SCM Die steel SKD (—40HRC)		Cast iron FC	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)
0.5	6000	0.01	5000	0.008	4000	0.005	6000	0.01
1.0	5000	0.02	4000	0.01	2800	0.008	5000	0.02
2.0	3000	0.05	2500	0.03	1800	0.02	3000	0.05
3.0	2100	0.10	1800	0.08	1200	0.05	2300	0.10
6.0	1100	0.18	900	0.15	600	0.13	1100	0.18
8.0	800	0.20	670	0.18	450	0.15	900	0.20
10.0	650	0.22	540	0.20	350	0.18	700	0.22
12.0	520	0.24	450	0.22	300	0.20	600	0.24
15.0	420	0.28	360	0.24	240	0.22	470	0.28
20.0	320	0.33	270	0.26	180	0.24	350	0.33
25.0	250	0.36	210	0.28	145	0.26	280	0.36
30.0	210	0.40	180	0.30	120	0.28	230	0.40
40.0	160	0.42	130	0.32	90	0.30	180	0.42

Work material	Martensitic stainless steel AISI 420 Ferritic stainless steel AISI 430		Austenitic stainless steel AISI 304 Precipitation hardening ASTM 630		Copper alloy, Brass		Aluminium alloy	
Dia. DC(mm)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)
0.5	5000	0.01	4000	0.01	6000	0.01	10000	0.02
1.0	4000	0.02	3000	0.02	5000	0.02	7000	0.04
2.0	2200	0.05	1500	0.04	3000	0.05	5000	0.08
3.0	1600	0.10	1000	0.07	2100	0.10	4200	0.13
6.0	800	0.18	530	0.10	1100	0.18	2100	0.23
8.0	600	0.20	400	0.13	800	0.20	1600	0.28
10.0	480	0.22	310	0.15	650	0.22	1200	0.33
12.0	400	0.24	250	0.17	520	0.24	1000	0.38
15.0	320	0.26	170	0.20	420	0.26	850	0.42
20.0	240	0.28	130	0.23	320	0.28	630	0.45
25.0	190	0.32	100	0.24	250	0.32	500	0.48
30.0	160	0.35	85	0.25	210	0.35	400	0.50
40.0	120	0.38	65	0.28	160	0.38	300	0.52

- Please reduce the cutting conditions when drilling a deep hole.
- This table only shows standard cutting conditions with water-soluble cutting fluids. Please make corrections or adjustments depending on the application.

Reduction rate of cutting conditions for hole drilling

Drilling depth	Reduction rate of cutting speed	Reduction rate of feed
4DC	10%	10%
5DC	10%	15%
6DC	20%	20%
7DC	20%	20%

Drilling depth	Reduction rate of cutting speed	Reduction rate of feed
8DC	30%	20%
10DC	30%	25%
15DC	40%	30%
20DC	40%	45%

- DC:Drill dia.

3KD TRIANGULAR SHANK DRILL

(Type 6.5)(Type 10)(Type 13)

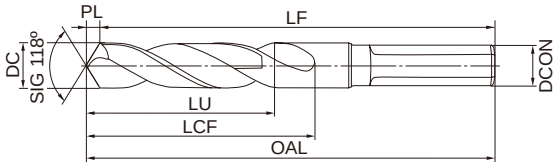
Product Information

HSS 118° SIG

Work Material

P K N

TECHNICAL INFO >> 1997 ISO13399 PROPERTY >> 1966 SYMBOL DESCRIPTIONS >> 1623 DRILLS SELECTION CHART >> 1636



Type1

	7≦DC≦10	10<DC≦18	18<DC≦26
	0 −0.022	0 −0.027	0 −0.033

Standard drill depth : LU=LCF-3DC

●Inventory maintained in Japan. Unit:mm

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
3KD6D0700	7.0	37.1	77.1	75	2.1	6.5	●	1
3KD6D0750	7.5	37.3	77.3	75	2.3	6.5	●	1
3KD6D0800	8.0	37.4	77.4	75	2.4	6.5	●	1
3KD6D0850	8.5	37.6	77.6	75	2.6	6.5	●	1
3KD6D0900	9.0	37.7	77.7	75	2.7	6.5	●	1
3KD6D0950	9.5	37.9	77.9	75	2.9	6.5	●	1
3KD6D1000	10.0	53.0	93.0	90	3.0	6.5	●	1
3KD6D1050	10.5	53.2	93.2	90	3.2	6.5	●	1
3KD6D1100	11.0	53.3	93.3	90	3.3	6.5	●	1
3KD6D1150	11.5	53.5	93.5	90	3.5	6.5	●	1
3KD6D1200	12.0	53.6	93.6	90	3.6	6.5	●	1
3KD6D1250	12.5	53.8	93.8	90	3.8	6.5	●	1
3KD6D1300	13.0	53.9	93.9	90	3.9	6.5	●	1
3KD10D1000	10.0	53.0	93.0	90	3.0	10	●	1
3KD10D1050	10.5	53.2	93.2	90	3.2	10	●	1
3KD10D1100	11.0	53.3	93.3	90	3.3	10	●	1
3KD10D1150	11.5	53.5	93.5	90	3.5	10	●	1
3KD10D1200	12.0	53.6	93.6	90	3.6	10	●	1
3KD10D1250	12.5	53.8	93.8	90	3.8	10	●	1
3KD10D1300	13.0	53.9	93.9	90	3.9	10	●	1
3KD10D1350	13.5	89.1	144.1	140	4.1	10	●	1
3KD10D1400	14.0	89.2	144.2	140	4.2	10	●	1
3KD10D1450	14.5	89.4	144.4	140	4.4	10	●	1
3KD10D1500	15.0	89.5	144.5	140	4.5	10	●	1
3KD10D1550	15.5	89.7	144.7	140	4.7	10	●	1
3KD10D1600	16.0	89.8	144.8	140	4.8	10	●	1

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type
3KD13D1350	13.5	89.1	144.1	140	4.1	13	●	1
3KD13D1400	14.0	89.2	144.2	140	4.2	13	●	1
3KD13D1450	14.5	89.4	144.4	140	4.4	13	●	1
3KD13D1500	15.0	89.5	144.5	140	4.5	13	●	1
3KD13D1550	15.5	89.7	144.7	140	4.7	13	●	1
3KD13D1600	16.0	89.8	144.8	140	4.8	13	●	1
3KD13D1650	16.5	90.0	145.0	140	5.0	13	●	1
3KD13D1700	17.0	90.1	145.1	140	5.1	13	●	1
3KD13D1750	17.5	90.3	145.3	140	5.3	13	●	1
3KD13D1800	18.0	90.4	145.4	140	5.4	13	●	1
3KD13D1850	18.5	90.6	145.6	140	5.6	13	●	1
3KD13D1900	19.0	90.7	145.7	140	5.7	13	●	1
3KD13D1950	19.5	90.9	145.9	140	5.9	13	●	1
3KD13D2000	20.0	91.0	146.0	140	6.0	13	●	1
3KD13D2050	20.5	91.2	146.2	140	6.2	13	●	1
3KD13D2100	21.0	91.3	146.3	140	6.3	13	●	1
3KD13D2150	21.5	91.5	146.5	140	6.5	13	●	1
3KD13D2200	22.0	91.6	146.6	140	6.6	13	●	1
3KD13D2250	22.5	91.8	146.8	140	6.8	13	●	1
3KD13D2300	23.0	91.9	146.9	140	6.9	13	●	1
3KD13D2350	23.5	92.1	147.1	140	7.1	13	●	1
3KD13D2400	24.0	92.2	147.2	140	7.2	13	●	1
3KD13D2450	24.5	92.4	147.4	140	7.4	13	●	1
3KD13D2500	25.0	92.5	147.5	140	7.5	13	●	1
3KD13D2550	25.5	92.7	147.7	140	7.7	13	●	1
3KD13D2600	26.0	92.8	147.8	140	7.8	13	●	1

BRS

BRAZED Drill

Product Information

UWC 150° SIG X Thinning

Work Material

P M K

TECHNICAL DATA >> 1997

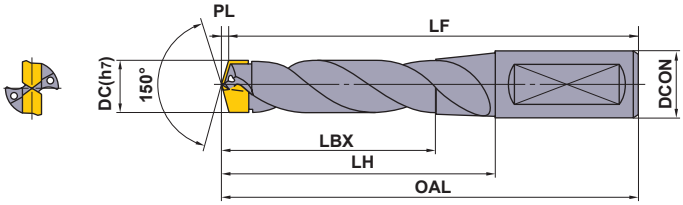
ISO13399 Property >> 1966

SYMBOL DESCRIPTIONS >> 1623

DRILLS SELECTION CHART >> 1624

(l/d=3)

14≤DC≤18	18<DC≤30
0 −0.018	0 −0.021



DC (mm)	Standard Diameter		Intermediate Diameters		Dimensions (mm)					
	Order Number	Stock UP20M	Range of Drill Diameters (DC)	Order Number	LBX	LH	OAL	LF	PL	DCON
14.0	BRS1400S16	●	14.0<DC≤14.5	BRS□□□□S16	53.9	67.9	115.9	114	1.9	16
14.5	BRS1450S16	●			53.9	67.9	115.9	114	1.9	16
15.0	BRS1500S20	●	14.5<DC≤15.5	BRS□□□□S20	63.0	78.0	128.0	126	2.0	20
15.5	BRS1550S20	●			63.1	78.1	128.1	126	2.1	20
16.0	BRS1600S20	●	15.5<DC≤16.5		67.1	83.1	133.1	131	2.1	20
16.5	BRS1650S20	●			67.2	83.2	133.2	131	2.2	20
17.0	BRS1700S20	●	16.5<DC≤17.5		71.3	88.3	138.3	136	2.3	20
17.5	BRS1750S20	●			71.3	88.3	138.3	136	2.3	20
18.0	BRS1800S20	●	17.5<DC≤18.5		75.4	93.4	143.4	141	2.4	20
18.5	BRS1850S20	●			75.5	93.5	143.5	141	2.5	20
19.0	BRS1900S25	●	18.5<DC≤19.5	BRS□□□□S25	79.5	103.5	159.5	157	2.5	25
19.5	BRS1950S25	●			79.6	103.6	159.6	157	2.6	25
20.0	BRS2000S25	●	19.5<DC≤20.5		83.7	103.7	159.7	157	2.7	25
20.5	BRS2050S25	●			83.7	103.7	159.7	157	2.7	25
21.0	BRS2100S25	●	20.5<DC≤21.5		82.8	103.8	159.8	157	2.8	25
21.5	BRS2150S25	●			82.9	103.9	159.9	157	2.9	25
22.0	BRS2200S25	●	21.5<DC≤22.5		86.9	108.9	164.9	162	2.9	25
22.5	BRS2250S25	●			87.0	109.0	165.0	162	3.0	25
23.0	BRS2300S25	●	22.5<DC≤23.5		86.1	109.1	165.1	162	3.1	25
23.5	BRS2350S25	●			86.1	109.1	165.1	162	3.1	25
24.0	BRS2400S32	●	23.5<DC≤24.5	BRS□□□□S32	90.2	114.2	174.2	171	3.2	32
24.5	BRS2450S32	●			90.3	114.3	174.3	171	3.3	32
25.0	BRS2500S32	●	24.5<DC≤25.5		89.3	114.3	174.3	171	3.3	32
25.5	BRS2550S32	●			89.4	114.4	174.4	171	3.4	32
26.0	BRS2600S32	●	25.5<DC≤26.5		93.5	119.5	179.5	176	3.5	32
26.5	BRS2650S32	●			93.6	119.6	179.6	176	3.6	32
27.0	BRS2700S32	●	26.5<DC≤27.5		92.6	119.6	179.6	176	3.6	32
27.5	BRS2750S32	●			92.7	119.7	179.7	176	3.7	32
28.0	BRS2800S32	●	27.5<DC≤28.5		96.8	124.8	184.8	181	3.8	32
28.5	BRS2850S32	●			96.8	124.8	184.8	181	3.8	32
29.0	BRS2900S32	●	28.5<DC≤29.5		100.9	129.9	189.9	186	3.9	32
29.5	BRS2950S32	●			101.0	130.0	190.0	186	4.0	32
30.0	BRS3000S32	●	29.5<DC≤30.5		100.0	130.0	190.0	186	4.0	32

For ordering an intermediate diameter, please enter the diameter (DC) into the 4-digit space□□□□in the nominal designation.
(Ex. UP20M BRS2530S32 for a diameter of ϕ25.30mm)

● : **Inventory maintained in Japan.**

BRS

RECOMMENDED CUTTING CONDITIONS

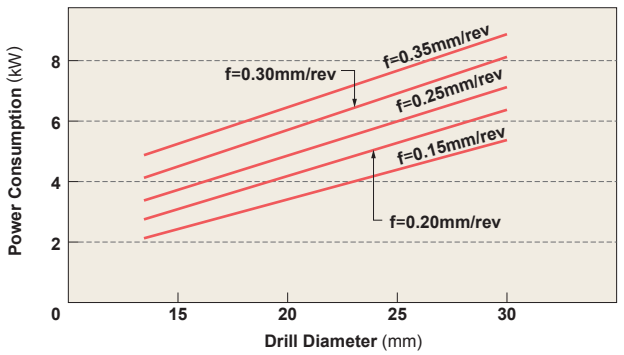
	Work Material		Hardness	Drill Dia. ϕ14.0−ϕ20.0		Drill Dia. ϕ20.0−ϕ30.0	
				Cutting Speed (m/min)	Feed (mm/rev)	Cutting Speed (m/min)	Feed (mm/rev)
P	Mild Steel		≤180HB	65 (50−75)	0.3 (0.20−0.40)	70 (55−85)	0.35 (0.20−0.45)
	Structural Steel	SS400 (JIS)	Tensile Strength 400−500MPa	80 (70−90)	0.30 (0.25−0.35)	80 (70−90)	0.35 (0.30−0.45)
		SM490 (JIS)	Tensile Strength 490−610MPa	70 (60−80)	0.25 (0.20−0.30)	70 (60−80)	0.30 (0.20−0.40)
		SM570 (JIS)	Tensile Strength 570−720MPa	60 (50−70)	0.25 (0.20−0.30)	60 (50−70)	0.30 (0.20−0.35)
	Carbon Steel Alloy Steel		180−280HB	60 (45−70)	0.25 (0.1−0.35)	65 (45−80)	0.30 (0.15−0.35)
			280−350HB	55 (40−65)	0.20 (0.15−0.35)	60 (45−70)	0.25 (0.15−0.35)
M	Stainless Steel (Austenitic)		≤200HB	70 (50−90)	0.30 (0.20−0.40)	80 (60−100)	0.3 (0.20−0.40)
K	Gray Cast Iron		Tensile Strength≤350MPa	75 (60−110)	0.30 (0.20−0.40)	80 (60−100)	0.35 (0.25−0.50)
	Ductile Cast Iron		Tensile Strength≤450MPa	75 (60−100)	0.30 (0.20−0.40)	80 (60−100)	0.35 (0.20−0.45)
			Tensile Strength 500−800MPa	70 (55−90)	0.25 (0.15−0.35)	75 (55−90)	0.30 (0.15−0.40)

(Note) The above conditions are for general cutting. The cutting conditions need to be modified depending on power, rigidity of the machine and workpiece shape.

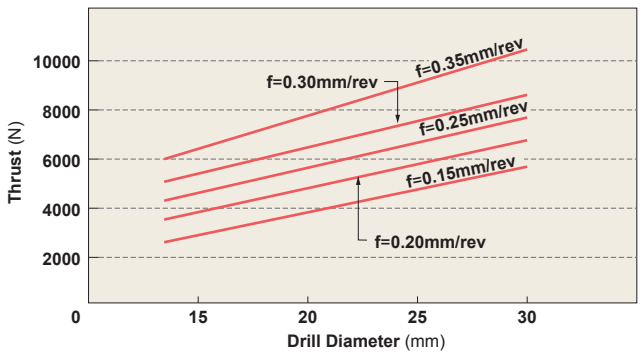
CUTTING RESISTANCE

Workpiece : JIS SUS304 Drilled Depth : l/d=3(Through Hole) Cutting Speed : 70m/min WSO (10%)

Power Consumption



Thrust



BRM

BRAZED Drill

Product Information

UWC 150° SIG X Thinning

Work Material

P M K

TECHNICAL DATA >> 1997

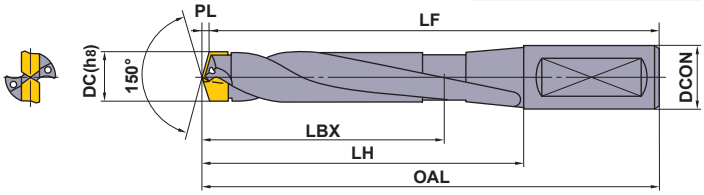
ISO13399 Property >> 1966

SYMBOL DESCRIPTIONS >> 1623

DRILLS SELECTION CHART >> 1624

(l/d=5)

14≤DC≤18	18<DC≤30
0 −0.027	0 −0.033



DC (mm)	Standard Diameter		Intermediate Diameters		Dimensions (mm)					
	Order Number	Stock UP20M	Range of Drill Diameters (DC)	Order Number	LBX	LH	OAL	LF	PL	DCON
14.0	BRM1400S16	●	14.0<DC≤14.5	BRM□□□□S16	79.9	93.9	141.9	140	1.9	16
14.5	BRM1450S16	●			79.9	93.9	141.9	140	1.9	16
15.0	BRM1500S20	●	14.5<DC≤15.5	BRM□□□□S20	87.0	102.0	152.0	150	2.0	20
15.5	BRM1550S20	●			87.1	102.1	152.1	150	2.1	20
16.0	BRM1600S20	●	15.5<DC≤16.5		91.1	107.1	157.1	155	2.1	20
16.5	BRM1650S20	●			91.2	107.2	157.2	155	2.2	20
17.0	BRM1700S20	●	16.5<DC≤17.5		100.3	117.3	167.3	165	2.3	20
17.5	BRM1750S20	●			100.3	117.3	167.3	165	2.3	20
18.0	BRM1800S20	●	17.5<DC≤18.5		104.4	122.4	172.4	170	2.4	20
18.5	BRM1850S20	●			104.5	122.5	172.5	170	2.5	20
19.0	BRM1900S25	●	18.5<DC≤19.5	BRM□□□□S25	107.5	126.5	182.5	180	2.5	25
19.5	BRM1950S25	●			107.6	126.6	182.6	180	2.6	25
20.0	BRM2000S25	●	19.5<DC≤20.5		116.7	136.7	192.7	190	2.7	25
20.5	BRM2050S25	●			116.7	136.7	192.7	190	2.7	25
21.0	BRM2100S25	●	20.5<DC≤21.5		120.8	141.8	197.8	195	2.8	25
21.5	BRM2150S25	●			120.9	141.9	197.9	195	2.9	25
22.0	BRM2200S25	●	21.5<DC≤22.5		124.9	146.9	202.9	200	2.9	25
22.5	BRM2250S25	●			125.0	147.0	203.0	200	3.0	25
23.0	BRM2300S25	●	22.5<DC≤23.5		129.1	152.1	208.1	205	3.1	25
23.5	BRM2350S25	●			129.1	152.1	208.1	205	3.1	25
24.0	BRM2400S32	●	23.5<DC≤24.5	BRM□□□□S32	139.2	163.2	223.2	220	3.2	32
24.5	BRM2450S32	●			139.3	163.3	223.3	220	3.3	32
25.0	BRM2500S32	●	24.5<DC≤25.5		143.3	168.3	228.3	225	3.3	32
25.5	BRM2550S32	●			143.4	168.4	228.4	225	3.4	32
26.0	BRM2600S32	●	25.5<DC≤26.5		147.5	173.5	233.5	230	3.5	32
26.5	BRM2650S32	●			147.6	173.6	233.6	230	3.6	32
27.0	BRM2700S32	●	26.5<DC≤27.5		151.6	178.6	238.6	235	3.6	32
27.5	BRM2750S32	●			151.7	178.7	238.7	235	3.7	32
28.0	BRM2800S32	●	27.5<DC≤28.5		160.8	188.8	248.8	245	3.8	32
28.5	BRM2850S32	●			160.8	188.8	248.8	245	3.8	32
29.0	BRM2900S32	●	28.5<DC≤29.5		164.9	193.9	253.9	250	3.9	32
29.5	BRM2950S32	●			165.0	194.0	254.0	250	4.0	32
30.0	BRM3000S32	●	29.5<DC≤30.0		169.0	199.0	259.0	255	4.0	32

For ordering an intermediate diameter, please enter the diameter (DC) into the 4-digit space□□□□in the nominal designation.
(Ex. UP20M BRM2530S32 for a diameter of ϕ25.30mm)

● : **Inventory maintained in Japan.**

BRM

RECOMMENDED CUTTING CONDITIONS

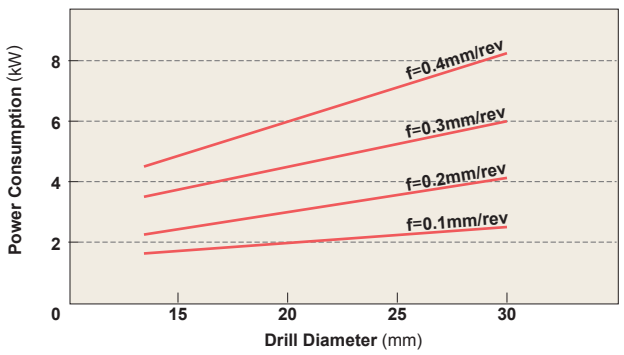
	Work Material		Hardness	Drill Dia. ϕ14.0−ϕ20.0		Drill Dia. ϕ20.0−ϕ30.0	
				Cutting Speed (m/min)	Feed (mm/rev)	Cutting Speed (m/min)	Feed (mm/rev)
P	Mild Steel		≤180HB	65 (50−75)	0.30 (0.20−0.40)	70 (55−85)	0.35 (0.20−0.45)
	Structural Steel	SS400 (JIS)	Tensile Strength 400−500MPa	70 (60−80)	0.30 (0.25−0.35)	70 (60−80)	0.35 (0.30−0.45)
		SM490 (JIS)	Tensile Strength 490−610MPa	60 (50−70)	0.25 (0.20−0.30)	60 (50−70)	0.30 (0.20−0.40)
		SM570 (JIS)	Tensile Strength 570−720MPa	50 (40−60)	0.25 (0.20−0.30)	50 (40−60)	0.30 (0.20−0.35)
	Carbon Steel Alloy Steel		180−280HB	60 (45−70)	0.25 (0.15−0.35)	65 (45−80)	0.30 (0.15−0.40)
			280−350HB	55 (40−65)	0.20 (0.15−0.35)	60 (45−70)	0.25 (0.15−0.35)
M	Stainless Steel (Austenitic)		≤200HB	60 (50−80)	0.25 (0.15−0.35)	65 (50−80)	0.30 (0.20−0.40)
K	Gray Cast Iron		Tensile Strength≤350MPa	65 (50−100)	0.30 (0.20−0.40)	70 (50−100)	0.35 (0.25−0.50)
	Ductile Cast Iron		Tensile Strength≤450MPa	65 (50−90)	0.30 (0.2−0.40)	70 (50−90)	0.35 (0.20−0.45)
			Tensile Strength 500−800MPa	60 (45−80)	0.25 (0.15−0.35)	65 (45−80)	0.30 (0.15−0.40)

(Note) The above conditions are for general cutting. The cutting conditions need to be modified depending on power, rigidity of the machine and workpiece shape.

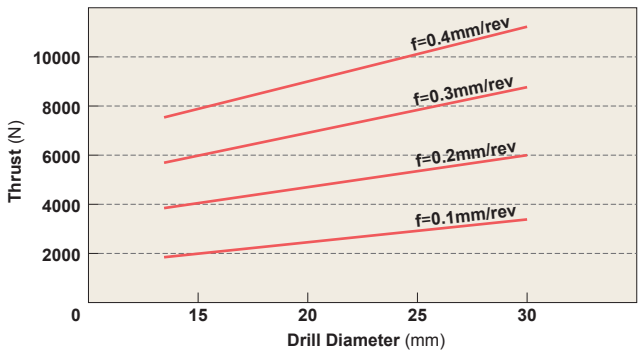
CUTTING RESISTANCE

Workpiece : JIS SUS304 Drilled Depth : l/d=5(Through Hole) Cutting Speed : 60m/min WSO (10%)

Power Consumption



Thrust



BRSB/BRMB

Key point drill for bridge construction

BRAZED Drill

Product Information

UWC 150° SIG X Thinning

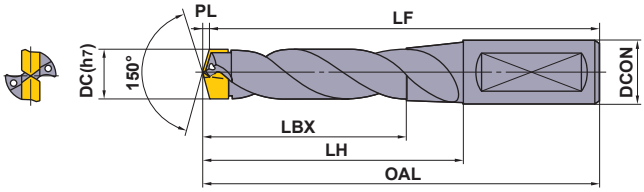
Work Material

P

TECHNICAL DATA >> 1997 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 1623 DRILLS SELECTION CHART >> 1624

18<DC≤30
0
−0.021

Key point drill for bridge construction (l/d=3)

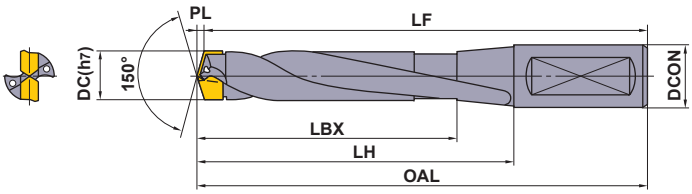


DC (mm)	Order Number	Stock UP20M	Dimensions (mm) LBX	LH	OAL	LF	PL	DCON
24.5	BRSB2450S32	●	90.3	114.3	174.3	171	3.3	32
24.6	BRSB2460S32	●	89.3	114.3	174.3	171	3.3	32
24.7	BRSB2470S32	●	89.3	114.3	174.3	171	3.3	32
26.5	BRSB2650S32	●	93.6	119.6	179.6	176	3.6	32
26.7	BRSB2670S32	●	92.6	119.6	179.6	176	3.6	32

● : Inventory maintained in Japan.

18<DC≤30
0
−0.021

Key point drill for bridge construction (l/d=5)



DC (mm)	Order Number	Stock UP20M	Dimensions (mm) LBX	LH	OAL	LF	PL	DCON
24.5	BRMB2450S32	●	139.3	163.3	223.3	220	3.3	32
24.6	BRMB2460S32	●	143.3	168.3	228.3	225	3.3	32
24.7	BRMB2470S32	●	143.3	168.3	228.3	225	3.3	32
26.5	BRMB2650S32	●	147.6	173.6	233.6	230	3.6	32
26.7	BRMB2670S32	●	151.6	178.6	238.6	235	3.6	32

BRB

New point drill for bridge construction parts

BRAZED Drill

Product Information

UWC 150° SIG X Thinning

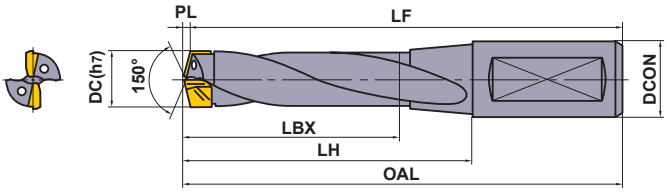
Work Material

P

TECHNICAL DATA >> 1997 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 1623 DRILLS SELECTION CHART >> 1624

18<DC≤30
0
−0.021

●New point drill for bridge construction parts
(l/d=3)



DC (mm)	Order Number	Stock UTi20T	Dimensions (mm) LBX	LH	OAL	LF	PL	DCON
24.5	BRB2450S32M	●	90.3	114.3	174.3	171	3.3	32
24.6	BRB2460S32M	●	89.3	114.3	174.3	171	3.3	32
24.7	BRB2470S32M	●	89.3	114.3	174.3	171	3.3	32
26.5	BRB2650S32M	●	93.6	119.6	179.6	176	3.6	32
26.7	BRB2670S32M	●	92.6	119.6	179.6	176	3.6	32

● : Inventory maintained in Japan.

RECOMMENDED CUTTING CONDITIONS

Work Material			Hardness	BRB Cutting Speed (m/min)	BRB Feed (mm/rev)	BRSB Cutting Speed (m/min)	BRSB Feed (mm/rev)	BRMB Cutting Speed (m/min)	BRMB Feed (mm/rev)
P	Structural Steel	SS400 (JIS)	Tensile Strength 400−500MPa	65 (60−75)	0.35 (0.3−0.4)	80 (70−90)	0.35 (0.3−0.45)	70 (60−80)	0.35 (0.3−0.45)
		SM490 (JIS)	Tensile Strength 490−610MPa	60 (50−70)	0.3 (0.2−0.4)	70 (60−80)	0.3 (0.2−0.4)	60 (50−70)	0.3 (0.2−0.4)
		SM570 (JIS)	Tensile Strength 570−720MPa	55 (50−60)	0.3 (0.2−0.35)	60 (50−70)	0.3 (0.2−0.35)	50 (40−60)	0.3 (0.2−0.35)
	Mild Steel		≤180HB	40 (30−50)	0.35 (0.25−0.4)	70 (55−85)	0.35 (0.2−0.45)	70 (55−85)	0.35 (0.2−0.45)

BRA

BRAZED Drill

Product Information

UWC 150° SIG X Thinning

Work Material

P M K

TECHNICAL DATA >> 1997

ISO13399 Property >> 1966

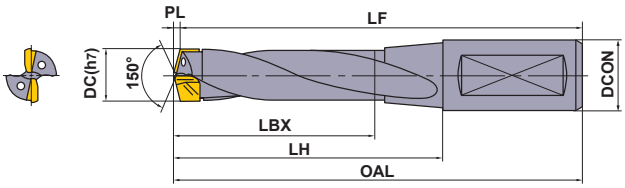
SYMBOL DESCRIPTIONS >> 1623

DRILLS SELECTION CHART >> 1624

8≤D≤10	10<DC≤18	18<DC≤30	30<DC≤40
0 / −0.015	0 / −0.018	0 / −0.021	0 / −0.025

General Use (Carbon Steel, Alloy Steel, Stainless Steel)

(l/d=3)



DC (mm)	Standard Diameter: Order Number	Stock UP20M	Intermediate Diameters: Range of Drill Diameters (DC)	Order Number	Dimensions (mm) LBX	LH	OAL	LF	PL	DCON
8.0	BRA0800S16	●	8.0<DC≤8.5	BRA□□□□S16	24.1	36.1	84.1	83	1.1	16
8.5	BRA0850S16	●			24.1	36.1	84.1	83	1.1	16
9.0	BRA0900S16	●	8.5<DC≤9.5		29.2	41.2	89.2	88	1.2	16
9.5	BRA0950S16	●			29.3	41.3	89.3	88	1.3	16
10.0	BRA1000S16	●	9.5<DC≤10.5		36.3	46.3	94.3	93	1.3	16
10.5	BRA1050S16	●			36.4	46.4	94.4	93	1.4	16
11.0	BRA1100S16	●	10.5<DC≤11.5		41.5	52.5	100.5	99	1.5	16
11.5	BRA1150S16	●			41.5	52.5	100.5	99	1.5	16
12.0	BRA1200S16	●	11.5<DC≤12.5		45.6	57.6	105.6	104	1.6	16
12.5	BRA1250S16	●			45.7	57.7	105.7	104	1.7	16
13.0	BRA1300S16	●	12.5<DC≤13.5		49.7	62.7	110.7	109	1.7	16
13.5	BRA1350S16	●			49.8	62.8	110.8	109	1.8	16
14.0	BRA1400S16	●	13.5<DC≤14.5		53.9	67.9	115.9	114	1.9	16
14.5	BRA1450S16	●			53.9	67.9	115.9	114	1.9	16
15.0	BRA1500S20	●	14.5<DC≤15.5	BRA□□□□S20	63.0	78.0	128.0	126	2.0	20
15.5	BRA1550S20	●			63.1	78.1	128.1	126	2.1	20
16.0	BRA1600S20	●	15.5<DC≤16.5		67.1	83.1	133.1	131	2.1	20
16.5	BRA1650S20	●			67.2	83.2	133.2	131	2.2	20
17.0	BRA1700S20	●	16.5<DC≤17.5		71.3	88.3	138.3	136	2.3	20
17.5	BRA1750S20	●			71.3	88.3	138.3	136	2.3	20
18.0	BRA1800S20	●	17.5<DC≤18.5		75.4	93.4	143.4	141	2.4	20
18.5	BRA1850S20	●			75.5	93.5	143.5	141	2.5	20
19.0	BRA1900S25	●	18.5<DC≤19.5	BRA□□□□S25	79.5	103.5	159.5	157	2.5	25
19.5	BRA1950S25	●			79.6	103.6	159.6	157	2.6	25
20.0	BRA2000S25	●	19.5<DC≤20.5		83.7	103.7	159.7	157	2.7	25
20.5	BRA2050S25	●			83.7	103.7	159.7	157	2.7	25
21.0	BRA2100S25	●	20.5<DC≤21.5		82.8	103.8	159.8	157	2.8	25
21.5	BRA2150S25	●			82.9	103.9	159.9	157	2.9	25
22.0	BRA2200S25	●	21.5<DC≤22.5		86.9	108.9	164.9	162	2.9	25
22.5	BRA2250S25	●			87.0	109.0	165.0	162	3.0	25
23.0	BRA2300S25	●	22.5<DC≤23.5		86.1	109.1	165.1	162	3.1	25
23.5	BRA2350S25	●			86.1	109.1	165.1	162	3.1	25

BRA

DC (mm)	Standard Diameter		Intermediate Diameters		Dimensions (mm)					
	Order Number	Stock UP20M	Range of Drill Diameters (DC)	Order Number	LBX	LH	OAL	LF	PL	DCON
24.0	BRA2400S32	●	23.5<DC≤24.5	BRA□□□□S32	90.2	114.2	174.2	171	3.2	32
24.5	BRA2450S32	●			90.3	114.3	174.3	171	3.3	32
25.0	BRA2500S32	●	24.5<DC≤25.5		89.3	114.3	174.3	171	3.3	32
25.5	BRA2550S32	●			89.4	114.4	174.4	171	3.4	32
26.0	BRA2600S32	●	25.5<DC≤26.5		93.5	119.5	179.5	176	3.5	32
26.5	BRA2650S32	●			93.6	119.6	179.6	176	3.6	32
27.0	BRA2700S32	●	26.5<DC≤27.5		92.6	119.6	179.6	176	3.6	32
27.5	BRA2750S32	●			92.7	119.7	179.7	176	3.7	32
28.0	BRA2800S32	●	27.5<DC≤28.5		96.8	124.8	184.8	181	3.8	32
28.5	BRA2850S32	●			96.8	124.8	184.8	181	3.8	32
29.0	BRA2900S32	●	28.5<DC≤29.5		100.9	129.9	189.9	186	3.9	32
29.5	BRA2950S32	●			101.0	130.0	190.0	186	4.0	32
30.0	BRA3000S32	●	29.5<DC≤30.5		100.0	130.0	190.0	186	4.0	32
30.5	BRA3050S32	●			100.1	130.1	190.1	186	4.1	32
31.0	BRA3100S40	□	30.5<DC≤31.5	BRA□□□□S40	100.2	131.2	201.2	197	4.2	40
31.5	BRA3150S40	□			100.2	131.2	201.2	197	4.2	40
32.0	BRA3200S40	□	31.5<DC≤32.5		104.3	136.3	206.3	202	4.3	40
32.5	BRA3250S40	□			104.4	136.4	206.4	202	4.4	40
33.0	BRA3300S40	□	32.5<DC≤33.5		108.4	141.4	211.4	207	4.4	40
33.5	BRA3350S40	□			108.5	141.5	211.5	207	4.5	40
34.0	BRA3400S40	□	33.5<DC≤34.5		107.6	141.6	211.6	207	4.6	40
34.5	BRA3450S40	□			107.6	141.6	211.6	207	4.6	40
35.0	BRA3500S40	□	34.5<DC≤35.5		111.7	146.7	216.7	212	4.7	40
35.5	BRA3550S40	□			111.8	146.8	216.8	212	4.8	40
36.0	BRA3600S40	□	35.5<DC≤36.5		115.8	151.8	221.8	217	4.8	40
36.5	BRA3650S40	□			115.9	151.9	221.9	217	4.9	40
37.0	BRA3700S40	□	36.5<DC≤37.5		120.0	157.0	227.0	222	5.0	40
37.5	BRA3750S40	□			120.0	157.0	227.0	222	5.0	40
38.0	BRA3800S40	□	37.5<DC≤38.5		124.1	162.1	232.1	227	5.1	40
38.5	BRA3850S40	□			124.2	162.2	232.2	227	5.2	40
39.0	BRA3900S40	□	38.5<DC≤39.5		123.2	162.2	232.2	227	5.2	40
39.5	BRA3950S40	□			123.3	162.3	232.3	227	5.3	40
40.0	BRA4000S40	□	39.5<DC≤40.0		127.4	167.4	237.4	232	5.4	40

(Note 1) Drills in the intermediate drill diameter range are produced to order only.
(Note 2) For ordering an intermediate diameter, please enter the diameter (DC) into the 4-digit space□□□□in the nominal designation.
(Ex. UP20M BRA2530S32 for a diameter of ϕ25.30mm)
(Note 3) Please contact us regarding special designs.
(Note 4) Please contact us for any geometry that is not in this catalogue (e.g. drills with chamfered cutting edges can be made to order).

● : Inventory maintained in Japan. □ : Non stock, produced to order only.

BRA

RECOMMENDED CUTTING CONDITIONS

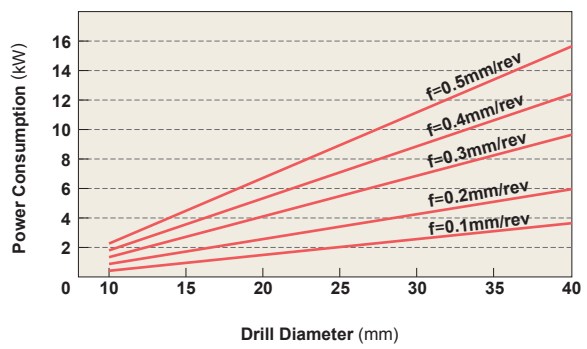
Type		Work Material	Hardness	Drill Diameter φ8.0−φ13.0		Drill Diameter φ13.0−φ18.0		Drill Diameter≥φ18.0	
				Cutting Speed (m/min)	Feed (mm/rev)	Cutting Speed (m/min)	Feed (mm/rev)	Cutting Speed (m/min)	Feed (mm/rev)
BRA	P	Mild Steel	≤180HB	55 (40−65)	0.25 (0.20−0.30)	65 (50−75)	0.30 (0.25−0.35)	75 (60−85)	0.30 (0.25−0.35)
		Carbon Steel Alloy Steel	180−280HB	50 (35−60)	0.25 (0.20−0.30)	60 (45−70)	0.30 (0.25−0.35)	70 (55−80)	0.30 (0.25−0.35)
			280−350HB	40 (30−50)	0.25 (0.20−0.30)	50 (40−60)	0.25 (0.20−0.30)	55 (45−65)	0.27 (0.20−0.30)
	M	Stainless Steel	≤200HB	30 (20−40)	0.25 (0.20−0.27)	35 (25−45)	0.27 (0.20−0.30)	40 (30−50)	0.30 (0.25−0.35)
	K	Gray Cast Iron	Tensile Strength≤350MPa	60 (40−70)	0.30 (0.25−0.35)	70 (50−80)	0.35 (0.30−0.40)	80 (60−90)	0.40 (0.35−0.45)
		Ductile Cast Iron	Tensile Strength≤450MPa	55 (40−65)	0.27 (0.20−0.30)	60 (45−70)	0.30 (0.25−0.35)	70 (55−80)	0.30 (0.25−0.35)
	S	Heat Resistant Alloy	–	15 (10−20)	0.10 (0.05−0.12)	20 (15−25)	0.15 (0.10−0.20)	25 (20−30)	0.15 (0.10−0.20)
		Titanium Alloy	–	20 (10−25)	0.15 (0.10−0.17)	30 (20−35)	0.20 (0.15−0.25)	35 (30−40)	0.25 (0.20−0.30)

(Note) The above conditions are for general cutting. The cutting conditions need to be modified depending on power, rigidity of the machine and workpiece shape.

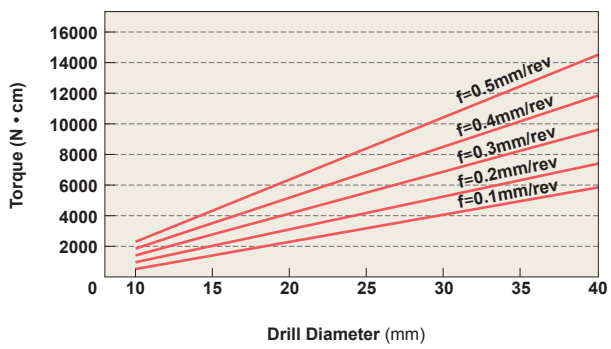
CUTTING RESISTANCE

Workpiece : JIS SCM440(200HB) Cutting Speed : 60m/min

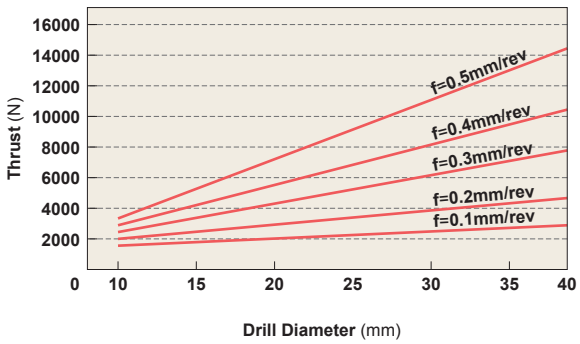
Power Consumption



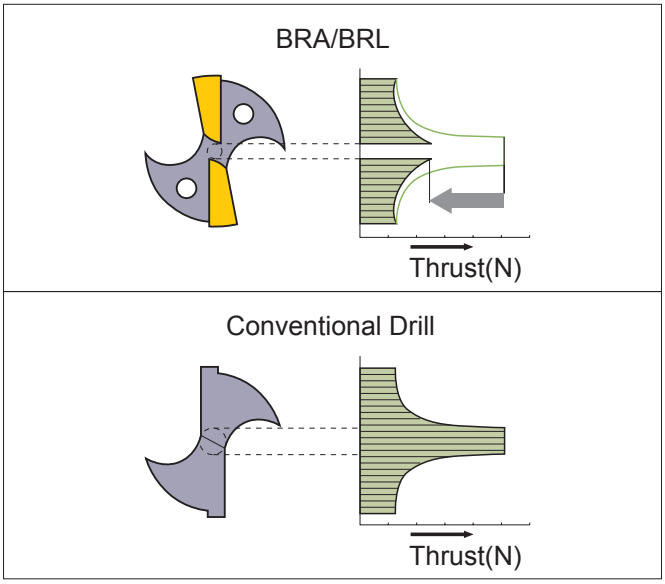
Torque



Thrust



Reason for Low Thrust Load



BRL

BRAZED Drill

Product Information

UWC 150° SIG X Thinning

Work Material

P M K

TECHNICAL DATA >> 1997

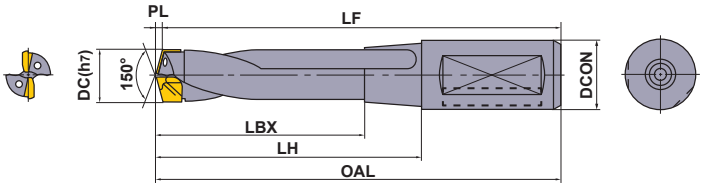
ISO13399 Property >> 1966

SYMBOL DESCRIPTIONS >> 1623

DRILLS SELECTION CHART >> 1624

8≤DC≤10	10<DC≤18	18<DC≤30	30<DC≤40
0 −0.015	0 −0.018	0 −0.021	0 −0.025

For turning
(l/d=3)



DC (mm)	Standard Diameter		Intermediate Diameters		Dimensions (mm)					
	Order Number	Stock STi40T	Range of Drill Diameters (DC)	Order Number	LBX	LH	OAL	LF	PL	DCON
8.0	BRL0800S16	●	8.0≤DC≤8.5	BRL□□□□S16	24.1	36.1	84.1	83	1.1	16
8.5	BRL0850S16	●			24.1	36.1	84.1	83	1.1	16
9.0	BRL0900S16	●	8.5<DC≤9.5		29.2	41.2	89.2	88	1.2	16
9.5	BRL0950S16	●			29.3	41.3	89.3	88	1.3	16
10.0	BRL1000S16	●	9.5<DC≤10.5		36.3	46.3	94.3	93	1.3	16
10.5	BRL1050S16	●			36.4	46.4	94.4	93	1.4	16
11.0	BRL1100S16	●	10.5<DC≤11.5		41.5	52.5	100.5	99	1.5	16
11.5	BRL1150S16	●			41.5	52.5	100.5	99	1.5	16
12.0	BRL1200S16	●	11.5<DC≤12.5		45.6	57.6	105.6	104	1.6	16
12.5	BRL1250S16	●			45.7	57.7	105.7	104	1.7	16
13.0	BRL1300S16	●	12.5<DC≤13.5		49.7	62.7	110.7	109	1.7	16
13.5	BRL1350S16	●			49.8	62.8	110.8	109	1.8	16
14.0	BRL1400S16	●	13.5<DC≤14.5		53.9	67.9	115.9	114	1.9	16
14.5	BRL1450S16	●			53.9	67.9	115.9	114	1.9	16
15.0	BRL1500S20	●	14.5<DC≤15.5	BRL□□□□S20	63.0	78.0	128.0	126	2.0	20
15.5	BRL1550S20	●			63.1	78.1	128.1	126	2.1	20
16.0	BRL1600S20	●	15.5<DC≤16.5		67.1	83.1	133.1	131	2.1	20
16.5	BRL1650S20	●			67.2	83.2	133.2	131	2.2	20
17.0	BRL1700S20	●	16.5<DC≤17.5		71.3	88.3	138.3	136	2.3	20
17.5	BRL1750S20	●			71.3	88.3	138.3	136	2.3	20
18.0	BRL1800S20	●	17.5<DC≤18.5		75.4	93.4	143.4	141	2.4	20
18.5	BRL1850S20	●			75.5	93.5	143.5	141	2.5	20
19.0	BRL1900S25	●	18.5<DC≤19.5	BRL□□□□S25	79.5	103.5	159.5	157	2.5	25
19.5	BRL1950S25	●			79.6	103.6	159.6	157	2.6	25
20.0	BRL2000S25	●	19.5<DC≤20.5		83.7	103.7	159.7	157	2.7	25
20.5	BRL2050S25	●			83.7	103.7	159.7	157	2.7	25
21.0	BRL2100S25	●	20.5<DC≤21.5		82.8	103.8	159.8	157	2.8	25
21.5	BRL2150S25	●			82.9	103.9	159.9	157	2.9	25
22.0	BRL2200S25	●	21.5<DC≤22.5		86.9	108.9	164.9	162	2.9	25
22.5	BRL2250S25	●			87.0	109.0	165.0	162	3.0	25
23.0	BRL2300S25	●	22.5<DC≤23.5		86.1	109.1	165.1	162	3.1	25
23.5	BRL2350S25	●			86.1	109.1	165.1	162	3.1	25

BRL

DC (mm)	Standard Diameter		Intermediate Diameters		Dimensions (mm)					
	Order Number	Stock STi40T	Range of Drill Diameters (DC)	Order Number	LBX	LH	OAL	LF	PL	DCON
24.0	**BRL2400S32**	●	23.5<DC≤24.5	**BRL□□□□S32**	90.2	114.2	174.2	171	3.2	32
24.5	**BRL2450S32**	●			90.3	114.3	174.3	171	3.3	32
25.0	**BRL2500S32**	●	24.5<DC≤25.5		89.3	114.3	174.3	171	3.3	32
25.5	**BRL2550S32**	●			89.4	114.4	174.4	171	3.4	32
26.0	**BRL2600S32**	●	25.5<DC≤26.5		93.5	119.5	179.5	176	3.5	32
26.5	**BRL2650S32**	●			93.6	119.6	179.6	176	3.6	32
27.0	**BRL2700S32**	●	26.5<DC≤27.5		92.6	119.6	179.6	176	3.6	32
27.5	**BRL2750S32**	●			92.7	119.7	179.7	176	3.7	32
28.0	**BRL2800S32**	●	27.5<DC≤28.5		96.8	124.8	184.8	181	3.8	32
28.5	**BRL2850S32**	●			96.8	124.8	184.8	181	3.8	32
29.0	**BRL2900S32**	●	28.5<DC≤29.5		100.9	129.9	189.9	186	3.9	32
29.5	**BRL2950S32**	●			101.0	130.0	190.0	186	4.0	32
30.0	**BRL3000S32**	●	29.5<DC≤30.5		100.0	130.0	190.0	186	4.0	32
30.5	**BRL3050S32**	●			100.1	130.1	190.1	186	4.1	32
31.0	**BRL3100S40**	□	30.5<DC≤31.5	**BRL□□□□S40**	100.2	131.2	201.2	197	4.2	40
31.5	**BRL3150S40**	□			100.2	131.2	201.2	197	4.2	40
32.0	**BRL3200S40**	□	31.5<DC≤32.5		104.3	136.3	206.3	202	4.3	40
32.5	**BRL3250S40**	□			104.4	136.4	206.4	202	4.4	40
33.0	**BRL3300S40**	□	32.5<DC≤33.5		108.4	141.4	211.4	207	4.4	40
33.5	**BRL3350S40**	□			108.5	141.5	211.5	207	4.5	40
34.0	**BRL3400S40**	□	33.5<DC≤34.5		107.6	141.6	211.6	207	4.6	40
34.5	**BRL3450S40**	□			107.6	141.6	211.6	207	4.6	40
35.0	**BRL3500S40**	□	34.5<DC≤35.5		111.7	146.7	216.7	212	4.7	40
35.5	**BRL3550S40**	□			111.8	146.8	216.8	212	4.8	40
36.0	**BRL3600S40**	□	35.5<DC≤36.5		115.8	151.8	221.8	217	4.8	40
36.5	**BRL3650S40**	□			115.9	151.9	221.9	217	4.9	40
37.0	**BRL3700S40**	□	36.5<DC≤37.5		120.0	157.0	227.0	222	5.0	40
37.5	**BRL3750S40**	□			120.0	157.0	227.0	222	5.0	40
38.0	**BRL3800S40**	□	37.5<DC≤38.5		124.1	162.1	232.1	227	5.1	40
38.5	**BRL3850S40**	□			124.2	162.2	232.2	227	5.2	40
39.0	**BRL3900S40**	□	38.5<DC≤39.5		123.2	162.2	232.2	227	5.2	40
39.5	**BRL3950S40**	□			123.3	162.3	232.3	227	5.3	40
40.0	**BRL4000S40**	□	39.5<DC≤40.0		127.4	167.4	237.4	232	5.4	40

(Note 1) Drills in the intermediate drill diameter range are produced to order only.
(Note 2) For ordering an intermediate diameter, please enter the diameter (DC) into the 4-digit space□□□□in the nominal designation.
(Ex. STi40T BRL2530S32 for a diameter of ϕ25.30mm)
(Note 3) Please contact us regarding special designs.
(Note 4) Please contact us for any geometry that is not in this catalogue (e.g. drills with chamfered cutting edges can be made to order).

● : Inventory maintained in Japan. □ : Non stock, produced to order only.

BRL

RECOMMENDED CUTTING CONDITIONS

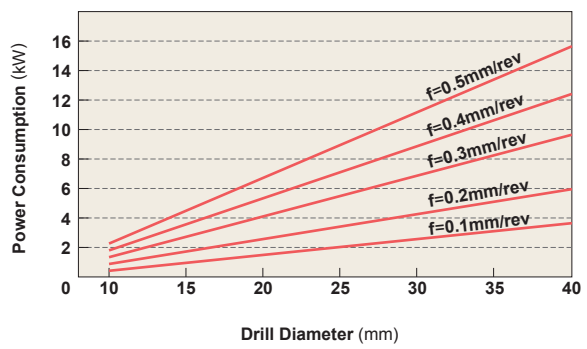
Type		Work Material	Hardness	Drill Diameter φ8.0−φ13.0		Drill Diameter φ13.0−φ18.0		Drill Diameter≥φ18.0	
				Cutting Speed (m/min)	Feed (mm/rev)	Cutting Speed (m/min)	Feed (mm/rev)	Cutting Speed (m/min)	Feed (mm/rev)
BRL	P	Mild Steel	≤180HB	50 (35−60)	0.25 (0.20−0.30)	60 (45−70)	0.30 (0.25−0.35)	65 (50−75)	0.30 (0.25−0.35)
		Carbon Steel Alloy Steel	180−280HB	45 (30−55)	0.25 (0.20−0.30)	55 (40−65)	0.30 (0.25−0.35)	60 (45−70)	0.30 (0.25−0.35)
			280−350HB	35 (25−45)	0.25 (0.20−0.30)	45 (35−55)	0.25 (0.20−0.30)	50 (40−60)	0.27 (0.20−0.30)
	M	Stainless Steel	≤200HB	30 (20−40)	0.25 (0.20−0.27)	30 (20−40)	0.27 (0.20−0.30)	35 (25−45)	0.30 (0.25−0.35)
	K	Gray Cast Iron	Tensile Strength≤350MPa	55 (40−70)	0.30 (0.25−0.35)	60 (45−75)	0.35 (0.3−0.40)	65 (50−80)	0.40 (0.35−0.45)
		Ductile Cast Iron	Tensile Strength≤450MPa	50 (35−60)	0.27 (0.20−0.30)	55 (40−65)	0.30 (0.25−0.35)	60 (45−70)	0.30 (0.25−0.35)
	S	Heat Resistant Alloy	–	15 (10−20)	0.10 (0.05−0.12)	15 (10−20)	0.15 (0.10−0.20)	20 (15−25)	0.15 (0.10−0.20)
		Titanium Alloy	–	20 (10−25)	0.15 (0.10−0.17)	25 (10−30)	0.20 (0.15−0.25)	30 (20−35)	0.25 (0.20−0.30)

(Note) The above conditions are for general cutting. The cutting conditions need to be modified depending on power, rigidity of the machine and workpiece shape.

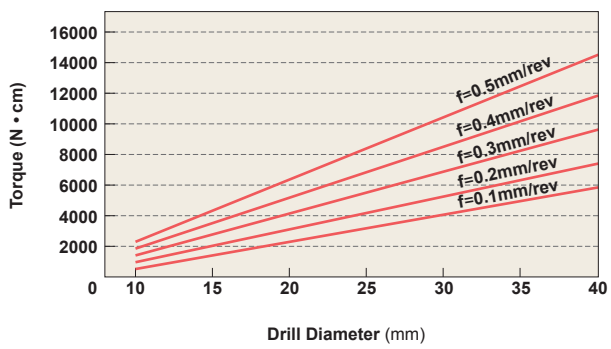
CUTTING RESISTANCE

Workpiece : JIS SCM440(200HB) Cutting Speed : 60m/min

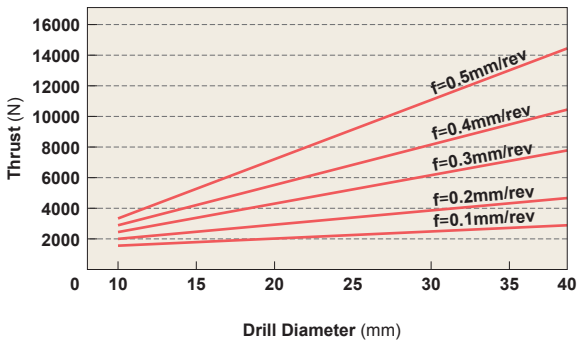
Power Consumption



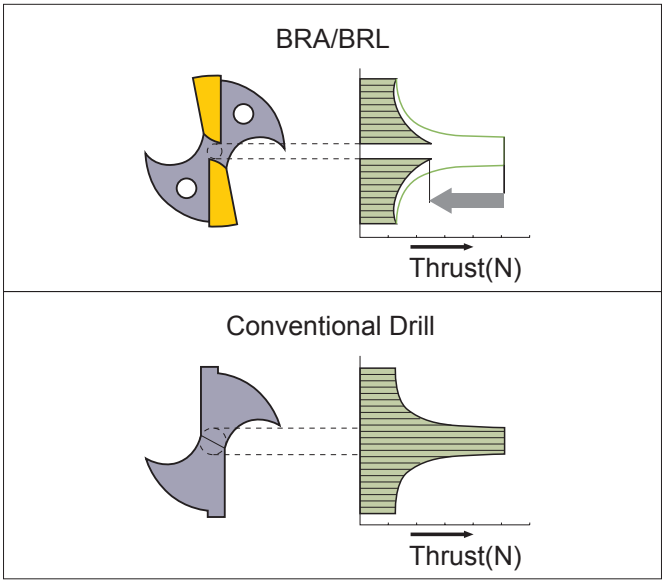
Torque



Thrust



Reason for Low Thrust Load



Memo

STAW

Small Diameter Indexable Drill

Indexable Drill

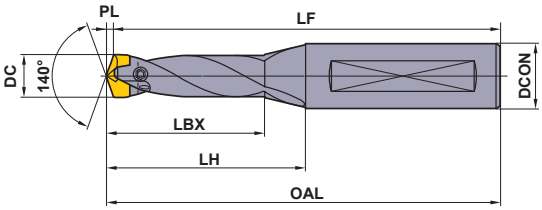
Product Information

UWC 140° SIG X Thinning

Work Material

P M K N

TECHNICAL DATA >> 1997 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 1623 DRILLS SELECTION CHART >> 1624



HOLDERS

DC (mm)	Hole Depth (l/d)	Holder: Order Number	Stock	Dimensions (mm): LBX	LH	OAL	LF	PL	DCON	Wrench	Insert: DC (mm)	Order Number	Stock: VP15TF	VP10H	DP5010
10.0 – 10.4	1.5	STAWSS1000S16	●	23.8	33.8	81.8	80	1.8	16	TIP06F	10.0	*STAWN1000TH	●	□	
												STAWK1000TG			●
	3	STAWSN1000S16	●	38.8	48.8	96.8	95	1.8	16	TIP06F	10.1	STAWN1010TH	●	□	
												STAWK1010TG			●
	5	STAWMN1000S16	●	58.9	68.9	116.9	115	1.9	16	TIP06F	10.2	STAWN1020TH	●	□	
												STAWK1020TG			●
	8	STAWLN1000S16	●	88.9	98.9	146.9	145	1.9	16	TIP06F	10.3	STAWN1030TH	●	□	
												STAWK1030TG			●
											10.4	STAWN1040TH	●	□	
												STAWK1040TG			●
10.5 – 10.9	1.5	STAWSS1050S16	●	23.9	33.9	81.9	80	1.9	16	TIP06F	10.5	*STAWN1050TH	●	□	
												STAWK1050TG			●
	3	STAWSN1050S16	●	38.9	48.9	96.9	95	1.9	16	TIP06F	10.6	STAWN1060TH	●	□	
												STAWK1060TG			●
	5	STAWMN1050S16	●	59.0	69.0	117.0	115	2.0	16	TIP06F	10.7	STAWN1070TH	●	□	
												STAWK1070TG			●
											10.8	STAWN1080TH	●	□	
												STAWK1080TG			●
	8	STAWLN1050S16	●	89.0	99.0	147.0	145	2.0	16	TIP06F	10.9	STAWN1090TH	●	□	
												STAWK1090TG			●
11.0 – 11.4	1.5	STAWSS1100S16	●	27.0	38.0	86.0	84	2.0	16	TIP06F	11.0	*STAWN1100TH	●	□	
												STAWK1100TG			●
	3	STAWSN1100S16	●	43.0	54.0	102.0	100	2.0	16	TIP06F	11.1	STAWN1110TH	●	□	
												STAWK1110TG			●
	5	STAWMN1100S16	●	68.1	79.1	127.1	125	2.1	16	TIP06F	11.2	STAWN1120TH	●	□	
												STAWK1120TG			●
											11.3	STAWN1130TH	●	□	
												STAWK1130TG			●
	8	STAWLN1100S16	●	98.1	109.1	157.1	155	2.1	16	TIP06F	11.4	STAWN1140TH	●	□	
												STAWK1140TG			●
11.5 – 11.9	1.5	STAWSS1150S16	●	27.1	38.1	86.1	84	2.1	16	TIP06F	11.5	*STAWN1150TH	●	□	
												STAWK1150TG			●
	3	STAWSN1150S16	●	43.1	54.1	102.1	100	2.1	16	TIP06F	11.6	STAWN1160TH	●	□	
												STAWK1160TG			●
	5	STAWMN1150S16	●	68.1	79.1	127.1	125	2.1	16	TIP06F	11.7	STAWN1170TH	●	□	
												STAWK1170TG			●
											11.8	STAWN1180TH	●	□	
												STAWK1180TG			●
	8	STAWLN1150S16	●	98.2	109.2	157.2	155	2.2	16	TIP06F	11.9	STAWN1190TH	●	□	
												STAWK1190TG			●
12.0 – 12.4	1.5	STAWSS1200S16	●	29.2	41.2	89.2	87	2.2	16	TIP06F	12.0	*STAWN1200TH	●	□	
												STAWK1200TG			●
	3	STAWSN1200S16	●	47.2	59.2	107.2	105	2.2	16	TIP06F	12.1	STAWN1210TH	●	□	
												STAWK1210TG			●
	5	STAWMN1200S16	●	72.2	84.2	132.2	130	2.2	16	TIP06F	12.2	STAWN1220TH	●	□	
												STAWK1220TG			●
											12.3	STAWN1230TH	●	□	
												STAWK1230TG			●
	8	STAWLN1200S16	●	107.3	119.3	167.3	165	2.3	16	TIP06F	12.4	STAWN1240TH	●	□	
												STAWK1240TG			●

(Note 1) The above dimensions are for when installing the STAWN (VP15TF) insert.
(Note 2) Please contact us for any geometry that is not in this catalogue (e.g. different diameter and length).

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STAW

DC (mm)	Hole Depth (l/d)	Holder Order Number	Stock	LBX	LH	OAL	LF	PL	DCON	Wrench	DC (mm)	Insert Order Number	Stock VP15TF	Stock VP10H	Stock DP5010
12.5 – 12.9	1.5	STAWSS1250S16	●	29.3	41.3	89.3	87	2.3	16	①TIP06F	12.5	*STAWN1250TH	●	□	
												STAWK1250TG			●
	3	STAWSN1250S16	●	47.3	59.3	107.3	105	2.3	16	①TIP06F	12.6	STAWN1260TH	●	□	
												STAWK1260TG			●
	5	STAWMN1250S16	●	72.3	84.3	132.3	130	2.3	16	①TIP06F	12.7	STAWN1270TH	●	□	
												STAWK1270TG			●
	8	STAWLN1250S16	●	107.3	119.3	167.3	165	2.3	16	①TIP06F	12.8	STAWN1280TH	●	□	
												STAWK1280TG			●
											12.9	STAWN1290TH	●	□	
												STAWK1290TG			●
13.0 – 13.4	1.5	STAWSS1300S16	●	32.4	45.4	93.4	91	2.4	16	②TIP08W	13.0	*STAWN1300TH	●	□	
												STAWK1300TG			●
	3	STAWSN1300S16	●	51.4	64.4	112.4	110	2.4	16	②TIP08W	13.1	STAWN1310TH	●	□	
												STAWK1310TG			●
	5	STAWMN1300S16	●	76.4	89.4	137.4	135	2.4	16	②TIP08W	13.2	STAWN1320TH	●	□	
												STAWK1320TG			●
	8	STAWLN1300S16	●	116.4	129.4	177.4	175	2.4	16	②TIP08W	13.3	STAWN1330TH	●	□	
												STAWK1330TG			●
											13.4	STAWN1340TH	●	□	
												STAWK1340TG			●
13.5 – 13.9	1.5	STAWSS1350S16	●	32.5	45.5	93.5	91	2.5	16	②TIP08W	13.5	*STAWN1350TH	●	□	
												STAWK1350TG			●
	3	STAWSN1350S16	●	51.5	64.5	112.5	110	2.5	16	②TIP08W	13.6	STAWN1360TH	●	□	
												STAWK1360TG			●
	5	STAWMN1350S16	●	76.5	89.5	137.5	135	2.5	16	②TIP08W	13.7	STAWN1370TH	●	□	
												STAWK1370TG			●
	8	STAWLN1350S16	●	116.5	129.5	177.5	175	2.5	16	②TIP08W	13.8	STAWN1380TH	●	□	
												STAWK1380TG			●
											13.9	STAWN1390TH	●	□	
												STAWK1390TG			●
14.0 – 14.4	1.5	STAWSS1400S16	●	33.5	47.5	95.5	93	2.5	16	②TIP08W	14.0	*STAWN1400TH	●		
												STAWK1400TG			●
	3	STAWSN1400S16	●	55.6	69.6	117.6	115	2.6	16	②TIP08W	14.1	STAWN1410TH	●		
												STAWK1410TG			●
	5	STAWMN1400S16	●	85.6	99.6	147.6	145	2.6	16	②TIP08W	14.2	STAWN1420TH	●		
												STAWK1420TG			●
	8	STAWLN1400S16	●	124.6	139.6	187.6	185	2.6	16	②TIP08W	14.3	STAWN1430TH	●		
												STAWK1430TG			●
											14.4	STAWN1440TH	●		
												STAWK1440TG			●
14.5 – 14.9	1.5	STAWSS1450S16	●	33.6	47.6	95.6	93	2.6	16	②TIP08W	14.5	*STAWN1450TH	●		
												STAWK1450TG			●
	3	STAWSN1450S16	●	55.7	69.7	117.7	115	2.7	16	②TIP08W	14.6	STAWN1460TH	●		
												STAWK1460TG			●
	5	STAWMN1450S16	●	85.7	99.7	147.7	145	2.7	16	②TIP08W	14.7	STAWN1470TH	●		
												STAWK1470TG			●
	8	STAWLN1450S16	●	124.7	139.7	187.7	185	2.7	16	②TIP08W	14.8	STAWN1480TH	●		
												STAWK1480TG			●
											14.9	STAWN1490TH	●		
												STAWK1490TG			●
15.0 – 15.4	1.5	STAWSS1500S20	●	35.7	50.7	100.7	98	2.7	20	②TIP08W	15.0	*STAWN1500TH	●		
												STAWK1500TG			●
	3	STAWSN1500S20	●	62.7	77.7	127.7	125	2.7	20	②TIP08W	15.1	STAWN1510TH	●		
												STAWK1510TG			●
	5	STAWMN1500S20	●	92.8	107.8	157.8	155	2.8	20	②TIP08W	15.2	STAWN1520TH	●		
												STAWK1520TG			●
	8	STAWLN1500S20	●	132.8	150.8	200.8	198	2.8	20	②TIP08W	15.3	STAWN1530TH	●		
												STAWK1530TG			●
											15.4	STAWN1540TH	●		
												STAWK1540TG			●

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(1 insert in one case)

STAW

DC (mm)	Hole Depth (l/d)	Holder Order Number	Holder Stock	LBX	LH	OAL	LF	PL	DCON	Wrench	Insert DC (mm)	Insert Order Number	Stock VP15TF	Stock VP10H	Stock DP5010
15.5 – 16.4	1.5	STAWSS1600S20	●	36.8	52.8	102.8	100	2.8	20	TIP10W	15.5	* STAWN1550T	●		
												STAWK1550TG			●
											15.6	STAWN1560T	●		
												STAWK1560TG			●
											15.7	STAWN1570T	●		
												STAWK1570TG			●
	3	STAWSN1600S20	●	62.9	82.9	132.9	130	2.9	20	TIP10W	15.8	STAWN1580T	●		
												STAWK1580TG			●
											15.9	STAWN1590T	●		
												STAWK1590TG			●
	5	STAWMN1600S20	●	92.9	117.9	167.9	165	2.9	20	TIP10W	16.0	STAWN1600T	●		
												STAWK1600TG			●
											16.1	STAWN1610T	●		
												STAWK1610TG			●
											16.2	STAWN1620T	●		
												STAWK1620TG			●
	8	STAWLN1600S20	●	140.9	160.9	210.9	208	2.9	20	TIP10W	16.3	STAWN1630T	●		
												STAWK1630TG			●
											16.4	STAWN1640T	●		
												STAWK1640TG			●
16.5 – 17.4	1.5	STAWSS1700S20	●	39.0	56.0	106.0	103	3.0	20	TIP10W	16.5	* STAWN1650T	●		
												STAWK1650TG			●
											16.6	STAWN1660T	●		
												STAWK1660TG			●
											16.7	STAWN1670T	●		
												STAWK1670TG			●
	3	STAWSN1700S20	●	64.0	88.0	138.0	135	3.0	20	TIP10W	16.8	STAWN1680T	●		
												STAWK1680TG			●
											16.9	STAWN1690T	●		
												STAWK1690TG			●
	5	STAWMN1700S20	●	98.1	123.1	173.1	170	3.1	20	TIP10W	17.0	STAWN1700T	●		
												STAWK1700TG			●
											17.1	STAWN1710T	●		
												STAWK1710TG			●
											17.2	STAWN1720T	●		
												STAWK1720TG			●
	8	STAWLN1700S20	●	149.1	169.1	219.1	216	3.1	20	TIP10W	17.3	STAWN1730T	●		
												STAWK1730TG			●
											17.4	STAWN1740T	●		
												STAWK1740TG			●
17.5 – 18.4	1.5	STAWSS1800S20	●	40.2	58.2	108.2	105	3.2	20	TIP10W	17.5	* STAWN1750T	●		
												STAWK1750TG			●
											17.6	STAWN1760T	●		
												STAWK1760TG			●
											17.7	STAWN1770T	●		
												STAWK1770TG			●
	3	STAWSN1800S20	●	67.2	93.2	143.2	140	3.2	20	TIP10W	17.8	STAWN1780T	●		
												STAWK1780TG			●
											17.9	STAWN1790T	●		
												STAWK1790TG			●
	5	STAWMN1800S20	●	103.3	128.3	178.3	175	3.3	20	TIP10W	18.0	STAWN1800T	●		
												STAWK1800TG			●
											18.1	STAWN1810T	●		
												STAWK1810TG			●
											18.2	STAWN1820T	●		
												STAWK1820TG			●
	8	STAWLN1800S20	●	157.3	177.3	227.3	224	3.3	20	TIP10W	18.3	STAWN1830T	●		
												STAWK1830TG			●
											18.4	STAWN1840T	●		
												STAWK1840TG			●

STAW

HONE WIDTH

If an insert with honing other than standard is needed, please order using the symbols below.

(Insert Order Number)

S T A W N 1 0 0 0 T ◌

- S T A W: STAW Product Name
- N: N : General Use / K : For Cast Iron
- 1 0 0 0: Insert Diameter
- T: Honing Symbol
- ◌: Honing Type

(Honing Standard)

Honing Type	Hone Width (mm)
F	0
G	0.02—0.05
H	0.05—0.10
-	0.10—0.15
K	0.15—0.20
S	0.20—0.25
M	0.25—0.30

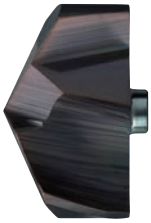
RECOMMENDED CUTTING CONDITIONS

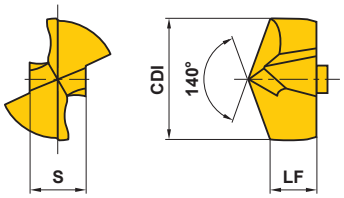
	Work Material	Drill Diameter	ϕ10.0—ϕ12.9		ϕ13.0—ϕ13.9		ϕ14.0—ϕ15.4		ϕ15.5—ϕ18.4	
		Conditions / Hardness	Cutting Speed (m/min)	Feed (mm/rev)	Cutting Speed (m/min)	Feed (mm/rev)	Cutting Speed (m/min)	Feed (mm/rev)	Cutting Speed (m/min)	Feed (mm/rev)
P	Mild Steel	≤180HB	80 (60—100)	0.20 (0.15—0.25)	90 (70—110)	0.25 (0.20—0.30)	100 (80—120)	0.30 (0.25—0.35)	100 (80—120)	0.35 (0.25—0.40)
P	Carbon Steel Alloy Steel	180—280HB	80 (60—100)	0.20 (0.15—0.25)	90 (70—110)	0.25 (0.20—0.30)	100 (80—120)	0.30 (0.25—0.35)	100 (80—120)	0.35 (0.25—0.40)
P	Carbon Steel Alloy Steel	280—350HB	70 (60—90)	0.20 (0.15—0.25)	80 (60—100)	0.25 (0.20—0.30)	90 (70—110)	0.25 (0.20—0.30)	90 (70—110)	0.30 (0.20—0.35)
M	Stainless Steel	≤200HB	40 (30—50)	0.13 (0.10—0.16)	50 (40—60)	0.15 (0.12—0.18)	60 (50—70)	0.17 (0.14—0.20)	60 (50—70)	0.17 (0.14—0.20)
K	Gray Cast Iron	Tensile Strength ≤350MPa	80 (60—100)	0.20 (0.15—0.25)	90 (70—110)	0.25 (0.20—0.30)	100 (80—120)	0.30 (0.25—0.35)	120 (80—140)	0.45 (0.35—0.55)
K	Ductile Cast Iron	Tensile Strength ≤450MPa	70 (60—90)	0.20 (0.15—0.25)	80 (60—100)	0.25 (0.20—0.30)	90 (70—110)	0.30 (0.25—0.35)	100 (80—120)	0.35 (0.25—0.40)

(Note 1) When using a drill for 1.5DC depth of hole, it is possible to increase the feed rate by approx. 20%.
(Note 2) When using the 8DC type holder, reduce the cutting speed by approx. 20%.
(Note 3) When using the 8DC type holder, it is recommended to drill a pilot guide hole.
(Note 4) For stainless steel, please use internal coolant. (Mist & MQL are not recommended).

STAW

INSERTS





Order Number	Stock VP15TF	Stock VP10H	Dimensions (mm) CDI	LF	S	Applicable Holder
STAWN1000TH	●	□	10.0	3.8	4.6	STAWSS1000S16 STAWSN1000S16 STAWMN1000S16 STAWLN1000S16
STAWN1010TH	●	□	10.1	3.8	4.6	
STAWN1020TH	●	□	10.2	3.8	4.6	
STAWN1030TH	●	□	10.3	3.8	4.6	
STAWN1040TH	●	□	10.4	3.8	4.6	
STAWN1050TH	●	□	10.5	4.0	4.8	STAWSS1050S16 STAWSN1050S16 STAWMN1050S16 STAWLN1050S16
STAWN1060TH	●	□	10.6	4.0	4.8	
STAWN1070TH	●	□	10.7	4.0	4.8	
STAWN1080TH	●	□	10.8	4.0	4.8	
STAWN1090TH	●	□	10.9	4.0	4.8	
STAWN1100TH	●	□	11.0	4.2	5.1	STAWSS1100S16 STAWSN1100S16 STAWMN1100S16 STAWLN1100S16
STAWN1110TH	●	□	11.1	4.2	5.1	
STAWN1120TH	●	□	11.2	4.2	5.1	
STAWN1130TH	●	□	11.3	4.2	5.1	
STAWN1140TH	●	□	11.4	4.2	5.1	
STAWN1150TH	●	□	11.5	4.4	5.3	STAWSS1150S16 STAWSN1150S16 STAWMN1150S16 STAWLN1150S16
STAWN1160TH	●	□	11.6	4.4	5.3	
STAWN1170TH	●	□	11.7	4.4	5.3	
STAWN1180TH	●	□	11.8	4.4	5.3	
STAWN1190TH	●	□	11.9	4.4	5.3	
STAWN1200TH	●	□	12.0	4.6	5.5	STAWSS1200S16 STAWSN1200S16 STAWMN1200S16 STAWLN1200S16
STAWN1210TH	●	□	12.1	4.6	5.5	
STAWN1220TH	●	□	12.2	4.6	5.5	
STAWN1230TH	●	□	12.3	4.6	5.5	
STAWN1240TH	●	□	12.4	4.6	5.5	
STAWN1250TH	●	□	12.5	4.8	5.8	STAWSS1250S16 STAWSN1250S16 STAWMN1250S16 STAWLN1250S16
STAWN1260TH	●	□	12.6	4.8	5.8	
STAWN1270TH	●	□	12.7	4.8	5.8	
STAWN1280TH	●	□	12.8	4.8	5.8	
STAWN1290TH	●	□	12.9	4.8	5.8	
STAWN1300TH	●	□	13.0	4.9	6.0	STAWSS1300S16 STAWSN1300S16 STAWMN1300S16 STAWLN1300S16
STAWN1310TH	●	□	13.1	4.9	6.0	
STAWN1320TH	●	□	13.2	4.9	6.0	
STAWN1330TH	●	□	13.3	4.9	6.0	
STAWN1340TH	●	□	13.4	4.9	6.0	
STAWN1350TH	●	□	13.5	5.1	6.2	STAWSS1350S16 STAWSN1350S16 STAWMN1350S16 STAWLN1350S16
STAWN1360TH	●	□	13.6	5.1	6.2	
STAWN1370TH	●	□	13.7	5.1	6.2	
STAWN1380TH	●	□	13.8	5.1	6.2	
STAWN1390TH	●	□	13.9	5.1	6.2	

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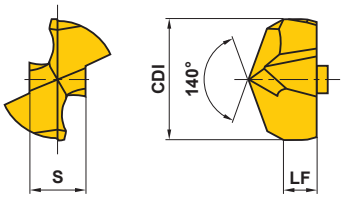
STAW

Order Number	Stock		Dimensions (mm)			Applicable Holder
	VP15TF	VP10H	CDI	LF	S	
STAWN1400TH	●		14.0	5.3	6.4	STAWSS1400S16 STAWSN1400S16 STAWMN1400S16 STAWLN1400S16
STAWN1410TH	●		14.1	5.3	6.4	
STAWN1420TH	●		14.2	5.3	6.4	
STAWN1430TH	●		14.3	5.3	6.4	
STAWN1440TH	●		14.4	5.3	6.4	
STAWN1450TH	●		14.5	5.5	6.7	STAWSS1450S16 STAWSN1450S16 STAWMN1450S16 STAWLN1450S16
STAWN1460TH	●		14.6	5.5	6.7	
STAWN1470TH	●		14.7	5.5	6.7	
STAWN1480TH	●		14.8	5.5	6.7	
STAWN1490TH	●		14.9	5.5	6.7	
STAWN1500TH	●		15.0	5.7	6.9	STAWSS1500S20 STAWSN1500S20 STAWMN1500S20 STAWLN1500S20
STAWN1510TH	●		15.1	5.7	6.9	
STAWN1520TH	●		15.2	5.7	6.9	
STAWN1530TH	●		15.3	5.7	6.9	
STAWN1540TH	●		15.4	5.7	6.9	
STAWN1550T	●		15.5	5.9	7.1	STAWSS1600S20 STAWSN1600S20 STAWMN1600S20 STAWLN1600S20
STAWN1560T	●		15.6	5.9	7.1	
STAWN1570T	●		15.7	5.9	7.1	
STAWN1580T	●		15.8	5.9	7.1	
STAWN1590T	●		15.9	5.9	7.1	
STAWN1600T	●		16.0	5.9	7.1	
STAWN1610T	●		16.1	5.9	7.1	
STAWN1620T	●		16.2	5.9	7.1	
STAWN1630T	●		16.3	5.9	7.1	
STAWN1640T	●		16.4	5.9	7.1	
STAWN1650T	●		16.5	6.3	7.6	STAWSS1700S20 STAWSN1700S20 STAWMN1700S20 STAWLN1700S20
STAWN1660T	●		16.6	6.3	7.6	
STAWN1670T	●		16.7	6.3	7.6	
STAWN1680T	●		16.8	6.3	7.6	
STAWN1690T	●		16.9	6.3	7.6	
STAWN1700T	●		17.0	6.3	7.6	
STAWN1710T	●		17.1	6.3	7.6	
STAWN1720T	●		17.2	6.3	7.6	
STAWN1730T	●		17.3	6.3	7.6	
STAWN1740T	●		17.4	6.3	7.6	
STAWN1750T	●		17.5	6.7	8.1	STAWSS1800S20 STAWSN1800S20 STAWMN1800S20 STAWLN1800S20
STAWN1760T	●		17.6	6.7	8.1	
STAWN1770T	●		17.7	6.7	8.1	
STAWN1780T	●		17.8	6.7	8.1	
STAWN1790T	●		17.9	6.7	8.1	
STAWN1800T	●		18.0	6.7	8.1	
STAWN1810T	●		18.1	6.7	8.1	
STAWN1820T	●		18.2	6.7	8.1	
STAWN1830T	●		18.3	6.7	8.1	
STAWN1840T	●		18.4	6.7	8.1	

STAW

INSERTS

(Cast Iron)



Order Number	Stock DP5010	Stock	Dimensions (mm) CDI	LF	S	Applicable Holder
STAWK1000TG	●		10.0	3.3	4.6	STAWSS1000S16 STAWSN1000S16 STAWMN1000S16 STAWLN1000S16
STAWK1010TG	●		10.1	3.3	4.6	
STAWK1020TG	●		10.2	3.3	4.6	
STAWK1030TG	●		10.3	3.3	4.6	
STAWK1040TG	●		10.4	3.3	4.6	
STAWK1050TG	●		10.5	3.5	4.8	STAWSS1050S16 STAWSN1050S16 STAWMN1050S16 STAWLN1050S16
STAWK1060TG	●		10.6	3.5	4.8	
STAWK1070TG	●		10.7	3.5	4.8	
STAWK1080TG	●		10.8	3.5	4.8	
STAWK1090TG	●		10.9	3.5	4.8	
STAWK1100TG	●		11.0	3.7	5.1	STAWSS1100S16 STAWSN1100S16 STAWMN1100S16 STAWLN1100S16
STAWK1110TG	●		11.1	3.7	5.1	
STAWK1120TG	●		11.2	3.7	5.1	
STAWK1130TG	●		11.3	3.7	5.1	
STAWK1140TG	●		11.4	3.7	5.1	
STAWK1150TG	●		11.5	3.9	5.3	STAWSS1150S16 STAWSN1150S16 STAWMN1150S16 STAWLN1150S16
STAWK1160TG	●		11.6	3.9	5.3	
STAWK1170TG	●		11.7	3.9	5.3	
STAWK1180TG	●		11.8	3.9	5.3	
STAWK1190TG	●		11.9	3.9	5.3	
STAWK1200TG	●		12.0	4.1	5.5	STAWSS1200S16 STAWSN1200S16 STAWMN1200S16 STAWLN1200S16
STAWK1210TG	●		12.1	4.1	5.5	
STAWK1220TG	●		12.2	4.1	5.5	
STAWK1230TG	●		12.3	4.1	5.5	
STAWK1240TG	●		12.4	4.1	5.5	
STAWK1250TG	●		12.5	4.2	5.8	STAWSS1250S16 STAWSN1250S16 STAWMN1250S16 STAWLN1250S16
STAWK1260TG	●		12.6	4.2	5.8	
STAWK1270TG	●		12.7	4.2	5.8	
STAWK1280TG	●		12.8	4.2	5.8	
STAWK1290TG	●		12.9	4.2	5.8	
STAWK1300TG	●		13.0	4.4	6.0	STAWSS1300S16 STAWSN1300S16 STAWMN1300S16 STAWLN1300S16
STAWK1310TG	●		13.1	4.4	6.0	
STAWK1320TG	●		13.2	4.4	6.0	
STAWK1330TG	●		13.3	4.4	6.0	
STAWK1340TG	●		13.4	4.4	6.0	
STAWK1350TG	●		13.5	4.6	6.2	STAWSS1350S16 STAWSN1350S16 STAWMN1350S16 STAWLN1350S16
STAWK1360TG	●		13.6	4.6	6.2	
STAWK1370TG	●		13.7	4.6	6.2	
STAWK1380TG	●		13.8	4.6	6.2	
STAWK1390TG	●		13.9	4.6	6.2	

● : Inventory maintained in Japan.
(1 insert in one case)

STAW

Order Number	Stock		Dimensions (mm)			Applicable Holder
	DP5010		CDI	LF	S	
STAWK1400TG	●		14.0	4.8	6.4	STAWSS1400S16 STAWSN1400S16 STAWMN1400S16 STAWLN1400S16
STAWK1410TG	●		14.1	4.8	6.4	
STAWK1420TG	●		14.2	4.8	6.4	
STAWK1430TG	●		14.3	4.8	6.4	
STAWK1440TG	●		14.4	4.8	6.4	
STAWK1450TG	●		14.5	5.0	6.7	STAWSS1450S16 STAWSN1450S16 STAWMN1450S16 STAWLN1450S16
STAWK1460TG	●		14.6	5.0	6.7	
STAWK1470TG	●		14.7	5.0	6.7	
STAWK1480TG	●		14.8	5.0	6.7	
STAWK1490TG	●		14.9	5.0	6.7	
STAWK1500TG	●		15.0	5.2	6.9	STAWSS1500S20 STAWSN1500S20 STAWMN1500S20 STAWLN1500S20
STAWK1510TG	●		15.1	5.2	6.9	
STAWK1520TG	●		15.2	5.2	6.9	
STAWK1530TG	●		15.3	5.2	6.9	
STAWK1540TG	●		15.4	5.2	6.9	
STAWK1550TG	●		15.5	5.3	7.1	STAWSS1600S20 STAWSN1600S20 STAWMN1600S20 STAWLN1600S20
STAWK1560TG	●		15.6	5.3	7.1	
STAWK1570TG	●		15.7	5.3	7.1	
STAWK1580TG	●		15.8	5.3	7.1	
STAWK1590TG	●		15.9	5.3	7.1	
STAWK1600TG	●		16.0	5.3	7.1	
STAWK1610TG	●		16.1	5.3	7.1	
STAWK1620TG	●		16.2	5.3	7.1	
STAWK1630TG	●		16.3	5.3	7.1	
STAWK1640TG	●		16.4	5.3	7.1	
STAWK1650TG	●		16.5	5.7	7.6	STAWSS1700S20 STAWSN1700S20 STAWMN1700S20 STAWLN1700S20
STAWK1660TG	●		16.6	5.7	7.6	
STAWK1670TG	●		16.7	5.7	7.6	
STAWK1680TG	●		16.8	5.7	7.6	
STAWK1690TG	●		16.9	5.7	7.6	
STAWK1700TG	●		17.0	5.7	7.6	
STAWK1710TG	●		17.1	5.7	7.6	
STAWK1720TG	●		17.2	5.7	7.6	
STAWK1730TG	●		17.3	5.7	7.6	
STAWK1740TG	●		17.4	5.7	7.6	
STAWK1750TG	●		17.5	6.0	8.1	STAWSS1800S20 STAWSN1800S20 STAWMN1800S20 STAWLN1800S20
STAWK1760TG	●		17.6	6.0	8.1	
STAWK1770TG	●		17.7	6.0	8.1	
STAWK1780TG	●		17.8	6.0	8.1	
STAWK1790TG	●		17.9	6.0	8.1	
STAWK1800TG	●		18.0	6.0	8.1	
STAWK1810TG	●		18.1	6.0	8.1	
STAWK1820TG	●		18.2	6.0	8.1	
STAWK1830TG	●		18.3	6.0	8.1	
STAWK1840TG	●		18.4	6.0	8.1	

STAW

NOTES ON USE

INSERT INSTALLATION

1. Before inserting the insert into the holder, ensure that there are no foreign objects or dirt in the holder slot or slit. If there are any foreign objects or dirt, use compressed air to remove them.

2. Use the provided wrench to loosen the inner screw to open the tip of the holder, then put the insert into the holder slot as shown in figure 1.
   *Ensure that the wrench is firmly in contact with the base of the inner screw head when tightening.

3. After the insert has been set in the holder slot, tighten the inner screw while holding the insert lightly as shown in figure 2 to securely clamp and locate the insert.
   *Ensure that the wrench is firmly in contact with the base of the inner screw head when tightening.

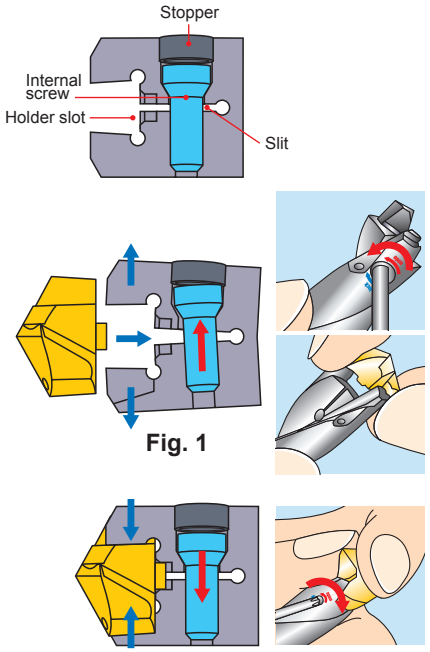


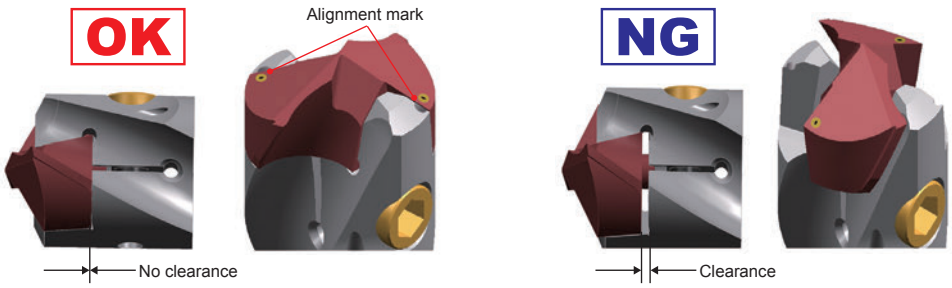
Fig. 1

Fig. 2

Tighten the clamp screw according to the torque below.

Drill Diameter (mm)	Clamp Torque N · m
10 －12.9	1
13 －15.4	2
15.5－18.4	2.5

4. Check there is no gap between the bottom of the insert and holder slot.



(Note) Poor or incorrect clamping of inserts can cause poor drilling performance and/or drill breakage.
Therefore ensure that the alignment marks on both the body and insert are aligned when setting.
When machining, use safety guards and goggles.

STAW

SPARE PARTS

Applicable Holder	Pack Order Number (Internal screw & stopper)	Internal screw	Stopper
STAWSS/SN/MN/LN1000S16	WS203107TPS-35LH	WS203107TPS	WS35LH
STAWSS/SN/MN/LN1050S16	WS203107TPS-35LH	WS203107TPS	WS35LH
STAWSS/SN/MN/LN1100S16	WS203108TPS-35LH	WS203108TPS	WS35LH
STAWSS/SN/MN/LN1150S16	WS203108TPS-35LH	WS203108TPS	WS35LH
STAWSS/SN/MN/LN1200S16	WS203108TPS-35LH	WS203108TPS	WS35LH
STAWSS/SN/MN/LN1250S16	WS203108TPS-35LH	WS203108TPS	WS35LH
STAWSS/SN/MN/LN1300S16	WS253909TPS-45LH	WS253909TPS	WS45LH
STAWSS/SN/MN/LN1350S16	WS253909TPS-45LH	WS253909TPS	WS45LH
STAWSS/SN/MN/LN1400S16	WS253909TPS-45LH	WS253909TPS	WS45LH
STAWSS/SN/MN/LN1450S16	WS253909TPS-45LH	WS253909TPS	WS45LH
STAWSS/SN/MN/LN1500S20	WS253909TPS-45LH	WS253909TPS	WS45LH
STAWSS/SN/MN/LN1600S20	WS304912TPS-55LH	WS304912TPS	WS55LH
STAWSS/SN/MN/LN1700S20	WS304912TPS-55LH	WS304912TPS	WS55LH
STAWSS/SN/MN/LN1800S20	WS304912TPS-55LH	WS304912TPS	WS55LH

(Note) The parts are packaged internal screw, stopper and operation manual. Please replace the parts in accordance with the operation manual.

TAW

WSTAR Insert Type Drill

Indexable Drill

Product Information

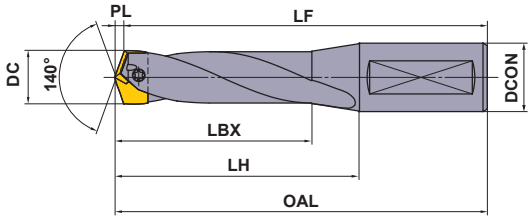
UWC 140° SIG X Thinning

Work Material

P M K

TECHNICAL DATA >> 1997 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 1623 DRILLS SELECTION CHART >> 1624

(General Use)



HOLDERS

DC (mm)	Hole Depth (l/d)	Holder: Order Number	Holder: Stock	Dimensions (mm): LBX	LH	OAL	LF	PL	DCON	Clamp Screw	Wrench	Plate	Anti-seize Lubricant	Insert: DC (mm)	Insert: Order Number	Stock: VP15TF	Stock: DP5010	Stock: VP10H
18.5 – 19.4	3	TAWSN1900S25	●	71.4	102.4	158.4	155	3.4	25	WS304517T	TKY10T	WPT4405	MK1KS	18.5	TAWNH1850T	●		□
															TAWKH1850TG		●	
														18.6	TAWNH1860T	●		□
															TAWKH1860TG		●	
														18.7	TAWNH1870T	●		□
															TAWKH1870TG		●	
														18.8	TAWNH1880T	●		□
															TAWKH1880TG		●	
	5	TAWMN1900S25	●	110.4	137.4	193.4	190	3.4	25	WS304517T	TKY10T	WPT4405	MK1KS	18.9	TAWNH1890T	●		□
															TAWKH1890TG		●	
														19.0	TAWNH1900T	●		□
															TAWKH1900TG		●	
														19.1	TAWNH1910T	●		□
															TAWKH1910TG		●	
	8	TAWLN1900S25	●	165.5	188.5	244.5	241	3.5	25	WS304517T	TKY10T	WPT4405	MK1KS	19.2	TAWNH1920T	●		□
															TAWKH1920TG		●	
														19.3	TAWNH1930T	●		□
															TAWKH1930TG		●	
														19.4	TAWNH1940T	●		□
															TAWKH1940TG		●	
19.5 – 20.4	3	TAWSN2000S25	●	75.5	102.5	158.5	155	3.5	25	WS304518T	TKY10T	WPT4405	MK1KS	19.5	TAWNH1950T	●		□
															TAWKH1950TG		●	
														19.6	TAWNH1960T	●		□
															TAWKH1960TG		●	
														19.7	TAWNH1970T	●		□
															TAWKH1970TG		●	
														19.8	TAWNH1980T	●		□
															TAWKH1980TG		●	
	5	TAWMN2000S25	●	116.6	142.6	198.6	195	3.6	25	WS304518T	TKY10T	WPT4405	MK1KS	19.9	TAWNH1990T	●		□
															TAWKH1990TG		●	
														20.0	TAWNH2000T	●		□
															TAWKH2000TG		●	
														20.1	TAWNH2010T	□		□
															TAWKH2010TG		□	
	8	TAWLN2000S25	●	173.7	196.7	252.7	249	3.7	25	WS304518T	TKY10T	WPT4405	MK1KS	20.2	TAWNH2020T	□		□
															TAWKH2020TG		□	
														20.3	TAWNH2030T	□		□
															TAWKH2030TG		□	
														20.4	TAWNH2040T	□		□
															TAWKH2040TG		□	

(Note 1) The dimensions in brackets represent the sizes when TAWNH type inserts are used.
(Note 2) Please contact us for any geometry that is not in this catalogue (e.g. different diameter and length).

● : Inventory maintained in Japan.
□ : Non stock, produced to order only.

TAW

DC (mm)	Hole Depth (l/d)	Holder: Order Number	Holder: Stock	Dimensions (mm): LBX	LH	OAL	LF	PL	DCON	Clamp Screw	Wrench	Plate	Anti-seize Lubricant	Insert: DC (mm)	Insert: Order Number	Stock: VP15TF	DP5010	VP10H
20.5 – 21.4	3	TAWSN2100S25	●	78.7	102.7	158.7	155.0	3.7	25	WS304518T	TKY10T	WPT4405	MK1KS	20.5	TAWNH2050T	●		□
															TAWKH2050TG		●	
														20.6	TAWNH2060T	□		□
															TAWKH2060TG		□	
														20.7	TAWNH2070T	□		□
															TAWKH2070TG		□	
														20.8	TAWNH2080T	□		□
															TAWKH2080TG		□	
	5	TAWMN2100S25	●	121.8	142.8	198.8	195.0	3.8	25	WS304518T	TKY10T	WPT4405	MK1KS	20.9	TAWNH2090T	□		□
															TAWKH2090TG		□	
														21.0	TAWNH2100T	●		□
															TAWKH2100TG		●	
														21.1	TAWNH2110T	□		□
															TAWKH2110TG		□	
	8	TAWLN2100S25	●	181.9	205.9	261.9	258.0	3.9	25	WS304518T	TKY10T	WPT4405	MK1KS	21.2	TAWNH2120T	□		□
															TAWKH2120TG		□	
														21.3	TAWNH2130T	□		□
															TAWKH2130TG		□	
														21.4	TAWNH2140T	□		□
															TAWKH2140TG		□	
21.5 – 22.4	3	TAWSN2200S25	●	83.2	108.2	164.2	160.3	3.9	25	WS355520T	TKY15T	WPT4405	MK1KS	21.5	TAWNH2150T	●		□
															TAWKH2150TG		●	
														21.6	TAWNH2160T	□		□
															TAWKH2160TG		□	
														21.7	TAWNH2170T	□		□
															TAWKH2170TG		□	
														21.8	TAWNH2180T	□		□
															TAWKH2180TG		□	
	5	TAWMN2200S25	●	128.3	148.3	204.3	200.3	4.0	25	WS355520T	TKY15T	WPT4405	MK1KS	21.9	TAWNH2190T	□		□
															TAWKH2190TG		□	
														22.0	TAWNH2200T	●		□
															TAWKH2200TG		●	
														22.1	TAWNH2210T	□		□
															TAWKH2210TG		□	
	8	TAWLN2200S25	●	190.0	214.0	270.0	266.0	4.0	25	WS355520T	TKY15T	WPT4405	MK1KS	22.2	TAWNH2220T	□		□
															TAWKH2220TG		□	
														22.3	TAWNH2230T	□		□
															TAWKH2230TG		□	
														22.4	TAWNH2240T	□		□
															TAWKH2240TG		□	
22.5 – 23.4	3	TAWSN2300S25	●	86.4	108.4	164.4	160.3	4.1	25	WS355521T	TKY15T	WPT4405	MK1KS	22.5	TAWNH2250T	●		□
															TAWKH2250TG		●	
														22.6	TAWNH2260T	□		□
															TAWKH2260TG		□	
														22.7	TAWNH2270T	□		□
															TAWKH2270TG		□	
														22.8	TAWNH2280T	□		□
															TAWKH2280TG		□	
	5	TAWMN2300S25	●	133.4	158.4	214.4	210.3	4.1	25	WS355521T	TKY15T	WPT4405	MK1KS	22.9	TAWNH2290T	□		□
															TAWKH2290TG		□	
														23.0	TAWNH2300T	●		□
															TAWKH2300TG		●	
														23.1	TAWNH2310T	□		□
															TAWKH2310TG		□	
	8	TAWLN2300S25	●	198.2	227.2	283.2	279.0	4.2	25	WS355521T	TKY15T	WPT4405	MK1KS	23.2	TAWNH2320T	□		□
															TAWKH2320TG		□	
														23.3	TAWNH2330T	□		□
															TAWKH2330TG		□	
														23.4	TAWNH2340T	□		□
															TAWKH2340TG		□	

(Note 1) The dimensions in brackets represent the sizes when TAWNH type inserts are used.
(Note 2) Please contact us for any geometry that is not in this catalogue (e.g. different diameter and length).

● : Inventory maintained in Japan. □ : Non stock, produced to order only.

TAW

DC (mm)	Hole Depth (l/d)	Holder Order Number	Holder Stock	LBX	LH	OAL	LF	PL	DCON	Clamp Screw	Wrench	Plate	Anti-seize Lubricant	Insert DC (mm)	Insert Order Number	Stock VP15TF	Stock DP5010	Stock VP10H
23.5 – 24.4	3	TAWSN2400S32	●	90.6	114.6	174.6	170.3	4.3	32	WS355521T	TKY15T	WPT4405	MK1KS	23.5	TAWNH2350T	●		□
															TAWKH2350TG		●	
														23.6	TAWNH2360T	□		□
															TAWKH2360TG		□	
														23.7	TAWNH2370T	□		□
															TAWKH2370TG		□	
														23.8	TAWNH2380T	□		□
															TAWKH2380TG		□	
	5	TAWMN2400S32	●	139.6	164.6	224.6	220.3	4.3	32	WS355521T	TKY15T	WPT4405	MK1KS	23.9	TAWNH2390T	□		□
															TAWKH2390TG		□	
														24.0	TAWNH2400T	●		□
															TAWKH2400TG		●	
														24.1	TAWNH2410T	□		□
															TAWKH2410TG		□	
	8	TAWLN2400S32	●	206.4	236.4	296.4	292.0	4.4	32	WS355521T	TKY15T	WPT4405	MK1KS	24.2	TAWNH2420T	□		□
															TAWKH2420TG		□	
														24.3	TAWNH2430T	□		□
															TAWKH2430TG		□	
														24.4	TAWNH2440T	□		□
															TAWKH2440TG		□	
24.5 – 25.4	3	TAWSN2500S32	●	93.1	115.1	175.1	170.6	4.5	32	WS406023T	TKY25T	WPT4405	MK1KS	24.5	TAWNH2450T	●		□
															TAWKH2450TG		●	
														24.6	TAWNH2460T	□		□
															TAWKH2460TG		□	
														24.7	TAWNH2470T	□		□
															TAWKH2470TG		□	
														24.8	TAWNH2480T	□		□
															TAWKH2480TG		□	
	5	TAWMN2500S32	●	145.1	170.1	230.1	225.6	4.5	32	WS406023T	TKY25T	WPT4405	MK1KS	24.9	TAWNH2490T	□		□
															TAWKH2490TG		□	
														25.0	TAWNH2500T	●		□
															TAWKH2500TG		●	
														25.1	TAWNH2510T	□		□
															TAWKH2510TG		□	
	8	TAWLN2500S32	●	214.6	244.6	304.6	300.0	4.6	32	WS406023T	TKY25T	WPT4405	MK1KS	25.2	TAWNH2520T	□		□
															TAWKH2520TG		□	
														25.3	TAWNH2530T	□		□
															TAWKH2530TG		□	
														25.4	TAWNH2540T	□		□
															TAWKH2540TG		□	
25.5 – 26.4	3	TAWSN2600S32	●	97.2	120.2	180.2	175.6	4.6	32	WS406024T	TKY25T	WPT4405	MK1KS	25.5	TAWNH2550T	●		□
															TAWKH2550TG		●	
														25.6	TAWNH2560T	□		□
															TAWKH2560TG		□	
														25.7	TAWNH2570T	□		□
															TAWKH2570TG		□	
														25.8	TAWNH2580T	□		□
															TAWKH2580TG		□	
	5	TAWMN2600S32	●	151.3	175.3	235.3	230.6	4.7	32	WS406024T	TKY25T	WPT4405	MK1KS	25.9	TAWNH2590T	□		□
															TAWKH2590TG		□	
														26.0	TAWNH2600T	●		□
															TAWKH2600TG		●	
														26.1	TAWNH2610T	□		□
															TAWKH2610TG		□	
	8	TAWLN2600S32	●	222.8	252.8	312.8	308.0	4.8	32	WS406024T	TKY25T	WPT4405	MK1KS	26.2	TAWNH2620T	□		□
															TAWKH2620TG		□	
														26.3	TAWNH2630T	□		□
															TAWKH2630TG		□	
														26.4	TAWNH2640T	□		□
															TAWKH2640TG		□	

TAW

DC (mm)	Hole Depth (l/d)	Holder: Order Number	Holder: Stock	Dimensions (mm): LBX	LH	OAL	LF	PL	DCON	Clamp Screw	Wrench	Plate	Anti-seize Lubricant
26.5 – 27.4	3	TAWSN2700S32	●	99.4	120.4	180.4	175.6	4.8	32	WS406024T	TKY25T	WPT4405	MK1KS
26.5 – 27.4	5	TAWMN2700S32	●	156.5	180.5	240.5	235.6	4.9	32	WS406024T	TKY25T	WPT4405	MK1KS
26.5 – 27.4	8	TAWLN2700S32	●	230.9	260.9	320.9	316.0	4.9	32	WS406024T	TKY25T	WPT4405	MK1KS
27.5 – 28.4	3	TAWSN2800S32	●	102.2	125.2	185.2	180.2	5.0	32	WS508026T	TKY27T	WPT4405	MK1KS
27.5 – 28.4	5	TAWMN2800S32	●	162.3	185.3	245.3	240.2	5.1	32	WS508026T	TKY27T	WPT4405	MK1KS
27.5 – 28.4	8	TAWLN2800S32	●	239.1	269.1	329.1	324.0	5.1	32	WS508026T	TKY27T	WPT4405	MK1KS
28.5 – 29.4	3	TAWSN2900S32	●	105.4	130.4	190.4	185.2	5.2	32	WS508027T	TKY27T	WPT4405	MK1KS
28.5 – 29.4	5	TAWMN2900S32	●	167.4	190.4	250.4	245.2	5.2	32	WS508027T	TKY27T	WPT4405	MK1KS
28.5 – 29.4	8	TAWLN2900S32	●	247.3	277.3	337.3	332.0	5.3	32	WS508027T	TKY27T	WPT4405	MK1KS

Insert: DC (mm)	Order Number	Stock: VP15TF	DP5010	VP10H
26.5	TAWNH2650T	●		□
	TAWKH2650TG		●	
26.6	TAWNH2660T	□		□
	TAWKH2660TG		□	
26.7	TAWNH2670T	□		□
	TAWKH2670TG		□	
26.8	TAWNH2680T	□		□
	TAWKH2680TG		□	
26.9	TAWNH2690T	□		□
	TAWKH2690TG		□	
27.0	TAWNH2700T	●		□
	TAWKH2700TG		●	
27.1	TAWNH2710T	□		□
	TAWKH2710TG		□	
27.2	TAWNH2720T	□		□
	TAWKH2720TG		□	
27.3	TAWNH2730T	□		□
	TAWKH2730TG		□	
27.4	TAWNH2740T	□		□
	TAWKH2740TG		□	
27.5	TAWNH2750T	●		□
	TAWKH2750TG		●	
27.6	TAWNH2760T	□		□
	TAWKH2760TG		□	
27.7	TAWNH2770T	□		□
	TAWKH2770TG		□	
27.8	TAWNH2780T	□		□
	TAWKH2780TG		□	
27.9	TAWNH2790T	□		□
	TAWKH2790TG		□	
28.0	TAWNH2800T	●		□
	TAWKH2800TG		●	
28.1	TAWNH2810T	□		□
	TAWKH2810TG		□	
28.2	TAWNH2820T	□		□
	TAWKH2820TG		□	
28.3	TAWNH2830T	□		□
	TAWKH2830TG		□	
28.4	TAWNH2840T	□		□
	TAWKH2840TG		□	
28.5	TAWNH2850T	●		□
	TAWKH2850TG		●	
28.6	TAWNH2860T	□		□
	TAWKH2860TG		□	
28.7	TAWNH2870T	□		□
	TAWKH2870TG		□	
28.8	TAWNH2880T	□		□
	TAWKH2880TG		□	
28.9	TAWNH2890T	□		□
	TAWKH2890TG		□	
29.0	TAWNH2900T	●		□
	TAWKH2900TG		●	
29.1	TAWNH2910T	□		□
	TAWKH2910TG		□	
29.2	TAWNH2920T	□		□
	TAWKH2920TG		□	
29.3	TAWNH2930T	□		□
	TAWKH2930TG		□	
29.4	TAWNH2940T	□		□
	TAWKH2940TG		□	

(Note 1) The dimensions in brackets represent the sizes when TAWNH type inserts are used.
(Note 2) Please contact us for any geometry that is not in this catalogue (e.g. different diameter and length).

● : Inventory maintained in Japan. **□ : Non stock, produced to order only.**

TAW

DC (mm)	Hole Depth (l/d)	Holder Order Number	Holder Stock	LBX	LH	OAL	LF	PL	DCON	Clamp Screw	Wrench	Plate	Anti-seize Lubricant	Insert DC (mm)	Insert Order Number	Stock VP15TF	Stock DP5010	Stock VP10H
29.5 – 30.4	3	TAWSN3000S32	●	109.6	130.6	190.6	185.2	5.4	32	WS508027T	TKY27T	WPT4405	MK1KS	29.5	TAWNH2950T	●		□
															TAWKH2950TG		●	
														29.6	TAWNH2960T	□		□
															TAWKH2960TG		□	
														29.7	TAWNH2970T	□		□
															TAWKH2970TG		□	
														29.8	TAWNH2980T	□		□
															TAWKH2980TG		□	
	5	TAWMN3000S32	●	172.6	200.6	260.6	255.2	5.4	32	WS508027T	TKY27T	WPT4405	MK1KS	29.9	TAWNH2990T	□		□
															TAWKH2990TG		□	
														30.0	TAWNH3000T	●		□
															TAWKH3000TG		●	
														30.1	TAWNH3010T	□		□
															TAWKH3010TG		□	
	8	TAWLN3000S32	●	255.5	290.5	350.5	345.0	5.5	32	WS508027T	TKY27T	WPT4405	MK1KS	30.2	TAWNH3020T	□		□
															TAWKH3020TG		□	
														30.3	TAWNH3030T	□		□
															TAWKH3030TG		□	
														30.4	TAWNH3040T	□		□
															TAWKH3040TG		□	

TAW

RECOMMENDED CUTTING CONDITIONS

Work Material		Drill Diameter / Conditions / Hardness	ϕ14.0−ϕ15.4 Cutting Speed (m/min)	ϕ14.0−ϕ15.4 Feed (mm/rev)	ϕ15.5−ϕ18.4 Cutting Speed (m/min)	ϕ15.5−ϕ18.4 Feed (mm/rev)	ϕ18.5−ϕ21.4 Cutting Speed (m/min)	ϕ18.5−ϕ21.4 Feed (mm/rev)
P	Mild Steel	≤180HB	70(60−90)	0.20 (0.15−0.25)	80 (60−100)	0.25 (0.20−0.30)	90 (70−110)	0.25 (0.20−0.30)
P	Carbon Steel Alloy Steel	180−280HB	70 (60−90)	0.20 (0.15−0.25)	80 (60−100)	0.25 (0.20−0.30)	80 (60−100)	0.25 (0.20−0.30)
P	Carbon Steel Alloy Steel	280−350HB	60 (50−80)	0.15 (0.12−0.18)	70 (50−90)	0.20 (0.15−0.25)	70 (50−90)	0.20 (0.15−0.25)
M	Stainless Steel	≤200HB	50 (40−60)	0.15 (0.12−0.18)	50 (40−60)	0.15 (0.12−0.18)	60 (50−70)	0.20 (0.15−0.22)
K	Gray Cast Iron	Tensile Strength ≤350MPa	70 (50−90)	0.20 (0.15−0.25)	100 (60−120)	0.25 (0.20−0.30)	120 (60−140)	0.25 (0.20−0.30)
K	Ductile Cast Iron	Tensile Strength ≤450MPa	70 (50−90)	0.20 (0.15−0.25)	80 (60−90)	0.25 (0.20−0.30)	80 (60−90)	0.25 (0.20−0.30)

Work Material		Drill Diameter / Conditions / Hardness	ϕ21.5−ϕ24.4 Cutting Speed (m/min)	ϕ21.5−ϕ24.4 Feed (mm/rev)	ϕ24.5−ϕ27.4 Cutting Speed (m/min)	ϕ24.5−ϕ27.4 Feed (mm/rev)	ϕ27.5−ϕ30.4 Cutting Speed (m/min)	ϕ27.5−ϕ30.4 Feed (mm/rev)
P	Mild Steel	≤180HB	100 (80−120)	0.30 (0.25−0.35)	110 (80−120)	0.30 (0.25−0.35)	110 (80−120)	0.30 (0.25−0.35)
P	Carbon Steel Alloy Steel	180−280HB	90 (70−110)	0.30 (0.25−0.35)	100 (80−120)	0.30 (0.25−0.35)	100 (80−120)	0.30 (0.25−0.35)
P	Carbon Steel Alloy Steel	280−350HB	80 (60−100)	0.25 (0.20−0.30)	90 (70−110)	0.25 (0.20−0.30)	90 (70−110)	0.25 (0.20−0.30)
M	Stainless Steel	≤200HB	60 (50−70)	0.20 (0.15−0.22)	70 (60−80)	0.25 (0.20−0.28)	70 (60−80)	0.25 (0.20−0.28)
K	Gray Cast Iron	Tensile Strength ≤350MPa	130 (80−150)	0.35 (0.25−0.40)	140 (90−160)	0.35 (0.25−0.40)	140 (90−160)	0.40 (0.30−0.45)
K	Ductile Cast Iron	Tensile Strength ≤450MPa	90 (60−100)	0.30 (0.25−0.35)	100 (80−110)	0.30 (0.25−0.35)	100 (80−110)	0.30 (0.25−0.35)

(Note 1) When using the 8DC type holder, reduce the cutting speed by approx. 20%.
(Note 2) When using the 8DC type holder, it is recommended to drill a pilot guide hole.
(Note 3) H type honing is recommended when machining mild steel and stainless steel.

HONE WIDTH

If an insert with honing other than standard is needed, please order using the symbols below.

(Insert Order Number)

T A W N H 1 4 0 0 T ◌

- TAW — TAW Product Name
- N — N : General Use; K : For Cast Iron; B : For Bridges
- H — H : H Type
- 1400 — Insert Diameter
- T — Honing Symbol
- ◌ — Honing Type

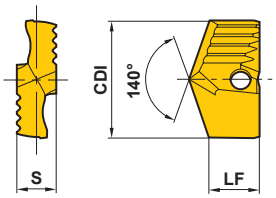
(Honing Standard)

Honing Type	Hone Width (mm)
F	0
G	0.02−0.05
H	0.05−0.10
-(Standard)	0.10−0.15
K	0.15−0.20
S	0.20−0.25
M	0.25−0.30

TAW

INSERTS

H Type



Order Number	Stock VP15TF	Stock VP10H	Dimensions (mm) CDI	LF	S	Applicable Holder
TAWNH1400T	▲		14.0	7.6	5.0	TAWSNH 1400S16 TAWMNH 1400S16 TAWLNH 1400S16
TAWNH1410T	▲		14.1	7.6	5.0	
TAWNH1420T	▲		14.2	7.6	5.0	
TAWNH1430T	▲		14.3	7.6	5.0	
TAWNH1440T	▲		14.4	7.6	5.0	
TAWNH1450T	▲		14.5	7.5	5.0	TAWSNH 1500S20 TAWMNH 1500S20 TAWLNH 1500S20
TAWNH1460T	▲		14.6	7.5	5.0	
TAWNH1470T	▲		14.7	7.5	5.0	
TAWNH1480T	▲		14.8	7.5	5.0	
TAWNH1490T	▲		14.9	7.5	5.0	
TAWNH1500T	▲		15.0	7.4	5.0	
TAWNH1510T	▲		15.1	7.4	5.0	
TAWNH1520T	▲		15.2	7.4	5.0	
TAWNH1530T	▲		15.3	7.4	5.0	
TAWNH1540T	▲		15.4	7.4	5.0	
TAWNH1550T	▲		15.5	7.9	6.0	TAWSN 1600S20 TAWMN 1600S20 TAWLN 1600S20
TAWNH1560T	▲		15.6	7.9	6.0	
TAWNH1570T	▲		15.7	7.9	6.0	
TAWNH1580T	▲		15.8	7.9	6.0	
TAWNH1590T	▲		15.9	7.9	6.0	
TAWNH1600T	▲		16.0	7.8	6.0	
TAWNH1610T	▲		16.1	7.8	6.0	
TAWNH1620T	▲		16.2	7.8	6.0	
TAWNH1630T	▲		16.3	7.8	6.0	
TAWNH1640T	▲		16.4	7.8	6.0	
TAWNH1650T	▲		16.5	7.7	6.0	TAWSN 1700S20 TAWMN 1700S20 TAWLN 1700S20
TAWNH1660T	▲		16.6	7.7	6.0	
TAWNH1670T	▲		16.7	7.7	6.0	
TAWNH1680T	▲		16.8	7.7	6.0	
TAWNH1690T	▲		16.9	7.7	6.0	
TAWNH1700T	▲		17.0	7.6	6.0	
TAWNH1710T	▲		17.1	7.6	6.0	
TAWNH1720T	▲		17.2	7.6	6.0	
TAWNH1730T	▲		17.3	7.6	6.0	
TAWNH1740T	▲		17.4	7.6	6.0	
TAWNH1750T	▲		17.5	7.5	6.0	TAWSN 1800S20 TAWMN 1800S20 TAWLN 1800S20
TAWNH1760T	▲		17.6	7.5	6.0	
TAWNH1770T	▲		17.7	7.5	6.0	
TAWNH1780T	▲		17.8	7.5	6.0	
TAWNH1790T	▲		17.9	7.5	6.0	
TAWNH1800T	▲		18.0	7.4	6.0	
TAWNH1810T	▲		18.1	7.4	6.0	
TAWNH1820T	▲		18.2	7.4	6.0	
TAWNH1830T	▲		18.3	7.4	6.0	
TAWNH1840T	▲		18.4	7.4	6.0	

Order Number	Stock VP15TF	Stock VP10H	Dimensions (mm) CDI	LF	S	Applicable Holder
TAWNH1850T	●	□	18.5	9.3	7.0	TAWSN 1900S25 TAWMN 1900S25 TAWLN 1900S25
TAWNH1860T	●	□	18.6	9.3	7.0	
TAWNH1870T	●	□	18.7	9.3	7.0	
TAWNH1880T	●	□	18.8	9.3	7.0	
TAWNH1890T	●	□	18.9	9.3	7.0	
TAWNH1900T	●	□	19.0	9.2	7.0	
TAWNH1910T	●	□	19.1	9.2	7.0	
TAWNH1920T	●	□	19.2	9.2	7.0	
TAWNH1930T	●	□	19.3	9.2	7.0	
TAWNH1940T	●	□	19.4	9.2	7.0	
TAWNH1950T	●	□	19.5	9.1	7.0	TAWSN 2000S25 TAWMN 2000S25 TAWLN 2000S25
TAWNH1960T	●	□	19.6	9.1	7.0	
TAWNH1970T	●	□	19.7	9.1	7.0	
TAWNH1980T	●	□	19.8	9.1	7.0	
TAWNH1990T	●	□	19.9	9.1	7.0	
TAWNH2000T	●	□	20.0	9.0	7.0	
TAWNH2010T	□	□	20.1	9.0	7.0	
TAWNH2020T	□	□	20.2	9.0	7.0	
TAWNH2030T	□	□	20.3	9.0	7.0	
TAWNH2040T	□	□	20.4	9.0	7.0	
TAWNH2050T	●	□	20.5	8.9	7.0	TAWSN 2100S25 TAWMN 2100S25 TAWLN 2100S25
TAWNH2060T	□	□	20.6	8.9	7.0	
TAWNH2070T	□	□	20.7	8.9	7.0	
TAWNH2080T	□	□	20.8	8.9	7.0	
TAWNH2090T	□	□	20.9	8.9	7.0	
TAWNH2100T	●	□	21.0	8.8	7.0	
TAWNH2110T	□	□	21.1	8.8	7.0	
TAWNH2120T	□	□	21.2	8.8	7.0	
TAWNH2130T	□	□	21.3	8.8	7.0	
TAWNH2140T	□	□	21.4	8.8	7.0	
TAWNH2150T	●	□	21.5	10.6	8.0	TAWSN 2200S25 TAWMN 2200S25 TAWLN 2200S25
TAWNH2160T	□	□	21.6	10.6	8.0	
TAWNH2170T	□	□	21.7	10.6	8.0	
TAWNH2180T	□	□	21.8	10.6	8.0	
TAWNH2190T	□	□	21.9	10.6	8.0	
TAWNH2200T	●	□	22.0	10.5	8.0	
TAWNH2210T	□	□	22.1	10.5	8.0	
TAWNH2220T	□	□	22.2	10.5	8.0	
TAWNH2230T	□	□	22.3	10.5	8.0	
TAWNH2240T	□	□	22.4	10.5	8.0	
TAWNH2250T	●	□	22.5	10.4	8.0	TAWSN 2300S25 TAWMN 2300S25 TAWLN 2300S25
TAWNH2260T	□	□	22.6	10.4	8.0	
TAWNH2270T	□	□	22.7	10.4	8.0	
TAWNH2280T	□	□	22.8	10.4	8.0	
TAWNH2290T	□	□	22.9	10.4	8.0	

● : Inventory maintained in Japan. □ : Non stock, produced to order only.
▲ : Inventory maintained in Japan. To be replaced by new products.
(1 insert in one case)

TAW

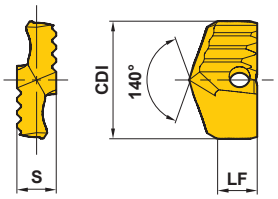
Order Number	Stock VP15TF	Stock VP10H	Dimensions (mm) CDI	LF	S	Applicable Holder
TAWNH2300T	●	□	23.0	10.3	8.0	TAWSN 2300S25 TAWMN 2300S25 TAWLN 2300S25
TAWNH2310T	□	□	23.1	10.3	8.0	
TAWNH2320T	□	□	23.2	10.3	8.0	
TAWNH2330T	□	□	23.3	10.3	8.0	
TAWNH2340T	□	□	23.4	10.3	8.0	
TAWNH2350T	●	□	23.5	10.2	8.0	TAWSN 2400S32 TAWMN 2400S32 TAWLN 2400S32
TAWNH2360T	□	□	23.6	10.2	8.0	
TAWNH2370T	□	□	23.7	10.2	8.0	
TAWNH2380T	□	□	23.8	10.2	8.0	
TAWNH2390T	□	□	23.9	10.2	8.0	
TAWNH2400T	●	□	24.0	10.1	8.0	
TAWNH2410T	□	□	24.1	10.1	8.0	
TAWNH2420T	□	□	24.2	10.1	8.0	
TAWNH2430T	□	□	24.3	10.1	8.0	
TAWNH2440T	□	□	24.4	10.1	8.0	
TAWNH2450T	●	□	24.5	11.7	9.0	TAWSN 2500S32 TAWMN 2500S32 TAWLN 2500S32
TAWNH2460T	□	□	24.6	11.7	9.0	
TAWNH2470T	□	□	24.7	11.7	9.0	
TAWNH2480T	□	□	24.8	11.7	9.0	
TAWNH2490T	□	□	24.9	11.7	9.0	
TAWNH2500T	●	□	25.0	11.6	9.0	
TAWNH2510T	□	□	25.1	11.6	9.0	
TAWNH2520T	□	□	25.2	11.6	9.0	
TAWNH2530T	□	□	25.3	11.6	9.0	
TAWNH2540T	□	□	25.4	11.6	9.0	
TAWNH2550T	●	□	25.5	11.5	9.0	TAWSN 2600S32 TAWMN 2600S32 TAWLN 2600S32
TAWNH2560T	□	□	25.6	11.5	9.0	
TAWNH2570T	□	□	25.7	11.5	9.0	
TAWNH2580T	□	□	25.8	11.5	9.0	
TAWNH2590T	□	□	25.9	11.5	9.0	
TAWNH2600T	●	□	26.0	11.4	9.0	
TAWNH2610T	□	□	26.1	11.4	9.0	
TAWNH2620T	□	□	26.2	11.4	9.0	
TAWNH2630T	□	□	26.3	11.4	9.0	
TAWNH2640T	□	□	26.4	11.4	9.0	
TAWNH2650T	●	□	26.5	11.3	9.0	TAWSN 2700S32 TAWMN 2700S32 TAWLN 2700S32
TAWNH2660T	□	□	26.6	11.3	9.0	
TAWNH2670T	□	□	26.7	11.3	9.0	
TAWNH2680T	□	□	26.8	11.3	9.0	
TAWNH2690T	□	□	26.9	11.3	9.0	
TAWNH2700T	●	□	27.0	11.2	9.0	
TAWNH2710T	□	□	27.1	11.2	9.0	
TAWNH2720T	□	□	27.2	11.2	9.0	
TAWNH2730T	□	□	27.3	11.2	9.0	
TAWNH2740T	□	□	27.4	11.2	9.0	

Order Number	Stock VP15TF	Stock VP10H	Dimensions (mm) CDI	LF	S	Applicable Holder
TAWNH2750T	●	□	27.5	12.3	10.0	TAWSN 2800S32 TAWMN 2800S32 TAWLN 2800S32
TAWNH2760T	□	□	27.6	12.3	10.0	
TAWNH2770T	□	□	27.7	12.3	10.0	
TAWNH2780T	□	□	27.8	12.3	10.0	
TAWNH2790T	□	□	27.9	12.3	10.0	
TAWNH2800T	●	□	28.0	12.2	10.0	
TAWNH2810T	□	□	28.1	12.2	10.0	
TAWNH2820T	□	□	28.2	12.2	10.0	
TAWNH2830T	□	□	28.3	12.2	10.0	
TAWNH2840T	□	□	28.4	12.2	10.0	
TAWNH2850T	●	□	28.5	12.1	10.0	TAWSN 2900S32 TAWMN 2900S32 TAWLN 2900S32
TAWNH2860T	□	□	28.6	12.1	10.0	
TAWNH2870T	□	□	28.7	12.1	10.0	
TAWNH2880T	□	□	28.8	12.1	10.0	
TAWNH2890T	□	□	28.9	12.1	10.0	
TAWNH2900T	●	□	29.0	12.0	10.0	
TAWNH2910T	□	□	29.1	12.0	10.0	
TAWNH2920T	□	□	29.2	12.0	10.0	
TAWNH2930T	□	□	29.3	12.0	10.0	
TAWNH2940T	□	□	29.4	12.0	10.0	
TAWNH2950T	●	□	29.5	11.9	10.0	TAWSN 3000S32 TAWMN 3000S32 TAWLN 3000S32
TAWNH2960T	□	□	29.6	11.9	10.0	
TAWNH2970T	□	□	29.7	11.9	10.0	
TAWNH2980T	□	□	29.8	11.9	10.0	
TAWNH2990T	□	□	29.9	11.9	10.0	
TAWNH3000T	●	□	30.0	11.8	10.0	
TAWNH3010T	□	□	30.1	11.8	10.0	
TAWNH3020T	□	□	30.2	11.8	10.0	
TAWNH3030T	□	□	30.3	11.8	10.0	
TAWNH3040T	□	□	30.4	11.8	10.0	

TAW

INSERTS

H Type
(Cast Iron)



Order Number	Stock DP5010	Dimensions (mm) CDI	LF	S	Applicable Holder
TAWKH1400TG	▲	14.0	7.1	5.0	TAWSNH 1400S16 TAWMNH 1400S16 TAWLNH 1400S16
TAWKH1410TG	▲	14.1	7.1	5.0	
TAWKH1420TG	▲	14.2	7.1	5.0	
TAWKH1430TG	▲	14.3	7.1	5.0	
TAWKH1440TG	▲	14.4	7.1	5.0	
TAWKH1450TG	▲	14.5	7.0	5.0	TAWSNH 1500S20 TAWMNH 1500S20 TAWLNH 1500S20
TAWKH1460TG	▲	14.6	7.0	5.0	
TAWKH1470TG	▲	14.7	7.0	5.0	
TAWKH1480TG	▲	14.8	7.0	5.0	
TAWKH1490TG	▲	14.9	7.0	5.0	
TAWKH1500TG	▲	15.0	6.9	5.0	
TAWKH1510TG	▲	15.1	6.9	5.0	
TAWKH1520TG	▲	15.2	6.9	5.0	
TAWKH1530TG	▲	15.3	6.9	5.0	
TAWKH1540TG	▲	15.4	6.9	5.0	
TAWKH1550TG	▲	15.5	7.3	6.0	TAWSN 1600S20 TAWMN 1600S20 TAWLN 1600S20
TAWKH1560TG	▲	15.6	7.3	6.0	
TAWKH1570TG	▲	15.7	7.3	6.0	
TAWKH1580TG	▲	15.8	7.3	6.0	
TAWKH1590TG	▲	15.9	7.3	6.0	
TAWKH1600TG	▲	16.0	7.2	6.0	
TAWKH1610TG	▲	16.1	7.2	6.0	
TAWKH1620TG	▲	16.2	7.2	6.0	
TAWKH1630TG	▲	16.3	7.2	6.0	
TAWKH1640TG	▲	16.4	7.2	6.0	
TAWKH1650TG	▲	16.5	7.1	6.0	TAWSN 1700S20 TAWMN 1700S20 TAWLN 1700S20
TAWKH1660TG	▲	16.6	7.1	6.0	
TAWKH1670TG	▲	16.7	7.1	6.0	
TAWKH1680TG	▲	16.8	7.1	6.0	
TAWKH1690TG	▲	16.9	7.1	6.0	
TAWKH1700TG	▲	17.0	7.0	6.0	
TAWKH1710TG	▲	17.1	7.0	6.0	
TAWKH1720TG	▲	17.2	7.0	6.0	
TAWKH1730TG	▲	17.3	7.0	6.0	
TAWKH1740TG	▲	17.4	7.0	6.0	
TAWKH1750TG	▲	17.5	6.8	6.0	TAWSN 1800S20 TAWMN 1800S20 TAWLN 1800S20
TAWKH1760TG	▲	17.6	6.8	6.0	
TAWKH1770TG	▲	17.7	6.8	6.0	
TAWKH1780TG	▲	17.8	6.8	6.0	
TAWKH1790TG	▲	17.9	6.8	6.0	
TAWKH1800TG	▲	18.0	6.8	6.0	
TAWKH1810TG	▲	18.1	6.8	6.0	
TAWKH1820TG	▲	18.2	6.8	6.0	
TAWKH1830TG	▲	18.3	6.8	6.0	
TAWKH1840TG	▲	18.4	6.8	6.0	

Order Number	Stock DP5010	Dimensions (mm) CDI	LF	S	Applicable Holder
TAWKH1850TG	●	18.5	8.6	7.0	TAWSN 1900S25 TAWMN 1900S25 TAWLN 1900S25
TAWKH1860TG	●	18.6	8.6	7.0	
TAWKH1870TG	●	18.7	8.6	7.0	
TAWKH1880TG	●	18.8	8.6	7.0	
TAWKH1890TG	●	18.9	8.6	7.0	
TAWKH1900TG	●	19.0	8.5	7.0	
TAWKH1910TG	●	19.1	8.5	7.0	
TAWKH1920TG	●	19.2	8.5	7.0	
TAWKH1930TG	●	19.3	8.5	7.0	
TAWKH1940TG	●	19.4	8.5	7.0	
TAWKH1950TG	●	19.5	8.4	7.0	TAWSN 2000S25 TAWMN 2000S25 TAWLN 2000S25
TAWKH1960TG	●	19.6	8.4	7.0	
TAWKH1970TG	●	19.7	8.4	7.0	
TAWKH1980TG	●	19.8	8.4	7.0	
TAWKH1990TG	●	19.9	8.4	7.0	
TAWKH2000TG	●	20.0	8.3	7.0	
TAWKH2010TG	□	20.1	8.3	7.0	
TAWKH2020TG	□	20.2	8.3	7.0	
TAWKH2030TG	□	20.3	8.3	7.0	
TAWKH2040TG	□	20.4	8.3	7.0	
TAWKH2050TG	●	20.5	8.2	7.0	TAWSN 2100S25 TAWMN 2100S25 TAWLN 2100S25
TAWKH2060TG	□	20.6	8.2	7.0	
TAWKH2070TG	□	20.7	8.2	7.0	
TAWKH2080TG	□	20.8	8.2	7.0	
TAWKH2090TG	□	20.9	8.2	7.0	
TAWKH2100TG	●	21.0	8.1	7.0	
TAWKH2110TG	□	21.1	8.1	7.0	
TAWKH2120TG	□	21.2	8.1	7.0	
TAWKH2130TG	□	21.3	8.1	7.0	
TAWKH2140TG	□	21.4	8.1	7.0	
TAWKH2150TG	●	21.5	9.8	8.0	TAWSN 2200S25 TAWMN 2200S25 TAWLN 2200S25
TAWKH2160TG	□	21.6	9.8	8.0	
TAWKH2170TG	□	21.7	9.8	8.0	
TAWKH2180TG	□	21.8	9.8	8.0	
TAWKH2190TG	□	21.9	9.8	8.0	
TAWKH2200TG	●	22.0	9.7	8.0	
TAWKH2210TG	□	22.1	9.7	8.0	
TAWKH2220TG	□	22.2	9.7	8.0	
TAWKH2230TG	□	22.3	9.7	8.0	
TAWKH2240TG	□	22.4	9.7	8.0	
TAWKH2250TG	●	22.5	9.6	8.0	TAWSN 2300S25 TAWMN 2300S25 TAWLN 2300S25
TAWKH2260TG	□	22.6	9.6	8.0	
TAWKH2270TG	□	22.7	9.6	8.0	
TAWKH2280TG	□	22.8	9.6	8.0	
TAWKH2290TG	□	22.9	9.6	8.0	

● : Inventory maintained in Japan. □ : Non stock, produced to order only.
▲ : Inventory maintained in Japan. To be replaced by new products.
(1 insert in one case)

TAW

Order Number	Stock DP5010	Dimensions (mm) CDI	LF	S	Applicable Holder
TAWKH2300TG	●	23.0	9.5	8.0	TAWSN 2300S25 TAWMN 2300S25 TAWLN 2300S25
TAWKH2310TG	□	23.1	9.5	8.0	
TAWKH2320TG	□	23.2	9.5	8.0	
TAWKH2330TG	□	23.3	9.5	8.0	
TAWKH2340TG	□	23.4	9.5	8.0	
TAWKH2350TG	●	23.5	9.4	8.0	TAWSN 2400S32 TAWMN 2400S32 TAWLN 2400S32
TAWKH2360TG	□	23.6	9.4	8.0	
TAWKH2370TG	□	23.7	9.4	8.0	
TAWKH2380TG	□	23.8	9.4	8.0	
TAWKH2390TG	□	23.9	9.4	8.0	
TAWKH2400TG	●	24.0	9.3	8.0	
TAWKH2410TG	□	24.1	9.3	8.0	
TAWKH2420TG	□	24.2	9.3	8.0	
TAWKH2430TG	□	24.3	9.3	8.0	
TAWKH2440TG	□	24.4	9.3	8.0	
TAWKH2450TG	●	24.5	10.8	9.0	TAWSN 2500S32 TAWMN 2500S32 TAWLN 2500S32
TAWKH2460TG	□	24.6	10.8	9.0	
TAWKH2470TG	□	24.7	10.8	9.0	
TAWKH2480TG	□	24.8	10.8	9.0	
TAWKH2490TG	□	24.9	10.8	9.0	
TAWKH2500TG	●	25.0	10.7	9.0	
TAWKH2510TG	□	25.1	10.7	9.0	
TAWKH2520TG	□	25.2	10.7	9.0	
TAWKH2530TG	□	25.3	10.7	9.0	
TAWKH2540TG	□	25.4	10.7	9.0	
TAWKH2550TG	●	25.5	10.6	9.0	TAWSN 2600S32 TAWMN 2600S32 TAWLN 2600S32
TAWKH2560TG	□	25.6	10.6	9.0	
TAWKH2570TG	□	25.7	10.6	9.0	
TAWKH2580TG	□	25.8	10.6	9.0	
TAWKH2590TG	□	25.9	10.6	9.0	
TAWKH2600TG	●	26.0	10.5	9.0	
TAWKH2610TG	□	26.1	10.5	9.0	
TAWKH2620TG	□	26.2	10.5	9.0	
TAWKH2630TG	□	26.3	10.5	9.0	
TAWKH2640TG	□	26.4	10.5	9.0	
TAWKH2650TG	●	26.5	10.4	9.0	TAWSN 2700S32 TAWMN 2700S32 TAWLN 2700S32
TAWKH2660TG	□	26.6	10.4	9.0	
TAWKH2670TG	□	26.7	10.4	9.0	
TAWKH2680TG	□	26.8	10.4	9.0	
TAWKH2690TG	□	26.9	10.4	9.0	
TAWKH2700TG	●	27.0	10.3	9.0	
TAWKH2710TG	□	27.1	10.3	9.0	
TAWKH2720TG	□	27.2	10.3	9.0	
TAWKH2730TG	□	27.3	10.3	9.0	
TAWKH2740TG	□	27.4	10.3	9.0	

Order Number	Stock DP5010	Dimensions (mm) CDI	LF	S	Applicable Holder
TAWKH2750TG	●	27.5	11.3	10.0	TAWSN 2800S32 TAWMN 2800S32 TAWLN 2800S32
TAWKH2760TG	□	27.6	11.3	10.0	
TAWKH2770TG	□	27.7	11.3	10.0	
TAWKH2780TG	□	27.8	11.3	10.0	
TAWKH2790TG	□	27.9	11.3	10.0	
TAWKH2800TG	●	28.0	11.2	10.0	
TAWKH2810TG	□	28.1	11.2	10.0	
TAWKH2820TG	□	28.2	11.2	10.0	
TAWKH2830TG	□	28.3	11.2	10.0	
TAWKH2840TG	□	28.4	11.2	10.0	
TAWKH2850TG	●	28.5	11.1	10.0	TAWSN 2900S32 TAWMN 2900S32 TAWLN 2900S32
TAWKH2860TG	□	28.6	11.1	10.0	
TAWKH2870TG	□	28.7	11.1	10.0	
TAWKH2880TG	□	28.8	11.1	10.0	
TAWKH2890TG	□	28.9	11.1	10.0	
TAWKH2900TG	●	29.0	11.0	10.0	
TAWKH2910TG	□	29.1	11.0	10.0	
TAWKH2920TG	□	29.2	11.0	10.0	
TAWKH2930TG	□	29.3	11.0	10.0	
TAWKH2940TG	□	29.4	11.0	10.0	
TAWKH2950TG	●	29.5	10.9	10.0	TAWSN 3000S32 TAWMN 3000S32 TAWLN 3000S32
TAWKH2960TG	□	29.6	10.9	10.0	
TAWKH2970TG	□	29.7	10.9	10.0	
TAWKH2980TG	□	29.8	10.9	10.0	
TAWKH2990TG	□	29.9	10.9	10.0	
TAWKH3000TG	●	30.0	10.8	10.0	
TAWKH3010TG	□	30.1	10.8	10.0	
TAWKH3020TG	□	30.2	10.8	10.0	
TAWKH3030TG	□	30.3	10.8	10.0	
TAWKH3040TG	□	30.4	10.8	10.0	

TAW

NOTES ON USE

INSERT INSTALLATION

●Loosen the clamp screw to install the insert.
●Correctly mesh the insert and the holder serrations, then slide the insert to the bottom of the slot.
●Fasten the clamp screw using the torque wrench provided while holding the insert lightly as shown. (Figure 1)
●Check there is no gap between the bottom of the insert and holder. (Figure 2)

Tighten the clamp screw according to the torque below.

Drill Diameter (mm)	Clamp Torque (N · m)
14—15	2.0
16—18	2.0
19—21	3.5
22—24	5.5
25—27	8.5
28—30	12.0

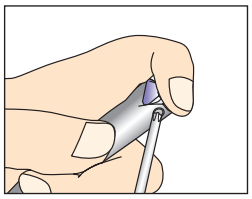


Fig. 1

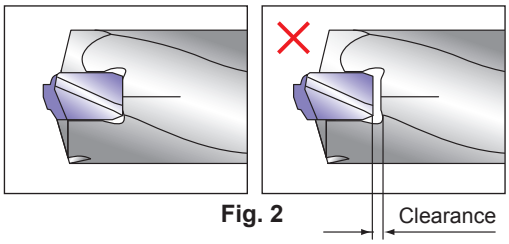


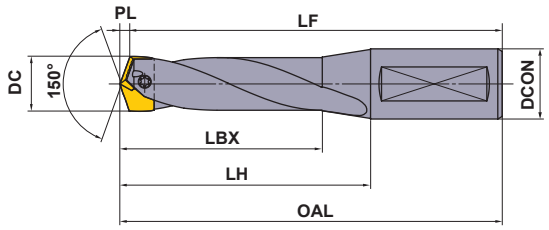
Fig. 2

INSERT REPLACEMENT

●Thouroughly clean the serrations of the holder before installing a new insert.
Remove heavy dirt in the holder serrations by using the cleaning plate provided.

TAW

(For Bridge Construction)

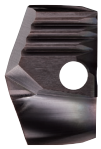
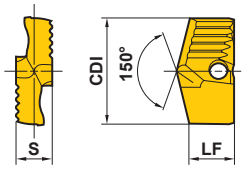


HOLDERS

DC (mm)	Hole Depth (l/d)	Holder Order Number	Holder Stock	Insert DC (mm)	Insert Order Number	Insert Stock VP15TF	Dimensions (mm) LBX	LH	OAL	LF	PL	DCON	Clamp Screw	Wrench	Plate	Anti-seize Lubricant
24.5	3	TAWSB2500S32	●	24.5	TAWBH2450T	●	91.9	113.9	173.9	170.6	3.3	32	WS406023T	TKY25T	WPT4405	MK1KS
24.6	5	TAWMB2500S32	□	24.6	TAWBH2460T	□	143.9	168.9	228.9	225.6	3.3	32	WS406023T	TKY25T	WPT4405	MK1KS
24.7				24.7	TAWBH2470T	●										
26.5	3	TAWSB2700S32	●	26.5	TAWBH2650T	□	98.2	119.2	179.2	175.6	3.6	32	WS406024T	TKY25T	WPT4405	MK1KS
26.7	5	TAWMB2700S32	□	26.7	TAWB2670T	●	155.2	179.2	239.2	235.6	3.6	32	WS406024T	TKY25T	WPT4405	MK1KS
					TAWBH2670T	●										

(Note 1) The above dimensions are for when installing the TAWBH (H type) insert.
(Note 2) Please contact us for any geometry that is not in this catalogue (e.g. different diameter and length).
● : Inventory maintained in Japan. □ : Non stock, produced to order only.

INSERTS

Shape	Order Number	Stock VP15TF	Dimensions (mm) CDI	LF	S	Applicable Holder	Hone Width (mm)	Geometry
H Type 	TAWBH2450T	●	24.5	11.7	9.0	TAWSB2500S32 TAWMB2500S32	0.20—0.25	
	TAWBH2460T	□	24.6	11.7	9.0			
	TAWBH2470T	●	24.7	11.7	9.0			
	TAWBH2650T	□	26.5	11.3	9.0	TAWSB2700S32 TAWMB2700S32		
	TAWBH2670T	●	26.7	11.3	9.0			

● : Inventory maintained in Japan. □ : Non stock, produced to order only.
(1 insert in one case)

RECOMMENDED CUTTING CONDITIONS

Work Material			Drill Diameter / Conditions / Hardness	ϕ24.5, ϕ24.6, ϕ24.7 Cutting Speed (m/min)	Feed (mm/rev)	ϕ26.5, ϕ26.7 Cutting Speed (m/min)	Feed (mm/rev)
P	Structural Steel	SS400 (JIS)	Tensile Strength ≦400—500MPa	70 (60—80)	0.30 (0.25—0.35)	70 (60—80)	0.30 (0.25—0.35)
		SM490 (JIS)	Tensile Strength ≦490—610MPa	65 (55—75)	0.30 (0.25—0.35)	65 (55—75)	0.30 (0.25—0.35)
		SM570 (JIS)	Tensile Strength ≦570—720MPa	60 (50—70)	0.30 (0.25—0.35)	60 (50—70)	0.30 (0.25—0.35)

● : Inventory maintained in Japan. □ : Non stock, produced to order only.

MVX

Indexable Drill

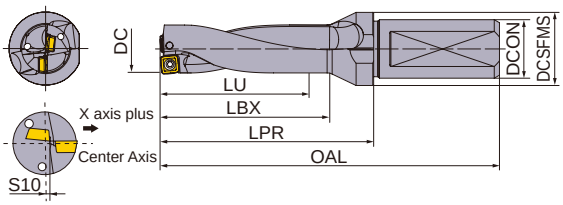
Product Information

UWC X Thinning

Work Material

P M K N H

SPARE PARTS >> 1927 TECHNICAL INFO >> 1997 ISO13399 PROPERTY >> 1966 SYMBOL DESCRIPTIONS >> 1623



Type1

-	*Dref.		
L/D	ø17-ø33	ø33.5-ø47	ø48-ø63
2D, 3D	+ 0.25 0	+ 0.3 0	+ 0.3 0
4D, 5D	+ 0.35 0	+ 0.4 0	+ 0.45 0
6D	+ 0.45 0	+ 0.6 0	

*Dref. : Machining tolerance (guide) (mm) ,

● : Inventory maintained in Japan.

Unit(mm)

DC (mm)	Hole Depth(l/d)	Order Number	Stock	No. of Flutes	LU	LBX	LPR	OAL	DCON	DCSFMS	S10	Insert Number	Clamp Screw	Wrench
17.0	2	MVX1700X2F20	●	2	34	41	56	99	20.0	25	0.50	SO**0630	TPS25	TIP07F
17.0	3	MVX1700X3F20	●	2	51	58	73	116	20.0	25	0.50	SO**0630	TPS25	TIP07F
17.0	4	MVX1700X4F20	●	2	68	75	90	133	20.0	25	0.50	SO**0630	TPS25	TIP07F
17.0	5	MVX1700X5F20	●	2	85	92	107	150	20.0	25	0.50	SO**0630	TPS25	TIP07F
17.0	6	MVX1700X6F20	●	2	102	109	124	167	20.0	25	0.50	SO**0630	TPS25	TIP07F
17.5	2	MVX1750X2F25	●	2	35	42	62	112	25.0	32	0.45	SO**0630	TPS25	TIP07F
17.5	3	MVX1750X3F25	●	2	52.5	59.5	79.5	129.5	25.0	32	0.45	SO**0630	TPS25	TIP07F
17.5	4	MVX1750X4F25	●	2	70	77	97	147	25.0	32	0.45	SO**0630	TPS25	TIP07F
17.5	5	MVX1750X5F25	●	2	87.5	94.5	114.5	164.5	25.0	32	0.45	SO**0630	TPS25	TIP07F
17.5	6	MVX1750X6F25	●	2	105	112	132	182	25.0	32	0.45	SO**0630	TPS25	TIP07F
18.0	2	MVX1800X2F25	●	2	36	43	63	113	25.0	32	0.40	SO**0630	TPS25	TIP07F
18.0	3	MVX1800X3F25	●	2	54	61	81	131	25.0	32	0.40	SO**0630	TPS25	TIP07F
18.0	4	MVX1800X4F25	●	2	72	79	99	149	25.0	32	0.40	SO**0630	TPS25	TIP07F
18.0	5	MVX1800X5F25	●	2	90	97	117	167	25.0	32	0.40	SO**0630	TPS25	TIP07F
18.0	6	MVX1800X6F25	●	2	108	115	135	185	25.0	32	0.40	SO**0630	TPS25	TIP07F
18.5	2	MVX1850X2F25	●	2	37	44	64	114	25.0	32	0.35	SO**0630	TPS25	TIP07F
18.5	3	MVX1850X3F25	●	2	55.5	62.5	82.5	132.5	25.0	32	0.35	SO**0630	TPS25	TIP07F
18.5	4	MVX1850X4F25	●	2	74	81	101	151	25.0	32	0.35	SO**0630	TPS25	TIP07F
18.5	5	MVX1850X5F25	●	2	92.5	99.5	119.5	169.5	25.0	32	0.35	SO**0630	TPS25	TIP07F
18.5	6	MVX1850X6F25	●	2	111	118	138	188	25.0	32	0.35	SO**0630	TPS25	TIP07F
19.0	2	MVX1900X2F25	●	2	38	45	65	115	25.0	32	0.30	SO**0630	TPS25	TIP07F
19.0	3	MVX1900X3F25	●	2	57	64	84	134	25.0	32	0.30	SO**0630	TPS25	TIP07F
19.0	4	MVX1900X4F25	●	2	76	83	103	153	25.0	32	0.30	SO**0630	TPS25	TIP07F
19.0	5	MVX1900X5F25	●	2	95	102	122	172	25.0	32	0.30	SO**0630	TPS25	TIP07F
19.0	6	MVX1900X6F25	●	2	114	121	141	191	25.0	32	0.30	SO**0630	TPS25	TIP07F
19.5	2	MVX1950X2F25	●	2	39	46	66	116	25.0	32	0.25	SO**0630	TPS25	TIP07F
19.5	3	MVX1950X3F25	●	2	58.5	65.5	85.5	135.5	25.0	32	0.25	SO**0630	TPS25	TIP07F
19.5	4	MVX1950X4F25	●	2	78	85	105	155	25.0	32	0.25	SO**0630	TPS25	TIP07F
19.5	5	MVX1950X5F25	●	2	97.5	104.5	124.5	174.5	25.0	32	0.25	SO**0630	TPS25	TIP07F

MVX

DC (mm)	Hole Depth(l/d)	Order Number	Stock	No. of Flutes	LU	LBX	LPR	OAL	DCON	DCSFMS	S10	Insert Number	Clamp Screw	Wrench
19.5	6	MVX1950X6F25	●	2	117	124	144	194	25.0	32	0.25	SO**0630	TPS25	TIP07F
20.0	2	MVX2000X2F25	●	2	40	47	67	117	25.0	32	0.60	SO**0735	TPS3	TIP10W
20.0	3	MVX2000X3F25	●	2	60	67	87	137	25.0	32	0.60	SO**0735	TPS3	TIP10W
20.0	4	MVX2000X4F25	●	2	80	87	107	157	25.0	32	0.60	SO**0735	TPS3	TIP10W
20.0	5	MVX2000X5F25	●	2	100	107	127	177	25.0	32	0.60	SO**0735	TPS3	TIP10W
20.0	6	MVX2000X6F25	●	2	120	127	147	197	25.0	32	0.60	SO**0735	TPS3	TIP10W
20.5	2	MVX2050X2F25	●	2	41	48	68	118	25.0	32	0.55	SO**0735	TPS3	TIP10W
20.5	3	MVX2050X3F25	●	2	61.5	68.5	88.5	138.5	25.0	32	0.55	SO**0735	TPS3	TIP10W
21.0	2	MVX2100X2F25	●	2	42	49	69	119	25.0	32	0.50	SO**0735	TPS3	TIP10W
21.0	3	MVX2100X3F25	●	2	63	70	90	140	25.0	32	0.50	SO**0735	TPS3	TIP10W
21.0	4	MVX2100X4F25	●	2	84	91	111	161	25.0	32	0.50	SO**0735	TPS3	TIP10W
21.0	5	MVX2100X5F25	●	2	105	112	132	182	25.0	32	0.50	SO**0735	TPS3	TIP10W
21.0	6	MVX2100X6F25	●	2	126	133	153	203	25.0	32	0.50	SO**0735	TPS3	TIP10W
21.5	2	MVX2150X2F25	●	2	43	50	70	120	25.0	32	0.45	SO**0735	TPS3	TIP10W
21.5	3	MVX2150X3F25	●	2	64.5	71.5	91.5	141.5	25.0	32	0.45	SO**0735	TPS3	TIP10W
22.0	2	MVX2200X2F25	●	2	44	51	71	121	25.0	32	0.40	SO**0735	TPS3	TIP10W
22.0	3	MVX2200X3F25	●	2	66	73	93	143	25.0	32	0.40	SO**0735	TPS3	TIP10W
22.0	4	MVX2200X4F25	●	2	88	95	115	165	25.0	32	0.40	SO**0735	TPS3	TIP10W
22.0	5	MVX2200X5F25	●	2	110	117	137	187	25.0	32	0.40	SO**0735	TPS3	TIP10W
22.0	6	MVX2200X6F25	●	2	132	139	159	209	25.0	32	0.40	SO**0735	TPS3	TIP10W
22.5	2	MVX2250X2F25	●	2	45	52	72	122	25.0	32	0.35	SO**0735	TPS3	TIP10W
22.5	3	MVX2250X3F25	●	2	67.5	74.5	94.5	144.5	25.0	32	0.35	SO**0735	TPS3	TIP10W
23.0	2	MVX2300X2F25	●	2	46	53	73	123	25.0	32	0.80	SO**0840	TPS351	TIP10W
23.0	3	MVX2300X3F25	●	2	69	76	96	146	25.0	32	0.80	SO**0840	TPS351	TIP10W
23.0	4	MVX2300X4F25	●	2	92	99	119	169	25.0	32	0.80	SO**0840	TPS351	TIP10W
23.0	5	MVX2300X5F25	●	2	115	122	142	192	25.0	32	0.80	SO**0840	TPS351	TIP10W
23.0	6	MVX2300X6F25	●	2	138	145	165	215	25.0	32	0.80	SO**0840	TPS351	TIP10W
23.5	2	MVX2350X2F25	●	2	47	54	74	124	25.0	32	0.75	SO**0840	TPS351	TIP10W
23.5	3	MVX2350X3F25	●	2	70.5	77.5	97.5	147.5	25.0	32	0.75	SO**0840	TPS351	TIP10W
24.0	2	MVX2400X2F25	●	2	48	55	75	125	25.0	32	0.70	SO**0840	TPS351	TIP10W
24.0	3	MVX2400X3F25	●	2	72	79	99	149	25.0	32	0.70	SO**0840	TPS351	TIP10W
24.0	4	MVX2400X4F25	●	2	96	103	123	173	25.0	32	0.70	SO**0840	TPS351	TIP10W
24.0	5	MVX2400X5F25	●	2	120	127	147	197	25.0	32	0.70	SO**0840	TPS351	TIP10W
24.0	6	MVX2400X6F25	●	2	144	151	171	221	25.0	32	0.70	SO**0840	TPS351	TIP10W
24.5	2	MVX2450X2F25	●	2	49	56	76	126	25.0	32	0.65	SO**0840	TPS351	TIP10W
24.5	3	MVX2450X3F25	●	2	73.5	80.5	100.5	150.5	25.0	32	0.65	SO**0840	TPS351	TIP10W
25.0	2	MVX2500X2F25	●	2	50	57	77	127	25.0	32	0.60	SO**0840	TPS351	TIP10W
25.0	3	MVX2500X3F25	●	2	75	82	102	152	25.0	32	0.60	SO**0840	TPS351	TIP10W
25.0	4	MVX2500X4F25	●	2	100	107	127	177	25.0	32	0.60	SO**0840	TPS351	TIP10W
25.0	5	MVX2500X5F25	●	2	125	132	152	202	25.0	32	0.60	SO**0840	TPS351	TIP10W
25.0	6	MVX2500X6F25	●	2	150	157	177	227	25.0	32	0.60	SO**0840	TPS351	TIP10W
25.5	2	MVX2550X2F25	●	2	51	58	78	128	25.0	32	0.60	SO**0840	TPS351	TIP10W
25.5	3	MVX2550X3F25	●	2	76.5	83.5	103.5	153.5	25.0	32	0.60	SO**0840	TPS351	TIP10W
26.0	2	MVX2600X2F32	●	2	52	59	79	134	32.0	42	0.50	SO**0840	TPS351	TIP10W
26.0	3	MVX2600X3F32	●	2	78	85	105	160	32.0	42	0.50	SO**0840	TPS351	TIP10W
26.0	4	MVX2600X4F32	●	2	104	111	131	186	32.0	42	0.50	SO**0840	TPS351	TIP10W
26.0	5	MVX2600X5F32	●	2	130	137	157	212	32.0	42	0.50	SO**0840	TPS351	TIP10W
26.0	6	MVX2600X6F32	●	2	156	163	183	238	32.0	42	0.50	SO**0840	TPS351	TIP10W
26.5	2	MVX2650X2F32	●	2	53	60	80	135	32.0	42	0.50	SO**0840	TPS351	TIP10W
26.5	3	MVX2650X3F32	●	2	79.5	86.5	106.5	161.5	32.0	42	0.50	SO**0840	TPS351	TIP10W
27.0	2	MVX2700X2F32	●	2	54	61	81	136	32.0	42	0.45	SO**0840	TPS351	TIP10W

MVX

DC (mm)	Hole Depth(l/d)	Order Number	Stock	No. of Flutes	LU	LBX	LPR	OAL	DCON	DCSFMS	S10	Insert Number	Clamp Screw	Wrench
27.0	3	MVX2700X3F32	●	2	81	88	108	163	32.0	42	0.45	SO**0840	TPS351	TIP10W
27.0	4	MVX2700X4F32	●	2	108	115	135	190	32.0	42	0.45	SO**0840	TPS351	TIP10W
27.0	5	MVX2700X5F32	●	2	135	142	162	217	32.0	42	0.45	SO**0840	TPS351	TIP10W
27.0	6	MVX2700X6F32	●	2	162	169	189	244	32.0	42	0.45	SO**0840	TPS351	TIP10W
27.5	2	MVX2750X2F32	●	2	55	62	82	137	32.0	42	0.40	SO**0840	TPS351	TIP10W
27.5	3	MVX2750X3F32	●	2	82.5	89.5	109.5	164.5	32.0	42	0.40	SO**0840	TPS351	TIP10W
28.0	2	MVX2800X2F32	●	2	56	63	83	138	32.0	42	0.85	SO**0945	TPS4	TIP15W
28.0	3	MVX2800X3F32	●	2	84	91	111	166	32.0	42	0.85	SO**0945	TPS4	TIP15W
28.0	4	MVX2800X4F32	●	2	112	119	139	194	32.0	42	0.85	SO**0945	TPS4	TIP15W
28.0	5	MVX2800X5F32	●	2	140	147	167	222	32.0	42	0.85	SO**0945	TPS4	TIP15W
28.0	6	MVX2800X6F32	●	2	168	175	195	250	32.0	42	0.85	SO**0945	TPS4	TIP15W
28.5	2	MVX2850X2F32	●	2	57	64	84	139	32.0	42	0.80	SO**0945	TPS4	TIP15W
28.5	3	MVX2850X3F32	●	2	85.5	92.5	112.5	167.5	32.0	42	0.80	SO**0945	TPS4	TIP15W
29.0	2	MVX2900X2F32	●	2	58	65	85	140	32.0	42	0.75	SO**0945	TPS4	TIP15W
29.0	3	MVX2900X3F32	●	2	87	94	114	169	32.0	42	0.75	SO**0945	TPS4	TIP15W
29.0	4	MVX2900X4F32	●	2	116	123	143	198	32.0	42	0.75	SO**0945	TPS4	TIP15W
29.0	5	MVX2900X5F32	●	2	145	152	172	227	32.0	42	0.75	SO**0945	TPS4	TIP15W
29.0	6	MVX2900X6F32	●	2	174	181	201	256	32.0	42	0.75	SO**0945	TPS4	TIP15W
29.5	2	MVX2950X2F32	●	2	59	66	86	141	32.0	42	0.70	SO**0945	TPS4	TIP15W
29.5	3	MVX2950X3F32	●	2	88.5	95.5	115.5	170.5	32.0	42	0.70	SO**0945	TPS4	TIP15W
30.0	2	MVX3000X2F32	●	2	60	67	87	142	32.0	42	0.65	SO**0945	TPS4	TIP15W
30.0	3	MVX3000X3F32	●	2	90	97	117	172	32.0	42	0.65	SO**0945	TPS4	TIP15W
30.0	4	MVX3000X4F32	●	2	120	127	147	202	32.0	42	0.65	SO**0945	TPS4	TIP15W
30.0	5	MVX3000X5F32	●	2	150	157	177	232	32.0	42	0.65	SO**0945	TPS4	TIP15W
30.0	6	MVX3000X6F32	●	2	180	187	207	262	32.0	42	0.65	SO**0945	TPS4	TIP15W
30.5	3	MVX3050X3F32	●	2	91.5	98.5	118.5	173.5	32.0	42	0.60	SO**0945	TPS4	TIP15W
31.0	2	MVX3100X2F40	●	2	62	69	89	154	40.0	50	0.55	SO**0945	TPS4	TIP15W
31.0	3	MVX3100X3F40	●	2	93	100	120	185	40.0	50	0.55	SO**0945	TPS4	TIP15W
31.0	4	MVX3100X4F40	●	2	124	131	151	216	40.0	50	0.55	SO**0945	TPS4	TIP15W
31.0	5	MVX3100X5F40	●	2	155	162	182	247	40.0	50	0.55	SO**0945	TPS4	TIP15W
31.0	6	MVX3100X6F40	●	2	186	193	213	278	40.0	50	0.55	SO**0945	TPS4	TIP15W
31.5	3	MVX3150X3F40	●	2	94.5	101.5	121.5	186.5	40.0	50	0.55	SO**0945	TPS4	TIP15W
32.0	2	MVX3200X2F40	●	2	64	71	91	156	40.0	50	0.45	SO**0945	TPS4	TIP15W
32.0	3	MVX3200X3F40	●	2	96	103	123	188	40.0	50	0.45	SO**0945	TPS4	TIP15W
32.0	4	MVX3200X4F40	●	2	128	135	155	220	40.0	50	0.45	SO**0945	TPS4	TIP15W
32.0	5	MVX3200X5F40	●	2	160	167	187	252	40.0	50	0.45	SO**0945	TPS4	TIP15W
32.0	6	MVX3200X6F40	●	2	192	199	219	284	40.0	50	0.45	SO**0945	TPS4	TIP15W
32.5	3	MVX3250X3F40	●	2	97.5	104.5	124.5	189.5	40.0	50	0.45	SO**0945	TPS4	TIP15W
33.0	2	MVX3300X2F40	●	2	66	73	93	158	40.0	50	0.40	SO**0945	TPS4	TIP15W
33.0	3	MVX3300X3F40	●	2	99	106	126	191	40.0	50	0.40	SO**0945	TPS4	TIP15W
33.0	4	MVX3300X4F40	●	2	132	139	159	224	40.0	50	0.40	SO**0945	TPS4	TIP15W
33.0	5	MVX3300X5F40	●	2	165	172	192	257	40.0	50	0.40	SO**0945	TPS4	TIP15W
33.0	6	MVX3300X6F40	●	2	198	205	225	290	40.0	50	0.40	SO**0945	TPS4	TIP15W
33.5	3	MVX3350X3F40	●	2	100.5	107.5	127.5	192.5	40.0	50	1.15	SO**1155	TPS43	TIP15W
34.0	2	MVX3400X2F40	●	2	68	75	105	170	40.0	50	1.11	SO**1155	TPS43	TIP15W
34.0	3	MVX3400X3F40	●	2	102	109	139	204	40.0	50	1.11	SO**1155	TPS43	TIP15W
34.0	4	MVX3400X4F40	●	2	136	143	173	238	40.0	50	1.11	SO**1155	TPS43	TIP15W
34.0	5	MVX3400X5F40	●	2	170	177	207	272	40.0	50	1.11	SO**1155	TPS43	TIP15W
34.0	6	MVX3400X6F40	●	2	204	211	241	306	40.0	50	1.10	SO**1155	TPS43	TIP15W
34.5	3	MVX3450X3F40	●	2	103.5	110.5	140.5	205.5	40.0	50	1.08	SO**1155	TPS43	TIP15W
35.0	2	MVX3500X2F40	●	2	70	77	107	172	40.0	50	1.03	SO**1155	TPS43	TIP15W

MVX

DC (mm)	Hole Depth(l/d)	Order Number	Stock	No. of Flutes	LU	LBX	LPR	OAL	DCON	DCSFMS	S10	Insert Number	Clamp Screw	Wrench
35.0	3	MVX3500X3F40	●	2	105	112	142	207	40.0	50	1.03	SO**1155	TPS43	TIP15W
35.0	4	MVX3500X4F40	●	2	140	147	177	242	40.0	50	1.03	SO**1155	TPS43	TIP15W
35.0	5	MVX3500X5F40	●	2	175	182	212	277	40.0	50	1.03	SO**1155	TPS43	TIP15W
35.0	6	MVX3500X6F40	●	2	210	217	247	312	40.0	50	1.02	SO**1155	TPS43	TIP15W
35.5	3	MVX3550X3F40	●	2	106.5	113.5	143.5	208.5	40.0	50	0.99	SO**1155	TPS43	TIP15W
36.0	2	MVX3600X2F40	●	2	72	79	109	174	40.0	50	0.95	SO**1155	TPS43	TIP15W
36.0	3	MVX3600X3F40	●	2	108	115	145	210	40.0	50	0.95	SO**1155	TPS43	TIP15W
36.0	4	MVX3600X4F40	●	2	144	151	181	246	40.0	50	0.95	SO**1155	TPS43	TIP15W
36.0	5	MVX3600X5F40	●	2	180	187	217	282	40.0	50	0.95	SO**1155	TPS43	TIP15W
36.0	6	MVX3600X6F40	●	2	216	223	253	318	40.0	50	0.94	SO**1155	TPS43	TIP15W
37.0	2	MVX3700X2F40	●	2	74	81	111	176	40.0	50	0.87	SO**1155	TPS43	TIP15W
37.0	3	MVX3700X3F40	●	2	111	118	148	213	40.0	50	0.87	SO**1155	TPS43	TIP15W
37.0	4	MVX3700X4F40	●	2	148	155	185	250	40.0	50	0.87	SO**1155	TPS43	TIP15W
37.0	5	MVX3700X5F40	●	2	185	192	222	287	40.0	50	0.87	SO**1155	TPS43	TIP15W
37.0	6	MVX3700X6F40	●	2	222	229	259	324	40.0	50	0.86	SO**1155	TPS43	TIP15W
38.0	2	MVX3800X2F40	●	2	76	83	113	178	40.0	50	0.79	SO**1155	TPS43	TIP15W
38.0	3	MVX3800X3F40	●	2	114	121	151	216	40.0	50	0.79	SO**1155	TPS43	TIP15W
38.0	4	MVX3800X4F40	●	2	152	159	189	254	40.0	50	0.79	SO**1155	TPS43	TIP15W
38.0	5	MVX3800X5F40	●	2	190	197	227	292	40.0	50	0.79	SO**1155	TPS43	TIP15W
38.0	6	MVX3800X6F40	●	2	228	235	265	330	40.0	50	0.78	SO**1155	TPS43	TIP15W
39.0	2	MVX3900X2F40	●	2	78	85	115	180	40.0	50	0.71	SO**1155	TPS43	TIP15W
39.0	3	MVX3900X3F40	●	2	117	124	154	219	40.0	50	0.71	SO**1155	TPS43	TIP15W
39.0	4	MVX3900X4F40	●	2	156	163	193	258	40.0	50	0.71	SO**1155	TPS43	TIP15W
39.0	5	MVX3900X5F40	●	2	195	202	232	297	40.0	50	0.71	SO**1155	TPS43	TIP15W
39.0	6	MVX3900X6F40	●	2	234	241	271	336	40.0	50	0.70	SO**1155	TPS43	TIP15W
40.0	2	MVX4000X2F40	●	2	80	87	117	182	40.0	50	1.46	SO**1360	TPS43	TIP15W
40.0	3	MVX4000X3F40	●	2	120	127	157	222	40.0	50	1.46	SO**1360	TPS43	TIP15W
40.0	4	MVX4000X4F40	●	2	160	167	197	262	40.0	50	1.46	SO**1360	TPS43	TIP15W
40.0	5	MVX4000X5F40	●	2	200	207	237	302	40.0	50	1.46	SO**1360	TPS43	TIP15W
40.0	6	MVX4000X6F40	●	2	240	247	277	342	40.0	50	1.45	SO**1360	TPS43	TIP15W
41.0	2	MVX4100X2F40	●	2	82	89	119	184	40.0	50	1.36	SO**1360	TPS43	TIP15W
41.0	3	MVX4100X3F40	●	2	123	130	160	225	40.0	50	1.36	SO**1360	TPS43	TIP15W
41.0	4	MVX4100X4F40	●	2	164	171	201	266	40.0	50	1.36	SO**1360	TPS43	TIP15W
41.0	5	MVX4100X5F40	●	2	205	212	242	307	40.0	50	1.36	SO**1360	TPS43	TIP15W
41.0	6	MVX4100X6F40	●	2	246	253	283	348	40.0	50	1.35	SO**1360	TPS43	TIP15W
42.0	2	MVX4200X2F40	●	2	84	91	121	186	40.0	50	1.27	SO**1360	TPS43	TIP15W
42.0	3	MVX4200X3F40	●	2	126	133	163	228	40.0	50	1.27	SO**1360	TPS43	TIP15W
42.0	4	MVX4200X4F40	●	2	168	175	205	270	40.0	63	1.27	SO**1360	TPS43	TIP15W
42.0	4	MVX4200X4F50	●	2	168	175	205	280	50.0	63	1.27	SO**1360	TPS43	TIP15W
42.0	5	MVX4200X5F40	●	2	210	217	247	312	40.0	63	1.27	SO**1360	TPS43	TIP15W
42.0	5	MVX4200X5F50	●	2	210	217	247	322	50.0	63	1.27	SO**1360	TPS43	TIP15W
42.0	6	MVX4200X6F40	●	2	252	259	289	354	40.0	63	1.27	SO**1360	TPS43	TIP15W
42.0	6	MVX4200X6F50	●	2	252	259	289	364	50.0	63	1.26	SO**1360	TPS43	TIP15W
43.0	2	MVX4300X2F40	●	2	86	93	123	188	40.0	50	1.18	SO**1360	TPS43	TIP15W
43.0	3	MVX4300X3F40	●	2	129	136	166	231	40.0	50	1.18	SO**1360	TPS43	TIP15W
43.0	4	MVX4300X4F40	●	2	172	179	209	274	40.0	63	1.18	SO**1360	TPS43	TIP15W
43.0	4	MVX4300X4F50	●	2	172	179	209	284	50.0	63	1.18	SO**1360	TPS43	TIP15W
43.0	5	MVX4300X5F40	●	2	215	222	252	317	40.0	63	1.18	SO**1360	TPS43	TIP15W
43.0	5	MVX4300X5F50	●	2	215	222	252	327	50.0	63	1.18	SO**1360	TPS43	TIP15W
43.0	6	MVX4300X6F40	●	2	258	265	295	360	40.0	63	1.17	SO**1360	TPS43	TIP15W
43.0	6	MVX4300X6F50	●	2	258	265	295	370	50.0	63	1.17	SO**1360	TPS43	TIP15W
44.0	2	MVX4400X2F40	●	2	88	95	125	190	40.0	50	1.08	SO**1360	TPS43	TIP15W

MVX

DC (mm)	Hole Depth(l/d)	Order Number	Stock	No. of Flutes	LU	LBX	LPR	OAL	DCON	DCSFMS	S10	Insert Number	Clamp Screw	Wrench
44.0	3	MVX4400X3F40	●	2	132	139	169	234	40.0	50	1.08	SO**1360	TPS43	TIP15W
44.0	4	MVX4400X4F40	●	2	176	183	213	278	40.0	63	1.08	SO**1360	TPS43	TIP15W
44.0	4	MVX4400X4F50	●	2	176	183	213	288	50.0	63	1.08	SO**1360	TPS43	TIP15W
44.0	5	MVX4400X5F40	●	2	220	227	257	322	40.0	63	1.08	SO**1360	TPS43	TIP15W
44.0	5	MVX4400X5F50	●	2	220	227	257	332	50.0	63	1.08	SO**1360	TPS43	TIP15W
45.0	2	MVX4500X2F40	●	2	90	97	127	192	40.0	50	0.99	SO**1360	TPS43	TIP15W
45.0	3	MVX4500X3F40	●	2	135	142	172	237	40.0	50	0.99	SO**1360	TPS43	TIP15W
45.0	4	MVX4500X4F40	●	2	180	187	217	282	40.0	63	0.99	SO**1360	TPS43	TIP15W
45.0	4	MVX4500X4F50	●	2	180	187	217	292	50.0	63	0.99	SO**1360	TPS43	TIP15W
45.0	5	MVX4500X5F40	●	2	225	232	262	327	40.0	63	0.99	SO**1360	TPS43	TIP15W
45.0	5	MVX4500X5F50	●	2	225	232	262	337	50.0	63	0.99	SO**1360	TPS43	TIP15W
46.0	2	MVX4600X2F40	●	2	92	99	129	194	40.0	50	0.89	SO**1360	TPS43	TIP15W
46.0	3	MVX4600X3F40	●	2	138	145	175	240	40.0	50	0.89	SO**1360	TPS43	TIP15W
46.0	4	MVX4600X4F40	●	2	184	191	221	286	40.0	63	0.89	SO**1360	TPS43	TIP15W
46.0	4	MVX4600X4F50	●	2	184	191	221	296	50.0	63	0.89	SO**1360	TPS43	TIP15W
46.0	5	MVX4600X5F40	●	2	230	237	267	332	40.0	63	0.89	SO**1360	TPS43	TIP15W
46.0	5	MVX4600X5F50	●	2	230	237	267	342	50.0	63	0.89	SO**1360	TPS43	TIP15W
47.0	2	MVX4700X2F40	●	2	94	101	141	206	40.0	63	1.90	SO**1665	TPS54	TIP25D
47.0	3	MVX4700X3F40	●	2	141	148	188	253	40.0	63	1.90	SO**1665	TPS54	TIP25D
47.0	4	MVX4700X4F40	●	2	188	195	235	300	40.0	63	1.90	SO**1665	TPS54	TIP25D
47.0	4	MVX4700X4F50	●	2	188	195	235	310	50.0	63	1.90	SO**1665	TPS54	TIP25D
47.0	5	MVX4700X5F40	●	2	235	242	282	347	40.0	63	1.90	SO**1665	TPS54	TIP25D
47.0	5	MVX4700X5F50	●	2	235	242	282	357	50.0	63	1.90	SO**1665	TPS54	TIP25D
48.0	2	MVX4800X2F40	●	2	96	103	143	208	40.0	63	1.80	SO**1665	TPS54	TIP25D
48.0	3	MVX4800X3F40	●	2	144	151	191	256	40.0	63	1.80	SO**1665	TPS54	TIP25D
48.0	4	MVX4800X4F40	●	2	192	199	239	304	40.0	63	1.80	SO**1665	TPS54	TIP25D
48.0	4	MVX4800X4F50	●	2	192	199	239	314	50.0	63	1.80	SO**1665	TPS54	TIP25D
48.0	5	MVX4800X5F40	●	2	240	247	287	352	40.0	63	1.80	SO**1665	TPS54	TIP25D
48.0	5	MVX4800X5F50	●	2	240	247	287	362	50.0	63	1.80	SO**1665	TPS54	TIP25D
49.0	2	MVX4900X2F40	●	2	98	105	145	210	40.0	63	1.70	SO**1665	TPS54	TIP25D
49.0	3	MVX4900X3F40	●	2	147	154	194	259	40.0	63	1.70	SO**1665	TPS54	TIP25D
49.0	4	MVX4900X4F40	●	2	196	203	243	308	40.0	63	1.70	SO**1665	TPS54	TIP25D
49.0	4	MVX4900X4F50	●	2	196	203	243	318	50.0	63	1.70	SO**1665	TPS54	TIP25D
49.0	5	MVX4900X5F40	●	2	245	252	292	357	40.0	63	1.70	SO**1665	TPS54	TIP25D
49.0	5	MVX4900X5F50	●	2	245	252	292	367	50.0	63	1.70	SO**1665	TPS54	TIP25D
50.0	2	MVX5000X2F40	●	2	100	107	147	212	40.0	63	1.60	SO**1665	TPS54	TIP25D
50.0	3	MVX5000X3F40	●	2	150	157	197	262	40.0	63	1.60	SO**1665	TPS54	TIP25D
50.0	4	MVX5000X4F40	●	2	200	207	247	312	40.0	63	1.60	SO**1665	TPS54	TIP25D
50.0	4	MVX5000X4F50	●	2	200	207	247	322	50.0	63	1.60	SO**1665	TPS54	TIP25D
50.0	5	MVX5000X5F40	●	2	250	257	297	362	40.0	63	1.60	SO**1665	TPS54	TIP25D
50.0	5	MVX5000X5F50	●	2	250	257	297	372	50.0	63	1.60	SO**1665	TPS54	TIP25D
51.0	2	MVX5100X2F40	●	2	102	109	149	214	40.0	63	1.50	SO**1665	TPS54	TIP25D
51.0	3	MVX5100X3F40	●	2	153	160	200	265	40.0	63	1.50	SO**1665	TPS54	TIP25D
51.0	4	MVX5100X4F40	●	2	204	211	251	316	40.0	63	1.50	SO**1665	TPS54	TIP25D
51.0	4	MVX5100X4F50	●	2	204	211	251	326	50.0	63	1.50	SO**1665	TPS54	TIP25D
51.0	5	MVX5100X5F40	●	2	255	262	302	367	40.0	63	1.50	SO**1665	TPS54	TIP25D
51.0	5	MVX5100X5F50	●	2	255	262	302	377	50.0	63	1.50	SO**1665	TPS54	TIP25D
52.0	2	MVX5200X2F40	●	2	104	111	151	216	40.0	63	1.39	SO**1665	TPS54	TIP25D
52.0	3	MVX5200X3F40	●	2	156	163	203	268	40.0	63	1.39	SO**1665	TPS54	TIP25D
52.0	4	MVX5200X4F40	●	2	208	215	255	320	40.0	63	1.39	SO**1665	TPS54	TIP25D
52.0	4	MVX5200X4F50	●	2	208	215	255	330	50.0	63	1.39	SO**1665	TPS54	TIP25D
52.0	5	MVX5200X5F40	●	2	260	267	307	372	40.0	63	1.39	SO**1665	TPS54	TIP25D

MVX

DC (mm)	Hole Depth(l/d)	Order Number	Stock	No. of Flutes	LU	LBX	LPR	OAL	DCON	DCSFMS	S10	Insert Number	Clamp Screw	Wrench
52.0	5	MVX5200X5F50	●	2	260	267	307	382	50.0	63	1.39	SO**1665	TPS54	TIP25D
53.0	2	MVX5300X2F40	●	2	106	113	153	218	40.0	63	1.29	SO**1665	TPS54	TIP25D
53.0	3	MVX5300X3F40	●	2	159	166	206	271	40.0	63	1.29	SO**1665	TPS54	TIP25D
53.0	4	MVX5300X4F40	●	2	212	219	259	324	40.0	63	1.29	SO**1665	TPS54	TIP25D
53.0	4	MVX5300X4F50	●	2	212	219	259	334	50.0	63	1.29	SO**1665	TPS54	TIP25D
53.0	5	MVX5300X5F40	●	2	265	272	312	377	40.0	63	1.29	SO**1665	TPS54	TIP25D
53.0	5	MVX5300X5F50	●	2	265	272	312	387	50.0	63	1.29	SO**1665	TPS54	TIP25D
54.0	2	MVX5400X2F40	●	2	108	115	155	220	40.0	63	1.19	SO**1665	TPS54	TIP25D
54.0	3	MVX5400X3F40	●	2	162	169	209	274	40.0	63	1.19	SO**1665	TPS54	TIP25D
54.0	4	MVX5400X4F40	●	2	216	223	263	328	40.0	63	1.19	SO**1665	TPS54	TIP25D
54.0	4	MVX5400X4F50	●	2	216	223	263	338	50.0	63	1.19	SO**1665	TPS54	TIP25D
54.0	5	MVX5400X5F40	●	2	270	277	317	382	40.0	63	1.19	SO**1665	TPS54	TIP25D
54.0	5	MVX5400X5F50	●	2	270	277	317	392	50.0	63	1.19	SO**1665	TPS54	TIP25D
55.0	2	MVX5500X2F40	●	2	110	117	157	222	40.0	63	1.08	SO**1665	TPS54	TIP25D
55.0	3	MVX5500X3F40	●	2	165	172	212	277	40.0	63	1.08	SO**1665	TPS54	TIP25D
55.0	4	MVX5500X4F40	●	2	220	227	267	332	40.0	63	1.08	SO**1665	TPS54	TIP25D
55.0	4	MVX5500X4F50	●	2	220	227	267	342	50.0	63	1.08	SO**1665	TPS54	TIP25D
55.0	5	MVX5500X5F40	●	2	275	282	322	387	40.0	63	1.08	SO**1665	TPS54	TIP25D
55.0	5	MVX5500X5F50	●	2	275	282	322	397	50.0	63	1.08	SO**1665	TPS54	TIP25D
56.0	2	MVX5600X2F40	●	2	112	119	159	224	40.0	63	0.98	SO**1665	TPS54	TIP25D
56.0	3	MVX5600X3F40	●	2	168	175	215	280	40.0	63	0.98	SO**1665	TPS54	TIP25D
56.0	4	MVX5600X4F40	●	2	224	231	271	336	40.0	63	0.98	SO**1665	TPS54	TIP25D
56.0	4	MVX5600X4F50	●	2	224	231	271	346	50.0	63	0.98	SO**1665	TPS54	TIP25D
56.0	5	MVX5600X5F40	●	2	280	287	327	392	40.0	63	0.98	SO**1665	TPS54	TIP25D
56.0	5	MVX5600X5F50	●	2	280	287	327	402	50.0	63	0.98	SO**1665	TPS54	TIP25D
57.0	2	MVX5700X2F40	●	2	114	121	161	226	40.0	68	1.47	SO**1870	TPS54	TIP25D
57.0	3	MVX5700X3F40	●	2	171	178	218	283	40.0	68	1.47	SO**1870	TPS54	TIP25D
57.0	4	MVX5700X4F40	●	2	228	235	275	340	40.0	68	1.47	SO**1870	TPS54	TIP25D
57.0	4	MVX5700X4F50	●	2	228	235	275	350	50.0	68	1.47	SO**1870	TPS54	TIP25D
57.0	5	MVX5700X5F40	●	2	285	292	332	397	40.0	68	1.47	SO**1870	TPS54	TIP25D
57.0	5	MVX5700X5F50	●	2	285	292	332	407	50.0	68	1.47	SO**1870	TPS54	TIP25D
58.0	2	MVX5800X2F40	●	2	116	123	163	228	40.0	68	1.37	SO**1870	TPS54	TIP25D
58.0	3	MVX5800X3F40	●	2	174	181	221	286	40.0	68	1.37	SO**1870	TPS54	TIP25D
58.0	4	MVX5800X4F40	●	2	232	239	279	344	40.0	68	1.37	SO**1870	TPS54	TIP25D
58.0	4	MVX5800X4F50	●	2	232	239	279	354	50.0	68	1.37	SO**1870	TPS54	TIP25D
58.0	5	MVX5800X5F40	●	2	290	297	337	402	40.0	68	1.37	SO**1870	TPS54	TIP25D
58.0	5	MVX5800X5F50	●	2	290	297	337	412	50.0	68	1.37	SO**1870	TPS54	TIP25D
59.0	2	MVX5900X2F40	●	2	118	125	165	230	40.0	68	1.26	SO**1870	TPS54	TIP25D
59.0	3	MVX5900X3F40	●	2	177	184	224	289	40.0	68	1.26	SO**1870	TPS54	TIP25D
59.0	4	MVX5900X4F40	●	2	236	243	283	348	40.0	68	1.26	SO**1870	TPS54	TIP25D
59.0	4	MVX5900X4F50	●	2	236	243	283	358	50.0	68	1.26	SO**1870	TPS54	TIP25D
59.0	5	MVX5900X5F40	●	2	295	302	342	407	40.0	68	1.26	SO**1870	TPS54	TIP25D
59.0	5	MVX5900X5F50	●	2	295	302	342	417	50.0	68	1.26	SO**1870	TPS54	TIP25D
60.0	2	MVX6000X2F40	●	2	120	127	167	232	40.0	68	1.16	SO**1870	TPS54	TIP25D
60.0	3	MVX6000X3F40	●	2	180	187	227	292	40.0	68	1.16	SO**1870	TPS54	TIP25D
60.0	4	MVX6000X4F40	●	2	240	247	287	352	40.0	68	1.16	SO**1870	TPS54	TIP25D
60.0	4	MVX6000X4F50	●	2	240	247	287	362	50.0	68	1.16	SO**1870	TPS54	TIP25D
60.0	5	MVX6000X5F40	●	2	300	307	347	412	40.0	68	1.16	SO**1870	TPS54	TIP25D
60.0	5	MVX6000X5F50	●	2	300	307	347	422	50.0	68	1.16	SO**1870	TPS54	TIP25D
61.0	2	MVX6100X2F40	●	2	122	129	169	234	40.0	68	1.05	SO**1870	TPS54	TIP25D
61.0	3	MVX6100X3F40	●	2	183	190	230	295	40.0	68	1.05	SO**1870	TPS54	TIP25D
61.0	4	MVX6100X4F40	●	2	244	251	291	356	40.0	68	1.05	SO**1870	TPS54	TIP25D

MVX

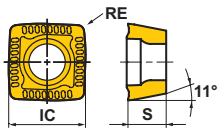
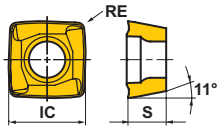
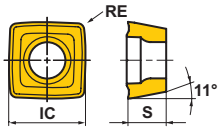
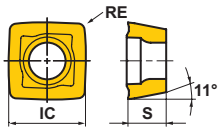
DC (mm)	Hole Depth(l/d)	Order Number	Stock	No. of Flutes	LU	LBX	LPR	OAL	DCON	DCSFMS	S10	Insert Number	Clamp Screw	Wrench
61.0	4	**MVX6100X4F50**	●	2	244	251	291	366	50.0	68	1.05	SO**1870	TPS54	TIP25D
61.0	5	**MVX6100X5F40**	●	2	305	312	352	417	40.0	68	1.05	SO**1870	TPS54	TIP25D
61.0	5	**MVX6100X5F50**	●	2	305	312	352	427	50.0	68	1.05	SO**1870	TPS54	TIP25D
62.0	2	**MVX6200X2F40**	●	2	124	131	171	236	40.0	68	0.95	SO**1870	TPS54	TIP25D
62.0	3	**MVX6200X3F40**	●	2	186	193	233	298	40.0	68	0.95	SO**1870	TPS54	TIP25D
62.0	4	**MVX6200X4F40**	●	2	248	255	295	360	40.0	68	0.95	SO**1870	TPS54	TIP25D
62.0	4	**MVX6200X4F50**	●	2	248	255	295	370	50.0	68	0.95	SO**1870	TPS54	TIP25D
62.0	5	**MVX6200X5F40**	●	2	310	317	357	422	40.0	68	0.95	SO**1870	TPS54	TIP25D
62.0	5	**MVX6200X5F50**	●	2	310	317	357	432	50.0	68	0.95	SO**1870	TPS54	TIP25D
63.0	2	**MVX6300X2F40**	●	2	126	133	173	238	40.0	68	0.85	SO**1870	TPS54	TIP25D
63.0	3	**MVX6300X3F40**	●	2	189	196	236	301	40.0	68	0.85	SO**1870	TPS54	TIP25D
63.0	4	**MVX6300X4F40**	●	2	252	259	299	364	40.0	68	0.85	SO**1870	TPS54	TIP25D
63.0	4	**MVX6300X4F50**	●	2	252	259	299	374	50.0	68	0.85	SO**1870	TPS54	TIP25D
63.0	5	**MVX6300X5F40**	●	2	315	322	362	427	40.0	68	0.85	SO**1870	TPS54	TIP25D
63.0	5	**MVX6300X5F50**	●	2	315	322	362	437	50.0	68	0.85	SO**1870	TPS54	TIP25D

- Tighten the clamp screw according to the torque below.
- Clamp Torque(N • m) : TPS25=1.0, TPS3=2.0, TPS351=2.5, TPS4=3.5, TPS43=3.5, TPS54=7.5

MVX

INSERTS

(mm)

Shape	Drill Dia.	Insert Number	IC	S	RE	Stock MC5020	Stock MC1020	Stock VP15TF	Stock DP8020	Stock TF15	Geometry
UM	ø17—ø19.5	**SOMX063005-UM**	6.0	3.0	0.5	●	●	●			
	ø20—ø22.5	**SOMX073505-UM**	7.0	3.5	0.5	●	●	●			
	ø23—ø27.5	**SOMX084005-UM**	8.3	4.0	0.5	●	●	●			
	ø28—ø33	**SOMX094506-UM**	9.7	4.5	0.6	●	●	●			
	ø33.5—ø39	**SOMX115506-UM**	11.6	5.5	0.6	●	●	●			
	ø40—ø46	**SOMX136008-UM**	13.8	6.0	0.8	●	●	●			
	ø47—ø56	**SOMX166508-UM**	16.5	6.5	0.8	●	●	●			
General Purpose	ø57—ø63	**SOMX187008-UM**	18.2	7.0	0.8	●	●	●			
US	ø17—ø19.5	**SOMX063005-US**	6.0	3.0	0.5			●			
	ø20—ø22.5	**SOMX073505-US**	7.0	3.5	0.5			●			
	ø23—ø27.5	**SOMX084005-US**	8.3	4.0	0.5			●			
	ø28—ø33	**SOMX094506-US**	9.7	4.5	0.6			●			
	ø33.5—ø39	**SOMX115506-US**	11.6	5.5	0.6			●			
	ø40—ø46	**SOMX136008-US**	13.8	6.0	0.8			●			
	ø47—ø56	**SOMX166508-US**	16.5	6.5	0.8			●			
For Stainless Steel and Inner Edge	ø57—ø63	**SOMX187008-US**	18.2	7.0	0.8			●			
UH	ø17—ø19.5	**SOMX062905-UH**	6.0	2.9	0.5				●		
	ø20—ø22.5	**SOMX073405-UH**	7.0	3.4	0.5				●		
	ø23—ø27.5	**SOMX083905-UH**	8.3	3.9	0.5				●		
	ø28—ø33	**SOMX094406-UH**	9.7	4.4	0.6				●		
	ø33.5—ø39	**SOMX115406-UH**	11.6	5.4	0.6				●		
	ø40—ø46	**SOMX135908-UH**	13.8	5.9	0.8				●		
	ø47—ø56	**SOMX166408-UH**	16.5	6.4	0.8				●		
Strong Cutting Edge Type and Inner Edge	ø57—ø63	**SOMX186908-UH**	18.2	6.9	0.8				●		
UN	ø17—ø19.5	**SOGX063005-UN**	6.0	3.0	0.5					●	
	ø20—ø22.5	**SOGX073505-UN**	7.0	3.5	0.5					●	
	ø23—ø27.5	**SOGX084005-UN**	8.3	4.0	0.5					●	
	ø28—ø33	**SOGX094506-UN**	9.7	4.5	0.6					●	
	ø33.5—ø39	**SOGX115506-UN**	11.6	5.5	0.6					●	
	ø40—ø46	**SOGX136008-UN**	13.8	6.0	0.8					●	
	ø47—ø56	**SOGX166508-UN**	16.5	6.5	0.8					●	
For Aluminum Alloy	ø57—ø63	**SOGX187008-UN**	18.2	7.0	0.8					●	

*MC1020 and MC5020 are made exclusively for use as an outer insert.

INSERT RECOMMENDATION

		1st Recommendation		When outer insert fractures	
		Outer Insert	Inner Insert	Outer Insert	Inner Insert
P	Breaker	**UM**	**UM**	**UM**	**UM**
	Grade	**MC1020**	**VP15TF**	**VP15TF**	**VP15TF**
M	Breaker	**UM**	**US**	**UM**	**US**
	Grade	**MC1020**	**VP15TF**	**VP15TF**	**VP15TF**
K	Breaker	**UM**	**UM**	**UM**	**UM**
	Grade	**MC5020**	**VP15TF**	**VP15TF**	**VP15TF**
H	Breaker	**UM**	**UH**	**UM**	**UH**
	Grade	**MC1020**	**DP8020**	**VP15TF**	**DP8020**
N	Breaker	**UN**	**UN**		
	Grade	**TF15**	**TF15**		

MVX

vc = Cutting Speed (Min.–Max.)
fr = Feed Rate (Min.–Max.)

RECOMMENDED CUTTING CONDITIONS

(mm)

	Work material	Hardness	vc (m/min)	Inner Breaker	ϕ17–ϕ19.5 fr (mm/rev)			
			l/d=2–6		l/d=2, 3	l/d=4	l/d=5	l/d=6
P	Mild Steel	≤180HB	200 (180–235)	UM	0.05 (0.04–0.06)	0.05 (0.04–0.06)	0.05 (0.04–0.06)	0.04 (0.04–0.05)
				UH				
	Carbon Steel,Alloy Steel	180–280HB	140 (115–180)	UM	0.08 (0.06–0.14)	0.08 (0.06–0.09)	0.08 (0.06–0.09)	0.05 (0.04–0.06)
				UH				
	Carbon Steel,Alloy Steel	280–350HB	100 (75–140)	UM	0.08 (0.06–0.14)	0.08 (0.06–0.09)	0.08 (0.06–0.09)	0.05 (0.04–0.06)
				UH				
	Alloy Tool Steel	≤350HB	135 (100–170)	UM	0.08 (0.06–0.14)	0.08 (0.06–0.09)	0.08 (0.06–0.09)	0.05 (0.04–0.06)
				UH				
M	Austenitic Stainless Steel	≤200HB	130 (80–180)	US	0.08 (0.06–0.12)	0.06 (0.04–0.08)	0.06 (0.04–0.08)	0.05 (0.04–0.06)
				UM	0.06 (0.04–0.08)	0.05 (0.04–0.06)	0.05 (0.04–0.06)	0.04 (0.04–0.05)
	Austenitic Stainless Steel	>200HB	130 (80–180)	US	0.08 (0.06–0.12)	0.06 (0.04–0.08)	0.06 (0.04–0.08)	0.05 (0.04–0.06)
				UM	0.06 (0.04–0.08)	0.05 (0.04–0.06)	0.05 (0.04–0.06)	0.04 (0.04–0.05)
	Ferritic and Martensitic Stainless Steel	≤200HB	120 (80–165)	US	0.08 (0.06–0.12)	0.06 (0.04–0.08)	0.06 (0.04–0.08)	0.05 (0.04–0.06)
				UM	0.06 (0.04–0.08)	0.05 (0.04–0.06)	0.05 (0.04–0.06)	0.04 (0.04–0.05)
	Ferritic and Martensitic Stainless Steel	>200HB	120 (80–165)	US	0.08 (0.06–0.12)	0.06 (0.04–0.08)	0.06 (0.04–0.08)	0.05 (0.04–0.06)
				UM	0.06 (0.04–0.08)	0.05 (0.04–0.06)	0.05 (0.04–0.06)	0.04 (0.04–0.05)
K	Gray Cast Iron	Tensile Strength ≤350MPa	160 (130–195)	UM	0.11 (0.08–0.14)	0.09 (0.08–0.10)	0.09 (0.08–0.10)	0.05 (0.04–0.06)
	Ductile Cast Iron	Tensile Strength ≤450MPa	100 (80–135)	UM	0.11 (0.08–0.14)	0.09 (0.08–0.10)	0.09 (0.08–0.10)	0.05 (0.04–0.06)
	Ductile Cast Iron	Tensile Strength ≤800MPa	100 (70–125)	UM	0.11 (0.08–0.14)	0.09 (0.08–0.10)	0.09 (0.08–0.10)	0.05 (0.04–0.06)
N	Aluminium Alloy	Si<5%	200 (100–350)	UN	0.12 (0.05–0.18)	0.12 (0.05–0.18)	0.12 (0.05–0.18)	0.08 (0.05–0.12)
	Aluminium Alloy	5%≤Si≤10%	150 (100–200)	UN	0.12 (0.05–0.18)	0.12 (0.05–0.18)	0.12 (0.05–0.18)	0.08 (0.05–0.12)
	Aluminium Alloy	Si>10%	150 (100–200)	UN	0.12 (0.05–0.18)	0.12 (0.05–0.18)	0.12 (0.05–0.18)	0.08 (0.05–0.12)
H	Hardened Steel	38–45HRC	50 (30–80)	UH	0.08 (0.04–0.12)	0.06 (0.04–0.09)	–	–

Note 1) Reduce the cutting speed by 30% when VP15TF is used as an outer insert.
Note 2) L/D=3 is the recommended maximum depth when only external coolant is used.
Note 3) Internal through coolant is highly necessary when drilling stainless steel.

MVX

vc = Cutting Speed (Min.–Max.)
fr = Feed Rate (Min.–Max.)

RECOMMENDED CUTTING CONDITIONS

(mm)

ϕ20–ϕ23.5				ϕ24–ϕ29.5				ϕ30–ϕ63			
fr (mm/rev)				**fr** (mm/rev)				**fr** (mm/rev)			
l/d=2, 3	l/d=4	l/d=5	l/d=6	l/d=2, 3	l/d=4	l/d=5	l/d=6	l/d=2, 3	l/d=4	l/d=5	l/d=6
0.06 (0.04–0.08)	0.06 (0.04–0.07)	0.06 (0.04–0.07)	0.04 (0.04–0.05)	0.07 (0.04–0.08)	0.06 (0.04–0.07)	0.06 (0.04–0.07)	0.05 (0.04–0.06)	0.08 (0.06–0.10)	0.07 (0.06–0.08)	0.07 (0.06–0.08)	0.06 (0.06–0.07)
0.10 (0.06–0.18)	0.09 (0.06–0.12)	0.09 (0.06–0.12)	0.07 (0.06–0.08)	0.12 (0.08–0.18)	0.10 (0.08–0.12)	0.10 (0.08–0.12)	0.09 (0.08–0.10)	0.14 (0.08–0.20)	0.12 (0.08–0.16)	0.12 (0.08–0.16)	0.11 (0.10–0.12)
0.10 (0.06–0.18)	0.09 (0.06–0.12)	0.09 (0.06–0.12)	0.07 (0.06–0.08)	0.12 (0.08–0.18)	0.10 (0.08–0.12)	0.10 (0.08–0.12)	0.09 (0.08–0.10)	0.14 (0.08–0.20)	0.12 (0.08–0.16)	0.12 (0.08–0.16)	0.11 (0.10–0.12)
0.10 (0.06–0.18)	0.09 (0.06–0.12)	0.09 (0.06–0.12)	0.07 (0.06–0.08)	0.12 (0.08–0.18)	0.10 (0.08–0.12)	0.10 (0.08–0.12)	0.09 (0.08–0.10)	0.14 (0.08–0.20)	0.12 (0.08–0.16)	0.12 (0.08–0.16)	0.10 (0.08–0.12)
0.10 (0.06–0.14)	0.07 (0.06–0.08)	0.07 (0.06–0.08)	0.06 (0.06–0.07)	0.10 (0.06–0.14)	0.08 (0.06–0.10)	0.08 (0.06–0.10)	0.07 (0.06–0.08)	0.10 (0.06–0.14)	0.09 (0.06–0.12)	0.09 (0.06–0.12)	0.07 (0.06–0.10)
0.08 (0.06–0.12)	0.07 (0.06–0.08)	0.07 (0.06–0.08)	0.06 (0.06–0.07)	0.09 (0.06–0.12)	0.07 (0.06–0.09)	0.07 (0.06–0.09)	0.06 (0.06–0.08)	0.09 (0.06–0.12)	0.08 (0.06–0.10)	0.08 (0.06–0.10)	0.07 (0.06–0.08)
0.10 (0.06–0.14)	0.07 (0.06–0.08)	0.07 (0.06–0.08)	0.06 (0.06–0.07)	0.10 (0.06–0.14)	0.08 (0.06–0.10)	0.08 (0.06–0.10)	0.07 (0.06–0.08)	0.10 (0.06–0.14)	0.09 (0.06–0.12)	0.09 (0.06–0.12)	0.07 (0.06–0.10)
0.08 (0.06–0.12)	0.07 (0.06–0.08)	0.07 (0.06–0.08)	0.06 (0.06–0.07)	0.09 (0.06–0.12)	0.07 (0.06–0.09)	0.07 (0.06–0.09)	0.06 (0.06–0.08)	0.09 (0.06–0.12)	0.08 (0.06–0.10)	0.08 (0.06–0.10)	0.07 (0.06–0.08)
0.10 (0.06–0.14)	0.07 (0.06–0.08)	0.07 (0.06–0.08)	0.06 (0.06–0.07)	0.10 (0.06–0.14)	0.08 (0.06–0.10)	0.08 (0.06–0.10)	0.07 (0.06–0.08)	0.10 (0.06–0.14)	0.09 (0.06–0.12)	0.09 (0.06–0.12)	0.07 (0.06–0.10)
0.08 (0.06–0.12)	0.07 (0.06–0.08)	0.07 (0.06–0.08)	0.06 (0.06–0.07)	0.09 (0.06–0.12)	0.07 (0.06–0.09)	0.07 (0.06–0.09)	0.06 (0.06–0.08)	0.09 (0.06–0.12)	0.08 (0.06–0.10)	0.08 (0.06–0.10)	0.07 (0.06–0.08)
0.10 (0.06–0.14)	0.07 (0.06–0.08)	0.07 (0.06–0.08)	0.06 (0.06–0.07)	0.10 (0.06–0.14)	0.08 (0.06–0.10)	0.08 (0.06–0.10)	0.07 (0.06–0.08)	0.10 (0.06–0.14)	0.09 (0.06–0.12)	0.09 (0.06–0.12)	0.07 (0.06–0.10)
0.08 (0.06–0.12)	0.07 (0.06–0.08)	0.07 (0.06–0.08)	0.06 (0.06–0.07)	0.09 (0.06–0.12)	0.07 (0.06–0.09)	0.07 (0.06–0.09)	0.06 (0.06–0.08)	0.09 (0.06–0.12)	0.08 (0.06–0.10)	0.08 (0.06–0.10)	0.07 (0.06–0.08)
0.14 (0.10–0.18)	0.10 (0.10–0.12)	0.10 (0.10–0.12)	0.07 (0.06–0.08)	0.15 (0.10–0.20)	0.11 (0.10–0.13)	0.11 (0.10–0.13)	0.09 (0.08–0.10)	0.15 (0.10–0.20)	0.12 (0.10–0.13)	0.12 (0.10–0.13)	0.11 (0.10–0.12)
0.13 (0.10–0.16)	0.10 (0.10–0.11)	0.10 (0.10–0.11)	0.07 (0.06–0.08)	0.14 (0.10–0.18)	0.11 (0.10–0.12)	0.11 (0.10–0.12)	0.09 (0.08–0.10)	0.15 (0.10–0.20)	0.12 (0.10–0.13)	0.12 (0.10–0.13)	0.11 (0.10–0.12)
0.13 (0.10–0.16)	0.10 (0.10–0.11)	0.10 (0.10–0.11)	0.07 (0.06–0.08)	0.14 (0.10–0.18)	0.11 (0.10–0.12)	0.11 (0.10–0.12)	0.09 (0.08–0.10)	0.15 (0.10–0.20)	0.12 (0.10–0.13)	0.12 (0.10–0.13)	0.11 (0.10–0.12)
0.12 (0.05–0.18)	0.12 (0.05–0.18)	0.12 (0.05–0.18)	0.08 (0.05–0.12)	0.12 (0.05–0.18)	0.12 (0.05–0.18)	0.12 (0.05–0.18)	0.08 (0.05–0.12)	0.12 (0.05–0.20)	0.12 (0.05–0.18)	0.12 (0.05–0.18)	0.08 (0.05–0.12)
0.12 (0.05–0.18)	0.12 (0.05–0.18)	0.12 (0.05–0.18)	0.08 (0.05–0.12)	0.12 (0.05–0.18)	0.12 (0.05–0.18)	0.12 (0.05–0.18)	0.08 (0.05–0.12)	0.12 (0.05–0.20)	0.12 (0.05–0.18)	0.12 (0.05–0.18)	0.08 (0.05–0.12)
0.12 (0.05–0.18)	0.12 (0.05–0.18)	0.12 (0.05–0.18)	0.08 (0.05–0.12)	0.12 (0.05–0.18)	0.12 (0.05–0.18)	0.12 (0.05–0.18)	0.08 (0.05–0.12)	0.12 (0.05–0.20)	0.12 (0.05–0.18)	0.12 (0.05–0.18)	0.08 (0.05–0.12)
0.09 (0.06–0.14)	0.07 (0.06–0.09)	–	–	0.09 (0.06–0.14)	0.07 (0.06–0.09)	–	–	0.11 (0.06–0.16)	0.09 (0.06–0.012)	–	–

Note 1) Reduce the cutting speed by 30% when VP15TF is used as an outer insert.
Note 2) L/D=3 is the recommended maximum depth when only external coolant is used.
Note 3) Internal through coolant is highly necessary when drilling stainless steel.

TAF

TAF DRILLS SERIES

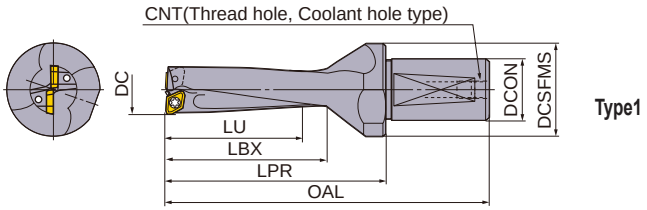
Indexable Drill

Product Information

Work Material

P M K

SPARE PARTS >> 1927 TECHNICAL DATA >> 1997 ISO13399 Property >> 1966 SYMBOL DESCRIPTIONS >> 1623



- A screw hole on the flange section is not a coolant hole.

●Inventory maintained in Japan. Unit:mm

DC (mm)	Hole Depth(l/d)	Order Number	Stock	No. of Flutes	LU	LBX	LPR	OAL	DCON	DCSFMS	CNT	Insert Number	Clamp Screw	Wrench
12.0	2	TAFS1200F20	●	2	24	29	39	82.0	20.0	25	PT1/8	GC**0402	TS2	TKY06F
12.0	3	TAFM1200F20	●	2	36	41	51	94.0	20.0	25	PT1/8	GC**0402	TS2	TKY06F
12.5	2	TAFS1250F20	●	2	25	29	39	82.0	20.0	25	PT1/8	GC**0402	TS2	TKY06F
12.5	3	TAFM1250F20	●	2	37.5	41	51	94.0	20.0	25	PT1/8	GC**0402	TS2	TKY06F
13.0	2	TAFS1300F20	●	2	26	31	41	84.0	20.0	25	PT1/8	GC**0402	TS2	TKY06F
13.0	3	TAFM1300F20	●	2	39	44	54	97.0	20.0	25	PT1/8	GC**0402	TS2	TKY06F
13.5	2	TAFS1350F20	●	2	27	31	41	84.0	20.0	25	PT1/8	GC**0402	TS2	TKY06F
13.5	3	TAFM1350F20	●	2	40.5	44	54	97.0	20.0	25	PT1/8	GC**0402	TS2	TKY06F
14.0	2	TAFS1400F20	●	2	28	33	43	86.0	20.0	25	PT1/8	GC**0402	TS2	TKY06F
14.0	3	TAFM1400F20	●	2	42	47	57	100.0	20.0	25	PT1/8	GC**0402	TS2	TKY06F
14.5	2	TAFS1450F20	●	2	29	33	43	86.0	20.0	25	PT1/8	GC**0402	TS2	TKY06F
14.5	3	TAFM1450F20	●	2	43.5	47	57	100.0	20.0	25	PT1/8	GC**0402	TS2	TKY06F
15.0	2	TAFS1500F20	●	2	30	35	45	88.0	20.0	25	PT1/8	GP**0602	TS2	TKY06F
15.0	3	TAFM1500F20	●	2	45	50	60	103.0	20.0	25	PT1/8	GP**0602	TS2	TKY06F
15.5	2	TAFS1550F20	●	2	31	35	45	88.0	20.0	25	PT1/8	GP**0602	TS2	TKY06F
15.5	3	TAFM1550F20	●	2	46.5	50	60	103.0	20.0	25	PT1/8	GP**0602	TS2	TKY06F
16.0	2	TAFS1600F25	●	2	32	38	57	107.0	25.0	35	PT1/8	GP**0602	TS2	TKY06F
16.0	3	TAFM1600F25	●	2	48	54	73	123.0	25.0	35	PT1/8	GP**0602	TS2	TKY06F
16.0	4	TAFL1600F25	●	2	64	70	89	139.0	25.0	35	PT1/8	GP**0602	TS2	TKY06F
16.5	2	TAFS1650F25	●	2	33	38	57	107.0	25.0	35	PT1/8	GP**0602	TS2	TKY06F
16.5	3	TAFM1650F25	●	2	49.5	54	73	123.0	25.0	35	PT1/8	GP**0602	TS2	TKY06F
17.0	2	TAFS1700F25	●	2	34	41	59	109.0	25.0	35	PT1/8	GP**0602	TS2	TKY06F
17.0	3	TAFM1700F25	●	2	51	58	76	126.0	25.0	35	PT1/8	GP**0602	TS2	TKY06F
17.0	4	TAFL1700F25	●	2	68	75	93	143.0	25.0	35	PT1/8	GP**0602	TS2	TKY06F
17.5	2	TAFS1750F25	●	2	35	41	59	109.0	25.0	35	PT1/8	GP**0602	TS2	TKY06F
17.5	3	TAFM1750F25	●	2	52.5	58	76	126.0	25.0	35	PT1/8	GP**0602	TS2	TKY06F
18.0	2	TAFS1800F25	●	2	36	43	61	111.0	25.0	35	PT1/8	GP**0702	TS25	TKY08F
18.0	3	TAFM1800F25	●	2	54	61	79	129.0	25.0	35	PT1/8	GP**0702	TS25	TKY08F
18.0	4	TAFL1800F25	●	2	72	79	97	147.0	25.0	35	PT1/8	GP**0702	TS25	TKY08F
18.5	2	TAFS1850F25	●	2	37	43	61	111.0	25.0	35	PT1/8	GP**0702	TS25	TKY08F
18.5	3	TAFM1850F25	●	2	55.5	61	79	129.0	25.0	35	PT1/8	GP**0702	TS25	TKY08F
19.0	2	TAFS1900F25	●	2	38	46	63	113.0	25.0	35	PT1/8	GP**0702	TS25	TKY08F

TAF

DC (mm)	Hole Depth(l/d)	Order Number	Stock	No. of Flutes	LU	LBX	LPR	OAL	DCON	DCSFMS	CNT	Insert Number	Clamp Screw	Wrench
19.0	3	TAFM1900F25	●	2	57	65	82	132.0	25.0	35	PT1/8	GP**0702	TS25	TKY08F
19.0	4	TAFL1900F25	●	2	76	84	101	151.0	25.0	35	PT1/8	GP**0702	TS25	TKY08F
19.5	2	TAFS1950F25	●	2	39	46	63	113.0	25.0	35	PT1/8	GP**0702	TS25	TKY08F
19.5	3	TAFM1950F25	●	2	58.5	65	82	132.0	25.0	35	PT1/8	GP**0702	TS25	TKY08F
20.0	2	TAFS2000F25	●	2	40	48	65	115.0	25.0	35	PT1/8	GP**0702	TS25	TKY08F
20.0	3	TAFM2000F25	●	2	60	68	85	135.0	25.0	35	PT1/8	GP**0702	TS25	TKY08F
20.0	4	TAFL2000F25	●	2	80	88	105	155.0	25.0	35	PT1/8	GP**0702	TS25	TKY08F
20.5	2	TAFS2050F25	●	2	41	48	65	115.0	25.0	35	PT1/8	GP**0702	TS25	TKY08F
20.5	3	TAFM2050F25	●	2	61.5	68	85	135.0	25.0	35	PT1/8	GP**0702	TS25	TKY08F
21.0	2	TAFS2100F25	●	2	42	50	67	117.0	25.0	35	PT1/8	GP**0702	TS25	TKY08F
21.0	3	TAFM2100F25	●	2	63	71	88	138.0	25.0	35	PT1/8	GP**0702	TS25	TKY08F
21.0	4	TAFL2100F25	●	2	84	92	109	159.0	25.0	35	PT1/8	GP**0702	TS25	TKY08F
21.5	2	TAFS2150F25	●	2	43	50	67	117.0	25.0	35	PT1/8	GP**0702	TS25	TKY08F
21.5	3	TAFM2150F25	●	2	64.5	71	88	138.0	25.0	35	PT1/8	GP**0702	TS25	TKY08F
22.0	2	TAFS2200F25	●	2	44	53	69	119.0	25.0	35	PT1/8	GP**0702	TS25	TKY08F
22.0	3	TAFM2200F25	●	2	66	75	91	141.0	25.0	35	PT1/8	GP**0702	TS25	TKY08F
22.0	4	TAFL2200F25	●	2	88	97	113	163.0	25.0	35	PT1/8	GP**0702	TS25	TKY08F
22.5	2	TAFS2250F25	●	2	45	53	69	119.0	25.0	35	PT1/8	GP**0702	TS25	TKY08F
22.5	3	TAFM2250F25	●	2	67.5	75	91	141.0	25.0	35	PT1/8	GP**0702	TS25	TKY08F
23.0	2	TAFS2300F25	●	2	46	55	71	121.0	25.0	35	PT1/8	GP**0903	TS3	TKY08F
23.0	3	TAFM2300F25	●	2	69	78	94	144.0	25.0	35	PT1/8	GP**0903	TS3	TKY08F
23.0	4	TAFL2300F25	●	2	92	101	117	167.0	25.0	35	PT1/8	GP**0903	TS3	TKY08F
23.5	2	TAFS2350F25	●	2	47	55	71	121.0	25.0	35	PT1/8	GP**0903	TS3	TKY08F
23.5	3	TAFM2350F25	●	2	70.5	78	94	144.0	25.0	35	PT1/8	GP**0903	TS3	TKY08F
24.0	2	TAFS2400F25	●	2	48	58	73	123.0	25.0	35	PT1/8	GP**0903	TS3	TKY08F
24.0	3	TAFM2400F25	●	2	72	82	97	147.0	25.0	35	PT1/8	GP**0903	TS3	TKY08F
24.0	4	TAFL2400F25	●	2	96	106	121	171.0	25.0	35	PT1/8	GP**0903	TS3	TKY08F
24.5	2	TAFS2450F25	●	2	49	58	73	123.0	25.0	35	PT1/8	GP**0903	TS3	TKY08F
24.5	3	TAFM2450F25	●	2	73.5	82	97	147.0	25.0	35	PT1/8	GP**0903	TS3	TKY08F
25.0	2	TAFS2500F32	●	2	50	60	75	130.0	32.0	42	PT1/8	GP**0903	TS3	TKY08F
25.0	3	TAFM2500F32	●	2	75	85	100	155.0	32.0	42	PT1/8	GP**0903	TS3	TKY08F
25.0	4	TAFL2500F32	●	2	100	110	125	180.0	32.0	42	PT1/8	GP**0903	TS3	TKY08F
25.5	2	TAFS2550F32	●	2	51	60	75	130.0	32.0	42	PT1/8	GP**0903	TS3	TKY08F
25.5	3	TAFM2550F32	●	2	76.5	85	100	155.0	32.0	42	PT1/8	GP**0903	TS3	TKY08F
26.0	2	TAFS2600F32	●	2	52	62	77	132.0	32.0	42	PT1/8	GP**0903	TS3	TKY08F
26.0	3	TAFM2600F32	●	2	78	88	103	158.0	32.0	42	PT1/8	GP**0903	TS3	TKY08F
26.0	4	TAFL2600F32	●	2	104	114	129	184.0	32.0	42	PT1/8	GP**0903	TS3	TKY08F
26.5	2	TAFS2650F32	●	2	53	62	77	132.0	32.0	42	PT1/8	GP**0903	TS3	TKY08F
26.5	3	TAFM2650F32	●	2	79.5	88	103	158.0	32.0	42	PT1/8	GP**0903	TS3	TKY08F
27.0	2	TAFS2700F32	●	2	54	65	79	134.0	32.0	42	PT1/8	GP**0903	TS3	TKY08F
27.0	3	TAFM2700F32	●	2	81	92	106	161.0	32.0	42	PT1/8	GP**0903	TS3	TKY08F
27.0	4	TAFL2700F32	●	2	108	119	133	188.0	32.0	42	PT1/8	GP**0903	TS3	TKY08F
27.5	2	TAFS2750F32	●	2	55	65	79	134.0	32.0	42	PT1/8	GP**0903	TS3	TKY08F
27.5	3	TAFM2750F32	●	2	82.5	92	106	161.0	32.0	42	PT1/8	GP**0903	TS3	TKY08F
28.0	2	TAFS2800F32	●	2	56	67	81	136.0	32.0	42	PT1/8	GP**11T3	TS4	TKY15D
28.0	3	TAFM2800F32	●	2	84	95	109	164.0	32.0	42	PT1/8	GP**11T3	TS4	TKY15D
28.0	4	TAFL2800F32	●	2	112	123	137	192.0	32.0	42	PT1/8	GP**11T3	TS4	TKY15D
28.5	2	TAFS2850F32	●	2	57	67	81	136.0	32.0	42	PT1/8	GP**11T3	TS4	TKY15D
28.5	3	TAFM2850F32	●	2	85.5	95	109	164.0	32.0	42	PT1/8	GP**11T3	TS4	TKY15D
29.0	2	TAFS2900F32	●	2	58	70	83	138.0	32.0	42	PT1/8	GP**11T3	TS4	TKY15D
29.0	3	TAFM2900F32	●	2	87	99	112	167.0	32.0	42	PT1/8	GP**11T3	TS4	TKY15D

TAF

DC (mm)	Hole Depth(l/d)	Order Number	Stock	No. of Flutes	LU	LBX	LPR	OAL	DCON	DCSFMS	CNT	Insert Number	Clamp Screw	Wrench
29.0	4	TAFL2900F32	●	2	116	128	141	196.0	32.0	42	PT1/8	GP**11T3	TS4	TKY15D
29.5	2	TAFS2950F32	●	2	59	70	83	138.0	32.0	42	PT1/8	GP**11T3	TS4	TKY15D
29.5	3	TAFM2950F32	●	2	88.5	99	112	167.0	32.0	42	PT1/8	GP**11T3	TS4	TKY15D
30.0	2	TAFS3000F40	●	2	60	72	90	155.0	40.0	50	PT1/4	GP**11T3	TS4	TKY15D
30.0	3	TAFM3000F40	●	2	90	102	120	185.0	40.0	50	PT1/4	GP**11T3	TS4	TKY15D
30.0	4	TAFL3000F40	●	2	120	132	150	215.0	40.0	50	PT1/4	GP**11T3	TS4	TKY15D
31.0	2	TAFS3100F40	●	2	62	74	92	157.0	40.0	50	PT1/4	GP**11T3	TS4	TKY15D
31.0	3	TAFM3100F40	●	2	93	105	123	188.0	40.0	50	PT1/4	GP**11T3	TS4	TKY15D
31.0	4	TAFL3100F40	●	2	124	136	154	219.0	40.0	50	PT1/4	GP**11T3	TS4	TKY15D
32.0	2	TAFS3200F40	●	2	64	77	94	159.0	40.0	50	PT1/4	GP**11T3	TS4	TKY15D
32.0	3	TAFM3200F40	●	2	96	109	126	191.0	40.0	50	PT1/4	GP**11T3	TS4	TKY15D
32.0	4	TAFL3200F40	●	2	128	141	158	223.0	40.0	50	PT1/4	GP**11T3	TS4	TKY15D
33.0	2	TAFS3300F40	●	2	66	79	96	161.0	40.0	50	PT1/4	GP**11T3	TS4	TKY15D
33.0	3	TAFM3300F40	●	2	99	112	129	194.0	40.0	50	PT1/4	GP**11T3	TS4	TKY15D
33.0	4	TAFL3300F40	●	2	132	145	162	227.0	40.0	50	PT1/4	GP**11T3	TS4	TKY15D
34.0	2	TAFS3400F40	●	2	68	82	98	163.0	40.0	50	PT1/4	GP**11T3	TS4	TKY15D
34.0	3	TAFM3400F40	●	2	102	116	132	197.0	40.0	50	PT1/4	GP**11T3	TS4	TKY15D
34.0	4	TAFL3400F40	●	2	136	150	166	231.0	40.0	50	PT1/4	GP**11T3	TS4	TKY15D
35.0	2	TAFS3500F40	●	2	70	84	100	165.0	40.0	50	PT1/4	GP**1404	TS55	TKY25D
35.0	3	TAFM3500F40	●	2	105	119	135	200.0	40.0	50	PT1/4	GP**1404	TS55	TKY25D
36.0	2	TAFS3600F40	●	2	72	86	102	167.0	40.0	50	PT1/4	GP**1404	TS55	TKY25D
36.0	3	TAFM3600F40	●	2	108	122	138	203.0	40.0	50	PT1/4	GP**1404	TS55	TKY25D
37.0	2	TAFS3700F40	●	2	74	89	104	169.0	40.0	50	PT1/4	GP**1404	TS55	TKY25D
37.0	3	TAFM3700F40	●	2	111	126	141	206.0	40.0	50	PT1/4	GP**1404	TS55	TKY25D
38.0	2	TAFS3800F40	●	2	76	91	106	171.0	40.0	50	PT1/4	GP**1404	TS55	TKY25D
38.0	3	TAFM3800F40	●	2	114	129	144	209.0	40.0	50	PT1/4	GP**1404	TS55	TKY25D
39.0	2	TAFS3900F40	●	2	78	94	108	173.0	40.0	50	PT1/4	GP**1404	TS55	TKY25D
39.0	3	TAFM3900F40	●	2	117	133	147	212.0	40.0	50	PT1/4	GP**1404	TS55	TKY25D
40.0	2	TAFS4000F40	●	2	80	96	110	175.0	40.0	50	PT1/4	GP**1404	TS55	TKY25D
40.0	3	TAFM4000F40	●	2	120	136	150	215.0	40.0	50	PT1/4	GP**1404	TS55	TKY25D
41.0	2	TAFS4100F40	●	2	82	98	112	177.0	40.0	50	PT1/4	GP**1404	TS55	TKY25D
41.0	3	TAFM4100F40	●	2	123	139	153	218.0	40.0	50	PT1/4	GP**1404	TS55	TKY25D
42.0	2	TAFS4200F40	●	2	84	101	114	179.0	40.0	50	PT1/4	GP**1404	TS55	TKY25D
42.0	3	TAFM4200F40	●	2	126	143	156	221.0	40.0	50	PT1/4	GP**1404	TS55	TKY25D
43.0	2	TAFS4300F40	●	2	86	103	116	181.0	40.0	50	PT1/4	GP**1404	TS55	TKY25D
43.0	3	TAFM4300F40	●	2	129	146	159	224.0	40.0	50	PT1/4	GP**1404	TS55	TKY25D
44.0	2	TAFS4400F40	●	2	88	106	118	183.0	40.0	50	PT1/4	GP**1404	TS55	TKY25D
44.0	3	TAFM4400F40	●	2	132	150	162	227.0	40.0	50	PT1/4	GP**1404	TS55	TKY25D
45.0	2	TAFS4500F40	●	2	90	108	120	185.0	40.0	54	PT1/4	GP**1404	TS55	TKY25D
45.0	3	TAFM4500F40	●	2	135	153	165	230.0	40.0	54	PT1/4	GP**1404	TS55	TKY25D
46.0	2	TAFS4600F40	●	2	92	110	122	187.0	40.0	54	PT1/4	GP**1404	TS55	TKY25D
46.0	3	TAFM4600F40	●	2	138	156	168	233.0	40.0	54	PT1/4	GP**1404	TS55	TKY25D
47.0	2	TAFS4700F40	●	2	94	113	124	189.0	40.0	54	PT1/4	GP**1404	TS55	TKY25D
47.0	3	TAFM4700F40	●	2	141	160	171	236.0	40.0	54	PT1/4	GP**1404	TS55	TKY25D
48.0	2	TAFS4800F40	●	2	96	115	126	191.0	40.0	54	PT1/4	GP**1404	TS55	TKY25D
48.0	3	TAFM4800F40	●	2	144	163	174	239.0	40.0	54	PT1/4	GP**1404	TS55	TKY25D
49.0	2	TAFS4900F40	●	4	98	118	133	198.0	40.0	58	PT1/4	GP**0903	TS3	TKY08F
49.0	3	TAFM4900F40	●	4	147	167	182	247.0	40.0	58	PT1/4	GP**0903	TS3	TKY08F
50.0	2	TAFS5000F40	●	4	100	120	135	200.0	40.0	58	PT1/4	GP**0903	TS3	TKY08F
50.0	3	TAFM5000F40	●	4	150	170	185	250.0	40.0	58	PT1/4	GP**0903	TS3	TKY08F
51.0	2	TAFS5100F40	●	4	102	122	137	202.0	40.0	58	PT1/4	GP**0903	TS3	TKY08F

TAF

DC (mm)	Hole Depth(l/d)	Order Number	Stock	No. of Flutes	LU	LBX	LPR	OAL	DCON	DCSFMS	CNT	Insert Number	Clamp Screw	Wrench
51.0	3	**TAFM5100F40**	●	4	153	173	188	253.0	40.0	58	PT1/4	GP**0903	TS3	TKY08F
52.0	2	**TAFS5200F40**	●	4	104	125	139	204.0	40.0	58	PT1/4	GP**0903	TS3	TKY08F
52.0	3	**TAFM5200F40**	●	4	156	177	191	256.0	40.0	58	PT1/4	GP**0903	TS3	TKY08F
53.0	2	**TAFS5300F40**	●	4	106	127	141	206.0	40.0	63	PT1/4	GP**0903	TS3	TKY08F
53.0	3	**TAFM5300F40**	●	4	159	180	194	259.0	40.0	63	PT1/4	GP**0903	TS3	TKY08F
54.0	2	**TAFS5400F40**	●	4	108	128	143	208.0	40.0	63	PT1/4	GP**0903	TS3	TKY08F
54.0	3	**TAFM5400F40**	●	4	162	182	197	262.0	40.0	63	PT1/4	GP**0903	TS3	TKY08F
55.0	2	**TAFS5500F40**	●	4	110	130	145	210.0	40.0	63	PT1/4	GP**0903	TS3	TKY08F
55.0	3	**TAFM5500F40**	●	4	165	185	200	265.0	40.0	63	PT1/4	GP**0903	TS3	TKY08F
56.0	2	**TAFS5600F40**	●	4	112	132	147	212.0	40.0	63	PT1/4	GP**0903	TS3	TKY08F
56.0	3	**TAFM5600F40**	●	4	168	188	203	268.0	40.0	63	PT1/4	GP**0903	TS3	TKY08F

TAF

INSERTS

Geometry	Drill Dia.	Insert Number	Dimensions (mm)				Stock				
			IC	L	S	RE	VP15TF	UP20M	GP20M	UE6020	US735
U1 Breaker	ø12—ø14.5	GCMT040204-U1	–	5.0	2.38	0.4		●			
	ø15—ø17.5	GPMT060204-U1	5.56	–	2.38	0.4		●		●	
GCMT	ø18—ø22.5	GPMT070204-U1	6.35	–	2.38	0.4		●		●	
	ø23—ø27.5 ø49—ø56	GPMT090304-U1	7.94	–	3.18	0.4		●		●	
GPMT	ø28—ø34	GPMT11T308-U1	9.525	–	3.97	0.8		●		●	
	ø35—ø48	GPMT140408-U1	12.70	–	4.76	0.8		●		●	
U2 Breaker	ø12—ø14.5	GCMT040204-U2	–	5.0	2.38	0.4	●		●		
	ø15—ø17.5	GPMT060204-U2	5.56	–	2.38	0.4	●	●		●	●
GCMT	ø18—ø22.5	GPMT070204-U2	6.35	–	2.38	0.4	●	●		●	●
	ø23—ø27.5 ø49—ø56	GPMT090304-U2	7.94	–	3.18	0.4	●	●		●	●
GPMT	ø28—ø34	GPMT11T308-U2	9.525	–	3.97	0.8	●	●		●	●
	ø35—ø48	GPMT140408-U2	12.70		4.76	0.8	●	●		●	●
U3 Breaker	ø15—ø17.5	GPMT060204-U3	5.56	–	2.38	0.4		●		●	●
	ø18—ø22.5	GPMT070204-U3	6.35	–	2.38	0.4		●		●	●
GPMT	ø23—ø27.5 ø49—ø56	GPMT090304-U3	7.94	–	3.18	0.4		●		●	●
	ø28—ø34	GPMT11T308-U3	9.525	–	3.97	0.8		●		●	●
	ø35—ø48	GPMT140408-U3	12.70	–	4.76	0.8		●		●	●

● : Inventory maintained in Japan. (1 insert in one case)

INSERT RECOMMENDATION

CHIP BREAKER RECOMMENDATION

◎ : 1st Recommendation ○ : 2nd Recommendation

Work Material / Breaker	P						M		K			
	Mild Steel		Carbon Steel		Alloy Steel		Stainless Steel		Gray Cast Iron		Ductile Cast Iron	
	GCMT	GPMT	GCMT	GPMT	GCMT	GPMT	GCMT	GPMT	GCMT	GPMT	GCMT	GPMT
U1	◎	◎	○	○	○	○	○	○	○	○	○	○
U2	○	○	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎
U3		○		○		○		○		○		○

INSERT GRADE RECOMMENDATION

◎ : 1st Recommendation ○ : 2nd Recommendation

Work Material / Grade	P						M		K			
	Mild Steel		Carbon Steel		Alloy Steel		Stainless Steel		Gray Cast Iron		Ductile Cast Iron	
	GCMT	GPMT	GCMT	GPMT	GCMT	GPMT	GCMT	GPMT	GCMT	GPMT	GCMT	GPMT
VP15TF		○	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎
UP20M	◎	◎	○	○	○	○	○	○	○	○	○	○
GP20M	○		○		○		○		○		○	
UE6020		○		○		○		○		○		○
US735		○		○		○		○		○		○

TAF

RECOMMENDED CUTTING CONDITIONS

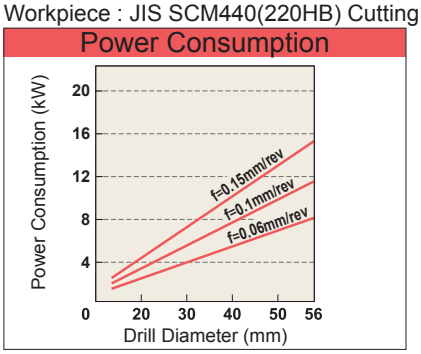
	Work Material	Hardness	Cutting Speed (m/min) For l/d=2,3 (ϕ12–ϕ14.5)	Cutting Speed (m/min) For l/d=2,3 (ϕ15–)	Cutting Speed (m/min) For l/d=4 (ϕ16–)	Breaker	Feed (mm/rev) Drill Diameter (mm) ϕ12–ϕ14.5	ϕ15–ϕ22.5	ϕ23–ϕ34	ϕ35–ϕ48	ϕ49–ϕ56
P	Mild Steel	≤180HB	150 (100–200)	200 (150–300)	140 (100–200)	U1	0.06 (0.04–0.10)	0.07 (0.04–0.10)	0.08 (0.04–0.10)	0.10 (0.04–0.12)	0.08 (0.04–0.10)
						U2	0.06 (0.04–0.10)	0.08 (0.04–0.12)	0.10 (0.04–0.12)	0.12 (0.04–0.14)	0.10 (0.04–0.12)
						U3	–	0.08 (0.04–0.12)	0.10 (0.04–0.12)	0.12 (0.04–0.14)	0.10 (0.04–0.12)
	Carbon Steel	180–280HB	120 (80–160)	150 (120–180)	100 (80–120)	U1	0.06 (0.04–0.10)	0.09 (0.06–0.12)	0.12 (0.08–0.14)	0.15 (0.08–0.18)	0.12 (0.08–0.14)
						U2	0.06 (0.04–0.10)	0.12 (0.06–0.14)	0.14 (0.08–0.18)	0.17 (0.08–0.20)	0.14 (0.08–0.18)
						U3	–	0.12 (0.06–0.14)	0.14 (0.08–0.18)	0.17 (0.08–0.20)	0.14 (0.08–0.18)
	Alloy Steel	180–280HB	120 (80–160)	150 (120–180)	100 (80–120)	U1	0.06 (0.04–0.10)	0.08 (0.06–0.10)	0.09 (0.06–0.12)	0.11 (0.06–0.14)	0.09 (0.06–0.12)
						U2	0.06 (0.04–0.10)	0.10 (0.06–0.12)	0.12 (0.08–0.16)	0.14 (0.08–0.18)	0.12 (0.08–0.16)
						U3	–	0.10 (0.06–0.12)	0.12 (0.08–0.16)	0.14 (0.08–0.18)	0.12 (0.08–0.16)
M	Stainless Steel	≤200HB	100 (80–120)	150 (120–200)	110 (80–140)	U1	0.07 (0.04–0.10)	0.07 (0.04–0.10)	0.08 (0.04–0.10)	0.10 (0.04–0.12)	0.08 (0.04–0.10)
						U2	0.07 (0.04–0.10)	0.08 (0.04–0.12)	0.10 (0.04–0.14)	0.12 (0.04–0.16)	0.10 (0.04–0.14)
						U3	–	0.08 (0.04–0.12)	0.10 (0.04–0.14)	0.12 (0.04–0.16)	0.10 (0.04–0.14)
K	Gray Cast Iron	Tensile Strength ≤350MPa	120 (80–160)	150 (120–180)	140 (110–160)	U1	0.07 (0.06–0.10)	0.07 (0.06–0.10)	0.10 (0.04–0.14)	0.10 (0.06–0.14)	0.10 (0.06–0.14)
						U2	0.07 (0.06–0.10)	0.15 (0.10–0.18)	0.20 (0.10–0.25)	0.20 (0.10–0.25)	0.20 (0.10–0.25)
						U3	–	0.15 (0.10–0.18)	0.20 (0.10–0.25)	0.20 (0.10–0.25)	0.20 (0.10–0.25)
	Ductile Cast Iron	Tensile Strength ≤450MPa	120 (80–150)	150 (120–180)	100 (80–120)	U1	0.06 (0.04–0.10)	0.07 (0.06–0.10)	0.10 (0.06–0.14)	0.10 (0.06–0.14)	0.10 (0.06–0.14)
						U2	0.06 (0.04–0.10)	0.12 (0.08–0.14)	0.15 (0.08–0.20)	0.18 (0.08–0.20)	0.15 (0.08–0.20)
						U3	–	0.12 (0.08–0.14)	0.15 (0.08–0.20)	0.18 (0.08–0.20)	0.15 (0.08–0.20)

(Note) When using drills for l/d= 4, the feed should be reduced to 80% of the above recommendations.

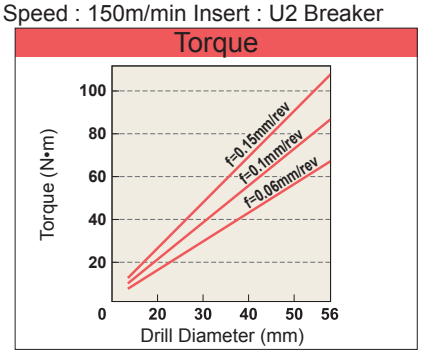
CUTTING RESISTANCE

Workpiece : JIS SCM440(220HB) Cutting Speed : 150m/min Insert : U2 Breaker

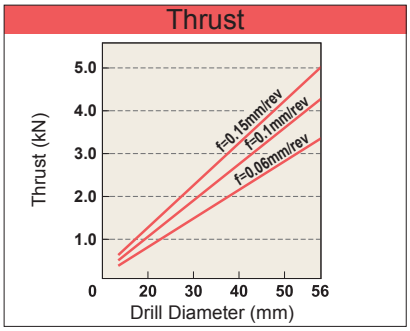
Power Consumption



Torque



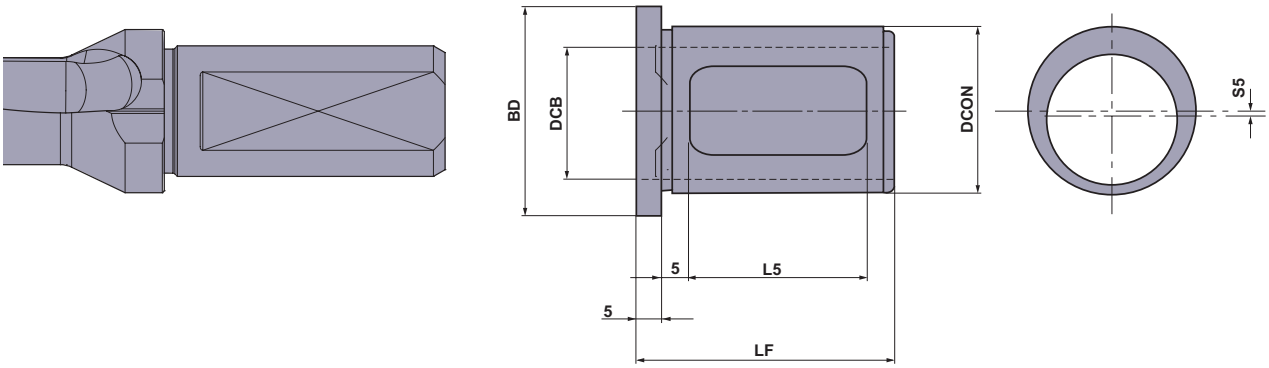
Thrust



TAF

·JUST FIT SLEEVE[JFS]

● When intstalling on the drill shank the rotation axis of the drill is slightly decentered. It enables slight enlargement of the machined hole. (enlargement range: 0.1-0.5mm)



(mm)

Order Number	Stock	Set Order Number	DCB	DCON	BD	LF	L5	∗Increase (S5×2)	MVX Order Number The Last Three Letters
JFS2520-10	●	JFS-1	20	25	33	43	30	0.1	F20
JFS2520-20	●	JFS-1	20	25	33	43	30	0.2	F20
JFS2520-30	●	JFS-1	20	25	33	43	30	0.3	F20
JFS2520-40	●	JFS-1	20	25	33	43	30	0.4	F20
JFS2520-50	●	JFS-1	20	25	33	43	30	0.5	F20
JFS3225-10	●	JFS-2	25	32	40	50	34	0.1	F25
JFS3225-20	●	JFS-2	25	32	40	50	34	0.2	F25
JFS3225-30	●	JFS-2	25	32	40	50	34	0.3	F25
JFS3225-40	●	JFS-2	25	32	40	50	34	0.4	F25
JFS3225-50	●	JFS-2	25	32	40	50	34	0.5	F25
JFS4032-10	●	JFS-3	32	40	48	55	40	0.1	F32
JFS4032-20	●	JFS-3	32	40	48	55	40	0.2	F32
JFS4032-30	●	JFS-3	32	40	48	55	40	0.3	F32
JFS4032-40	●	JFS-3	32	40	48	55	40	0.4	F32
JFS4032-50	●	JFS-3	32	40	48	55	40	0.5	F32
JFS5040-10	●	–	40	50	68	65	50	0.1	F40
JFS5040-20	●	–	40	50	68	65	50	0.2	F40
JFS5040-30	●	–	40	50	68	65	50	0.3	F40
JFS5040-40	●	–	40	50	68	65	50	0.4	F40
JFS5040-50	●	–	40	50	68	65	50	0.5	F40

It does not correspond to the shank diameter ø50mm.

∗Increase : Size of the increase in the cutting diameter.

Guideline for Selecting a JUST FIT SLEEVE

Desired = (Drillø+ Increase of JFS) + 0.1mm

(Eg.) Desired diameter is 20.3mm (oversize is taken as 0.1mm).

ø20.3=(MVX2000 X ◌F25+JFS3225-20)+0.1

20mm Drill — Using JFS an Increase of 0.2mm. — Oversize

<Tool Selected>
MVX : **MVX2000 X ◌F25**
JUST FIT SLEEVE [JFS]
: **JFS3225-20**

(Note) Oversize can vary due to the cutting conditions used, please use the above as a guideline.

Ordering the JUST FIT SLEEVE

● **Purchasing Method 1**
Oversize can vary due to the cutting conditions used. Therefore it is recommended to purchase as a set. When placing an order, please use the set order number. (5 sleeves/set)

● **Purchasing Method 2**
It is possible to order individually. When placing an order, please use the order number.

● **: Inventory maintained in Japan.**

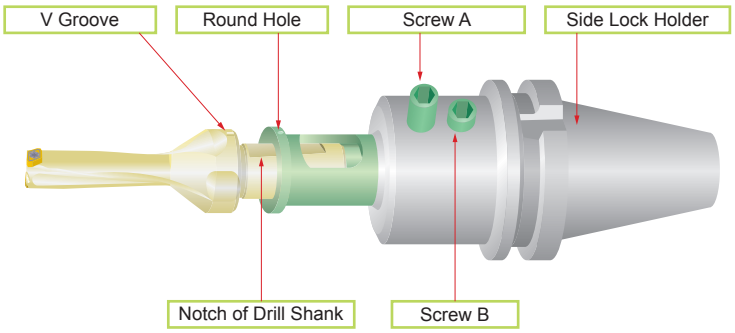
TAF

APPLICATION OF JUST FIT SLEEVE

1 When inserting the drill into the side lock holder, aligin the V groove on the outer peripheral edge of the drill flange, as well as the round holes of the outer peripheral edge of the sleeve flange and the screws of the side lock holder for fixing the drill. (If the drill does not have a V groove, align the notch of the drill shank with the round holes of the sleeve.)

2 Insert screws A of the side lock holder directly to the open window of the sleeve and fix the drill. Tighten screw B to a degree so as not to damage the sleeve.

(Note)
- Fine adjustments cannot be made for the diameter
- Cannot be used with collect chuck type holders.

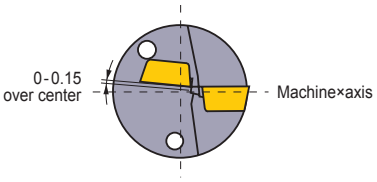


APPLICATION OF MVX TYPE DRILL

●Use on a Lathe

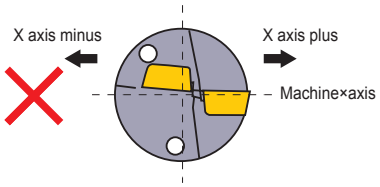
(1)The outer insert and machine X axis must be set parallel. The drill is designed so that when the drill center and the machine spindle center are aligned then the inner insert height is 0-0.15mm lower.

*The inner insert may fracture if the center height of the inner insert is higher than the machine X axis.

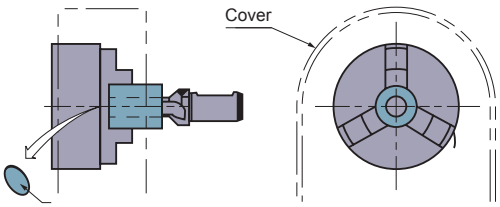


(2)By off setting it is possible to adjust the hole diameter. To do this adjust in the positive X axis direction (hole oversize direction). For the amount of possible adjustment please refer to the dimensions list.

*It is not recommended to adjust in the negative X axis direction as this may lead to drill interference with the hole.



(3)When through hole drilling on a lathe the disc produced by the drill exiting the workpiece may be expelled at high velocity.
To reduce the danger of injury or damage a cover guard is highly recommended.



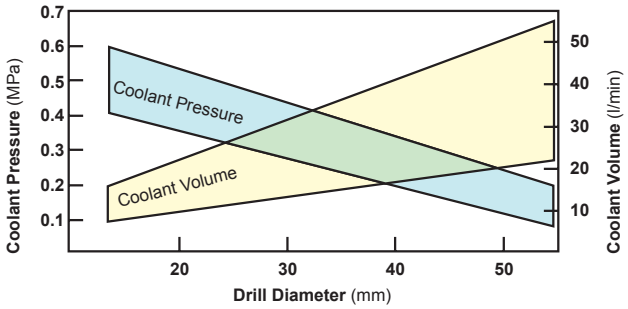
TAF

APPLICATION OF TAF TYPE DRILL

●Please ensure the highest rigidity possible exists in both machine set up and workholding.

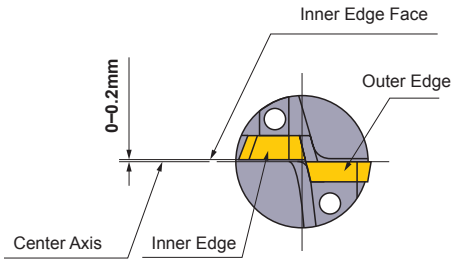
●Refer to the following graph on the right for coolant pressure and volume. Coolant is an important factor in the efficient use of these drills.

●Cannot be used for stack drilling.
In common with many indexable insert drills, these drills produce a round disc on exit which unless evacuated may cause the drill to fracture.

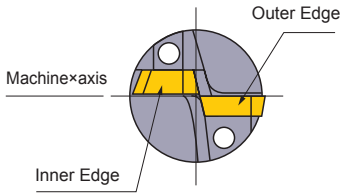


●Use on a Lathe

(1)The inner cutting edge must be positioned between 0—0.2mm over center.

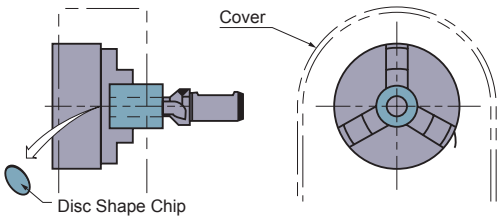


(2)To adjust the hole diameter by off-setting the drill, the outer cutting edge and machine axis must be set parallel.



(3)When producing an oversize hole.
The drill offset should be no more than 2% of the diameter.
It is not possible to produce an undersized hole.

(4)When through hole drilling on a lathe the disc produced by the drill exiting the workpiece may be expelled at high velocity.
To reduce the danger of injury or damage a cover guard is highly recommended.



Memo

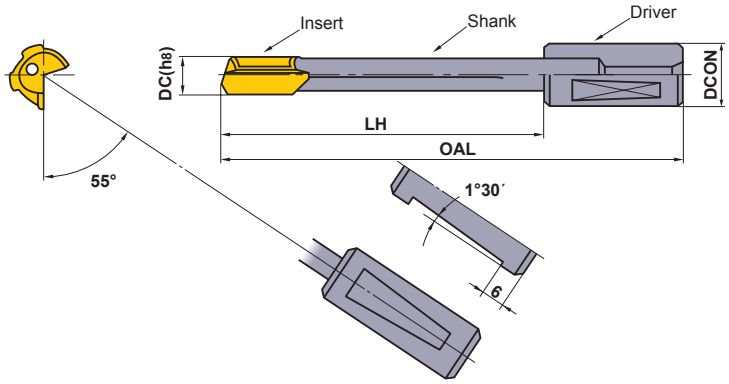
GUN DRILL

BRAZED TYPE

Technical Info >> 1997

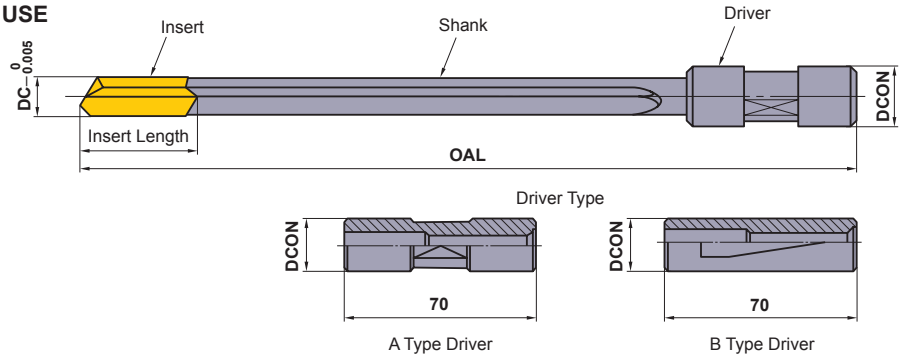
●GUN DRILL FOR MACHINING CENTER

- ●Suitable for deep hole drilling on Machining Center.
- ●Drill Diameter :ϕ6.0—ϕ20.0



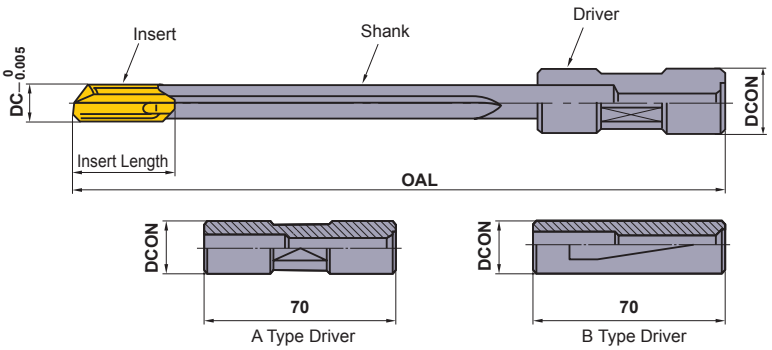
●GUN DRILL FOR GENERAL USE

- ●Suitable for deep hole drilling.
- ●Drill Diameter : ϕ2.0—ϕ30.3



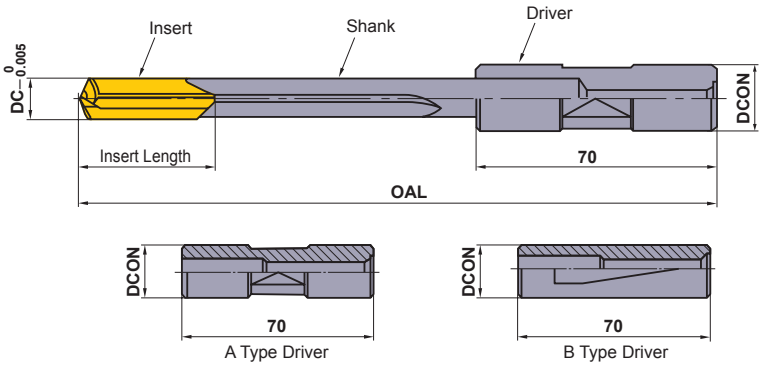
●SAMMIKA GUN DRILL

- ●The unique uneven cutting edge shape displays excellent chip dividing and enables high feed machining.
- ●Drill Diameter : ϕ5.0—ϕ30.3



●ARROW JET GUN DRILL

- ●Excellent chip discharge due to the double-tooth design and chip breaker.
- ●Drill Diameter : ϕ6.0—ϕ30.0



■ORDERING METHOD

Please specify the following when ordering.
①Drill Name ②Diameter of Drill (DC) ③Length of Drill (OAL) ④Outside Diameter of Driver (DCON) and Type ⑤Workpiece Material, Drilling Accuracy, Drilling Depth and Drilling Mode (Through Hole, Blind Hole)
e.g.) General Gun Drill ϕ8 x 500 x ϕ19.5 A type Driver, SCM440(250HB) x $\phi 8^{\pm 0.020}$ 300 x Through Hole

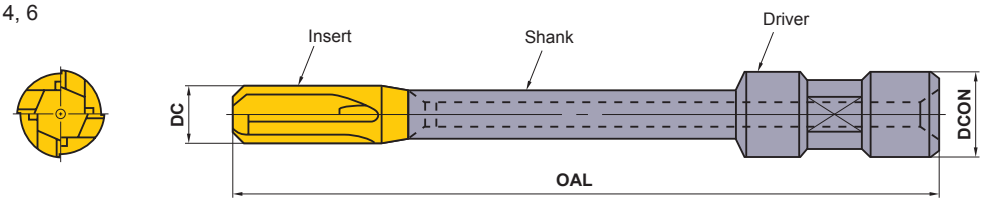
GUN REAMER

BRAZED TYPE

Technical Info >> 1997

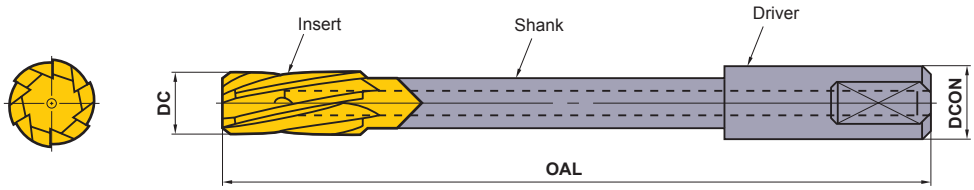
●Straight Reamer Type

●Reamer Diameter : ϕ6.0—ϕ30.0
●Number of teeth : 1, 2, 3, 4, 6



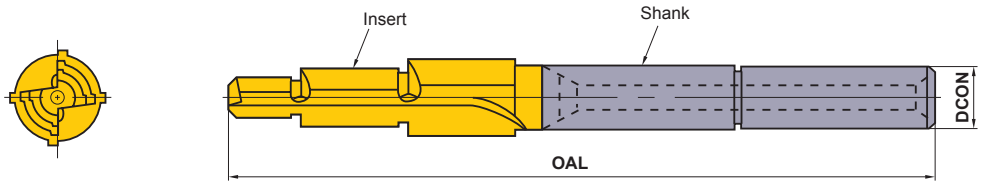
●Spiral Reamer Type

●Reamer Diameter : ϕ6.0—ϕ30.0
●Number of teeth : 4, 6



●Line Reamer Type

●Reamer Diameter : ϕ6.0—ϕ30.0
●Number of teeth : 1, 2, 4



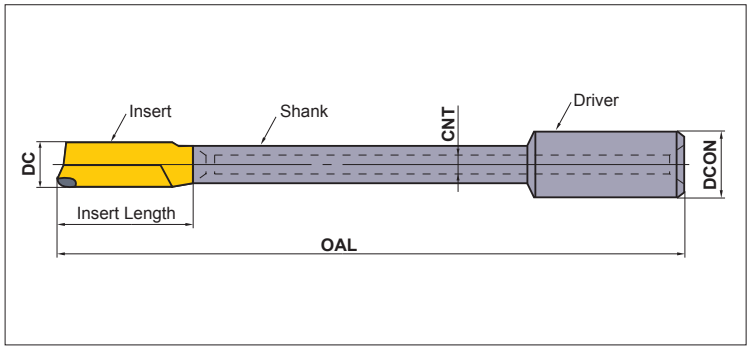
■ORDERING METHOD

Please specify the following when ordering.
①Reamer Name ②Diameter of Reamer (DC) ③Length of Reamer (OAL) ④Outside Diameter of Driver (DCON) and Type
⑤Number of Teeth ⑥Workpiece Material, Drilling Accuracy, Drilling Depth and Drilling Mode (Through Hole, Blind Hole)
e.g.) General Gun Reamer ϕ12 x 450 x ϕ19.5 A type Driver, 4-Teeth, FC250 (180HB) x $\phi 12^{\pm 0.020}$ x 100 x Through Hole

GUN REAMER

WITH DIAMOND COMPOUND

Technical Info >> 1997



STANDARD

Reamer Diameter	Insert Length	Overall Length OAL	Number of Teeth	Shape of Teeth
ø6−ø30.3	*	*	*	Straight

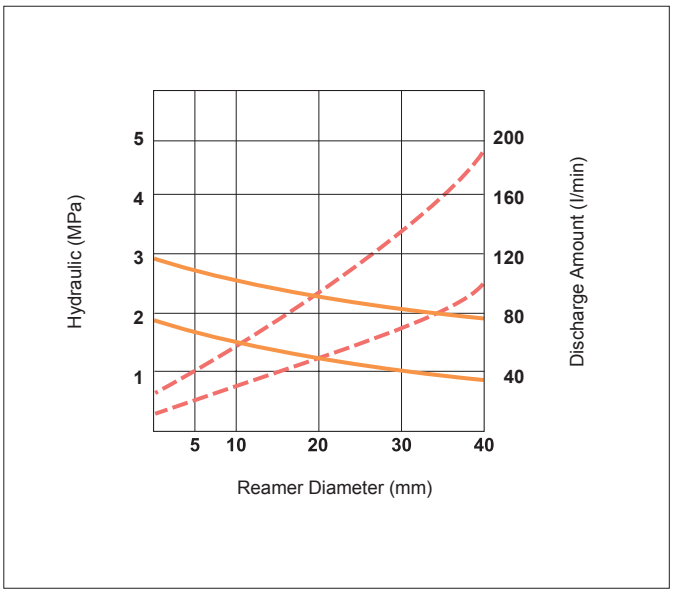
*Please contact us for any geometry (different diameter of reamer, insert length, tool length, number of teeth) that is not in this list.

Reamer Diameter DC	Driver hole diameter CNT	External Diameter of Driver DCON
6.0≦DC≦7.0	3.5	12.70
7.0<DC≦13.3	4.8	19.05
13.3<DC≦20.8	6.4	25.40
20.8<DC≦25.3	8.0	31.75
25.3<DC≦30.3	8.0	38.10

RECOMMENDED CUTTING CONDITIONS

Work Material	Cutting Speed (m/min)	Feed (mm/rev)		
		ø5 − ø10	ø10 − ø20	ø25 − ø30
Aluminium Alloy	150 (100−200)	0.08 (0.05−0.10)	0.10 (0.05−0.15)	0.10 (0.05−0.15)
Alloy Steel	130 (80−180)	0.03 (0.02−0.04)	0.05 (0.03−0.06)	0.06 (0.04−0.07)

COOLANT



ORDERING METHOD

Please specify the following when ordering.

①Reamer Name ②Diameter of Reamer (DC) ③Length of Reamer (OAL) ④Number of Teeth ⑤Outside Diameter of Driver (DCON) and Type ⑥Workpiece Material, Drilling Accuracy, Drilling Depth and Drilling Mode (Through Hole, Blind Hole)

e.g.) Gun Reamer with Diamond Compound ϕ10 x 300 1-Tooth x ϕ19.05 A Type Driver, AC4B x $\phi 10^{+0.01}_{0}$ x 200 x Through Hole

SPARE PARTS

STANDARD OF SPARE PARTS..... 1926
IDENTIFICATION 1926
SPARE PARTS..... 1927
ANTI SEIZE LUBRICANT..... 1941
REPLACEMENT PARTS FOR OLD TYPE TOOLS..... 1942
REPLACEMENT PARTS FOR OLD TYPE TOOLS(TURNING HOLDERS) 1942
REPLACEMENT PARTS FOR OLD TYPE TOOLS(BORING BARS) 1948
REPLACEMENT PARTS FOR OLD TYPE TOOLS(BORING UNITS) 1951
REPLACEMENT PARTS FOR OLD TYPE TOOLS(FACE MILLS) 1952
REPLACEMENT PARTS FOR OLD TYPE TOOLS(END MILLS)..... 1956
REPLACEMENT PARTS FOR OLD TYPE TOOLS(DRILLS)..... 1960

IDENTIFICATION

IDENTIFICATION OF CLAMP SCREW (Metric coarse right screw thread)

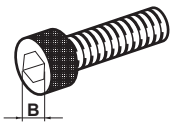
H SC 060 05

Length

Example	
Symbol	L
05	5
10	10
20	20
30	30

Screw Diameter

Example	
Symbol	d
050	M5
060	M6

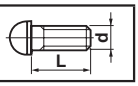
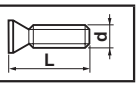
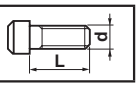
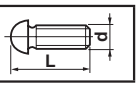
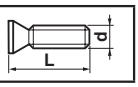
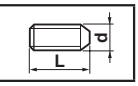
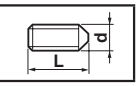
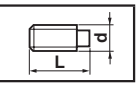
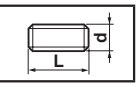


● **Hexagonal Hole Dimensions**

Diameter	Pitch	B Dimensions			
		HBH	HFC	HSC	HS◌
M2	0.4	—	—	1.5	0.9
M2.5	0.45	—	—	2	1.3
M3	0.5	2	2	2.5	1.5
M4	0.7	2.5	2.5	3	2
M5	0.8	3	3	4	2.5
M6	1	4	4	5	3
M8	1.25	5	5	6	4
M10	1.5	6	6	8	5

Screw Head

Symbol	Shape
BH	CHUUBURASHI CO.
BHA	UNBRAKO CO.
FC	CHUUBURASHI CO.
SC	JIS Standard
PM	JIS Standard
FM	JIS Standard
SD	JIS Standard
SP	JIS Standard
SR	JIS Standard
SS	JIS Standard

Button Head	
Flat Head	
Socket Head	
Pan Head	
Flat Head	
Set Screw (Cut Point)	
Set Screw (Cone Point)	
Set Screw (Dog Point)	
Set Screw (Flat Point)	

Hexagonal Hole Dimensions

Symbol	Shape
H	

With Slot

Symbol	Shape
S	

With Cross Hole

Symbol	Shape
C	

IDENTIFICATION OF WRENCH

HKY 15 R

Symbol	Wrench
HKY	Hexagonal Wrench
TKY	Torx Wrench
TIP	Torx plus® Wrench

Hexagonal Wrench

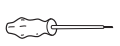
Symbol	B
15	1.5
20	2
25	2.5
30	3
35	3.5
40	4
50	5
60	6

Torx Wrench

Symbol	B	Size
06	1.7	T6
08	2.3	T8
10	2.7	T10
15	3.3	T15
20	3.8	T20
25	4.4	T25
27	5.0	T27
30	5.5	T30

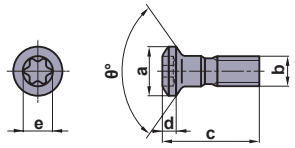
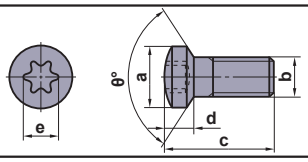
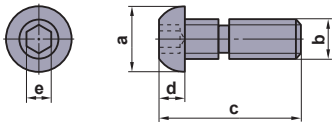
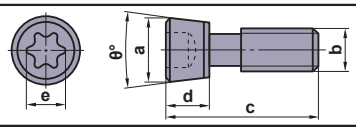
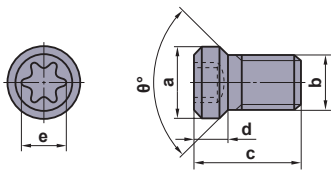
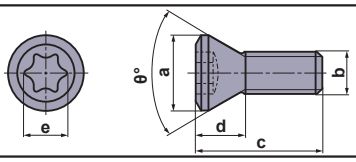
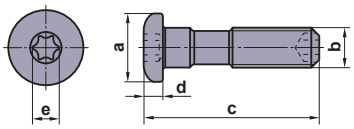
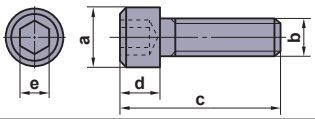
Torx plus® Wrench

Symbol	Size
06	6IP
07	7IP
08	8IP
15	15IP

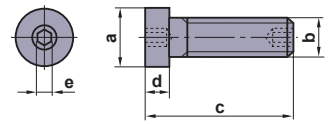
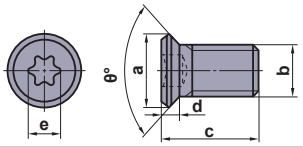
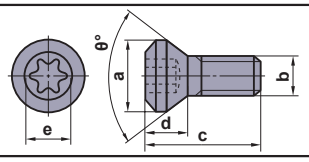
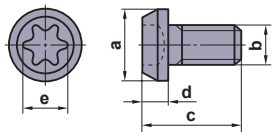
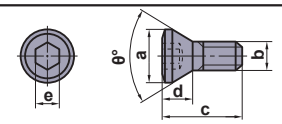
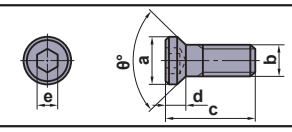
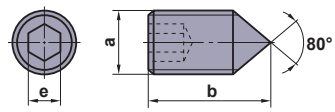
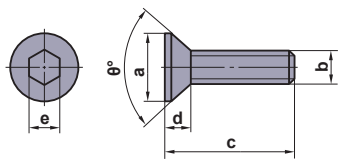
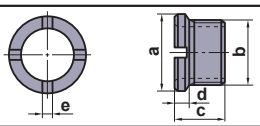
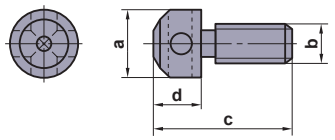
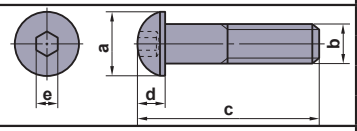
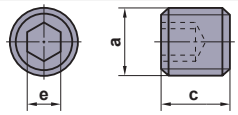
R	Standard L Wrench	
L	Long L Wrench	
T	T Wrench	
F FS	Flag Wrench	
W	Flag Wrench	
D DS	Driver	

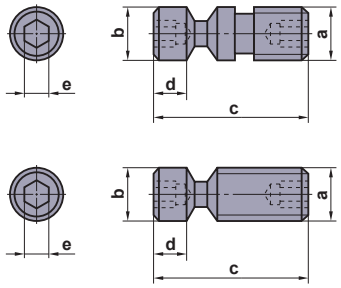
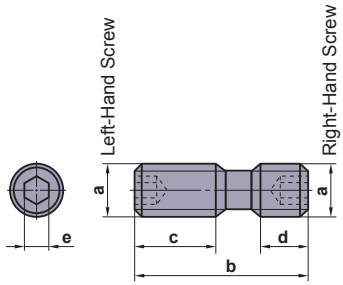
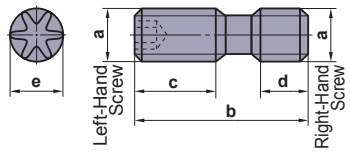
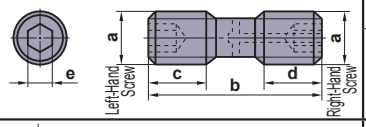
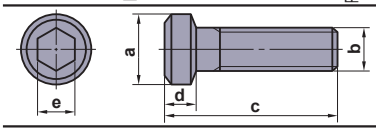
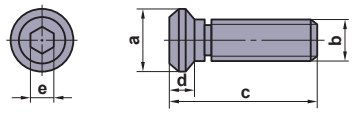
SPARE PARTS

CLAMP SCREW

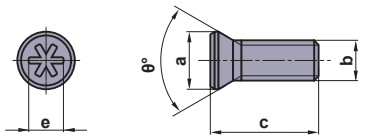
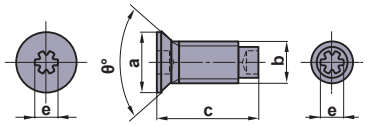
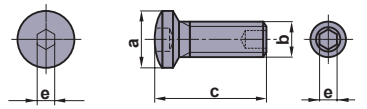
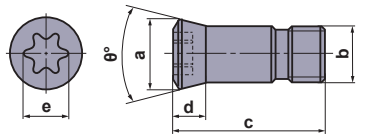
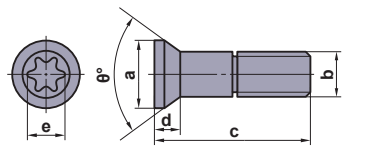
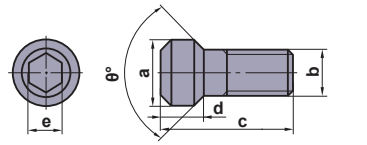
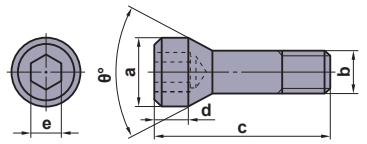
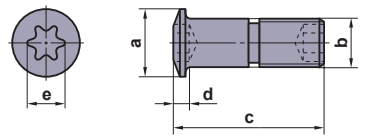
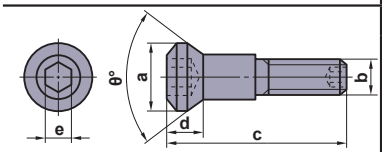
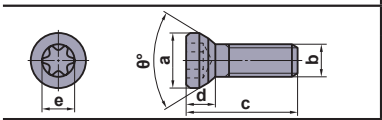
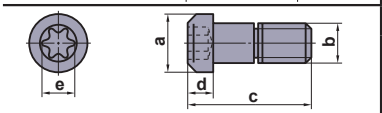
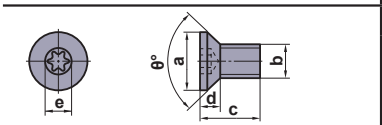
Geometry	Order Number	Dimensions (mm) a	b	c	d	e	Angle θ°	Drive Size	Torque (N•m)	Tool Holder
	**AJS3010T10**	5	M3×0.5	10	1.5	2.8	120	T10	2.5	**Profile** Holder
	AJS4012T15	7	M4×0.7	12	2.2	3.4	120	T15	3.5	**AJX** Type Cutter
	AJS5014T25	8	M5×0.8	14	2.7	4.5	120	T25	7.5	
	**BRS103**	5	M3×0.5	9.9	2.9	3.4	120	T15	3.5	**BRE** Type Cutter
	BRS105	8	M5×0.8	13.8	3.8	4.5	120	T25	7.5	
	**CS3**(For Use with C3)	7	M4×0.7	14.6	2.6	2.5	—	—	2.2	**F** Type Boring Bar
	CS4(For Use with C4)	9	M5×0.8	15.4	3.4	3	—	—	3.3	
	CS5(For Use with C5)	10.5	M6×1	22	4	4	—	—	7.0	
										This clamp screw is included with the clamp as a set.
	**CAS51T**	7.9	M5×0.8	19	5	4.5	10	T25	8.5	**BF407** Type Cutter
	**CS200T**	3.2	M2×0.4	5	1.6	1.8	90	T6	0.6	**AL** Holder
	CS250T	3.7	M2.5×0.45	6	1.8	2.4	90	T8	1.0	**F** Type Boring Bar
	* **CS250560T**	3.9	M2.5×0.45	5.2	2.5	2.4	60	T8	1.0	**MMTI** Type Boring Bar
	CS300590T	4.1	M3×0.5	5.5	2.1	2.4	90	T8	1.0	**SNT** Type Boring Bar
	CS300790TS	4.7	M3×0.5	7	2.3	2.8	90	T10	2.0	**Milling Tools** Series
	CS300890T	4.1	M3×0.5	8	2.1	2.4	90	T8	1.0	**AHX640S** Type Cutter
	* **CS350760T**	5.5	M3.5×0.6	7	4	3.4	60	T15	3.5	**Boring Unit**
	CS350790T	4.8	M3.5×0.6	7	2.4	2.8	90	T10	2.5	**MI** Type Boring Bar
	* **CS350860T**	5.5	M3.5×0.6	8.4	4	3.4	60	T15	3.5	
	CS350990T	4.8	M3.5×0.6	9	2.4	2.8	90	T10	2.5	
	CS400990T	6.0	M4×0.7	9	2.8	3.4	90	T15	3.5	
	CS401160T	5.7	M4×0.7	11	4.5	3.4	60	T15	3.5	
	CS401990T	6.0	M4×0.7	19	3.0	3.9	90	T20	3.5	
	CS451190T	6.3	M4.5×0.75	11	2.9	3.9	90	T20	5.0	
	* **CS501160T**	7.0	M5×0.8	11	3.6	3.9	60	T20	5.0	
	CS501290T	7.0	M5×0.8	11	3.5	4.5	90	T25	7.5	
	* **CS5015060T**	7.2	M5×0.8	15	2.4	3.9	60	T20	5.0	
	CS502190T	8.5	M5×0.8	21	4.0	5.1	90	T27	7.5	
	CS6016060T	8.5	M6×1.0	16	4.5	4.5	60	T25	7.5	
	**CSF401260T**	7.2	M4×0.5	12	5.2	3.9	60	T20	5.0	**PMR** Type Cutter
	**DC0520T**	8.5	M5×0.8	22.5	2.5	3.4	—	T15	3.5	**DOUBLE CLAMP** Holder
	DC0621T	10.5	M6×1.0	25	4	3.9	—	T20	5.0	**DOUBLE CLAMP DIMPLE BAR**
										HSK Tool Holder
	**DKS4**	5.6	M4×0.7	18	3.5	3	—	—	3.3	
	DKS5	7.6	M5×0.8	19	4.5	4	—	—	7.0	

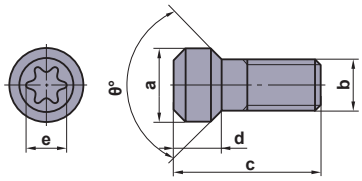
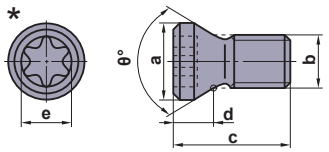
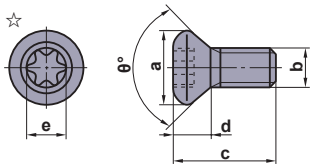
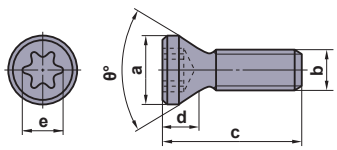
CLAMP SCREW

Geometry	Order Number	Dimensions (mm) a	b	c	d	e	Angle θ°	Drive Size	Torque (N•m)	Tool Holder
	**EGS06019**	9	M6×1	22.5	3.5	3	—	—	3.3	**EG** Type Holder
	EGS08024	11	M8×1.25	28.5	4.5	4	—	—	7.0	
	**FC400890T**	5.6	M4×0.7	7.5	1.3	2.8	90	T10	2.5	**AL** Type Holder **AL** Type Boring Bar **SMG** Type Holder
	**GY05016S**	8.7	M5×0.8	16	3.5	3.9	90	T20	5.0	**GY** Series
	**GY06013M**	12	M6×1.0	18	5	5.6	—	T30	6.0	**GY** Series
	**HFF06015**	10	M6×1	15	6	5	80	—	8.2	
	**HS4L**	5.4	M4×0.7	14	2.3	2.5	80	—	3.8	
	HS5S	6.8	M5×0.8	9	2.8	3	80	—	3.3	
	HS5L	6.8	M5×0.8	15	2.8	3	80	—	6.6	
	**HSP05008C**	M5×0.8	8	—	—	2.5	—	—	2.5	**MP** Type Holder **D** Type Boring Head
	**HY-A1**	4.4	M3×0.5	7	2.1	2	82	—	1.5	**Boring Unit**
	HY-V1	5.5	M3×0.5	7	2.5	2	82	—	1.5	
	HY2	5.5	M3×0.5	10	2.5	2	82	—	1.5	
	HY3	7	M3.5×0.6	12	2.9	2	82	—	1.5	
	HY4	9.3	M5×0.8	16	3.6	3	82	—	3.3	
	**JSS6**	6.9	M6×0.75	4.5	1.5	0.8	—	—	—	
	JSS7	8	M7×0.75	4.4	1.5	1	—	—	—	
	**KS1**	7	M4×0.7	14	5	—	—	—	—	**V10000** Type Cutter **LL** Type Cartridge **BC** Type Cartridge **SS** Type Cartridge **SET/MG/DG** Type Cartridge **MI** Type Boring Bar
	KS2	10	M6×1	18	7	—	—	—	—	
	KS3	8	M4×0.7	14	6.5	—	—	—	—	
	KS1S	7	M4×0.7	14	5	—	—	—	—	
	KS2S	10	M6×1	18	7	—	—	—	—	
	**KS11**	8	M5×0.8	19	3	3	—	—	3.3	
	KS12	10	M6×1	26	4	4	—	—	7.0	
	KS13	10	M6×1	30	4	4	—	—	7.0	
	KS14	13	M8×1.25	45	5	5	—	—	9.0	
	**LLR1**	M5×0.8	—	3.5	—	2.5	—	—	—	**LL** Type Cartridge
	LLR2	M6×1	—	5	—	3	—	—	—	

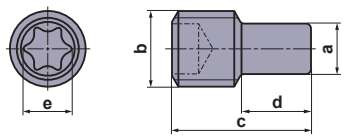
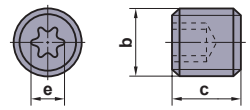
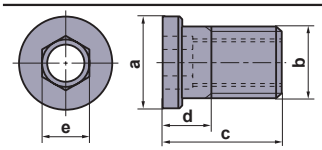
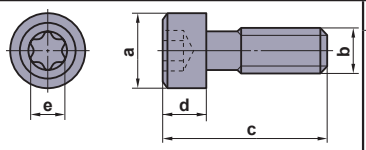
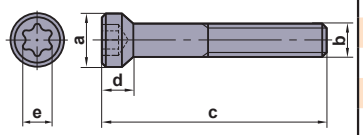
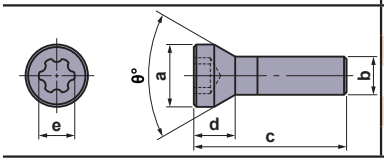
Geometry	Order Number	Dimensions (mm) a	b	c	d	e	Angle θ°	Drive Size	Torque (N•m)	Tool Holder
 LLCS103, LLCS105 LLCS112, LLCS125 LLCS205 The products with "*" do not have a hexagonal hole at the end marked **b**. The products with "☆" do not have a hexagonal hole at the end marked **a**.	☆ **LLCS103**	M3×0.5	4	11	4.6	2	—	—	1.5	**LL** Type Holder
	* **LLCS105**	M5×0.8	M5×0.8	10	1.5	2	—	—	1.5	**P** Type Boring Bar
	LLCS106	M6×1	6	16.5	3.5	2.5	—	—	2.2	**D** Type Boring Head
	* **LLCS106S**	M6×1	6	13.4	0.7	2.5	—	—	2.2	**HSK** Tool Holder
	LLCS108	M8×1.25	8	21	6.5	3	—	—	3.3	**KSMG** Type Cutter
	* **LLCS108S**	M8×1.25	8	16.5	2	3	—	—	3.3	**LL** Type Cartridge
	LLCS110	M10×1.5	10	29	8	4	—	—	7.0	**Boring Unit**
	LLCS112	M12×1	11.9	36.2	9	5	—	—	8.0	
	LLCS125	M5×0.8	M5×0.8	12	2	2	—	—	1.5	
	LLCS205	M5×0.8	M5×0.8	16	4	2	—	—	1.5	
	LLCS206	M6×1	6	26	13	2.5	—	—	2.2	
	LLCS208	M8×1.25	8	24	6.5	3	—	—	3.3	
	LLCS306	M6×1	6	21	4	2.5	—	—	2.2	
	LLCS308	M8×1.25	8	42	27.5	3	—	—	3.3	
	LLCS310	M10×1	10	29	8	4	—	—	7.0	
	LLCS410	M10×1	10	30	6.6	4	—	—	7.0	
	LLCS508	M8×1	8	24	6.5	3	—	—	3.3	
	* **LLCS508S**	M8×1	8	20.5	3	3	—	—	3.3	
 The products with "*" do not have a hexagonal hole at the end of Right-Hand Screw side.	**LS1**	M6×1	22	8	8	3	—	—	5.0	**DOUBLE CLAMP** Holder (For Heavy Cutting)
	LS2	M8×1	29	13	10	4	—	—	8.2	**MC** Type Holder
	LS3	M8×1	32	13	13	4	—	—	8.2	**UG** Type Holder
	* **LS4**	M6×1	15	8	4	3	—	—	5.0	**Milling Tools** Series
	* **LS5**	M6×1	18	8	5	3	—	—	5.0	
	* **LS6**	M8×1	24	13	5	4	—	—	8.2	
	* **LS7**	M8×1	27	13	8	4	—	—	8.2	
	* **LS8**	M6×0.75	18	7	7	3	—	—	5.0	
	* **LS9**	M6×0.75	22	8	8	3	—	—	5.0	
	* **LS10**	M7×0.75	16	6	6	4	—	—	7.8	
	* **LS11**	M8×1	16	6	6	4	—	—	7.8	
	* **LS12**	M8×1	24	7	7	4	—	—	7.8	
	* **LS13**	M8×1	34	12	12	4	—	—	7.8	
	* **LS14**	M7×0.75	24	10	10	4	—	—	7.8	
	* **LS15**	M7×0.75	18	6	8	4	—	—	7.8	
	* **LS16**	M7×0.75	23	11	8	4	—	—	7.8	
	* **LS17**	M8×1	42	17	11	4	—	—	7.8	
	* **LS18**	M7×0.75	14	6	4	4	—	—	7.8	
	* **LS20**	M10×1.5	26	9	9	5	—	—	9.0	
	* **LS21**	M10×1.5	32	12	12	5	—	—	9.0	
	LS24	M8×1.25	24	8.5	8.5	4	—	—	7.8	
	LS25	M8×1.0	28.5	12.0	10.5	4	—	—	7.8	
	**LS10T**	M7×0.75	14	6	5	4.5	—	T25	8.0	
	LS14T	M7×0.75	24	10	10	4.5	—	T25	8.0	
	LS15T	M7×0.75	18	7	7	4.5	—	T25	8.0	
	LS19T	M6×0.75	11	4	4	3.4	—	T15	5.0	
	LS10TS	M7×0.75	13	6	4	4.5	—	T25	8.5	
	LS0622T	M6×0.75	22	8	8	3.4	—	T15	6.0	
	**LS24H**	M8×1.25	24	8.5	8.5	4	—	—	8.2	**APX3000** Type Cutter
	**MGS6**	10	M6×1	26	4	5	—	—	9.0	
	**MHT1**	11	M8×1	18.5	3.5	4	—	—	8.7	

CLAMP SCREW

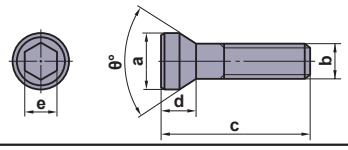
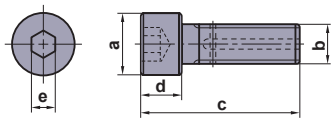
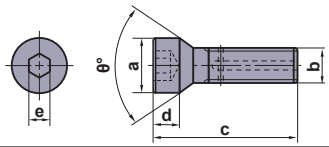
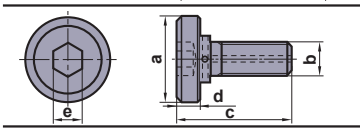
Geometry	Order Number	Dimensions (mm) a	b	c	d	e	Angle θ°	Drive Size	Torque (N•m)	Tool Holder
	**NS251**	3.6	M2.5×0.45	7	—	2.2	60	—	0.7	**SMALL TOOLS**
	NS401	5.8	M4×0.7	6	—	3.6	60	—	3.5	
	**NS402W**	5.85	M4×0.7	10	—	2.2	60	—	0.7	**SMALL TOOLS**
	NS403W	5.85	M4×0.7	12	—	2.2	60	—	0.7	
	NS404W	5.8	M4×0.7	10	—	2.2	90	—	0.7	
	**NS501W**	8	M5×0.8	16	—	2.5	120	—	2.2	**SMALL TOOLS**
	NS502W	8	M5×0.8	20	—	2.5	120	—	2.2	
	**RN-S4S**	5.8	M4×0.5	8.4	2.5	3.4	61	T15	3.5	
	RN-S4M	5.8	M4×0.5	10	2.2	3.4	61	T15	3.5	
	RN-S4	5.8	M4×0.5	12.5	2.2	3.4	61	T15	3.5	
	RN-S5	8.1	M5×0.5	15.4	3.6	3.9	61	T20	5.0	
	RN-S6	9.5	M6×0.75	20.3	4.6	3.9	61	T20	5.0	
	RN-S7	11	M7×0.75	24.7	5.2	4.5	61	T25	7.5	
	**RS3008T**	4.3	M3×0.35	8.6	2	2.4	61	T8	1.5	**SRF** Type Cutter
	RS3510T	5	M3.5×0.35	10	2.3	2.8	61	T10	2.5	
	RS4015T	6	M4×0.5	14	2.7	3.4	61	T15	3.3	
	RS5020T	8.1	M5×0.5	16.4	3.6	3.9	61	T20	5.0	
	RS6025T	9.5	M6×0.75	21.5	4.2	4.5	61	T25	7.5	
	RS8030T	12	M8×0.75	25	5	5.6	61	T30	10.0	
	**S1**	3.5	M2×0.4	5.5	2.2	1.5	92	—	1.0	**Boring Unit**
	S3	4.5	M3×0.5	7.7	2.4	2	92	—	1.5	
	S4	5.3	M4×0.7	8	1.8	2.5	62	—	2.2	
	S5	6.8	M5×0.8	9	2.4	3	62	—	3.3	
	**SD32**	12	M8×1.25	28	7.2	6	50	—	9.5	**D** Type Head Arbor
	SD40	12	M8×1.25	36	7.2	6	50	—	9.5	
	SD50	16	M10×1.5	46	8.2	8	50	—	1.0	
	SD63	16	M10×1.5	61	8.2	8	50	—	1.0	
	**SETS51**	6.8	M5×0.8	14.8	1.5	3.4	—	T15	3.5	**MMTE** Type Holder **MMTI** Type Boring Bar **SET** Type Holder **SNT** Type Boring Bar **HSK** Tool Holder **SET** Type Cartridge
	SETS61	8	M6×1	20	1.8	3.9	—	T20	5.0	
	**SLCS105**	10	M5×0.8	25	6.3	4	90	—	7.0	**WP** Type Holder
	SLCS106	12	M6×1	32	6.2	4	90	—	7.0	**M** Type Boring Bar
	**SPS1**	8.5	M5×0.8	16	4	4.5	70	T25	5.0	
	**SRS5**	6.7	M5×0.8	16	3.5	3.9	—	T20	5.0	**SRE** Type Cutter
	**STS1**	6.8	M3×0.5	7	2.2	2.8	90	T10	2.5	

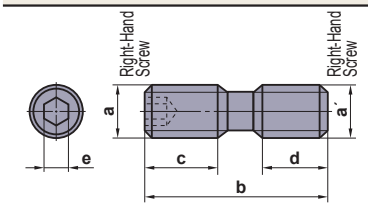
Geometry	Order Number	Dimensions (mm) a	b	c	d	e	Angle θ°	Drive Size	Torque (N•m)	Tool Holder
	* TS16	2.5	M1.6×0.35	3.2	1.6	1.8	60	T6	0.6	**SP** Type Holder
	TS2	2.7	M2×0.4	4.6	1.4	1.8	60	T6	0.6	**Profile Holder**
	* TS2A	2.7	M2×0.4	4.5	1.2	1.8	60	T6	0.5	**SMALL TOOLS**
	TS2C	2.7	M2×0.4	3.8	1.4	1.8	60	T6	0.6	**DIMPLE BAR**
	☆ TS2D	3.8	M2×0.4	5.3	1.9	1.8	82	T6	0.6	**MICRO-DEX**
	TS21	2.7	M2×0.4	3.4	1.4	1.8	60	T6	0.6	**F** Type Boring Bar
	* TS22	3.0	M2.2×0.45	5	1.2	1.8	60	T6	0.6	**S** Type Boring Bar
	* TS25	3.3	M2.5×0.45	5.5	1.7	2.4	60	T8	1.0	**GY** SERIES
	☆ TS25D	4.4	M2.5×0.45	6.2	2.2	2.4	82	T8	1.0	**MMTI** Type Boring Bar
	* TS25H	3.6	M2.5×0.45	5.5	2	2.4	60	T8	1.7	**SNT** Type Boring Bar
	TS202	2.7	M2×0.4	5.5	1.8	1.8	60	T6	0.6	**HSK** Tool Holder
	TS253	3.3	M2.5×0.45	4.5	1.7	2.4	60	T8	1.0	**Milling Tools** Series
	TS254	3.3	M2.5×0.45	7	1.7	2.4	60	T8	1.0	**VFX5** Type Cutter
	* TS255	3.5	M2.5×0.45	7.5	1.6	2.4	60	T8	1.0	**VFX6** Type Cutter
	TS3	3.9	M3×0.5	6	2	2.4	60	T8	1.0	**SS** Type Cartridge
	TS3D	5.0	M3×0.5	6	2.3	2.8	82	T10	2.5	**Boring Unit**
	* TS3SB	4.4	M3×0.5	8	2	2.4	80	T8	1.5	**TAF** Drill
	TS31D	4.8	M3×0.5	7.2	2.2	2.8	82	T10	2.5	
	* TS32	3.9	M3×0.5	7.5	2	2.4	60	T8	2.0	
	* TS33	3.9	M3×0.5	6.7	2	2.4	60	T8	1.5	
	TS35	4.8	M3.5×0.6	6.5	2.4	2.8	60	T10	2.5	
	* TS35D	5.3	M3.5×0.6	12	2.8	3.4	60	T15	3.5	
* 	TS35R	5.7	M3.5×0.6	10	2.1	3.4	—	T15	3.5	**AHX440** Type Cutter **AHX475** Type Cutter
	TS351	4.8	M3.5×0.6	7.2	2.4	2.8	60	T10	2.5	
	TS352	4.8	M3.5×0.6	10	3	2.8	60	T10	2.5	
	* TS4S	5.4	M4×0.7	7	2.4	3.4	80	T15	3.5	
	* TS4SL	5.4	M4×0.7	8	2.4	3.4	80	T15	4.0	
	* TS4SB	5.8	M4×0.7	9	2.7	3.4	80	T15	3.5	
	TS4SBL	5.8	M4×0.7	10.5	2.7	3.4	80	T15	3.5	
☆ 	TS4	5.4	M4×0.7	8	2.6	3.4	60	T15	3.5	
	TS4D	5.6	M4×0.7	7.7	2.5	3.4	82	T15	3.5	
	TS42	5.4	M4×0.7	6	2.6	3.4	60	T15	3.5	
	TS43	5.4	M4×0.7	10	2.6	3.4	60	T15	6.0	
	TS44	5.4	M4×0.7	12	2.6	3.4	60	T15	3.5	
	TS406	5.4	M4×0.7	15.5	2.6	3.4	60	T15	3.5	
	TS407	5.4	M4×0.7	9	2.6	3.4	60	T15	3.5	
	TS450	5.9	M4.5×0.75	13	3.6	3.9	60	T20	5.0	
	* TS5S	6.8	M5×0.8	9	2.9	4.5	80	T25	7.5	
	TS5SL	6.8	M5×0.8	12	2.9	4.5	80	T25	7.5	
	TS5	6.8	M5×0.8	9	3.2	4.5	60	T25	7.5	
	TS5L	6.8	M5×0.8	15	2.9	4.5	80	T25	7.5	
	TS52	6.8	M5×0.8	8	3.2	4.5	60	T25	7.5	
	TS53	6.8	M5×0.8	16	3.2	4.5	60	T25	7.5	
	TS54	6.8	M5×0.8	12	3.2	4.5	60	T25	7.5	
	TS55	6.8	M5×0.8	10.5	3.2	4.5	60	T25	7.5	
	* TS6S	8.5	M6×1.0	13	4.4	5.6	60	T30	8.5	
	* TS6	8.5	M6×1.0	16	4.4	5.6	60	T30	10.0	
	TPS20	2.7	M2×0.4	3.5	1.3	1.8	60	6IP	0.5	**ASX445** Type Cutter
	TPS22	3.0	M2.2×0.45	4.7	1.6	2.1	60	7IP	0.5	**ASX400** Type Cutter
	TPS22S	3.0	M2.2×0.45	4.2	1.6	2.1	60	7IP	0.5	**APX3000** Type Cutter
	TPS25	3.3	M2.5×0.45	5.5	1.7	2.1	60	7IP	1.0	**APX4000** Type Cutter **MVX** Drill
	TPS25-1	3.3	M2.5×0.45	6.5	1.7	2.1	60	7IP	1.0	**ARX** Type Cutter
	TPS3	3.9	M3×0.5	6.7	1.4	2.82	60	IP10	1.0	**MVX** Drill
	TPS35	5.3	M3.5×0.6	11.5	2.8	3.4	60	15IP	3.5	**PMR** Type Cutter
	TPS351	4.8	M3.5×0.6	7.2	1.4	2.82	60	IP10	2.5	**MVX** Drill
	TPS4	5.3	M4×0.7	8	2.6	3.4	60	15IP	4.0	**MVX** Drill
	TPS43	5.3	M4×0.7	10	2.6	3.4	60	15IP	4.0	
	TPS4R	6.4	M4×0.7	10.6	2.9	3.4	60	15IP	4.0	**WSX445**
	TPS54	6.8	M5×0.8	12	3.2	4.5	60	T25	7.5	**MVX** Large diameter

CLAMP SCREW

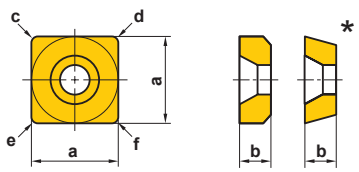
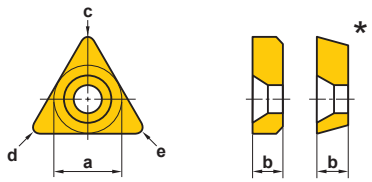
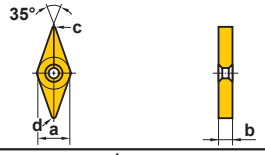
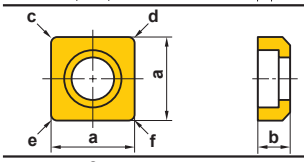
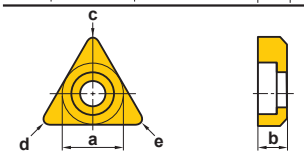
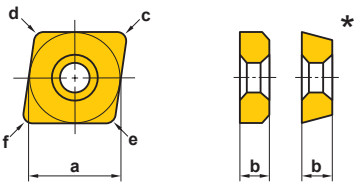
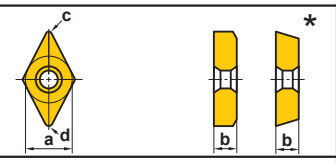
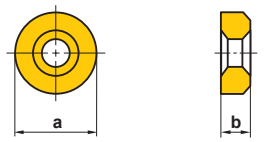
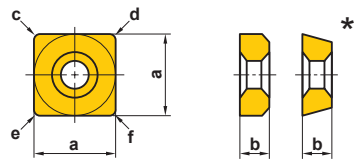
Geometry	Order Number	Dimensions (mm) a	b	c	d	e	Angle θ°	Drive Size	Torque (N•m)	Tool Holder
	**TSR05008S**	3.5	M5×0.8	8	—	2.8	—	T10	—	
	TSR06011S	4	M6×1.0	11	—	3.9	—	T20	—	
	**TSS04005**	—	M4×0.7	5	—	2.4	—	T8	—	**PMF** Type Cutter
	TSS05006	—	M5×0.8	6	—	2.8	—	T10	—	**BC** Type Cartridge
	TSS06010	—	M6×1	10	—	3.9	—	T20	—	**SS** Type Cartridge
	**WCS503507H**	6.3	M5×0.5	7	3.3	3.5	—	—	5.0	**ASX445** Type Cutter
	WCS604010H	7.8	M6×0.75	10	4.1	4.0	—	—	7.0	**ASX400** Type Cutter
										PMR Type Cutter
	**WS1**	8.5	M5×0.8	19	5	4.5	—	T25	7.5	
	**WS254012T**	4	M2.5×0.45	11.5	2.2	2.4	80	T8	2.0	**TAW** Drill
	WS254013T	4	M2.5×0.45	12.5	2.2	2.4	80	T8	2.0	
	WS254014T	4	M2.5×0.45	13.5	2.2	2.4	80	T8	2.0	
	WS254015T	4	M2.5×0.45	14.5	2.2	2.4	80	T8	2.0	
	WS254016T	4	M2.5×0.45	15.5	2.2	2.4	80	T8	2.0	
	WS304517T	4.5	M3×0.5	16.5	3.4	2.8	60	T10	3.5	
	WS304518T	4.5	M3×0.5	17.5	3.4	2.8	60	T10	3.5	
	WS355520T	5.5	M3.5×0.6	19.5	3.9	3.4	60	T15	5.5	
	WS355521T	5.5	M3.5×0.6	20.5	3.9	3.4	60	T15	5.5	
	WS406023T	6	M4×0.7	22.0	4.4	4.5	60	T25	8.5	
	WS406024T	6	M4×0.7	23.0	4.4	4.5	60	T25	8.5	
	WS508026T	8	M5×0.8	25.0	5.2	5.1	60	T27	12.0	
	WS508027T	8	M5×0.8	26.0	5.2	5.1	60	T27	12.0	
	**WS203107TPS**	3.1	M2×0.25	7.3	1.7	1.8	60	6IP	1.0	**STAW** Drill
	WS203108TPS	3.1	M2×0.25	8.3	1.9	1.8	60	6IP	1.0	
	WS253909TPS	3.9	M2.5×0.35	9.5	2.4	2.4	60	8IP	2.0	
	WS304912TPS	4.9	M3×0.35	12	3.25	2.82	60	10IP	2.5	

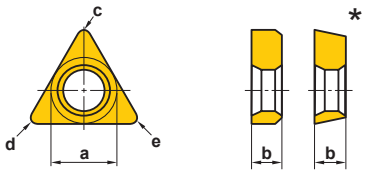
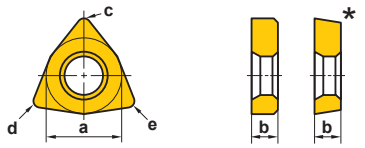
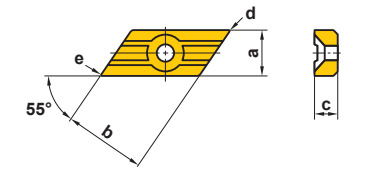
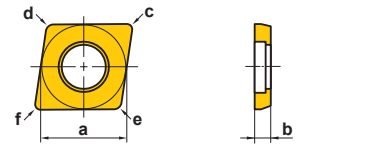
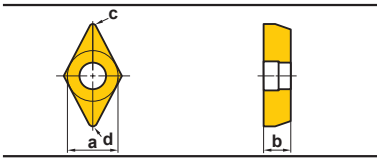
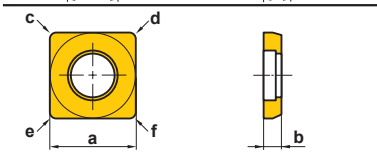
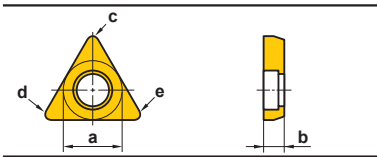
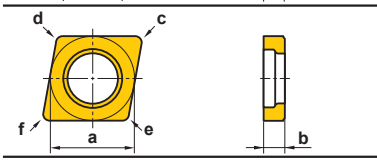
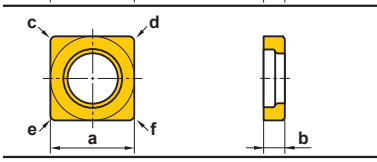
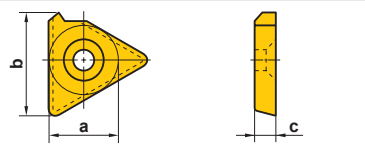
SET BOLT

Geometry	Order Number	Dimensions (mm) a	b	c	d	e	Angle θ°	Drive Size	Torque (N•m)	Tool Holder
	**BOES101**	15	M10×1.5	45	10	8	60	—	10.0	**OCTACUT** Type Cutter
	**HSC08030H**	13	M8×1.25	38	8	5	—	—	24	**APX3000/4000** Type Cutter **AJX** Type Cutter
	HSC08040	13	M8×1.25	48	8	6	—	—	24	**APX4000** Type Cutter **WSX445** Type Cutter
	HSC08050	13	M8×1.25	58	8	6	—	—	24	**AXD4000** Type Cutter
	HSC10030H	16	M10×1.5	40	10	6	—	—	40	**AXD7000** Type Cutter
	HSC10035	16	M10×1.5	45	10	8	—	—	44	**APX** Type Cutter **AJX** Type Cutter **WSX445** Type Cutter
	HSC10045	16	M10×1.5	55	10	8	—	—	44	**BXD** Type Cutter
	HSC10055	16	M10×1.5	65	10	8	—	—	44	**VFX5/6** Type Cutter
	HSC12035	18	M12×1.75	47	12	10	—	—	80	**WSX445** Type Cutter
	HSC12035H	18	M12×1.75	47	12	10	—	—	80	**APX3000/4000** Type Cutter **AJX** Type Cutter
	HSC12045	18	M12×1.75	57	12	10	—	—	80	**WSX445** Type Cutter
	HSC12070	18	M12×1.75	82	12	10	—	—	80	
	HSC16040	24	M16×2	56	16	14	—	—	150	
	HSC16040H	24	M16×2	56	16	14	—	—	150	**APX3000/4000** Type Cutter **AJX** Type Cutter
	HSC16080	24	M16×2	96	16	14	—	—	150	
	HSC20040	30	M20×2.5	60	20	17	—	—	320	
	HSC20090	30	M20×2.5	110	20	17	—	—	320	
	**HFF08043H**	11	M8×1.25	43	5	5	90	—	8.2	**AXD4000** Type Cutter **BXD** Type Cutter
	**MBA16033H**	40	M16×2	43	10	14	—	—	150	**AHX640** Type Cutter (For ϕ100) **WSX445** Type Cutter **APX4000** Type Cutter **AXD4000** Type Cutter **AXD7000** Type Cutter **AJX** Type Cutter **BXD** Type Cutter
	MBA20040H	50	M20×2.5	54	14	17	—	—	320	
	MBA24045H	65	M24×3	59	14	17	—	—	520	

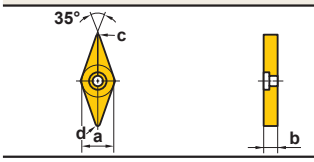
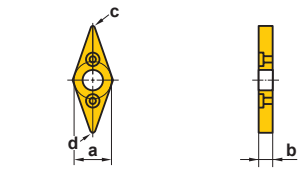
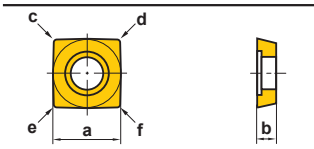
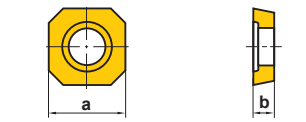
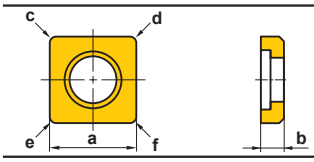
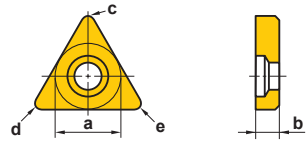
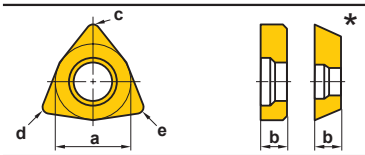
Geometry	Order Number	Dimensions (mm) a	a′	b	c	d	e	Torque (N•m)	Tool Holder
	**HDS08030**	M8×0.75	M8×1.25	30	13.5	11.5	4	8.2	**BRP** Type Cutter
	HDS10031	M10×1.0	M10×1.5	31	14	12	5	9.0	**OCTACUT** Type Cutter **PMF** Type Cutter

SHIM

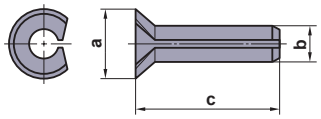
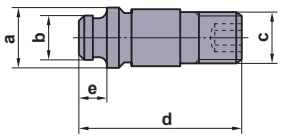
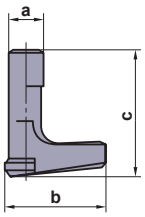
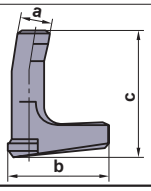
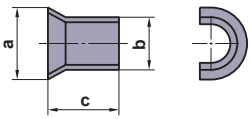
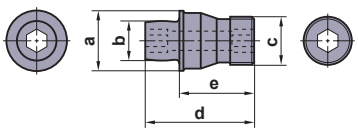
Geometry	Order Number	Dimensions (mm) a	b	c	d	e	f	Tool Holder
	CS32	9.52	3.18	0.8	0.8	1.2	1.2	**MC** Type Holder (Negative type)
	CS42	12.70	3.18	0.8	0.8	1.2	1.6	
	CS43	12.70	4.76	0.8	0.8	1.2	1.6	
	CS62	19.05	3.18	1.2	1.2	1.6	1.6	
	* PS31	8.28	2.38	0.2	0.2	0.6	0.6	**MC** Type Holder (Positive type)
	* PS42	11.46	3.18	0.2	0.2	0.6	1.0	**BC** Type Cartridge
	* PS62	17.20	3.18	0.3	0.3	0.7	0.7	
	CT22	6.35	3.18	0.4	0.8	1.2	—	**MC** Type Holder (Negative type)
	CT32	9.52	3.18	0.4	0.8	1.2	—	
	CT33	9.52	4.76	0.4	0.8	1.2	—	
	CT42	12.70	3.18	0.4	0.8	1.2	—	
	* PT21	5.11	2.38	0.2	0.2	0.6	—	**MC** Type Holder (Positive type)
	* PT32	8.28	3.18	0.2	0.2	0.6	—	**F** Type Boring Bar
	* PT42	10.85	3.18	0.3	0.3	0.7	—	**BC** Type Cartridge
	BPT322	7.8	3.18	—	—	—	—	
	DCSVN32	9.52	3.18	0.8	1.2	—	—	**DOUBLE CLAMP** Holder **DOUBLE CLAMP DIMPLE BAR**
	ESS42	12.70	3.18	0.8	0.8	1.2	1.6	**ML** Type Holder
	EST32	9.52	3.18	0.4	0.8	1.2	—	**ML** Type Holder
	EST43	12.70	4.76	0.4	0.8	1.2	—	
	LLSCN3T3	9.52	3.97	0.4	0.4	0.8	0.8	**DOUBLE CLAMP** Holder **LL** Type Holder **DOUBLE CLAMP DIMPLE BAR** **P** Type Boring Bar **D** Type Boring Head **HSK** Tool Holder **LL** Type Cartridge
	LLSCN33	9.52	4.76	0.4	0.4	0.8	0.8	
	LLSCN42	12.70	3.18	0.8	0.8	1.2	1.2	
	LLSCN53	15.87	4.76	1.2	1.2	1.6	1.6	
	LLSCN63	19.05	4.76	1.2	1.2	1.6	1.6	
	* LLSCP42	12.70	3.18	0.8	0.8	1.2	1.2	**DOUBLE CLAMP DIMPLE BAR**
	* LLSCP63	19.05	4.76	1.2	1.2	1.6	1.6	**P** Type Boring Bar **HSK** Tool Holder
	LLSDN32	9.52	3.18	0.8	1.2	—	—	**DOUBLE CLAMP** Holder **LL** Type Holder **DOUBLE CLAMP DIMPLE BAR** **P** Type Boring Bar **D** Type Boring Head **HSK** Tool Holder
	LLSDN42	12.70	3.18	0.8	1.2	—	—	
	LLSDN43	12.70	4.76	0.8	1.2	—	—	
	LLSDN53	15.87	4.76	1.2	1.6	—	—	
	* LLSDP42	12.70	3.18	0.8	1.2	—	—	**DOUBLE CLAMP DIMPLE BAR**
	LLSRN103	8.3	3.18	—	—	—	—	**LL** Type Holder **HSK** Tool Holder
	LLSRN123	9.8	3.18	—	—	—	—	
	LLSRN164	13.6	4.76	—	—	—	—	
	LLSRN204	17.3	4.76	—	—	—	—	
	LLSRN256	22.0	6.35	—	—	—	—	
	LLSRN326	28.0	6.35	—	—	—	—	
	LLSSN32	9.52	3.18	0.8	0.8	1.2	1.2	**LL** Type Holder **DOUBLE CLAMP DIMPLE BAR** **P** Type Boring Bar **LL** Type Cartridge
	LLSSN33	9.52	4.76	0.8	0.8	1.2	1.2	
	LLSSN42	12.70	3.18	0.8	0.8	1.2	1.6	
	LLSSN53	15.87	4.76	1.2	1.2	1.6	1.6	
	LLSSN63	19.05	4.76	1.2	1.2	1.6	2.0	
	LLSSN84	25.40	6.35	1.6	1.6	2.4	2.4	
	* LLSSP42	12.70	3.18	0.8	0.8	1.2	1.6	

Geometry	Order Number	Dimensions (mm) a	b	c	d	e	f	Tool Holder
	**LLSTE32**	7.6	3.18	0.4	0.4	0.4	—	**LL** Type Holder
	LLSTN32	9.52	3.18	0.4	0.8	1.2	—	**DOUBLE CLAMP** Holder
	LLSTN33	9.52	4.76	0.4	0.8	1.2	—	**DOUBLE CLAMP DIMPLE BAR**
	LLSTN42	12.70	3.18	0.4	0.8	1.2	—	**P** Type Boring Bar
	LLSTN53	15.87	4.76	0.8	1.2	1.6	—	**D** Type Boring Head
	*** LLSTP32**	9.52	3.18	0.4	0.8	1.2	—	**LL** Type Cartridge
	*** LLSTP42**	12.70	3.18	0.4	0.8	1.2	—	**Boring Unit**
	**LLSWN32**	9.52	3.18	0.4	0.8	1.2	—	**LL** Type Holder
	LLSWN3T3	9.52	3.97	0.4	0.8	1.2	—	**DOUBLE CLAMP** Holder
	LLSWN42	12.70	3.18	0.4	0.8	1.2	—	**DOUBLE CLAMP DIMPLE BAR**
	*** LLSWP32**	9.52	3.18	0.4	0.8	1.2	—	
	*** LLSWP42**	12.70	3.18	0.4	0.8	1.2	—	
	**MHS532R/L**	9.4	15.7	4.5	0.8	0.8	—	
	MHS533R/L	9.4	15.7	4.5	1.2	1.2	—	
	MHS534R/L	9.4	15.7	4.5	1.6	1.6	—	
	MHS542R/L	9.4	15.7	6.5	0.8	0.8	—	
	MHS543R/L	9.4	15.7	6.5	1.2	1.2	—	
	MHS544R/L	9.4	15.7	6.5	1.6	1.6	—	
	**MLCP42**	12.58	3.18	1.2	1.2	1.2	1.2	**P** Type Boring Bar
	**MLDP42**	12.56	3.18	1.2	1.2	—	—	**P** Type Boring Bar
	**MLSP42**	12.63	3.18	1.2	1.2	1.2	1.2	**P** Type Boring Bar
	**MLTP32**	9.50	3.18	1.2	1.2	1.2	—	**P** Type Boring Bar
	**MSCN63**	18.8	4.76	1.6	1.6	1.6	1.6	**DOUBLE CLAMP** Holder (For Heavy Cutting)
	**MSSN63**	18.8	4.76	1.6	1.6	1.6	1.6	**DOUBLE CLAMP** Holder (For Heavy Cutting)
	**CT32T1**	9.525	15.03	3.18	—	—	—	**SET** Type Holder **SNT** Type Boring Bar **SET** Type Cartridge
	PT32T1R	8.28	13.34	3.18	—	—	—	
	PT32T2R	8.28	13.19	3.18	—	—	—	
	PT42TR	10.85	17.20	3.18	—	—	—	

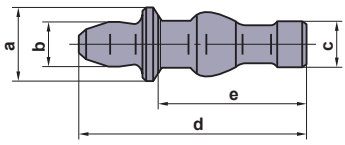
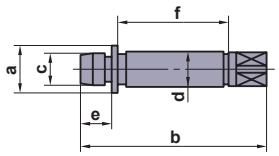
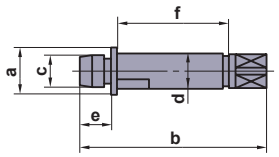
SHIM

Geometry	Order Number	Dimensions (mm)						Tool Holder
		a	b	c	d	e	f	
	**PV321**	9.52	3.18	0.4	0.4	—	—	**MP** Type Holder **D** Type Boring Head
	PV322	9.52	3.18	0.8	0.8	—	—	
	PV323	9.52	3.18	1.2	1.2	—	—	
	**SPSVN32**	8.06	3.18	0.3	0.3	—	—	**SP** Type Holder **HSK** Tool Holder
	**STASX400N**	11.00	3.00	0.4	0.4	0.4	0.4	**ASX400** Type Cutter
	**STASX445N**	10.76	3.00	—	—	—	—	**ASX445** Type Cutter
	**STBS500N**	12.7	3.18	0.8	0.8	0.8	0.8	
	**WPSTN33**	9.3	4.76	0.8	0.4	1.2	—	**WP** Type Holder
	WPSTN43	12.50	4.76	0.8	0.4	1.2	—	
	* **WPSWC43**	12.50	4.76	0.4	0.8	1.2	—	**M** Type Boring Bar
	WPSWN43	12.50	4.76	0.4	0.8	1.2	—	

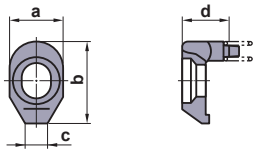
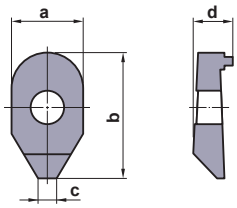
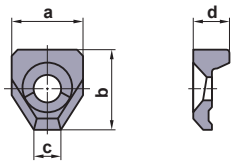
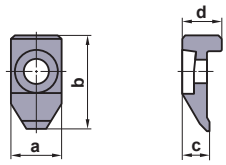
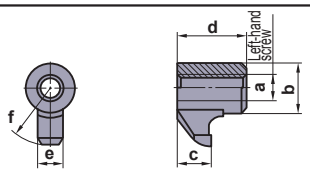
SHIM PIN AND CLAMP LEVER

Geometry	Order Number	Dimensions (mm) a	b	c	d	e	Tool Holder
	**BCP141**	3.0	1.4	5.6	—	—	**MC** Type Holder
	BCP201	4.3	2	7.4	—	—	**SP** Type Holder
	BCP202	4.3	2	6.4	—	—	**F** Type Boring Bar
	BCP251	4.8	2.5	7.4	—	—	**HSK** Tool Holder
	BCP252	4.8	2.5	6.4	—	—	**BC** Type Cartridge
	BCP301	5.3	3	7.4	—	—	
	BCP401	6.3	4	7.4	—	—	
	**CCP33**	6.5	3.66	M5×0.8	18.5	3	**WP** Holder
	CCP34	7.5	5.0	M6×1.0	18.5	3	**M** Type Boring Bar
	CCP44	7.5	5.0	M5×0.8	14.2	3	
	**LLCL12S**	2.1	9.3	5.6	—	—	**LL** Type Holder
	LLCL13	3.6	10	12.5	—	—	**P** Type Boring Bar
	LLCL13S	3.6	10	7.8	—	—	**D** Type Boring Head
	LLCL14	4.7	13.4	13.2	—	—	**HSK** Tool Holder
	LLCL14S	4.7	13.6	12.2	—	—	**KSMG** Type Cutter
	LLCL15	6.0	19	17	—	—	**LL** Type Cartridge
	LLCL16	7.5	20.8	21	—	—	**Boring Unit**
	LLCL18	8.6	25.4	25.2	—	—	
	LLCL23	3.6	12.0	11.5	—	—	
	LLCL23S	3.6	11.6	9.5	—	—	
	LLCL24	4.7	16.2	14.8	—	—	
	LLCL25	6.0	17.1	17	—	—	
	**LLCL110**	3.0	10.7	11.6	—	—	
	LLCL112	3.5	13	13.5	—	—	
	LLCL116	4.5	18.5	18	—	—	
	LLCL120	5.6	20.3	19	—	—	
	LLCL125	6	24	24	—	—	
	LLCL132	8	30	27	—	—	
	**LLP13**	5.55	4.85	5.3	—	—	**LL** Type Holder
	LLP14	7.25	6.55	5.8	—	—	**DOUBLE CLAMP** Holder
	LLP15	8.8	8.05	8.6	—	—	**DOUBLE CLAMP DIMPLE BAR**
	LLP16	10.85	9.85	11.1	—	—	**P** Type Boring Bar
	LLP18	15.35	13.05	12.0	—	—	**D** Type Boring Head
	LLP23	5.55	4.85	6.8	—	—	**HSK** Tool Holder
	LLP24	7.25	6.55	9.1	—	—	**KSMG** Type Cutter
							LL Type Cartridge
							Boring Unit
	**MP6**	11.9	7.8	M10×1	22.1	15	**DOUBLE CLAMP** Holder (For Heavy Cutting)

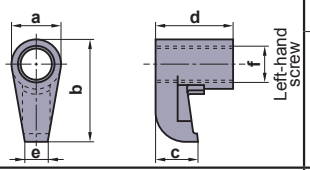
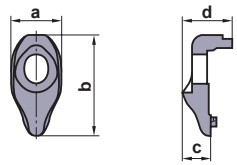
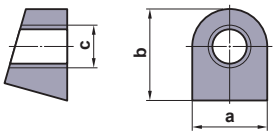
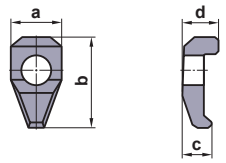
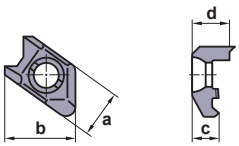
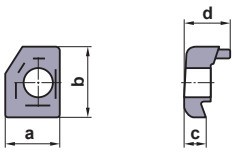
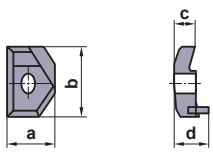
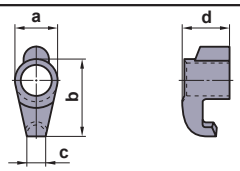
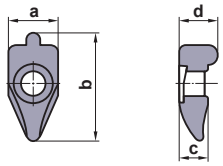
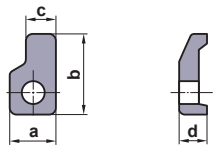
LOCK PIN

Geometry	Order Number	Dimensions (mm) a	b	c	d	e	f	Tool Holder
	**P11S**	6	3.7	4	17	11.1	—	**MP** Type Holder
	P21S	7.5	4.9	4.5	17.2	11.5	—	**D** Type Boring Head
	**P221US**	4	18	2.11	3.5	3.3	7.7	**ML** Type Holder
	P321US	5.5	18	3.64	5.0	3.3	7.5	
	P322US	5.5	21	3.64	5.0	3.3	10.5	
	P323US	5.5	24	3.64	5.0	3.3	13.5	
	P332US	5.5	21	3.64	5.0	4.9	8.9	
	**P323WS**	5.75	24	3.64	5.0	3.3	12.9	**ML** Type Holder
	P333WS	5.75	24	3.64	5.0	4.9	11.3	
	P334WS	5.75	30	3.64	5.0	4.9	17.3	
	P433W	7.75	24	5.03	7.0	4.9	10.8	
	P434W	7.75	30	5.03	7.0	4.9	16.8	

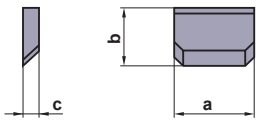
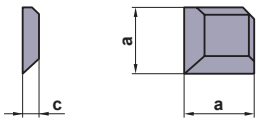
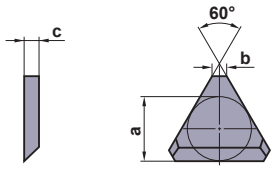
CLAMP BRIDGE

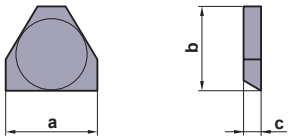
Geometry	Order Number	Dimensions (mm) a	b	c	d	e	f	Tool Holder
	**AMS3**	7	12	3	3.3	—	—	**Profile** Holder
	AMS4	9	13.5	3	3.8	—	—	**AJX** Type Cutter
	AMS5	10	15	3.5	5	—	—	**BRE** Type Cutter
	**CA142**	8	15	4	7	—	—	
	CA150	9	16	4.5	7	—	—	
	CA151	10	17	5	7	—	—	
	CA152	10	19	5	7	—	—	
	CA153	10	24	5	7	—	—	
	CA161	13	20	6	8	—	—	
	CA162	13	24	6	8	—	—	
	CA163	13	27	6	8	—	—	
	CA181	16	30	8	10	—	—	
	CA183	16	37	8	10	—	—	
	**CCK13**	15	18.5	6	9	—	—	**WP** Type Holder
	CCK14	19	22	8	9.5	—	—	**M** Type Boring Bar
	**CCTC1**	13	25	7	10.2	—	—	
	**CK231**	M6×1	8	4	7.5	4.5	9.5	**MC** Type Holder
	CK232	M6×1	8	4.5	8	4.5	11.5	
	CK341	M8×1	11	5.5	13.5	6	13.5	
	CK342	M8×1	11	6	14	6	16.5	

CLAMP BRIDGE

Geometry	Order Number	Dimensions (mm) a	b	c	d	e	f	Tool Holder
	**CKW6**	10.9	22.5	9.2	16.8	5	M8×1	**DOUBLE CLAMP** Holder (For Heavy Cutting)
	**DCK2211**	11	22	6.57	11.1	—	—	**DOUBLE CLAMP** Holder
	DCK2613	13	26.5	7.35	12.9	—	—	**DOUBLE CLAMP DIMPLE BAR**
	DCK3113	13	31	9	14.5	—	—	**HSK** Tool Holder
	**KGC1**	12.0	15.0	M7×0.75	—	—	—	**UG** Type Holder
	**LK1**	8	14.3	4.5	5.9	—	—	
	**MHK5NR/L**	15.5	23.5	8.1	12.1	—	—	
	**MTK1R/L**	13	17.5	5	12	—	—	**MG** Type Holder **MT** Type Holder **MT1** Type Holder **HSK** Tool Holder **MG** Type Cartridge
	**MTK2R/L**	18	28	7	14	—	—	
	**SETK51**	6.8	14.5	2.9	8	—	—	**MMTE** Type Holder **MMTI** Type Holder **SET** Type Holder **SNT** Type Holder **HSK** Tool Holder **SET** Type Cartridge
	SETK61	8.9	18.1	4.1	8.6	—	—	
	**SRK1R**	9.4	21	5.5	7.5	—	—	**SRE** Type Cutter
	**UCR**	12	24	8	7	—	—	

BREAKER PIECE

Geometry	Order Number	Dimensions (mm)					Tool Holder
		a	b	c	Inscribed Circle	Breaker Width	
	**CBS3**	9.4	8.0	1.5	9.525	1.5	**MC** Type Holder
	CBS4	12.6	9.2	2.5	12.70	3.5	
	CBS4N	12.6	10.2	2.5	12.70	2.5	
	CBS4F	12.6	11.2	2.5	12.70	1.5	
	CBS6	18.9	14.6	2.5	19.05	4.5	
	CBS6N	18.9	16.6	2.5	19.05	2.5	
	CBS6F	18.9	17.6	2.5	19.05	1.5	
	**CBS3D**	8.0	—	1.5	9.525	1.5	**MC** Type Holder
	CBS4D	10.2	—	2.5	12.70	2.5	
	CBS6D	15.6	—	2.5	19.05	3.5	
	**CBT2**	5.33	1.4	1.5	6.35	1.5	**MC** Type Holder **F** Type Boring Bar *For positive inserts, the breaker width is 0.5mm larger than the figures in the list.
	CBT2N	5.67	1.4	1.5	6.35	1.0	
	CBT3	7.20	1.4	2.5	9.525	3.5	
	CBT3N	7.87	1.4	2.5	9.525	2.5	
	CBT3F	8.53	1.4	2.5	9.525	1.5	
	CBT4	9.73	1.4	2.5	12.70	4.5	
	CBT4N	11.07	1.4	2.5	12.70	2.5	
	CBT4F	11.73	1.4	2.5	12.70	1.5	

Geometry	Order Number	Dimensions (mm)			Thread Pitch (mm)	Tool Holder
		a	b	c		
	**CBT3106**	11.5	10.6	2.0	2.5—3.0	
	CBT3113	11.5	11.3	2.0	1.5—2.0	
	CBT3120	11.5	12	2.0	0.75—1.25	
	CBT4108	13.3	10.8	2.0	3.5—4.0	
	CBT4128	13.3	12.8	2.0	4.5—5.0	

ANTI SEIZE LUBRICANT

ANTI SEIZE LUBRICANT

Shape	Order Number	Stock	Volume (g)
	MK1K	●	20
	MK1KS	●	3

● : **Inventory maintained in Japan.**

LL TYPE HOLDER

Old Type Tool Number		Shim	Shim Pin	Clamp Lever	Clamp Screw	Wrench
Type	Size					
PCFNR/L PCLNR/L PCBNR/L	1616H09	LLSCN3T3	LLP13	LLCL13	LLCS106	HKY25R
	2020K09	LLSCN3T3	LLP13	LLCL13	LLCS106	HKY25R
	2525M09	LLSCN3T3	LLP13	LLCL13	LLCS106	HKY25R
	2020K12	LLSCN42	LLP14	LLCL14	LLCS108	HKY30R
	2525M12	LLSCN42	LLP14	LLCL14	LLCS108	HKY30R
	2525M16	LLSCN53	LLP15	LLCL25	LLCS508	HKY30R
	3225P16	LLSCN53	LLP15	LLCL25	LLCS508	HKY30R
	4040R19	LLSCN63	LLP16	LLCL16	LLCS310	HKY40R
PTANR/L PTBNR/L PTTNR/L PTGNR/L PTFNR/L	1010E11	—	—	LLCL12S	LLCS105	HKY20F
	1212F11	—	—	LLCL12S	LLCS105	HKY20F
	1616H16	LLSTN32	LLP13	LLCL13	LLCS106	HKY25R
	2020K16	LLSTN32	LLP13	LLCL13	LLCS106	HKY25R
	2525M16	LLSTN32	LLP13	LLCL13	LLCS206	HKY25R
	2525M22	LLSTN42	LLP14	LLCL14	LLCS108	HKY30R
	3225P22	LLSTN42	LLP14	LLCL14	LLCS108	HKY30R
	3232P22	LLSTN42	LLP14	LLCL14	LLCS108	HKY30R
	4040R27	LLSTN53	LLP15	LLCL25	LLCS508	HKY30R
PSBNR/L PSSNR/L PSKNR/L	3225P12	LLSSN42	LLP14	LLCL14	LLCS108	HKY30R
	2525M15	LLSSN53	LLP15	LLCL25	LLCS508	HKY30R
	3232P15	LLSSN53	LLP15	LLCL25	LLCS508	HKY30R
	3232P19	LLSSN63	LLP16	LLCL16	LLCS310	HKY40R
	4040R19	LLSSN63	LLP16	LLCL16	LLCS310	HKY40R
	5050T25	LLSSN84	LLP18	LLCL18	LLCS112	HKY50R
PRGCR/L PRDCN	2020K10	LLSRN103	LLP13	LLCL110	LLCS205	HKY20R
	2020K12	LLSRN123	LLP13	LLCL112	LLCS106	HKY25R
	3225P12	LLSRN123	LLP13	LLCL112	LLCS106	HKY25R
	3225P16	LLSRN164	LLP24	LLCL116	LLCS306	HKY25R
	4040R25	LLSRN256	LLP16	LLCL125	LLCS410	HKY40R
	5050T32	LLSRN326	LLP18	LLCL132	LLCS112	HKY50R

MC TYPE HOLDER (OLD TYPE PRODUCTS)

Old Type Tool Number		Shim	Shim Pin	Clamp Bridge	Clamp Screw	Breaker Piece	Wrench
Type	Size						
N11R/L N12R/L N13R/L N14M N15R/L	22	CS32	BCP251	CK6	LS1	CBS3◌	HKY30R
	33H	CS42	BCP301	* CK2	LS2	CBS4◌	HKY40R
	44	CS42	BCP301	* CK2	LS3	CBS4◌	HKY40R
N21R/L N22R/L N25R/L	22	CT22	BCP201	CK1	LS1	CBT2◌	HKY30R
	33H	CT32	BCP301	CK2	LS2	CBT3◌	HKY40R
	44	CT32	BCP301	CK2	LS3	CBT3◌	HKY40R
P11R/L P12R/L P14M P15R/L	22	PS31	BCP201	CK6	LS1	CBS3◌	HKY30R
	33	PS42	BCP251	* CK3	LS2	CBS4◌	HKY40R
	44	PS42	BCP251	* CK3	LS3	CBS4◌	HKY40R
P21R/L P22R/L P25R/L	22	PT21	BCP141	CK1	LS1	CBT2◌	HKY30R
	33	CT32	BCP201	CK2	LS2	CBT3◌	HKY40R
	44	CT32	BCP201	CK2	LS3	CBT3◌	HKY40R

*Please use clamp bridge No.CK3 with N11R/L33H and N11R/L44 types. Please use clamp bridge No.CK2 with P12R/L33 and P12R/L44 types.

MC TYPE HOLDER

Old Type Tool Number		Shim	Shim Pin	Clamp Bridge	Clamp Screw	Breaker Piece	Wrench	Spring
Type	Size							
CTANR/L CTGNR/L	1616	CT22	BCP201	CK231	LS1	CBT2◌	HKY30R	–
	2020	CT32	BCP301	CK341	LS2	CBT3◌	HKY40R	–
	2525	CT32	BCP301	CK341	LS3	CBT3◌	HKY40R	–
CSTNR/L CSSNR/L	1616	CS32	BCP251	CK232	LS1	CBS3◌	HKY30R	–
	2020	CS42	BCP301	CK341	LS2	CBS4◌	HKY40R	–
	2525M43	CS42	BCP301	CK341	LS3	CBS4◌	HKY40R	–
CTAPR/L	2020	PT32	BCP201	CK341	LS2	CBT3◌	HKY40R	–
CSBPR/L CSSPR/L CSKPR/L	1616	PS31	BCP201	CK232	LS1	CBS3◌	HKY30R	–
	2020	PS42	BCP251	CK342	LS2	CBS4◌	HKY40R	–
CTCPR/L	2020K16	BPT322	BCP201	CCTC1	HSC06020	CBT3◌	HKY50R	MES3
	2525M16	BPT322	BCP201	CCTC1	HSC06020	CBT3◌	HKY50R	MES3

ML TYPE HOLDER (OLD TYPE PRODUCTS)

Old Type Tool Number		Lock Pin	Shim	Stop Ring	Spanner
Type	Size				
E11R/L E12R/L E13R/L E14R/L E15R/L	11U	P321US	–	ER3	KY40
	22U	P322US	–	ER3	KY40
	33W	P433W	ESS42	ER4	KY40
	44W	P434W	ESS42	ER4	KY40
E21R/L E22R/L E25R/L E26M E27R/L	11U	P221US	–	ER2	KY25
	22FU	P322US	–	ER3	KY40
	33HU	P333US	–	ER3	KY40
	33FW	P323WS	EST32	ER3	KY40
	33HW	P333WS	EST32	ER3	KY40
	44AW	P334WS	EST32	ER3	KY40
	44BW	P434W	EST43	ER4	KY40

ML TYPE HOLDER

Old Type Tool Number		Lock Pin	Shim	Stop Ring	Spanner
Type	Size				
ETANR/L ETENN ETFNR/L ETXNR/L	1212	P221US	–	ER2	KY25
	1616H32	P322US	–	ER3	KY40
	1616H33	P332US	–	ER3	KY40
	2020K32W	P323WS	EST32	ER3	KY40
	2020K33W	P333WS	EST32	ER3	KY40
	2525M33W	P334WS	EST32	ER3	KY40
	2525M43W	P434W	EST43	ER4	KY40
ESBNR/L ESENR/L ESDNR/L ESKNR/L	1212	P321US	–	ER3	KY40
	1616H32	P322US	–	ER3	KY40
	2020W	P433W	ESS42	ER4	KY40
	2525W	P434W	ESS42	ER4	KY40

MH TYPE HOLDER

Old Type Tool Number		Shim	Shim Pin	Clamp Bridge	Clamp Screw	Stop Ring	Wrench
Type	Size						
KKCR/L	445	MHS532R/L 533R/L 534R/L	SFC03010	MHK5NR/L	MHT1	CE8	HKY40R

SL TYPE HOLDER

Old Type Tool Number		Shim	Lock Pin	Nut	Clamp Wedge	Clamp Screw	Wrench
Type	Size						
ETJNR/L ETQNR/L	33K16S	SLSTN33	SLP13	SLN13	SLCW13	SLCS105	HKY25R HKY40R
	44M16S	SLSTN33	SLP13	SLN13	SLCW13	SLCS105	HKY25R HKY40R
	44M22S	SLSTN43	SLP14	SLN14	SLCW14	SLCS106	HKY30R HKY40R
	54P22S	SLSTN43	SLP14	SLN14	SLCW14	SLCS106	HKY30R HKY40R
ETNNR/L	64M22S	SLSTN43	SLP14	SLN14	SLCW14	SLCS106	HKY30R HKY40R
	85M22S	SLSTN43	SLP14	SLN14	SLCW14	SLCS106	HKY30R HKY40R

WP TYPE HOLDER (OLD TYPE PRODUCTS)

Old Type Tool Number		Shim	Shim Pin	Clamp Bridge	Clamp Screw	Side Lock Plate	Lock Screw	Spring	Wrench
Type	Size								
MTJNR/L MTENN MTQNR/L	2020K16	SLSTN33	CCP13	CCK13	SLCS105	CPT13	WPS1	MES2	HKY25R HKY40R
	2525M16	SLSTN33	CCP13	CCK13	SLCS105	CPT13	WPS1	MES2	HKY25R HKY40R
	2525M22	SLSTN43	CCP14	CCK14	SLCS106	CPT14	WPS1	MES3	HKY30R HKY40R
MTNNR/L	5032M22	SLSTN43	CCP14	CCK14	SLCS106	CPT14	WPS1	MES3	HKY30R HKY40R
MWLNR/L	2020K08	WPSWN43	CCP34	CCK13	SLCS105	CPT24	—	MES2	HKY25R HKY30R HKY40R
	2525M08								
	3225P08								

WP TYPE HOLDER

Old Type Tool Number		Shim	Shim Pin	Clamp Bridge	Clamp Screw	Side Lock Plate	Lock Screw	Spring	Wrench
Type	Size								
MTENN MTQNR/L	2020K16N	WPSTN33	CCP33	CCK13	SLCS105	CPT13	—	MES2	HKY25R HKY40R
	2525M16N	WPSTN33	CCP33	CCK13	SLCS105	CPT13	—	MES2	HKY25R HKY40R
	2525M22N	WPSTN43	CCP34	CCK14	SLCS106	CPT14	—	MES3	HKY30R HKY40R
MTNNR/L	5032M22N	WPSTN43	CCP34	CCK14	SLCS106	CPT14	—	MES3	HKY30TL HKY40R

SP TYPE HOLDER

Old Type Tool Number		Clamp Screw	Wrench	Shim	Shim Pin
Type	Size				
SDJCR/L SDFCR/L SDXCR/L	0808D07	TS25	TKY08F	—	—
	1010E07	TS25	TKY08F	—	—
	1212F07	TS25	TKY08F	—	—
	1616H11	TS43	TKY15F	—	—
SVJCR/L SVVCN SVPCR/L	0808D11	TS25	TKY08F	—	—
	1010E11	TS25	TKY08F	—	—
	1212F16	TS43	TKY15F	—	—
	3225P16	TS44	TKY15R	SPSVN32	BCP141
SSBCR/L	1616H09	TS43	TKY15F	—	—
SRGCR/L SRXCR/L SRDCN	0808D06	TS25	TKY08F	—	—
	1010E06	TS25	TKY08F	—	—
	1212F06	TS25	TKY08F	—	—
	1010E08	TS3	TKY08F	—	—
	1212F08	TS3	TKY08F	—	—

MP TYPE HOLDER

Old Type Tool Number		Shim	Lock Pin	Lock Screw	Stop Ring	Wrench
Type	Size					
PVVNN PVPNR/L	**3225P16**	PV32◌	P11S	HSP05008C	E03	HKY25R

SR TYPE HOLDER

Old Type Tool Number		Clamp Screw	Wrench
Type	Size		
SRSGR/L SRSGN	**2525M20**	TS5	TKY25F
	3225P20	TS5	TKY25F

AL TYPE HOLDER

Old Type Tool Number		Shim	Shim Pin	Clamp Lever	Clamp Screw	Wrench
Type	Size					
PTGER/L PTFER/L	**2020K16**	LLSTE32	LLP13	LLCL131	LLCS106	HKY25R
	2525M16	LLSTE32	LLP13	LLCL131	LLCS106	HKY25R
SVVDN SVPDR/L	**1616H16**	–	–	–	FC400890T	TKY10F
	2020K16	–	–	–	FC400890T	TKY10F
	2525M16	–	–	–	FC400890T	TKY10F

MT2 TYPE HOLDER

Old Type Tool Number		Clamp Bridge	Clamp Screw	Spring	Wrench
Type	Size				
MT2R/L	**2525M4**	MTK1L/R	HBH06020	MES3	HKY40R

MG2 TYPE HOLDER

Old Type Tool Number		Clamp Bridge	Clamp Screw	Spring	Wrench
Type	Size				
MG2R/L	**2525M4315**	MTK1R/L	HBH06020	MES3	HKY40R
	2525M4323	MTK1R/L	HBH06020	MES3	HKY40R
	2525M4333	MTK1R/L	HBH06020	MES3	HKY40R

MG TYPE HOLDER

Old Type Tool Number		Clamp Bridge	Clamp Screw	Spring	Wrench
Type	Size				
MGHR/L	**2020K3333**	MTK1L/R	HBH06020	MES3	HKY40R
	2020K4447	MTK1L/R	HBH06020	MES3	HKY40R
	3232P5660	MTK2L/R	MGS6	MES3	HKY50R
	3232P5670	MTK2L/R	MGS6	MES3	HKY50R
	3232P5680	MTK2L/R	MGS6	MES3	HKY50R

EG TYPE HOLDER

Old Type Tool Number		Clamp Screw	Wrench
Type	Size		
EGHR	**2020K03**	EGS06019	HKY30R
	2525M3	EGS06019	HKY30R
	2525M4	EGS08024	HKY40R
	2525M5	EGS08024	HKY40R
	2525M7	EGS08024	HKY40R
	2525M8	EGS08024	HKY40R

ET TYPE HOLDER

Old Type Tool Number		Clamp Bridge	Clamp Screw	Shim Screw	Shim	Breaker Piece	Wrench
Type	Size						
ETHR	**2525M16**	CK341	LS2	CFM02008	PT32T1R PT32T2R	CBT3106 CBT3113 CBT3120	HKY40R

SET TYPE HOLDER

Old Type Tool Number		Clamp Bridge	Clamp Screw	Stop Ring	Shim Pin	Shim	Wrench
Type	Size						
SETHR	**1616H16**	SETK51	SETS51	CR4	HFC03008	CT32T1	TKY15F HKY20R
	2020K16	SETK51	SETS51	CR4	HFC03008	CT32T1	TKY15F HKY20R
	2525M16	SETK51	SETS51	CR4	HFC03008	CT32T1	TKY15F HKY20R

HSK-T TOOLS (DG)

Old Type Tool Number	Locator Screw	Clamp Screw	Spring	Wrench
H63TH-DGHR/LS	HSC05012	DGS51	MES2	HKY40R
H63TH-DGHR/L	HSC05012	DGS51	MES2	HKY40R
H63TH-DGHN-H4	HSC05010	DGS51	MES2	HKY40R
H63TH-DGHN-H5	HSC05012	DGS51	MES2	HKY40R
H63TH-DGHN-H6	HSC05012	DGS51	MES2	HKY40R
H63TH-DGHN-L4	HSC05010	DGS51	MES2	HKY40R
H63TH-DGHN-L5	HSC05012	DGS51	MES2	HKY40R
H63TH-DGHN-L6	HSC05012	DGS51	MES2	HKY40R

DG TYPE HOLDER

Old Type Tool Number	Clamp Bridge	Locator Screw	Wrench	Clamp Screw	Spring
DGHR/L 1616K2G	DGK2R/L	–	HKY40R	DGS51	MES2
DGHR/L 1616K3	DGK3R/L	–	HKY40R	DGS51	MES2
DGHR/L 1616K3G	DGK3R/L	–	HKY40R	DGS51	MES2
DGHR/L 1616KF3	DGK3R/L	–	HKY40R	DGS51	MES2
DGHR/L 2020K	–	HSC04014	HKY30R HKY40R	DGS51	MES2
DGHR/L 2020KFS	–	HSC04014	HKY30R HKY40R	DGS51	MES2
DGHR/L 2020KL	–	HSC04014	HKY30R HKY40R	DGS51	MES2
DGHR/L 2020KLS	–	HSC04014	HKY30R HKY40R	DGS51	MES2
DGHR/L 2020KS	–	HSC04014	HKY30R HKY40R	DGS51	MES2
DGHR/L 2525M	–	HSC05012	HKY40R	DGS51	MES2
DGHR/L 2525MC	–	HSC05012	HKY40R	DGS51	MES2
DGHR/L 2525MCS	–	HSC05010	HKY40R	DGS51	MES2
DGHR/L 2525MF	–	HSC05012	HKY40R	DGS51	MES2
DGHR/L 2525MFS	–	HSC05012	HKY40R	DGS51	MES2
DGHR/L 2525ML	–	HSC05012	HKY40R	DGS51	MES2
DGHR/L 2525MLS	–	HSC05012	HKY40R	DGS51	MES2
DGHR/L 2525MS	–	HSC05012	HKY40R	DGS51	MES2

COBRA (STEEL SHANK)

Old Type Tool Number	Clamp Screw	Wrench
S08HSTFPR09	TS253	TKY08F
S10KSTFPR09	TS25	TKY08F
S○○○STFPR11	TS3	TKY08F
S○○○STFPR16	TS4	TKY15F
S○○○SCLPR/L08	TS3	TKY08F
S○○○SCLPR/L09	TS4	TKY15F
S○○○SWLPR/L04	TS25	TKY08F
S○○○SWLPR/L06	TS4	TKY15F

COBRA (CARBIDE SHANK)

Old Type Tool Number	Clamp Screw	Wrench
E08KSTFPR09	TS253	TKY08F
E10MSTFPR09	TS25	TKY08F
E○○○STFPR11	TS3	TKY08F
E○○○SCLPR08	TS3	TKY08F
E○○○SCLPR09	TS4	TKY15F

S TYPE (STEEL SHANK)

Old Type Tool Number	Clamp Screw	Wrench
S○○○SSKCR/L12	TS5	TKY25F
S○○○SDQCR/L15	TS5	TKY25F
S○○○SCZCR/L06	TS25	TKY08F
S○○○SCZCR/L09	TS4	TKY15F
S○○○SCZCR/L12	TS5	TKY25F
S○○○SDZCR11	TS4	TKY15F

S TYPE (CARBIDE SHANK)

Old Type Tool Number	Clamp Screw	Wrench
C○○○SSKCR/L09	TS4	TKY15F
C○○○SDUCR/L15	TS5	TKY25F
C○○○SVUCR/L11	TS25	TKY08F
C○○○SVUCR/L16	TS4	TKY15F
C○○○SCLCR/L12	TS5	TKY25F
C○○○SCZCR/L06	TS25	TKY08F
C○○○SCZCR/L09	TS4	TKY15F
C○○○SCZCR/L12	TS5	TKY25F
C○○○SDZCR11	TS4	TKY15F

F TYPE

Old Type Tool Number		Shim	Shim Pin	Clamp Set	Breaker Piece	Wrench
Type	Size					
FCSK	116R/L	–	–	C3	CBS3	HKY25R
	120R/L	–	–	C3	CBS3	HKY25R
	125R/L	PS42	BCP252	C4	CBS4F	HKY30R
	132R/L	PS42	BCP251	C4	CBS4F	HKY30R
FCSK	216R/L	–	–	C3	CBS3	HKY25R
	220R/L	–	–	C3	CBS3	HKY25R
	225R/L	PS42	BCP252	C4	CBS4F	HKY30R
FCTU	232R/L	PT32	BCP201	C4	CBT3F	HKY30R

P TYPE

Old Type Tool Number	Shim	Shim Pin	Clamp Lever	Clamp Screw	Wrench	Plug
A50UPSKNR/L19	LLSSP63	LLP16	LLCL16	LLCS310	HKY40R	HGM-PT3/8
A40TPCLNR/L16	LLSCN53	LLP15	LLCL25	LLCS508	HKY30R	HGM-PT3/8
A50UPCLNR/L19	LLSCP63	LLP16	LLCL16	LLCS310	HKY40R	HGM-PT3/8

D TYPE (FOR BORING)

Old Type Tool Number		Shim	Shim Pin	Clamp Lever	Clamp Screw	Clamp Set	Breaker Piece	Stop Ring	Wrench
Type	Size								
DPSK	132R/L	LLSSN42	LLP14	LLCL14	LLCS108	–	–	–	HKY30R
	140R/L	LLSSN42	LLP14	LLCL14	LLCS108	–	–	–	HKY30R
	150R/L	LLSSN63	LLP16	LLCL16	LLCS110	–	–	–	HKY40R
	163R/L	LLSSN63	LLP16	LLCL16	LLCS110	–	–	–	HKY40R
DPTF	150R/L	LLSTN42	LLP14	LLCL14	LLCS108	–	–	–	HKY30R
	163R/L	LLSTN42	LLP14	LLCL14	LLCS108	–	–	–	HKY30R
DPDU DPDH DPDZ	132R/L	LLSDN42	LLP14	LLCL24	LLCS108	–	–	–	HKY30R
	140R/L	LLSDN42	LLP14	LLCL24	LLCS108	–	–	–	HKY30R
	* 150R/L	LLSDN53	LLP15	LLCL15	LLCS208	–	–	–	HKY30R
DPCL	150R/L	LLSCN63	LLP16	LLCL16	LLCS110	–	–	–	HKY40R
	163R/L	LLSCN63	LLP16	LLCL16	LLCS110	–	–	–	HKY40R
DPVP	150R/L	PV322	P11S	–	HSP05008C	–	–	E03	HKY25R
DCTU	132R/L	PT32	BCP201	–	–	C4	CBT3N	–	HKY30R
	140R/L	PT42	BCP251	–	–	C5	CBT4F	–	HKY40R
	150R/L	PT42	BCP251	–	–	C5	CBT4F	–	HKY40R

*DPDH150R/L can be compatible with 140R/L.

D TYPE (FOR GROOVING AND THREADING)

Old Type Tool Number		Lock Pin	Lock Screw	Stop Ring	Wrench
Type	Size				
DPT2	132R	P21S	HSP08014	E01	HKY40R
	140R	P21S	HSP08014	E01	HKY40R
DPT4	132R	P21S	HSP08014	E01	HKY40R
	140R	P21S	HSP08014	E01	HKY40R

F TYPE (FOR GROOVING AND THREADING)

Old Type Tool Number		Clamp Bridge	Clamp Set	Clamp Screw	Shim	Shim Pin	Stop Ring	Wrench
Type	Size							
FCL5	116R/L	LK1	–	HBH04012	–	–	–	HKY25R
	120R/L	LK1	–	HBH04012	–	–	–	HKY25R
	125R/L	LK1	–	HBH04012	–	–	–	HKY25R
	132R/L	LK1	–	HBH04012	–	–	–	HKY25R
	216R/L	LK1	–	HBH04012	–	–	–	HKY25R
	220R/L	LK1	–	HBH04012	–	–	–	HKY25R
	225R/L	LK1	–	HBH04012	–	–	–	HKY25R
NTF	M16R	–	C3	–	–	–	–	HKY25R
	Q20R	–	C4	–	–	–	–	HKY30R
	R25R	–	C4	–	–	–	–	HKY30R
	R216R	–	C3	–	–	–	–	HKY25R
	S220R	–	C4	–	–	–	–	HKY30R
	T225R	–	C4	–	–	–	–	HKY30R
SNTF	K16R11	–	–	TS25	–	–	–	TKY08F
	M16R	–	–	CS350860T	–	–	–	TKY15F
	P20R	SETK51	–	SETS51	CT32T1	HFC03008	CR4	TKY15F HKY20R
	R25R	SETK51	–	SETS51	CT32T1	HFC03008	CR4	TKY15F HKY20R
	M210R11	–	–	TS25	–	–	–	TKY08F
	Q212R11	–	–	TS25	–	–	–	TKY08F
	R216R	–	–	CS350860T	–	–	–	TKY15F
	S220R	SETK51	–	SETS51	CT32T1	HFC03008	CR4	TKY15F
	T225R	SETK51	–	SETS51	CT32T1	HFC03008	CR4	TKY15F
FCDG4	120R/L3M	–	BC5	–	–	–	–	TKY20R
	125R/L3M	–	BC5	–	–	–	–	TKY20R
	132R/L3M	–	BC5	–	–	–	–	TKY20R
	120R/L4M	–	BC5	–	–	–	–	TKY20R
	125R/L4M	–	BC5	–	–	–	–	TKY20R
	132R/L4M	–	BC5	–	–	–	–	TKY20R
	125R/L5M	–	BC5	–	–	–	–	TKY20R
	132R/L5M	–	BC5	–	–	–	–	TKY20R
FCDG4	120R/L4J	–	BC5	–	–	–	–	TKY20R
	125R/L4J	–	BC5	–	–	–	–	TKY20R
	132R/L4J	–	BC5	–	–	–	–	TKY20R
	125R/L5J	–	BC5	–	–	–	–	TKY20R
	132R/L5J	–	BC5	–	–	–	–	TKY20R

UNIT

Old Type Tool Number	Washer Screw	Bush Screw	Wrench	Bush	Washer	Leaf Spring
NA1	HFC03008	HY-A1	HKY20R	The parts above are not sold separately as accuracy can only be guaranteed by having the complete set. Please contact us for questions about parts replacement.		
NV1	HFC03008	HY-V1	HKY20R			
NA2	HSC03010	HY2	HKY20R HKY25R			
NV2	HSC03010	HY2	HS-N2 HKY25R			
NA3	HSC04010	HY3	HKY20R HKY30R			
NV3	HSC04010	HY3	HKY20R HKY30R			
NA4	HSC05012	HY4	HKY30R HKY40R			
NV4	HSC05012	HY4	HKY30R HKY40R			

CARTRIDGE

Old Type Tool Number	Clamp Lever	Clamp Screw	Shim	Shim Pin	Spanner	Wrench
NASP11	–	CS250T	–	–	HR12	TKY08F
NVSP11	–	CS250T	–	–	HR12	TKY08F
NASP21	–	CS300890T	–	–	HR12	TKY08F
NVSP21	–	CS300890T	–	–	HR12	TKY08F
NAPN21	LLCL12S	LLCS103	–	–	HR12	HKY20F
NVPN21	LLCL12S	LLCS103	–	–	HR12	HKY20F
NASP31	–	CS300890T	–	–	HR34	TKY08F
NVSP31	–	CS300890T	–	–	HR34	TKY08F
NAPN31	LLCL12S	LLCS103	–	–	HR34	HKY20F
NVPN31	LLCL12S	LLCS103	–	–	HR34	HKY20F
NAPN41	LLCL13	LLCS106	LLSTN32	LLP13	HR34	HKY25F
NVPN41	LLCL13	LLCS106	LLSTN32	LLP13	HR34	HKY25F

AF5000 TYPE

Old Type Tool Number	Wedge	Clamp Screw	Adjust Screw	Wrench	Wrench	Recommended Cutter
AF5000 Type	CWAF5R/L	LS10T	KS1S	TKY25T	HKY15R	**NF10000 Type**

BAP300 TYPE

Old Type Tool Number	Clamp Screw	Wrench	Recommended Cutter
BAP300 Type	TS25	TKY08F	**APX3000 Type**

BAP400 TYPE

Old Type Tool Number	Clamp Screw	Wrench	Recommended Cutter
BAP400-040A04R	TS43	TKY15F	**APX4000 Type**
BAP400-050A05R	TS43	TKY15F	
BAP400-063A06R	TS43	TKY15F	
BAP400R0307C	TS43	TKY15F	
BAP400R0408D	TS43	TKY15F	
BAP400R0509E	TS43	TKY15D	
BAP400R0610E	TS43	TKY15D	

BF407 TYPE

Old Type Tool Number	Wedge	Clamp Screw	Setting Screw	Wrench	Recommended Cutter
BF407R0812K	CWSF407TR2	LS15T	CAS51T	TKY25T	—
BF407R1016K	CWSF407TR2	LS15T	CAS51T	TKY25T	
BF407R1218P	CWSF407TR2	LS15T	CAS51T	TKY25T	

BN425 TYPE

Old Type Tool Number	Wedge	Clamp Screw	Wrench	Recommended Cutter
BN425 Type	CWS43SNN	LS14T	TKY25T	—

BOE TYPE

Old Type Tool Number	Set Bolt	Set Bolt	Clamp Screw	Wrench (Insert)	Wrench (Set Bolt)	Recommended Cutter
BOER0202B	LS21	—	CS501290T	TKY25T	HKY50R	**OCTACUT Type**
BOE-050A02R	LS20	—	CS501290T	TKY25T	HKY50R	
BOER2H03B	—	BOES101	CS501290T	TKY25T	HKY80R	
BOE-063A03R	—	BOES101	CS501290T	TKY25T	HKY80R	
BOER0304C	—	—	CS501290T	TKY25T	—	
BOER0405D	—	HSC16035	CS501290T	TKY25T	—	

BSX400 TYPE

Old Type Tool Number	Clamp Screw	Wrench	Recommended Cutter
BSX400R05004A	TS43	TKY15F	**ASX400 Type**
BSX400R06305A	TS43	TKY15F	
BSX400R08006C	TS43	TKY15F	
BSX400R10008D	TS43	TKY15F	
BSX400R12510E	TS43	TKY15D	
BSX400R16012E	TS43	TKY15D	

BSX500 TYPE

Old Type Tool Number	Clamp Screw	Shim Screw	Shim	Wrench	Recommended Cutter
BSX500 Type	CSF401260T	WCS604010H	STBS500N	TKY20D	**ASX400 Type**

BXD7000 TYPE

Old Type Tool Number	Clamp Screw	Wrench	Recommended Cutter
BXD7000 Type	TS5SL	TKY25D	**AXD7000 Type**

BZC400 TYPE

Old Type Tool Number	Clamp Screw	Set Bolt	Wrench (Wedge)	Wrench (Set Bolt)	Recommended Cutter
BZC400-032A03R	CS350990T	LS24	TKY10F	HKY40R	**APX4000 Type**
BZC400-040A04R	CS350990T	—	TKY10F	—	
BZC400R0408D	CS350990T	—	TKY10F	—	

E404 TYPE

Old Type Tool Number	Locator	Locator Screw	Shim	Shim Screw	Wedge	Clamp Screw (Wedge)	Wrench	Wrench	Recommended Cutter
E404 Type	SSE41R	SPS1	SCD43	STS1	CWS3R/L	WS1	TKY10R	TKY25T	—

FN548 TYPE

Old Type Tool Number	Wedge	Clamp Screw	Wrench	Wrench	Hexagonal Head	Recommended Cutter
FN548 Type	CWS4	LS14	HKY40T	120QSPK x 80 (KANNON-SEIKI CO.)	6.35□ x 4 (KYOKUTO MFG CO.)	—

LSE445 TYPE

Old Type Tool Number	Shim	Shim Screw	Wedge	Clamp Screw	Wrench (Wedge)	Wrench	Recommended Cutter
LSE445 Type	STBE445NF	CS300890T	CWSE445TR	LS15T	TKY25T	TKY08F	**ASX445 Type**

MG300, 400 TYPE

Old Type Tool Number	Clamp Screw	Wrench	Recommended Cutter
MG300 Type	CS350990T	TKY10F	–
MG400 Type	CS451190T	TKY20F	**ASX400 Type**

MG345, 445 TYPE

Old Type Tool Number	Clamp Screw	Wrench	Recommended Cutter
MG345 Type	CS350990T	TKY10F	**ASX445 Type**
MG445 Type	CS451190T	TKY20F	

MGP445 TYPE

Old Type Tool Number	Clamp Screw	Wrench	Recommended Cutter
MGP445 Type	CS401160T	TKY15D	**ASX445 Type**

MSD445 TYPE

Old Type Tool Number	Wedge	Clamp Screw	Wrench	Recommended Cutter
MSD445 Type	CWMSE445R2	LS15T	TKY25T	**ASX445 Type**

MSE445 TYPE

Old Type Tool Number	Wedge	Clamp Screw	Wrench	Recommended Cutter
MSE445 Type	CWMSE445R2	LS15T	TKY25T	**ASX445 Type**

NR10000 TYPE

Old Type Tool Number	Wedge	Clamp Screw	Adjusting Wedge	Adjusting Screw	Clamp Screw	Wrench	Recommended Cutter
NR10000 Type	CWAF10R2	LS10T	CWAF10N	LS15T	CSAF10	TKY25T	–

P425, P525 TYPE

Old Type Tool Number	Locator	Locator Screw	Shim	Shim Screw	Wedge	Clamp Screw (Wedge)	Wrench	Wrench	Recommended Cutter
P425 Type	SSP41R	SPS1	SCP431R/L	STS1	CWS1R/L	WS1	TKY10R	TKY25T	**ASX445 Type**
P525 Type	SSP51R	SPS1	SCP521R/L	STS1	CWS1R/L	WS1	TKY10R	TKY25T	**SE515 Type**

QBF407 TYPE

Old Type Tool Number	Wedge	Clamp Screw	Setting Screw	Guide Plate	Stop Screw	Wrench	Recommended Cutter
QBF407R0304Q	CWSF407TR1	LS15T	CAS51T	QPAR1	TFC04010	TKY20R TKY25T	–
QBF407R0406Q	CWSF407TR1	LS15T	CAS51T	QPAR1	TFC04010	TKY20R TKY25T	
QBF407R0508Q	CWSF407TR2	LS15T	CAS51T	QPAR1	TFC04010	TKY20R TKY25T	

QBP415 TYPE

Old Type Tool Number	Shim	Shim Pin	Wedge-T	Clamp Screw	Wrench	Recommended Cutter
QBP415 Type	STSP415R	TS32	QWGR1	LS10T	TKY25T	–

QF10000 TYPE

Old Type Tool Number	Wedge	Clamp Screw	Guide Plate	Stop Screw	Adjusting Wedge	Adjusting Screw	Stop Screw	Wrench	Recommended Cutter
QF10000 Type	CWAF10R3	LS15T	QPCR1	TFC04010	CWAF10N	LS10T	CSAF10	TKY20T TKY25T	–

QSE415 TYPE

Old Type Tool Number	Wedge	Clamp Screw	Setting Screw	Guide Plate	Stop Screw	Wrench	Recommended Cutter
QSE415 Type	CWSF407TR3	LS15T	CAS51T	QPAR1	TFC04010	TKY20R TKY25T	–

SE300 TYPE

Old Type Tool Number	Locator	Locator (Wiper)	Wedge-T	Wedge-S	Wedge-S (Wiper)	Clamp Screw	Wrench	Recommended Cutter
SE300 Type	SPSE300R	SPSEW300R	CWNSE300TR	CWSE300SN	CWSEW300SN	LS10T	TKY25T	–

SE400 TYPE

Old Type Tool Number	Locator	Locator (Wiper)	Wedge-T	Wedge-S	Clamp Screw	Wrench	Recommended Cutter
SE400 Type	SPSE400R	SPSEW400R	CWSE400TN	CWSE400SN	LS15T (SE400R0304C:LS10T)	TKY25T	–

SHP400 TYPE

Old Type Tool Number	Locator	Wedge-T	Clamp Screw	Locator Screw	Wrench (Wedge)	Wrench (Locator)	Recommended Cutter
SHP400 Type	SPSHP400R/L	CWSE300TR/L	LS10T	TS32	TKY25T	TKY08F	**ASX400 Type**

VIP400 TYPE

Old Type Tool Number	Clamp Screw	Wrench	Recommended Cutter
VIP400 Type	CS501160T	TKY20F	**ASX400 Type**

VIP445 TYPE

Old Type Tool Number	Clamp Screw	Wrench	Recommended Cutter
VIP445 Type	CS501160T	TKY20F	**ASX445 Type**

VSD645 TYPE

Old Type Tool Number	Locator	Locator Screw	Clamp Screw	Adjust Screw	Wrench (Insert)	Wrench	Recommended Cutter
VSD645 Type	NE04R30	SE03-65	SE02-81	SA04-47	TKY15D	HKY30R	**ASX445 Type**

BAE TYPE

Old Type Tool Number	Clamp Screw	Wrench	Recommended End Mill
BAE500R161S16	TS42	TKY15F	**APX4000 Type**
BAE500R201S20	TS42	TKY15F	
BAE500R252S25	TS42	TKY15F	
BAE500R323S32	TS4	TKY15F	
BAE500R403S32	TS4	TKY15F	
BAE500R504S32	TS4	TKY15F	
BAE600 Type	TS52	TKY25F	

BAP400 TYPE

Old Type Tool Number	Clamp Screw	Wrench	Recommended End Mill
BAP400R252S25	TS4	TKY15F	**APX4000 Type**
BAP400R323S32	TS43	TKY15F	
BAP400R404S32	TS43	TKY15F	
BAP400R505S32	TS43	TKY15F	
BAP400R636S32	TS43	TKY15F	

BAEP400 (Long Cutting Edge Type) TYPE

Old Type Tool Number	Clamp Screw	Wrench	Recommended End Mill
BAP400R4008ES42	TS43	TKY15F	**APX4000 Type**
BAP400R5012ES58	TS43	TKY15F	
BAP400R06308C	TS43	TKY15F	
BAP400R08012D	TS43	TKY15F	
BAP400R06312A27	TS43	TKY15F	
BAP400R08018A27	TS43	TKY15F	

BOE TYPE

Old Type Tool Number	Clamp Screw	Wrench	Recommended End Mill
BOE Type	CS501290T	TKY25T	**OCTACUT Type**

BRE TYPE

Old Type Tool Number	Clamp Screw	Clamp Bridge	Clamp Screw (Bridge)	Spring	Wrench	Recommended End Mill
BRE Type	TS5S	AMS5	BRS105	ASS3	TKY25R	**BRP Type**

BSX300 TYPE

Old Type Tool Number	Clamp Screw	Wrench	Recommended End Mill
BSX300 Type	TS32	TKY08F	**APX3000 Type**

BSX400 TYPE

Old Type Tool Number	Clamp Screw	Wrench	Recommended End Mill
BSX400 Type	TS43	TKY15F	**ASX400 Type**

BSX500 TYPE

Old Type Tool Number	Clamp Screw	Shim Screw	Shim	Wrench	Recommended End Mill
BSX500 Type	CSF401260T	WCS604010H	STBS500N	TKY20D	**ASX400 Type**

BXD7000 TYPE

Old Type Tool Number	Clamp Screw	Wrench	Recommended End Mill
BXD7000R251SA25SA/B	TS5S	TKY25D	**AXD7000 Type**
BXD7000R321SA32SA/B	TS5S	TKY25D	
BXD7000R402SA42SA/B	TS5SL	TKY25D	

BZC400 TYPE

Old Type Tool Number	Clamp Screw	Wrench	Recommended End Mill
BZC400 Type	CS350990T	TKY10F	**APX4000 Type**

CV TYPE

Old Type Tool Number	Clamp Screw	Clamp Bridge	Clamp Screw (Bridge)	Spring	Wrench	Recommended End Mill
CV10R253S32	TS4	AMS3	BRS103	ASS2	TKY15R	**BRP Type**
CV12R323S32	TS4	AMS3	BRS103	ASS2	TKY15R	
CV16R403S32	TS5	AMS5	BRS105	ASS3	TKY25R	

CV20 TYPE

Old Type Tool Number	Clamp Screw	Wedge	Wrench	Recommended End Mill
CV20R403S32	LS14T	CWCV20	TKY25T	–

DCSD, DCSN TYPE

Old Type Tool Number	Holder			Cartridge					Wrench	Recommended End Mill
	Shim	Shim Screw	Clamp Screw	Body	Shim	Shim Screw	Clamp Screw	Wrench		
DCSDR2063SN	–	–	TS5S	JKDS4	–	–	DKS5	HKY40R	TKY25T	**SPX Type**
DCSDR2063LN	–	–	TS5S	JKDS4	–	–	DKS5	HKY40R	TKY25T	
DCSDR2080SN	–	–	TS5S	JKDS4	–	–	DKS5	HKY40R	TKY25T	
DCSDR2100SN	–	–	TS5S	JKDS4	–	–	DKS5	HKY40R	TKY25T	
DCSNR2063SN	JENS42	JSS7	TS5L	JKNS4	JENS42	JSS7	DKS5	HKY40R	TKY25T	
DCSNR2063LN	JENS42	JSS7	TS5L	JKNS4	JENS42	JSS7	DKS5	HKY40R	TKY25T	
DCSDR2063SB	–	–	TS5S	JKDS4	–	–	DKS5	HKY40R	TKY25T	
DCSDR2063LN	–	–	TS5S	JKDS4	–	–	DKS5	HKY40R	TKY25T	
DCSNR2063SB	JENS42	JSS7	TS5L	JKNS4	JENS42	JSS7	DKS5	HKY40R	TKY25T	
DCSDR2080SA	–	–	TS5S	JKDS4	–	–	DKS5	HKY40R	TKY25T	
DCSNR2080SA	JENS42	JSS7	TS5L	JKNS4	JENS42	JSS7	DKS5	HKY40R	TKY25T	

ECMP TYPE

Old Type Tool Number	Clamp Screw	Wrench	Recommended End Mill
ECMP252S25	TS4	TKY15R	–
ECMP322S32	TS5	TKY25R	
ECMP402S42	TS5	TKY25R	

FF3000 TYPE

Old Type Tool Number	Shim	Lock Pin	Wrench	Recommended End Mill
FF3000 Type	FFSS	FFP	HKY25L	–

FSTE TYPE

Old Type Tool Number	Locator	Wedge	Clamp Screw	Locator Screw	Wrench	Recommended End Mill
FSTE Type	TS441R	CWFSTE	LS10T	CPM03008	TKY25T	**ASX400 Type**

MG200, 300 TYPE

Old Type Tool Number	Clamp Screw	Wrench	Recommended End Mill
MG200 Type	CS300890T	TKY08F	–
MG300 Type	CS350990T	TKY10F	**ASX400 Type**

MG245, 345 TYPE

Old Type Tool Number	Clamp Screw	Wrench	Recommended End Mill
MG245 Type	CS300890T	TKY08F	**ASX445 Type**
MG345 Type	CS350990T	TKY10F	

MSE445 TYPE

Old Type Tool Number	Wedge	Clamp Screw	Wrench	Recommended End Mill
MSE445 Type	CWMSE445R1	LS15T	TKY25T	**ASX445 Type**

SRE TYPE

Old Type Tool Number	Clamp Screw	Clamp Bridge	Stop Ring	Wrench	Recommended End Mill
SRER100SS16	TS253	–	–	TKY08F	**AQX Type**
SRER120SS16	TS3	–	–	TKY08F	
SRER140SS16	TS3	–	–	TKY08F	
SRER160SS16	TS35	–	–	TKY10F	
SRER180SS20	TS35	–	–	TKY10F	
SRER200SS20	SRS5	SRK1R	CR4	TKY20F	
SRER200SL20	SRS5	SRK1R	CR4	TKY20F	
SRER250SS25	SRS5	SRK1R	CR4	TKY20F	
SRER250SL25	SRS5	SRK1R	CR4	TKY20F	
SRER300SS32	SRS5	SRK1R	CR4	TKY20F	
SRER300SL32	SRS5	SRK1R	CR4	TKY20F	

SE300 TYPE

Old Type Tool Number	Locator	Wedge-T	Wedge-S	Clamp Screw	Wrench	Recommended End Mill
SE300 Type	SPSE300R	CWNSE300TR	CWSE300SN	LS10T	TKY25T	–

SHP400 TYPE

Old Type Tool Number	Locator	Wedge-T	Clamp Screw	Locator Screw	Wrench (Insert)	Wrench (Locator)	Recommended End Mill
SHP400 Type	SPSHP400R	CWSE300TR	LS10T	TS32	TKY25T	TKY08F	**ASX400 Type**

VIPER TYPE

Old Type Tool Number	Clamp Screw	Wrench	Recommended End Mill
VIPER Type	CS400990T	TKY15D	**SPX Type**

ZR TYPE

Old Type Tool Number	Clamp Screw	Wrench	Recommended End Mill
ZR202C/T	TS25	TKY08F	–
ZR252C/T	CS300890T	TKY08F	
ZR322C/T	CS300990T	TKY10F	
ZR402C/T	CS451190T	TKY20F	
ZR502C/T	CS451190T	TKY20F	

FBE2 TYPE

Old Type Tool Number	Clamp Screw	Wrench	Recommended End Mill
FBE2200SM	CS300590T	TKY08R	**SRF Type**
FBE2250SM	CS350790T	TKY10R	
FBE2300SM	CS400990T	TKY15R	
FBE2200SF	CS300590T	TKY08R	
FBE2250SF	CS350790T	TKY10R	
FBE2300SF	CS400990T	TKY15R	

TBE1/TBE2 TYPE

Old Type Tool Number	Clamp Screw		Wrench				Recommended End Mill
	R	Peripheral	R		Peripheral		
TBE1100SS	TS3	–	TKY08F	–	–	–	**SRM2 Type**
TBE1100SM	TS3	–	TKY08F	–	–	–	
TBE1100S	TS3	–	TKY08F	–	–	–	
TBE1150S	CS300790TS	–	–	TKY10R	–	–	
TBE1200S	CS400990T	–	–	TKY15R	–	–	
TBE1250S	CS400990T	–	–	TKY15R	–	–	
TBE1300S	CS501290T	–	–	TKY25R	–	–	
TBE2200S	CS350790T	–	–	TKY10R	–	–	
TBE2200SM	CS350790T	–	–	TKY10R	–	–	
TBE2250S	CS400990T	–	–	TKY15R	–	–	
TBE2250SM	CS400990T	–	–	TKY15R	–	–	
TBE2300S	CS501290T	–	–	TKY25R	–	–	
TBE2300SM	CS501290T	–	–	TKY25R	–	–	
TBE1150SU	CS300790TS	–	–	TKY10R	–	–	
TBE1200SU	CS400990T	–	–	TKY15R	–	–	
TBE1250SU	CS400990T	–	–	TKY15R	–	–	
TBE1300SU	CS501290T	–	–	TKY25R	–	–	
TBE2200SU	CS350790T	–	–	TKY10R	–	–	
TBE2250SU	CS400990T	–	–	TKY15R	–	–	
TBE2300SU	CS501290T	–	–	TKY25R	–	–	
TBE1200SL	CS400990T	TS3	–	TKY15R	TKY08F	–	
TBE1250SL	CS400990T	TS3	–	TKY15R	TKY08F	–	
TBE1300SL	CS501290T	TS4	–	TKY25R	–	TKY15R	
TBE2200SL	CS350790T	CS350790T	–	TKY10R	–	TKY10R	
TBE2250SL	CS400990T	CS400990T	–	TKY15R	–	TKY15R	
TBE2300SL	CS501290T	CS400990T	–	TKY25R	–	TKY15R	

TBE2 TYPE

Old Type Tool Number	Clamp Screw	Wrench	Recommended End Mill
TBE2150S/SM/SU	TS254	TKY08F	**SRM2 Type**
TBE2160S/SM/SU	TS254	TKY08F	

TRM2 TYPE

Old Type Tool Number	Clamp Screw		Wrench		Recommended End Mill
	Inner, Outer	Peripheral	Inner, Outer	Peripheral	
TRM2200SM	CS300790TS	–	TKY10R	–	**SRM2 Type**
TRM2250SM	CS400990T	–	TKY15R	–	
TRM2300SM	CS501290T	–	TKY25R	–	
TRM2200SL	CS300790TS	TS3	TKY10R	TKY08F	
TRM2250SL	CS400990T	TS3	TKY15R	TKY08F	
TRM2300SL	CS501290T	TS4	TKY25R	TKY15R	
TRM2200SF	CS300790TS	TS3	TKY10R	TKY08F	
TRM2250SF	CS400990T	TS3	TKY15R	TKY08F	
TRM2300SF	CS501290T	TS4	TKY25R	TKY15R	

TASS TYPE (STANDARD)

Old Type Tool Number	Clamp Screw	Wrench	Recommended Drill
TASS1600S32	TS202	TKY06F	**TAF Drill**
TASS1700S32	TS202	TKY06F	
TASS1800S32	TS202	TKY06F	
TASS1900S32	TS202	TKY06F	
TASS2000S32	TS25	TKY08F	
TASS2100S32	TS25	TKY08F	
TASS2200S32	TS25	TKY08F	
TASS2300S32	TS25	TKY08F	
TASS2400S32	TS25	TKY08F	
TASS2500S32	TS32	TKY08F	
TASS2600S32	TS32	TKY08F	
TASS2700S32	TS32	TKY08F	
TASS2800S32	TS32	TKY08F	
TASS2900S32	TS32	TKY08F	
TASS3000S32	TS43	TKY15F	
TASS3100S32	TS43	TKY15F	
TASS3200S32	TS43	TKY15F	
TASS3300S40	TS43	TKY15F	
TASS3400S40	TS43	TKY15F	
TASS3500S40	TS43	TKY15F	
TASS3600S40	TS43	TKY15F	

TASS TYPE (FLANGE)

Old Type Tool Number	Clamp Screw	Wrench	Recommended Drill
TASS1600C20	TS202	TKY06F	**TAF Drill**
TASS1650C20	TS202	TKY06F	
TASS1700C20	TS202	TKY06F	
TASS1750C20	TS202	TKY06F	
TASS1800C20	TS202	TKY06F	
TASS1850C20	TS202	TKY06F	
TASS1900C20	TS202	TKY06F	
TASS1950C20	TS202	TKY06F	
TASS2000C20	TS25	TKY08F	
TASS2100C25	TS25	TKY08F	
TASS2200C25	TS25	TKY08F	
TASS2300C25	TS25	TKY08F	
TASS2400C25	TS25	TKY08F	
TASS2500C25	TS32	TKY08F	
TASS2600C25	TS32	TKY08F	
TASS2700C25	TS32	TKY08F	
TASS2800C25	TS32	TKY08F	
TASS2900C25	TS32	TKY08F	
TASS3000C25	TS43	TKY15F	
TASS3100C32	TS43	TKY15F	
TASS3200C32	TS43	TKY15F	
TASS3300C32	TS43	TKY15F	
TASS3400C32	TS43	TKY15F	
TASS3500C32	TS43	TKY15F	
TASS3600C32	TS43	TKY15F	
TASS3700C32	TS43	TKY15F	
TASS3800C32	TS43	TKY15F	
TASS3900C32	TS43	TKY15F	
TASS4000C32	TS5	TKY25F	
TASS4100C32	TS5	TKY25F	
TASS4200C40	TS5	TKY25F	
TASS4300C40	TS5	TKY25F	
TASS4400C40	TS5	TKY25F	
TASS4500C40	TS5	TKY25F	
TASS4600C40	TS5	TKY25F	
TASS4700C40	TS5	TKY25F	
TASS4800C40	TS5	TKY25F	
TASS4900C40	TS5	TKY25F	
TASS5000C40	TS32	TKY08F	

TAGS TYPE

Old Type Tool Number	Clamp Screw	Wrench	Recommended Drill
TAGS1600F25	TS2	TKY06F	**TAF Drill**
TAGS1700F25	TS2	TKY06F	
TAGS1800F25	TS2	TKY06F	
TAGS1900F25	TS2	TKY06F	
TAGS2000F25	TS25	TKY08F	
TAGS2100F25	TS25	TKY08F	
TAGS2200F25	TS25	TKY08F	
TAGS2300F25	TS25	TKY08F	
TAGS2400F25	TS25	TKY08F	
TAGS2500F32	TS3	TKY08F	
TAGS2600F32	TS3	TKY08F	
TAGS2700F32	TS3	TKY08F	
TAGS2800F32	TS3	TKY08F	
TAGS2900F32	TS3	TKY08F	
TAGS3000F40	TS4	TKY15F	
TAGS3100F40	TS4	TKY15F	
TAGS3200F40	TS4	TKY15F	
TAGS3300F40	TS4	TKY15F	
TAGS3400F40	TS4	TKY15F	
TAGS3500F40	TS4	TKY15F	
TAGS3600F40	TS4	TKY15F	
TAGS3700F40	TS4	TKY15F	
TAGS3800F40	TS4	TKY15F	
TAGS3900F40	TS4	TKY15F	
TAGS4000F40	TS5	TKY25F	
TAGS4100F40	TS5	TKY25F	
TAGS4200F40	TS5	TKY25F	
TAGS4300F40	TS5	TKY25F	
TAGS4400F40	TS5	TKY25F	
TAGS4500F40	TS5	TKY25F	
TAGS4600F40	TS5	TKY25F	
TAGS4700F40	TS5	TKY25F	
TAGS4800F40	TS5	TKY25F	
TAGS4900F40	TS5	TKY25F	
TAGS5000F40	TS3	TKY08F	
TAGS5100F40	TS3	TKY08F	
TAGS5200F40	TS3	TKY08F	
TAGS5300F40	TS3	TKY08F	
TAGS5400F40	TS3	TKY08F	
TAGS5500F40	TS4	TKY15F	
TAGS5600F40	TS4	TKY15F	
TAGS5700F40	TS4	TKY15F	
TAGS5800F40	TS4	TKY15F	
TAGS5900F40	TS4	TKY15F	

TAGM TYPE

Old Type Tool Number	Clamp Screw	Wrench	Recommended Drill
TAGM1600F25	TS2	TKY06F	**TAF Drill**
TAGM1700F25	TS2	TKY06F	
TAGM1800F25	TS2	TKY06F	
TAGM1900F25	TS2	TKY06F	
TAGM2000F25	TS25	TKY08F	
TAGM2100F25	TS25	TKY08F	
TAGM2200F25	TS25	TKY08F	
TAGM2300F25	TS25	TKY08F	
TAGM2400F25	TS25	TKY08F	
TAGM2500F32	TS3	TKY08F	
TAGM2600F32	TS3	TKY08F	
TAGM2700F32	TS3	TKY08F	
TAGM2800F32	TS3	TKY08F	
TAGM2900F32	TS3	TKY08F	
TAGM3000F40	TS4	TKY15F	
TAGM3100F40	TS4	TKY15F	
TAGM3200F40	TS4	TKY15F	
TAGM3300F40	TS4	TKY15F	
TAGM3400F40	TS4	TKY15F	
TAGM3500F40	TS4	TKY15F	
TAGM3600F40	TS4	TKY15F	
TAGM3700F40	TS4	TKY15F	
TAGM3800F40	TS4	TKY15F	
TAGM3900F40	TS4	TKY15F	
TAGM4000F40	TS5	TKY25F	
TAGM4100F40	TS5	TKY25F	
TAGM4200F40	TS5	TKY25F	
TAGM4300F40	TS5	TKY25F	
TAGM4400F40	TS5	TKY25F	
TAGM4500F40	TS5	TKY25F	
TAGM4600F40	TS5	TKY25F	
TAGM4700F40	TS5	TKY25F	
TAGM4800F40	TS5	TKY25F	
TAGM4900F40	TS5	TKY25F	
TAGM5000F40	TS3	TKY08F	
TAGM5100F40	TS3	TKY08F	
TAGM5200F40	TS3	TKY08F	
TAGM5300F40	TS3	TKY08F	
TAGM5400F40	TS3	TKY08F	
TAGM5500F40	TS4	TKY15F	
TAGM5600F40	TS4	TKY15F	
TAGM5700F40	TS4	TKY15F	
TAGM5800F40	TS4	TKY15F	
TAGM5900F40	TS4	TKY15F	

TAB TYPE

Old Type Tool Number	Clamp Screw	Plug	Wrench	Recommended Drill
TAB1700S32	TS3	PT1/4	TKY08D	
TAB1800S32	TS3	PT1/4	TKY08D	
TAB1900S32	TS3	PT1/4	TKY08D	
TAB2000S32	TS32	PT1/4	TKY08D	
TAB2100S32	TS32	PT1/4	TKY08D	
TAB2200S32	TS32	PT1/4	TKY08D	
TAB2300S32	TS32	PT1/4	TKY08D	
TAB2400S32	TS32	PT1/4	TKY08D	
TAB2500S32	TS32	PT1/4	TKY08D	
TAB2600S32	TS4	PT1/4	TKY15D	
TAB2700S32	TS4	PT1/4	TKY15D	
TAB2800S32	TS4	PT1/4	TKY15D	
TAB2900S32	TS4	PT1/4	TKY15D	
TAB3000S32	TS4	PT1/4	TKY15D	
TAB3100S32	TS4	PT1/4	TKY15D	**TAF Drill**
TAB3200S32	TS4	PT1/4	TKY15D	
TAB3300S40	TS5	PT1/4	TKY25D	
TAB3400S40	TS5	PT1/4	TKY25D	
TAB3500S40	TS5	PT1/4	TKY25D	
TAB3600S40	TS5	PT1/4	TKY25D	
TAB3700S40	TS5	PT1/4	TKY25D	
TAB3800S40	TS5	PT1/4	TKY25D	
TAB3900S40	TS5	PT1/4	TKY25D	
TAB4000S40	TS5	PT1/4	TKY25D	
TAB4100S40	TS5	PT1/4	TKY25D	
TAB4200S40	TS5	PT1/4	TKY25D	
TAB4300S40	TS5	PT1/4	TKY25D	
TAB4400S40	TS5	PT1/4	TKY25D	
TAB4500S40	TS5	PT1/4	TKY25D	

NPX TYPE

Old Type Tool Number	Clamp Screw	Wrench	Recommended Drill
NPXM2000S25	TS3	TKY08F	
NPXM2100S25	TS3	TKY08F	
NPXM2200S25	TS3	TKY08F	
NPXM2300S25	TS35	TKY10F	
NPXM2400S32	TS35	TKY10F	
NPXM2500S32	TS35	TKY10F	**TAW Drill**
NPXM2600S32	TS35	TKY10F	
NPXM2700S32	TS4	TKY15F	
NPXM2800S32	TS4	TKY15F	
NPXM2900S32	TS4	TKY15F	
NPXM3000S32	TS4	TKY15F	

Memo

Memo

TECHNICAL DATA

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ISO13399 Compliance

List of Property Symbols Complying with ISO13399

Alphabetical

Source: ISO13399 standard
URL : https://www.iso.org/search/x/query/13399

ISO13399 Property Symbols	Content	English Names
ADJLX	Adjustment limit maximum	adjustment limit maximum
ADJRG	Adjustment range	adjustment range
ALF	Clearance angle radial	clearance angle radial
ALP	Clearance angle axial	clearance angle axial
AN	Clearance angle major	clearance angle major
ANN	Clearance angle minor	clearance angle minor
APMX	Depth of cut maximum	depth of cut maximum
AS	Clearance angle wiper edge	clearance angle wiper edge
ASP	Adjusting screw protrusion	adjusting screw protrusion
AZ	Plunge depth maximum	plunge depth maximum
B	Shank width	shank width
BBD	Balanced by design	balanced by design
BCH	Corner chamfer length	corner chamfer length
BD	Body diameter	body diameter
BDX	Body diameter maximum	body diameter maximum
BHCC	Bolt hole circle count	bolt hole circle count
BHTA	Body half taper angle	body half taper angle
BMC	Body material code	body material code
BS	Wiper edge length	wiper edge length
BSR	Wiper edge radius	wiper edge radius
CASC	Cartridge size code	cartridge size code
CB	Chip breaker face count	chip breaker face count
CBDP	Connection bore depth	connection bore depth
CBMD	Chip breaker manufacturers designation	chip breaker manufacturers designation
CBP	Chip breaker property	chip breaker property
CCMS	Connection code machine side	connection code machine side
CCWS	Connection code workpiece side	connection code workpiece side
CCP	Chamfer corner property	chamfer corner property
CDI	Insert cutting diameter	insert cutting diameter
CDX	Cutting depth maximum	cutting depth maximum
CEATC	Tool cutting edge angle type code	tool cutting edge angle type code
CECC	Cutting edge condition code	cutting edge condition code
CEDC	Cutting edge count	cutting edge count
CF	Spot chamfer	spot chamfer
CHW	Corner chamfer width	corner chamfer width
CICT	Cutting item count	cutting item count
CNC	Corner count	corner count
CND	Coolant entry diameter	coolant entry diameter
CNSC	Coolant entry style code	coolant entry style code
CNT	Coolant entry thread size	coolant entry thread size
CP	Coolant pressure	coolant pressure
CRE	Spot radius	spot radius
CRKS	Connection retention knob thread size	connection retention knob thread size
CSP	Coolant supply property	coolant supply property
CTP	Coating property	coating property
CTX	Cutting point translation X-direction	cutting point translation X-direction
CTY	Cutting point translation Y-direction	cutting point translation Y-direction
CUTDIA	Work piece parting diameter maximum	work piece parting diameter maximum
CUB	Connection unit basis	connection unit basis
CW	Cutting width	cutting width
CWX	Cutting width maximum	cutting width maximum
CXD	Coolant exit diameter	coolant exit diameter

ISO13399 Property Symbols	Content	English Names
CXSC	Coolant exit style code	coolant exit style code
CZC	Connection size code	connection size code
D1	Fixing hole diameter	fixing hole diameter
DAH	Diameter access hole	diameter access hole
DAXN	Axial groove outside diameter minimum	axial groove outside diameter minimum
DAXX	Axial groove outside diameter maximum	axial groove outside diameter maximum
DBC	Diameter bolt circle	diameter bolt circle
DC	Cutting diameter	cutting diameter
DCB	Connection bore diameter	connection bore diameter
DCBN	Connection bore diameter minimum	connection bore diameter minimum
DCBX	Connection bore diameter maximum	connection bore diameter maximum
DCC	Design configuration style code	design configuration style code
DCCB	Counterbore diameter connection bore	counterbore diameter connection bore
DCIN	Cutting diameter internal	cutting diameter internal
DCINN	Cutting diameter internal minimum	cutting diameter internal minimum
DCINX	Cutting diameter internal maximum	cutting diameter internal maximum
DCN	Cutting diameter minimum	cutting diameter minimum
DCON	Connection diameter	connection diameter
DCONMS	Connection diameter machine side	connection diameter machine side
DCONWS	Connection diameter workpiece side	connection diameter workpiece side
DCSC	Cutting diameter size code	cutting diameter size code
DCSFMS	Contact surface diameter machine side	contact surface diameter machine side
DCX	Cutting diameter maximum	cutting diameter maximum
DF	Flange diameter	flange diameter
DHUB	Hub diameter	hub diameter
DMIN	Mminimum bore diameter	minimum bore diameter
DMM	Shank diameter	shank diameter
DN	Neck diameter	neck diameter
DRVA	Drive angle	drive angle
EPSR	Insert included angle	insert included angle
FHA	Flute helix angle	flute helix angle
FHCSA	Fixing hole countersunk angle	fixing hole countersunk angle
FHCSD	Fixing hole countersunk diameter	fixing hole countersunk diameter
FLGT	Flange thickness	flange thickness
FMT	Form type	form type
FXHLP	Fixing hole property	fixing hole property
GAMF	Rake angle radial	rake angle radial
GAMN	Rake angle normal	rake angle normal
GAMO	Rake angle orthogonal	rake angle orthogonal
GAMP	Rake angle axial	rake angle axial
GAN	Insert rake angle	insert rake angle
H	Shank height	shank height
HA	Thread height theoretical	thread height theoretical
HAND	Hand	hand
HBH	Head bottom offset height	head bottom offset height
HBKL	Head back offset length	head back offset length
HBKW	Head back offset width	head back offset width
HBL	Head bottom offset length	head bottom offset length
HC	Thread height actual	thread height actual
HF	Functional height	functional height
HHUB	Hub height	hub height
HTB	Body height	body height
IC	Inscribed circle diameter	inscribed circle diameter
IFS	Insert mounting style code	insert mounting style code
IIC	Insert interface code	insert interface code
INSL	Insert length	insert length
KAPR	Tool cutting edge angle	tool cutting edge angle
KCH	Corner chamfer angle	corner chamfer angle

ISO13399 Property Symbols	Content	English Names
KRINS	Cutting edge angle major	cutting edge angle major
KWW	Keyway width	keyway width
KYP	Keyway property	keyway property
L	Cutting edge length	cutting edge length
LAMS	Inclination angle	inclination angle
LB	Body length	body length
LBB	Chip breaker width	chip breaker width
LBX	Body length maximum	body length maximum
LCCB	Counterbore depth connection bore	counterbore depth connection bore
LCF	Length chip flute	length chip flute
LDRED	Reduced body diameter length	reduced body diameter length
LE	Cutting edge effective length	cutting edge effective length
LF	Functional length	functional length
LFA	a dimension on lf	a dimension on lf
LH	Head length	head length
LPR	Protruding length	protruding length
LS	Shank length	shank length
LSC	Clamping length	clamping length
LSCN	Clamping length minimum	clamping length minimum
LSCX	Clamping length maximum	clamping length maximum
LTA	LTA length (length from MCS to CRP)	LTA length (length from MCS to CRP)
LU	Usable length	usable length
LUX	Usable length maximum	usable length maximum
M	m-dimension	m-dimension
M2	m2-dimension	m2-dimension
MHA	Mounting hole angle	mounting hole angle
MHD	Mounting hole distance	mounting hole distance
MHH	Mounting hole height	mounting hole height
MIID	Master insert identification	master insert identification
MTP	Clamping type code	clamping type code
NCE	Cutting end count	cutting end count
NOF	Flute count	flute count
NOI	Insert index count	insert index count
NT	Tooth count	tooth count
OAH	Overall height	overall height
OAL	Overall length	overall length
OAW	Overall width	overall width
PDPT	Profile depth insert	profile depth insert
PDX	Profile distance ex	profile distance ex
PDY	Profile distance ey	profile distance ey
PFS	Profile style code	profile style code
PL	Point length	point length
PNA	Profile included angle	profile included angle
PRFRAD	Profile radius	profile radius
PSIR	Tool lead angle	tool lead angle
PSIRL	Cutting edge angle major left hand	cutting edge angle major left hand
PSIRR	Cutting edge angle major right hand	cutting edge angle major right hand
RAL	Relief angle left hand	relief angle left hand
RAR	Relief angle right hand	relief angle right hand
RCP	Rounded corner property	rounded corner property
RE	Corner radius	corner radius
REL	Corner radius left hand	corner radius left hand
RER	Corner radius right hand	corner radius right hand
RMPX	Ramping angle maximum	ramping angle maximum
RPMX	Rotational speed maximum	rotational speed maximum
S	Insert thickness	insert thickness
S1	Insert thickness total	insert thickness total
SC	Insert shape code	insert shape code
SDL	Step diameter length	step diameter length
SIG	Point angle	point angle

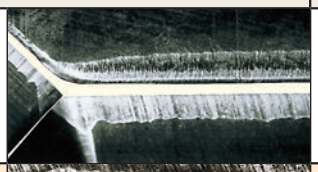
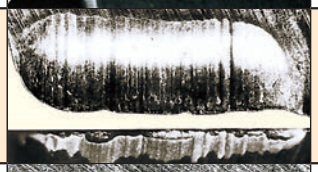
ISO13399 Property Symbols	Content	English Names
SSC	Insert seat size code	insert seat size code
SX	Shank cross section shape code	shank cross section shape code
TC	Tolerance class insert	tolerance class insert
TCE	Tipped cutting edge code	tipped cutting edge code
TCTR	Thread tolerance class	thread tolerance class
TD	Thread diameter	thread diameter
THFT	Thread form type	thread form type
THL	Threading length	threading length
THLGTH	Thread length	thread length
THSC	Tool holder shape code	tool holder shape code
THUB	Hub thickness	hub thickness
TP	Thread pitch	thread pitch
TPI	Threads per inch	threads per inch
TPIN	Threads per inch minimum	threads per inch minimum
TPIX	Threads per inch maximum	threads per inch maximum
TPN	Thread pitch minimum	thread pitch minimum
TPT	Thread profile type	thread profile type
TPX	Thread pitch maximum	thread pitch maximum
TQ	Torque	torque
TSYC	Tool style code	tool style code
TTP	Thread type	thread type
ULDR	Usable length diameter ratio	usable length diameter ratio
UST	Unit system	unit system
W1	Insert width	insert width
WEP	Wiper edge property	wiper edge property
WF	Functional width	functional width
WFS	Functional width secondary	functional width secondary
WT	Weight of item	weight of item
ZEFF	Face effective cutting edge count	face effective cutting edge count
ZEFP	Peripheral effective cutting edge count	peripheral effective cutting edge count
ZNC	Cutting edge center count	cutting edge center count
ZNF	Face mounted insert count	face mounted insert count
ZNP	Peripheral mounted insert count	peripheral mounted insert count

List of Reference Symbols Complying with ISO13399

ISO13399 Reference Symbols	Content	English Names
CIP	Coordinate system In Process	Coordinate system In Process
CRP	Cutting Reference Point	Cutting Reference Point
CSW	Coordinate System Workpiece side	Coordinate System Workpiece side
MCS	Mounting Coordinate System	Mounting Coordinate System
PCS	Primary Coordinate System	Primary Coordinate System

TOOL WEAR AND DAMAGE

CAUSES AND COUNTERMEASURES

Tool Damage Form		Cause	Countermeasure
Flank Wear		• Tool grade is too soft. • Cutting speed is too high. • Flank angle is too small. • Feed rate is extremely low.	• Tool grade with high wear resistance. • Lower cutting speed. • Increase flank angle. • Increase feed rate.
Crater Wear		• Tool grade is too soft. • Cutting speed is too high. • Feed rate is too high.	• Tool grade with high wear resistance. • Lower cutting speed. • Lower feed rate.
Chipping		• Tool grade is too hard. • Feed rate is too high. • Lack of cutting edge strength. • Lack of shank or holder rigidity.	• Tool grade with high toughness. • Lower feed rate. • Increase honing. (Round honing is to be changed to chamfer honing.) • Use large shank size.
Fracture		• Tool grade is too hard. • Feed rate is too high. • Lack of cutting edge strength. • Lack of shank or holder rigidity.	• Tool grade with high toughness. • Lower feed rate. • Increase honing. (Round honing is to be changed to chamfer honing.) • Use large shank size.
Plastic Deformation		• Tool grade is too soft. • Cutting speed is too high. • Depth of cut and feed rate are too large. • Cutting temperature is high.	• Tool grade with high wear resistance. • Lower cutting speed. • Decrease depth of cut and feed rate. • Tool grade with high thermal conductivity.
Welding		• Cutting speed is low. • Poor sharpness. • Unsuitable grade.	• Increase cutting speed. (For JIS S45C, cutting speed 80m/min.) • Increase rake angle. • Tool grade with low affinity. (Coated grade, cermet grade)
Thermal Cracks		• Expansion or shrinkage due to cutting heat. • Tool grade is too hard. *Especially in milling.	• Dry cutting. (For wet cutting, flood workpiece with cutting fluid) • Tool grade with high toughness.
Notching		• Hard surfaces such as uncut surfaces, chilled parts and machining hardened layer. • Friction caused by jagged shape chips. (Caused by small vibration)	• Tool grade with high wear resistance. • Increase rake angle to improve sharpness.
Flaking		• Cutting edge welding and adhesion. • Poor chip disposal.	• Increase rake angle to improve sharpness. • Enlarge chip pocket.
Flank Wear Fracture *Damage for polycrystallines		• Damage due to the lack of strength of a curved cutting edge.	• Increase honing. • Tool grade with high toughness.
Crater Wear Fracture *Damage for polycrystallines		• Tool grade is too soft. • Cutting resistance is too high and causes high cutting heat.	• Decrease honing. • Tool grade with high wear resistance.

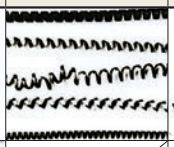
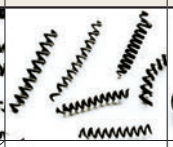
TROUBLE SHOOTING FOR TURNING

Trouble		Solution / Factors	Insert Grade Selection: Select a harder grade	Insert Grade Selection: Select a tougher grade	Insert Grade Selection: Select a grade with better thermal shock resistance	Insert Grade Selection: Select a grade with better adhesion resistance	Cutting Conditions: Cutting speed (Up ↗ / Down ↘)	Cutting Conditions: Feed (Up ↗ / Down ↘)	Cutting Conditions: Depth of cut (Up ↗ / Down ↘)	Cutting Conditions: Coolant: Do not use water-soluble cutting fluid	Cutting Conditions: Coolant: Determine dry or wet cutting	Style and Design of the Tool: Select chip breaker	Style and Design of the Tool: Rake (Up ↗ / Down ↘)	Style and Design of the Tool: Corner radius (Up ↗ / Down ↘)	Style and Design of the Tool: Lead angle (Up ↗ / Down ↘)	Style and Design of the Tool: Honing strengthens the cutting edge (Up ↗ / Down ↘)	Style and Design of the Tool: Class of insert	Style and Design of the Tool: Improve tool holder rigidity	Machine, Installation of Tool: Increase clamping rigidity of the tool and workpiece	Machine, Installation of Tool: Decrease holder overhang	Machine, Installation of Tool: Decrease power and machine backlash
Deterioration of Tool Life	Insert wear quickly generated	Improper tool grade	●																		
		Improper cutting edge geometry										●	↗●	↗●	↗●	●↘					
		Improper cutting speed					●↘	↗●			● Wet										
	Chipping or fracturing of cutting edge	Improper tool grade		●																	
		Improper cutting conditions						●↘	●↘												
		Lack of cutting edge strength.										●		↗●		↗●					
		Thermal crack occurs			●		●↘	●↘	●↘	●	● Dry										
		Build-up edge occurs				●	↗●	↗●		●	● Wet										
		Lack of rigidity																●	●	●	●
Out of Tolerance	Dimensions are not constant	Poor insert accuracy															●				
		Large cutting resistance and cutting edge flank										●	●	●↘	●↘	●↘		●	●	●	●
	Necessary to adjust often because of over-size	Improper tool grade	●																		
		Improper cutting conditions					●↘	↗●													
Deterioration of Surface Finish	Poor finished surface	Welding occurs					↗●			●	● Wet										
		Improper cutting edge geometry										●		↗●							
		Chattering					●↘	●↘	●↘									●	●	●	●
Generation of Heat	Workpiece over heating can cause poor accuracy and short life of insert	Improper cutting conditions					●↘	●↘	●↘												
		Improper cutting edge geometry										●	↗●			●↘					

Trouble		Solution / Factors	Insert Grade Selection				Cutting Conditions					Style and Design of the Tool							Machine, Installation of Tool		
			Select a harder grade	Select a tougher grade	Select a grade with better thermal shock resistance	Select a grade with better adhesion resistance	Cutting speed (Up ↗ / Down ↘)	Feed (Up ↗ / Down ↘)	Depth of cut (Up ↗ / Down ↘)	Coolant: Do not use water-soluble cutting fluid	Coolant: Determine dry or wet cutting	Select chip breaker	Rake (Up ↗ / Down ↘)	Corner radius (Up ↗ / Down ↘)	Lead angle (Up ↗ / Down ↘)	Honing strengthens the cutting edge (Up ↗ / Down ↘)	Class of insert	Improve tool holder rigidity	Increase clamping rigidity of the tool and workpiece	Decrease holder overhang	Decrease power and machine backlash
Burrs, Chipping etc.	Burrs (steel, aluminium)	Notch wear	●																		
		Improper cutting conditions					● ↘	↗ ●			● Wet										
		Improper cutting edge geometry										●	↗ ●	● ↘	● ↘	● ↘					
	Workpiece chipping (cast iron)	Improper cutting conditions						● ↘	● ↘												
		Improper cutting edge geometry										●	↗ ●	↗ ●	↗ ●	● ↘					
		Vibration occurs																●	●	●	●
	Burrs (mild steel)	Improper tool grade				●															
		Improper cutting conditions					↗ ●			●	● Wet										
		Improper cutting edge geometry										●	↗ ●			● ↘					
		Vibration occurs																●	●	●	●
Poor Chip Dispersal	long chips	Improper cutting conditions					● ↘	↗ ●	↗ ●		● Wet										
		Large chip control range										●									
		Improper cutting edge geometry												● ↘	● ↘						
	Chips are short and scattered	Improper cutting conditions						● ↘	● ↘		● Dry										
		Small chip control range										●									
		Improper cutting edge geometry												↗ ●	↗ ●						

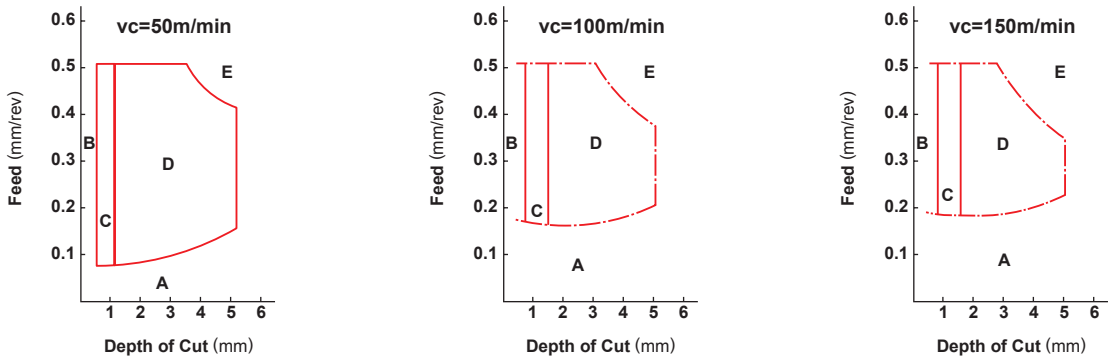
CHIP CONTROL FOR TURNING

CHIP BREAKING CONDITIONS IN STEEL TURNING

Type	A Type	B Type	C Type	D Type	E Type
Small Depth of Cut d < 7mm					
Small Depth of Cut d=7−15mm					
Curl Length l	Curless	l ≥ 50mm	l ≤ 50mm 1−5 Curl	≒ 1 Curl	Less Than 1 Curl Half a Curl
Note	●Irregular continuous shape ●Tangle around tool and workpiece	●Regular continuous shape ●Long chips	Good	Good	●Chip scattering ●Chattering ●Poor finished surface ●Maximum

Cutting speed and chip control range of chip breaker

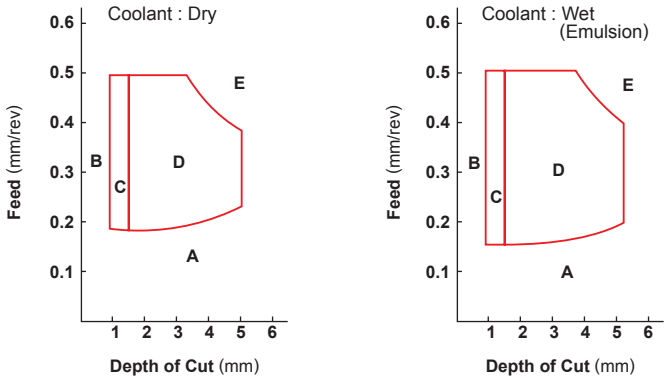
In general, when cutting speed increases, the chip control range tends to become narrower.



Workpiece : **S45C(180HB)**
Insert : **TNMG160408**
Grade : **P10**Cemented Carbide
Tool : **MTJNR2525M16N**
Dry Cutting

Effects of coolant on the chip control range of a chip breaker

If the cutting speed is the same, the range of chip control differs according to whether coolant is used or not.



Workpiece : **S45C**
Cutting Conditions : **vc=100m/min**

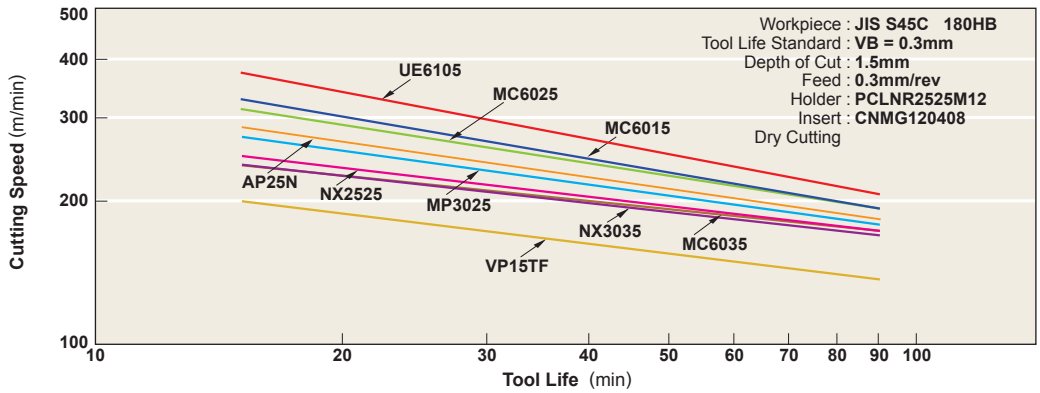
EFFECTS OF CUTTING CONDITIONS FOR TURNING

EFFECTS OF CUTTING CONDITIONS

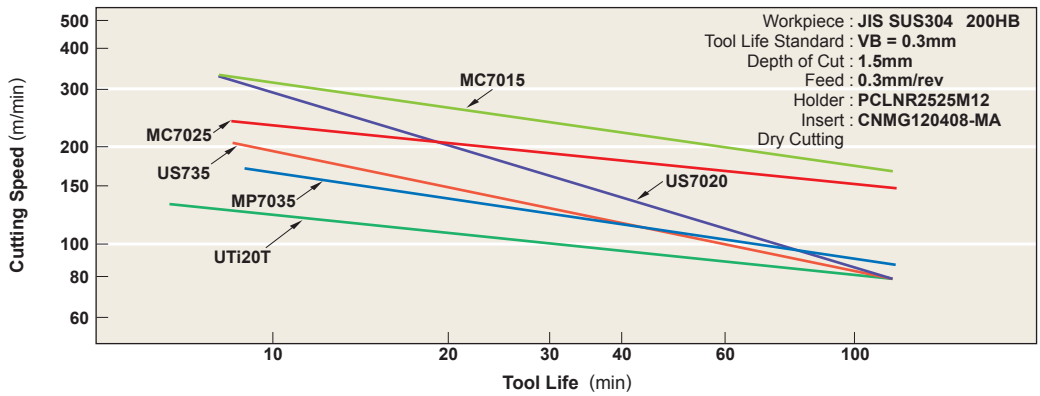
Ideal conditions for cutting are short cutting time, long tool life, and high cutting accuracy. In order to obtain these conditions, selection of efficient cutting conditions and tools, based on work material, hardness, shape and machine capability is necessary.

CUTTING SPEED

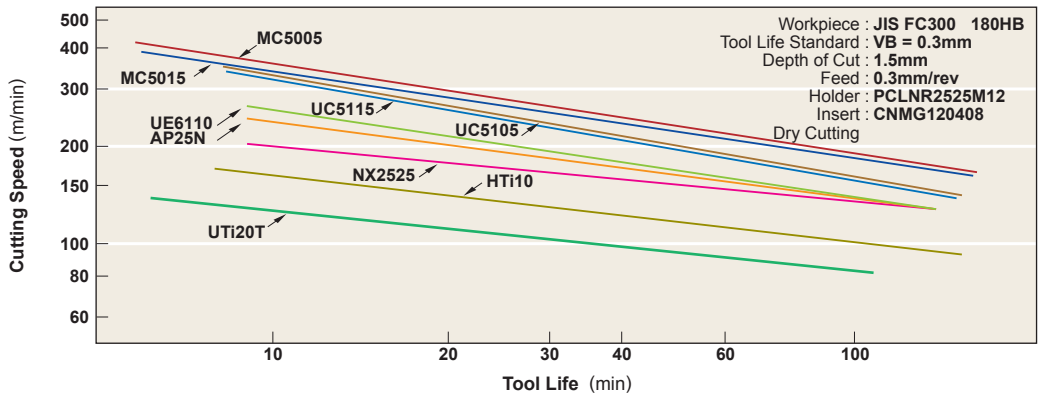
Cutting speed effects tool life greatly. Increasing cutting speed increases cutting temperature and results in shortening tool life. Cutting speed varies depending on the type and hardness of the work material. Selecting a tool grade suitable for the cutting speed is necessary.



P Class Grade Tool Life



M Class Grade Tool Life



K Class Grade Tool Life

Effects of Cutting Speed

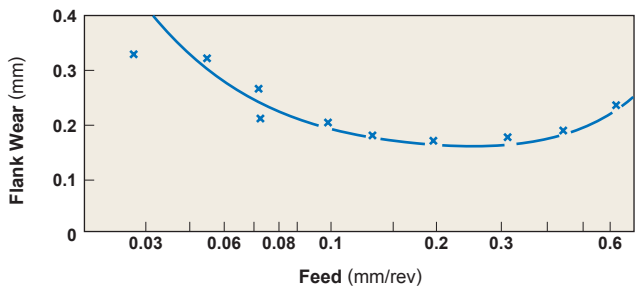
1. Increasing cutting speed by 20% decreases tool life by 50%. Increasing cutting speed by 50% decreases tool life by 80%.
2. Cutting at low cutting speed (20−40m/min) tends to cause chattering. Thus, tool life is shortened.

FEED

When cutting with a general type holder, feed is the distance a holder moves per workpiece revolution. When milling, feed is the distance a machine table moves per cutter revolution divided by the number of inserts. Thus, it is indicated as feed per tooth. Feed rate relates to finished surface roughness.

Effects of Feed

1. Decreasing feed rate results in flank wear and shortens tool life.
2. Increasing feed rate increases cutting temperature and flank wear. However, effects on the tool life is minimal compared to cutting speed.
3. Increasing feed rate improves machining efficiency.



Cutting Conditions Workpiece : **JIS SNCM431** Grade : **STi10T**
Insert : **0-0-5-5-35-35-0.3mm**
Depth of Cut **ap=1.0mm** Cutting Speed **vc=200m/min**
Cutting Time **Tc=10min**

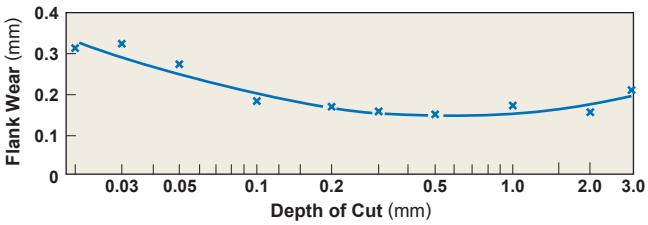
Feed and Flank Wear Relationship in Steel Turning

DEPTH OF CUT

Depth of cut is determined according to the required stock removal, shape of workpiece, power and rigidity of the machine and tool rigidity.

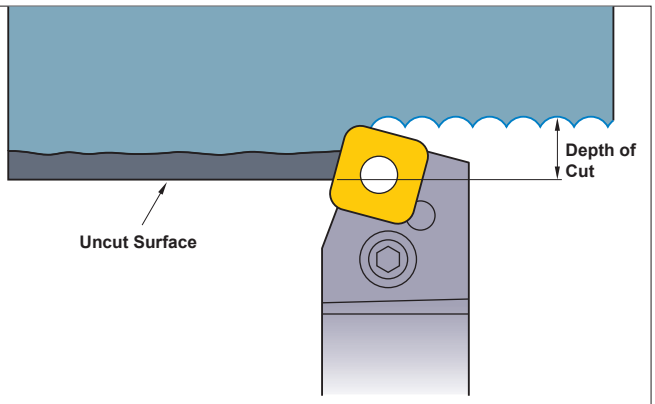
Effects of Depth of Cut

1. Changing depth of cut doesn't effect tool life greatly.
2. Small depths of cut result in friction when cutting the hardened layer of a workpiece. Thus tool life is shortened.
3. When cutting uncut surfaces or cast iron surfaces, the depth of cut needs to be increased as much as the machine power allows in order to avoid cutting impure hard layers with the tip of cutting edge to prevent chipping and abnormal wear.



Cutting Conditions Workpiece : **JIS SNCM431** Grade : **STi10T**
Insert : **0-0-5-5-35-35-0.3mm**
Feed **f=0.20mm/rev** Cutting Speed **vc=200m/min**
Cutting Time **Tc=10min**

Depth of Cut and Flank Wear Relationship in Steel Turning

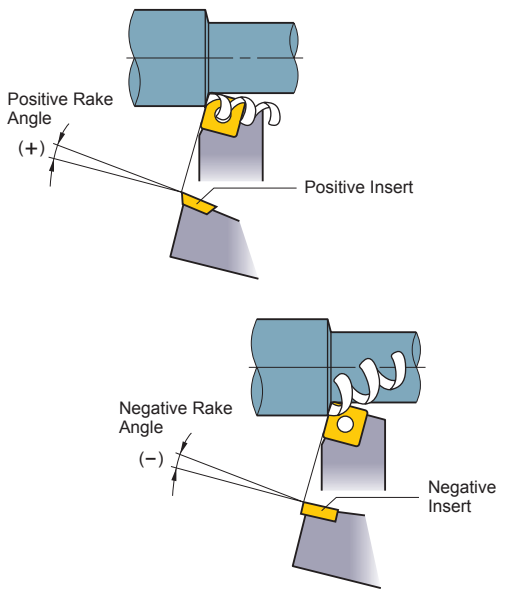


Roughing of Surface Layer that Includes Uncut Surface

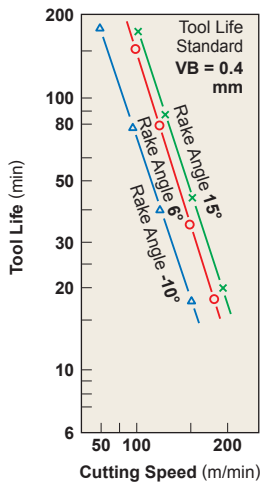
FUNCTION OF TOOL FEATURES FOR TURNING

RAKE ANGLE

Rake angle is cutting edge angle that has a large effect on cutting resistance, chip disposal, cutting temperature and tool life.

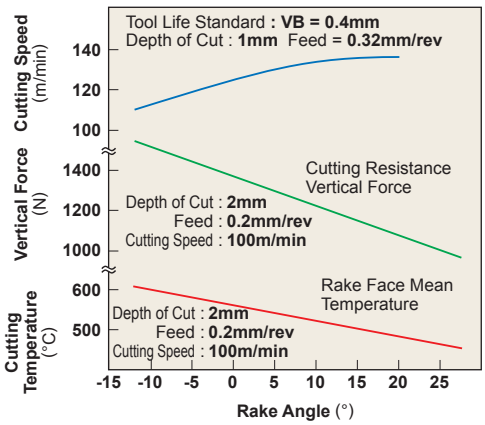


Chip Disposal and Rake Angle



Cutting Conditions
Grade : **STi10**
Depth of Cut : **1mm** Feed : **0.32mm/rev**
Workpiece : **JIS SK5**

Rake Angle and Tool Life



Cutting Conditions
Workpiece : **JIS SK5** Grade : **STi10T**
Insert : **0-Var-5-5-20-20-0.5mm**
Dry Cutting

Effects of Rake Angle on Cutting Speed, Vertical Force, and Cutting Temperature

Effects of Rake Angle

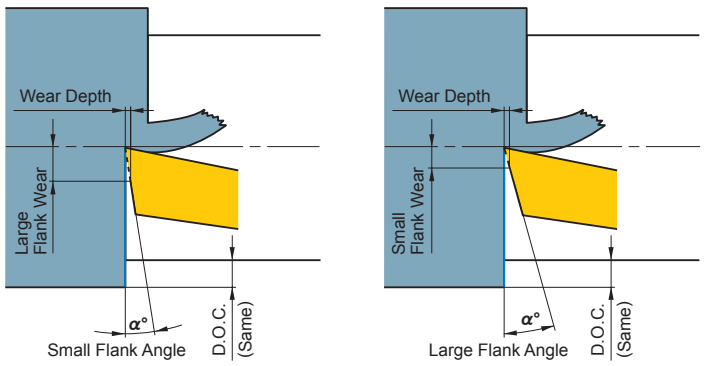
1. Increasing rake angle in the positive (+) direction improves sharpness.
2. Increasing rake angle by 1° in the positive (+) direction decreases cutting power by about 1%.
3. Increasing rake angle in the positive (+) direction lowers cutting edge strength and in the negative (-) direction increases cutting resistance.

When to Increase Rake Angle in the Negative (-) Direction
○ Hard workpieces.
○ When the cutting edge strength is required such as for uncut surfaces and interrupted cutting.

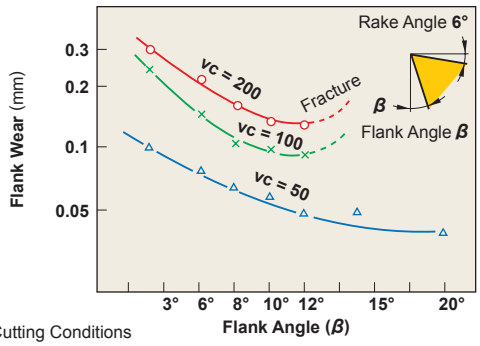
When to Increase Rake Angle in the Positive (+) Direction
○ Soft workpieces.
○ Workpiece is easily machined.
○ When the workpiece or the machine have poor rigidity.

FLANK ANGLE

Flank angle prevents friction between flank face and workpiece resulting in smooth feed.



Flank angle creates a space between tool and workpiece. Flank angle relates to flank wear.



Cutting Conditions
Workpiece : **JIS SNCM431 (200HB)**
Grade : **STi20** Insert : **0-6-β-β-20-20-0.5mm**
Depth of Cut : **1mm** Feed : **0.32mm/rev** Cutting Time : **20min**

Flank Angle and Flank Wear Relationship

Effects of Rake Angle

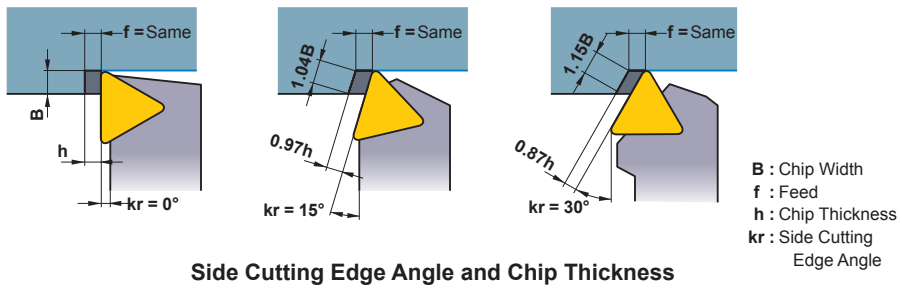
1. Increasing flank angle decreases flank wear occurrence.
2. Increasing flank angle lowers cutting edge strength.

When to Decrease Flank Angle
○ Hard workpieces.
○ When cutting edge strength is required.

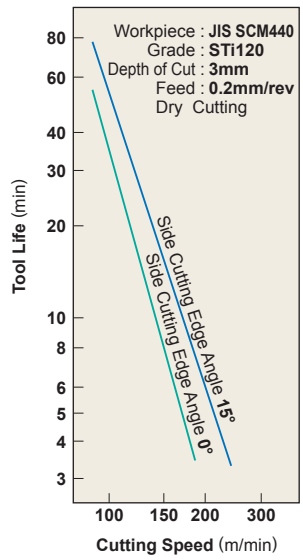
When to Increase Flank Angle
○ Soft workpieces.
○ Workpieces suffer from work hardening easily.

SIDE CUTTING EDGE ANGLE (LEAD ANGLE)

The side cutting edge angle reduces impact load and effects the amount of feed force, back force and chip thickness.



Side Cutting Edge Angle and Chip Thickness

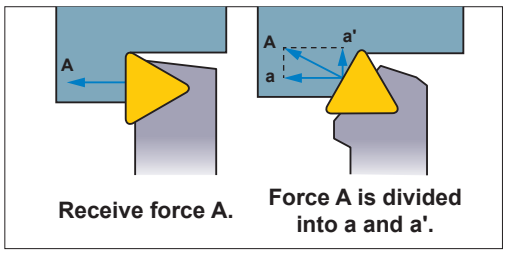


Side Cutting Edge and Tool Life

Effects of Side Cutting Edge Angle (Lead Angle)

1. At the same feed rate, increasing the side cutting edge angle increases the chip contact length and decreases chip thickness. As a result, the cutting force is dispersed on a longer cutting edge and tool life is prolonged. (Refer to the chart.)
2. Increasing the side cutting edge angle increases force a'. Thus, thin, long workpieces suffer from bending in some cases.
3. Increasing the side cutting edge angle decreases chip control.
4. Increasing the side cutting edge angle decreases the chip thickness and increases chip width. Thus, breaking chips is difficult.

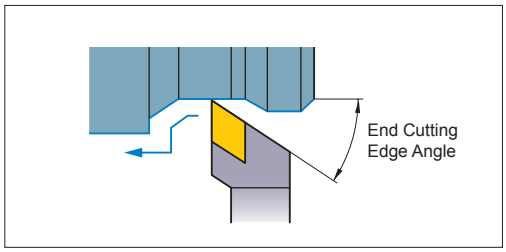
When to Decrease Lead Angle	When to Increase Lead Angle
○ Finishing with small depth of cut. ○ Thin, long workpieces. ○ When the machine has poor rigidity.	○ Hard workpieces which produce high cutting temperature. ○ When roughing a workpiece with large diameter. ○ When the machine has high rigidity.



Receive force A. Force A is divided into a and a'.

END CUTTING EDGE ANGLE

The end cutting edge angle avoids interference between the machined surface and the tool (end cutting edge). Usually 5°–15°.

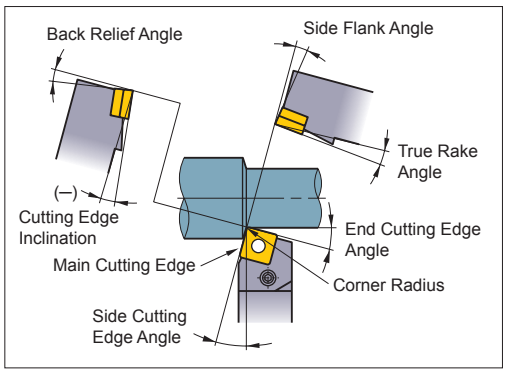


Effects of End Cutting Edge Angle

1. Decreasing the end cutting edge angle increases cutting edge strength, but it also increases cutting edge temperature.
2. Decreasing the end cutting edge angle increases the back force and can result in chattering and vibration while machining.
3. Small end cutting edge angle for roughing and large angle for finishing are recommended.

CUTTING EDGE INCLINATION

Cutting edge inclination indicates inclination of the rake face. During heavy cutting, the cutting edge receives an extremely large shock at the beginning of each cut. Cutting edge inclination keeps the cutting edge from receiving this shock and prevents fracturing. 3°–5° in turning and 10°–15° in milling are recommended.

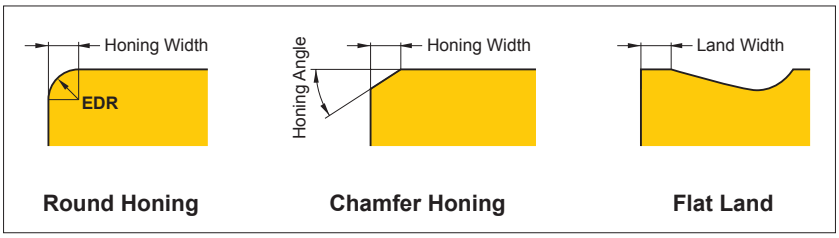


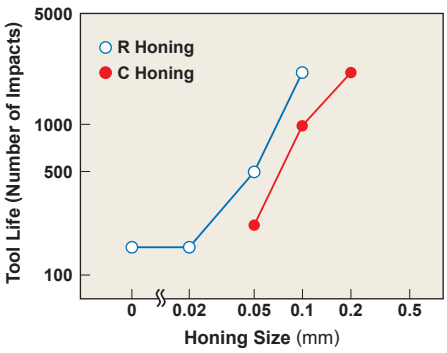
Effects of Cutting Edge Inclination

1. Negative (–) cutting edge inclination disposes chips in the workpiece direction, and positive (+) disposes chips in the opposite direction.
2. Negative (–) cutting edge inclination increases cutting edge strength, but it also increases the back force of cutting resistance. Thus, chattering can easily occur.

HONING AND LAND

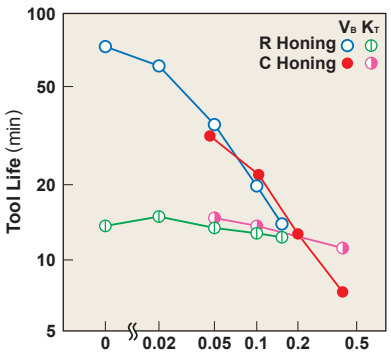
Honing and land are cutting edge shapes that maintain cutting edge strength.
Honing can be round or chamfer type. The optimal honing width is approximately 1/2 of the feed.
Land is the narrow flat area on the rake or flank face.





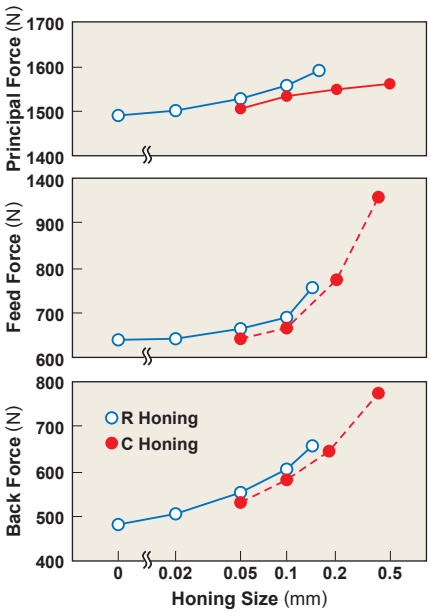
Workpiece : **JIS SNCM439 (280HB)**
Grade : **P10**
Cutting Conditions : **vc=200m/min ap=1.5mm f=0.335mm/rev**

Honing Size and Tool Life Due to Fracturing



Workpiece : **JIS SNCM439 (220HB)**
Grade : **P10**
Cutting Conditions : **vc=160m/min ap=1.5mm f=0.45mm/rev**

Honing Size and Tool Life Due to Wear



Workpiece : **JIS SNCM439 (220HB)**
Grade : **P10**
Cutting Conditions : **vc=100m/min ap=1.5mm f=0.425mm/rev**

Honing Size and Cutting Resistance

Effects of Honing

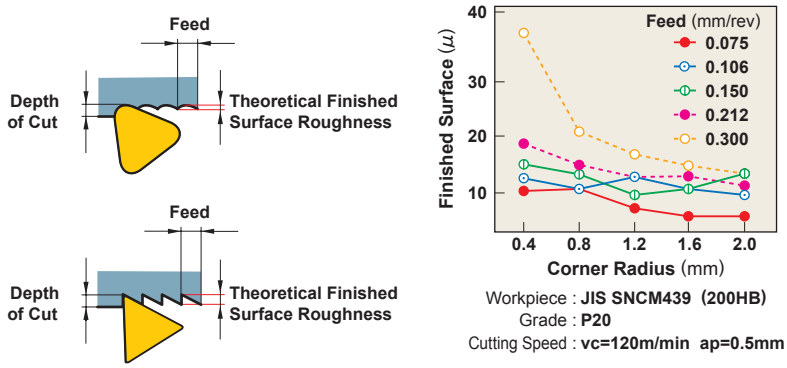
1. Enlarging the honing increases cutting edge strength, tool life and reduces fracturing.
2. Enlarging the honing increases flank wear occurrence and shortens tool life. Honing size doesn't affect rake wear.
3. Enlarging the honing increases cutting resistance and chattering.

When to Decrease Honing Size	When to Increase Honing Size
○ When finishing with small depth of cut and small feed. ○ Soft workpieces. ○ When the workpiece or the machine have poor rigidity.	○ Hard workpieces. ○ When the cutting edge strength is required such as for uncut surfaces and interrupted cutting. ○ When the machine has high rigidity.

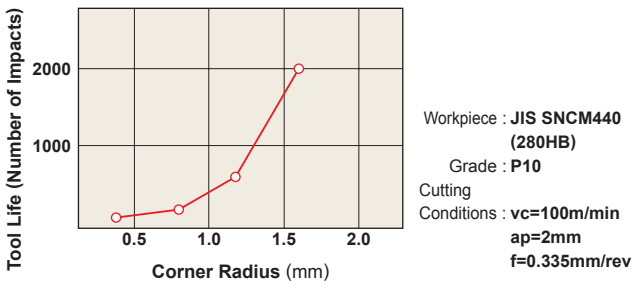
*Cemented carbide, coated diamond, and indexable cermet inserts have round honing as standard.

RADIUS

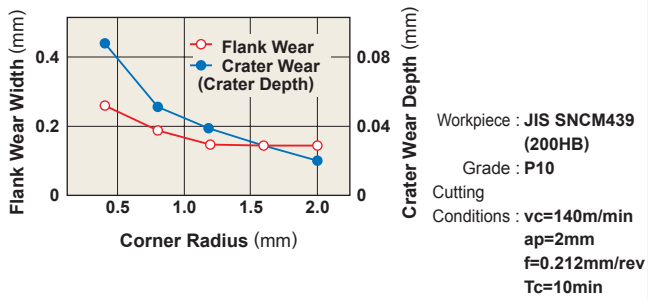
Radius effects the cutting edge strength and finished surface. In general, a corner radius 2−3 times the feed is recommended.



Corner Radius and Finished Surface



Corner Radius Size and Tool Life Due to Fracturing



Corner Radius Size and Tool Wear

Effects of Corner Radius

1. Increasing the corner radius improves the surface finish.
2. Increasing the corner radius improves cutting edge strength.
3. Increasing the corner radius too much increases the cutting resistance and causes chattering.
4. Increasing the corner radius decreases flank and rake wear.
5. Increasing the corner radius too much results in poor chip control.

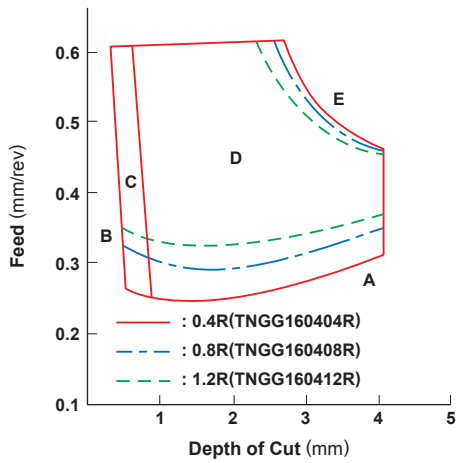
When to Decrease Corner Radius

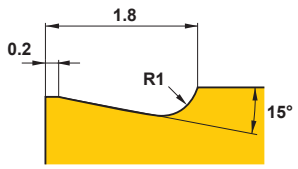
- ○Finishing with small depth of cut.
- ○Thin, long workpieces.
- ○When the machine has poor rigidity.

When to Increase Corner Radius

- ○When the cutting edge strength is required such as in intrrupted cutting and uncut surface cutting.
- ○When roughing a workpiece with large diameter.
- ○When the machine has high rigidity.

Corner Radius and Chip Control Range





Workpiece : JIS S45C (180HB)
Insert : TNGG160404R
TNGG160408R
TNGG160412R
(STi10T)
Holder : ETJNR33K16
(Side Cutting Edge angle 3°)
Cutting Speed : vc=100m/min
Dry Cutting

FORMULAE FOR CUTTING POWER

CUTTING POWER (Pc)

$$Pc = \frac{ap \cdot f \cdot vc \cdot Kc}{60 \times 10^3 \times \eta} \text{ (kW)}$$

Pc (kW)	: Actual Cutting Power	**ap (mm)**	: Depth of Cut
f (mm/rev)	: Feed per Revolution	**vc (m/min)**	: Cutting Speed
Kc (MPa)	: Specific Cutting Force	**η**	: (Machine Coefficient)

(Problem) What is the cutting power required for machining mild steel at cutting speed 120m/min with depth of cut 3mm and feed 0.2mm/rev (Machine coefficient 80%) ?

(Answer) Substitute the specific cutting force Kc=3100MPa into the formula.

$$Pc = \frac{3 \times 0.2 \times 120 \times 3100}{60 \times 10^3 \times 0.8} = 4.65 \text{(kW)}$$

Kc

Work Material	Tensile Strength(MPa) and Hardness	Specific Cutting Force Kc (MPa)				
		0.1 (mm/rev)	0.2 (mm/rev)	0.3 (mm/rev)	0.4 (mm/rev)	0.6 (mm/rev)
Mild Steel	**520**	3610	3100	2720	2500	2280
Medium Steel	**620**	3080	2700	2570	2450	2300
Hard Steel	**720**	4050	3600	3250	2950	2640
Tool Steel	**670**	3040	2800	2630	2500	2400
Tool Steel	**770**	3150	2850	2620	2450	2340
Chrome Manganese Steel	**770**	3830	3250	2900	2650	2400
Chrome Manganese Steel	**630**	4510	3900	3240	2900	2630
Chrome Molybdenum Steel	**730**	4500	3900	3400	3150	2850
Chrome Molybdenum Steel	**600**	3610	3200	2880	2700	2500
Nickel Chrome Molybdenum Steel	**900**	3070	2650	2350	2200	1980
Nickel Chrome Molybdenum Steel	**352HB**	3310	2900	2580	2400	2200
Hard Cast Iron	**46HRC**	3190	2800	2600	2450	2270
Meehanite Cast Iron	**360**	2300	1930	1730	1600	1450
Grey Cast Iron	**200HB**	2110	1800	1600	1400	1330

CUTTING SPEED (vc)

$$vc = \frac{\pi \cdot Dm \cdot n}{1000} \text{ (m/min)}$$

vc	**(m/min)**	: Cutting Speed
Dm	**(mm)**	: Workpiece Diameter
π	**(3.14)**	: Pi
n	**(min^{-1})**	: Main Axis Spindle Speed

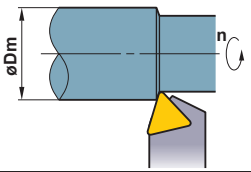
*Divide by 1000 to change to m from mm.

(Problem) What is the cutting speed when main axis spindle speed is 700min^{-1} and external diameter is ϕ50 ?

(Answer) Substitute π=3.14, Dm=50, n=700 into the formula.

$$vc = \frac{\pi \cdot Dm \cdot n}{1000} = \frac{3.14 \times 50 \times 700}{1000} = 110\text{m/min}$$

Cutting speed is 110m/min.



FEED (f)

$$f = \frac{l}{n} \text{ (mm/rev)}$$

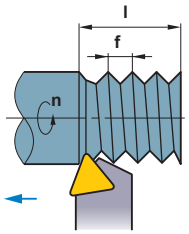
f	**(mm/rev)**	: Feed per Revolution
l	**(mm/min)**	: Cutting Length per Min.
n	**(min^{-1})**	: Main Axis Spindle Speed

(Problem) What is the feed per revolution when main axis spindle speed is 500min^{-1} and cutting length per minute is 120mm/min ?

(Answer) Substitute n=500, l=120 into the formula.

$$f = \frac{l}{n} = \frac{120}{500} = 0.24\text{mm/rev}$$

The answer is 0.24mm/rev.



CUTTING TIME (Tc)

$$Tc = \frac{lm}{l} \text{ (min)}$$

Tc	**(min)**	: Cutting Time
lm	**(mm)**	: Workpiece Length
l	**(mm/min)**	: Cutting Length per Min.

(Problem) What is the cutting time when 100mm workpiece is machined at 1000min^{-1} with feed = 0.2mm/rev ?

(Answer) First, calculate the cutting length per min. from the feed and spindle speed.

$$l = f \times n = 0.2 \times 1000 = 200\text{mm/min}$$

Substitute the answer above into the formula.

$$Tc = \frac{lm}{l} = \frac{100}{200} = 0.5\text{min}$$

0.5 x 60=30 (sec.) The answer is 30 sec.

THEORETICAL FINISHED SURFACE ROUGHNESS (h)

$$h = \frac{f^2}{8RE} \times 1000 (\mu m)$$

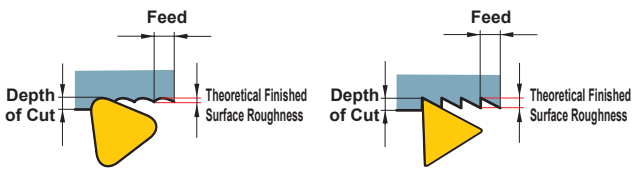
h	**(μm)**	: Finished Surface Roughness
f	**(mm/rev)**	: Feed per Revolution
RE	**(mm)**	: Insert Corner Radius

(Problem) What is the theoretical finished surface roughness when the insert corner radius is 0.8mm and feed is 0.2mm/rev ?

(Answer) Substitute f=0.2mm/rev, RE=0.8 into the formula.

$$h = \frac{0.2^2}{8 \times 0.8} \times 1000 = 6.25 \mu m$$

The theoretical finished surface roughness is 6μm.



TROUBLE SHOOTING FOR THREADING

TROUBLE SHOOTING

Problems	Observation	Causes	Solutions
Low thread precision.	Threads do not mesh with each other.	Incorrect tool installation.	Set the insert center height at 0mm.
			Check holder inclination (Lateral).
	Shallow thread.	Incorrect depth of cut.	Modify the depth of cut.
		Lack of insert wear or plastic deformation resistance.	Refer to "Quickly generated flank wear." and "Large plastic deformation." below.
Poor surface finish.	Surface damage.	Chips wrap around or clog the work pieces.	Change to flank infeed and control the chip discharge direction.
			Change to an M-class insert with a 3-D chip breaker.
		The side of the insert cutting edge interferes with the workpiece.	Check the lead angle and select an appropriate shim.
	Surface tears.	Built-up edge (Welding).	Increase cutting speed.
			Increase coolant pressure and volume.
		Cutting resistance too high.	Decrease depth of cut per pass.
	Surface vibrations.	Cutting speed too high.	Decrease the cutting speed.
		Insufficient work piece or tool clamping.	Re-check work piece and tool clamping. (Chuck pressure, clamping allowance)
		Incorrect tool installation.	Set the insert center height at 0mm.
Short tool life.	Flank wear quickly generated.	Cutting speed too high.	Decrease the cutting speed.
		Too many passes causes abrasive wear.	Reduce the number of passes.
		Small depth of cut for the finishing pass.	Do not re-cut at 0mm depth of cut, larger than 0.05mm depth of cut is recommended.
	Non-uniform wear of the right and left sides of the cutting edge.	The work piece lead angle and the tool lead angle do not match.	Check the work piece lead angle and select an appropriate shim.
	Chipping and fracture.	Cutting speed too low.	Increase cutting speed.
		Cutting resistance too high.	Increase the number of passes and decrease the cutting resistance per pass.
		Unstable clamping.	Check work piece deflection.
			Shorten tool overhang.
			Recheck work piece and tool clamping. (Chuck pressure, clamping allowance)
		Chip packing.	Increase coolant pressure to blow away chips.
			Change the tool pass to control chips. (Lengthen each pass to allow the coolant to clear the chips.
			Change from standard internal cutting to back turning to prevent chip jamming.
		Non-chamfered work pieces causes high resistance at the start of each pass.	Chamfer the workpiece entry and exit faces.
	Large plastic deformation.	High cutting speed and large heat generation.	Decrease the cutting speed.
		Lack of coolant supply.	Check coolant is supply is sufficient.
			Increase coolant pressure and volume.
		Cutting resistance too high.	Increase the number of passes and decrease the cutting resistance per pass.

DRILL DIAMETERS FOR PREPARED HOLES

●Metric Coarse Screw Thread

Nominal	Drill Diameter	
	HSS	Carbide
M1 ×0.25	0.75	0.75
M1.1×0.25	0.85	0.85
M1.2×0.25	0.95	0.95
M1.4×0.3	1.10	1.10
M1.6×0.35	1.25	1.30
M1.7×0.35	1.35	1.40
M1.8×0.35	1.45	1.50
M2 ×0.4	1.60	1.65
M2.2×0.45	1.75	1.80
M2.3×0.4	1.90	1.95
M2.5×0.45	2.10	2.15
M2.6×0.45	2.15	2.20
M3 ×0.5	2.50	2.55
M3.5×0.6	2.90	2.95
M4 ×0.7	3.3	3.4
M4.5×0.75	3.8	3.9
M5 ×0.8	4.2	4.3
M6 ×1.0	5.0	5.1
M7 ×1.0	6.0	6.1
M8 ×1.25	6.8	6.9
M9 ×1.25	7.8	7.9
M10 ×1.5	8.5	8.7
M11 ×1.5	9.5	9.7
M12 ×1.75	10.3	10.5
M14 ×2.0	12.0	12.2
M16 ×2.0	14.0	14.2
M18 ×2.5	15.5	15.7
M20 ×2.5	17.5	17.7
M22 ×2.5	19.5	19.7
M24 ×3.0	21.0	—
M27 ×3.0	24.0	—
M30 ×3.5	26.5	—
M33 ×3.5	29.5	—
M36 ×4.0	32.0	—
M39 ×4.0	35.0	—
M42 ×4.5	37.5	—
M45 ×4.5	40.5	—
M48 ×5.0	43.0	—

●Metric Fine Screw Thread

Nominal	Drill Diameter	
	HSS	Carbide
M1 ×0.2	0.80	0.80
M1.1×0.2	0.90	0.90
M1.2×0.2	1.00	1.00
M1.4×0.2	1.20	1.20
M1.6×0.2	1.40	1.40
M1.8×0.2	1.60	1.60
M2 ×0.25	1.75	1.75
M2.2×0.25	1.95	2.00
M2.5×0.35	2.20	2.20
M3 ×0.35	2.70	2.70
M3.5×0.35	3.20	3.20
M4 ×0.5	3.50	3.55
M4.5×0.5	4.00	4.05
M5 ×0.5	4.50	4.55
M5.5×0.5	5.00	5.05
M6 ×0.75	5.30	5.35
M7 ×0.75	6.30	6.35
M8 ×1.0	7.00	7.10
M8 ×0.75	7.30	7.35
M9 ×1.0	8.00	8.10
M9 ×0.75	8.30	8.35
M10 ×1.25	8.80	8.90
M10 ×1.0	9.00	9.10
M10 ×0.75	9.30	9.35
M11 ×1.0	10.0	10.1
M11 ×0.75	10.3	10.3
M12 ×1.5	10.5	10.7
M12 ×1.25	10.8	10.9
M12 ×1.0	11.0	11.1
M14 ×1.5	12.5	12.7
M14 ×1.0	13.0	13.1
M15 ×1.5	13.5	13.7
M15 ×1.0	14.0	14.1
M16 ×1.5	14.5	14.7
M16 ×1.0	15.0	15.1
M17 ×1.5	15.5	15.7
M17 ×1.0	16.0	16.1
M18 ×2.0	16.0	16.3
M18 ×1.5	16.5	16.7
M18 ×1.0	17.0	17.1

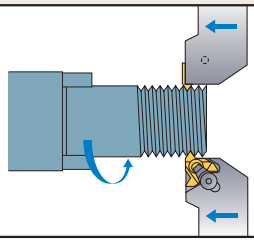
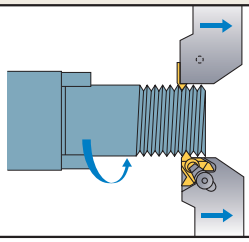
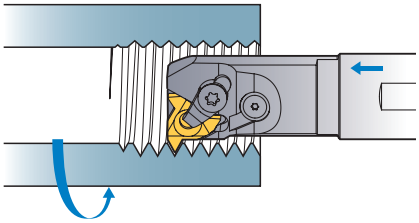
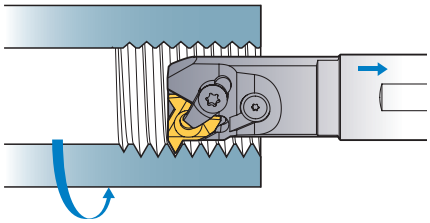
Nominal	Drill Diameter	
	HSS	Carbide
M20 ×2.0	18.0	18.3
M20 ×1.5	18.5	18.7
M20 ×1.0	19.0	19.1
M22 ×2.0	20.0	—
M22 ×1.5	20.5	—
M22 ×1.0	21.0	—
M24 ×2.0	22.0	—
M24 ×1.5	22.5	—
M24 ×1.0	23.0	—
M25 ×2.0	23.0	—
M25 ×1.5	23.5	—
M25 ×1.0	24.0	—
M26 ×1.5	24.5	—
M27 ×2.0	25.0	—
M27 ×1.5	25.5	—
M27 ×1.0	26.0	—
M28 ×2.0	26.0	—
M28 ×1.5	26.5	—
M28 ×1.0	27.0	—
M30 ×3.0	27.0	—
M30 ×2.0	28.0	—
M30 ×1.5	28.5	—
M30 ×1.0	29.0	—
M32 ×2.0	30.0	—
M32 ×1.5	30.5	—
M33 ×3.0	30.0	—
M33 ×2.0	31.0	—
M33 ×1.5	31.5	—
M35 ×1.5	33.5	—
M36 ×3.0	33.0	—
M36 ×2.0	34.0	—
M36 ×1.5	34.5	—
M38 ×1.5	36.5	—
M39 ×3.0	36.0	—
M39 ×2.0	37.0	—
M39 ×1.5	37.5	—
M40 ×3.0	37.0	—
M40 ×2.0	38.0	—
M40 ×1.5	38.5	—
M42 ×4.0	38.0	—

Nominal	Drill Diameter	
	HSS	Carbide
M42 ×3.0	39.0	—
M42 ×2.0	40.0	—
M42 ×1.5	40.5	—
M45 ×4.0	41.0	—
M45 ×3.0	42.0	—
M45 ×2.0	43.0	—
M45 ×1.5	43.5	—
M48 ×4.0	44.0	—
M48 ×3.0	45.0	—
M48 ×2.0	46.0	—
M48 ×1.5	46.5	—
M50 ×3.0	47.0	—
M50 ×2.0	48.0	—
M50 ×1.5	48.5	—

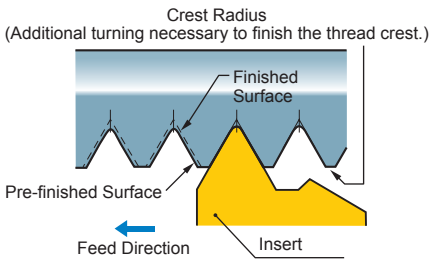
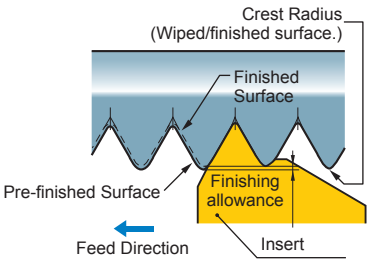
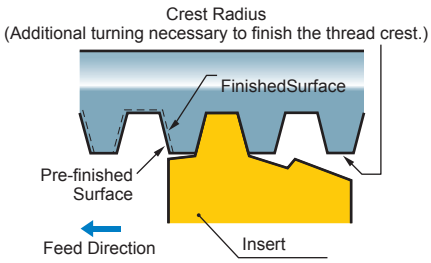
(Note) When using the drill diameters shown in this table, that the processed hole should be measured since the size accuracy of a drill hole may change due to the drilling condition, and that if found to be inappropriate for a prepared hole, the drill diameter must be corrected accordingly.

THREADING METHODS

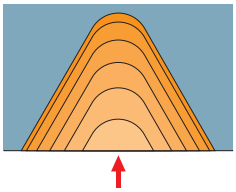
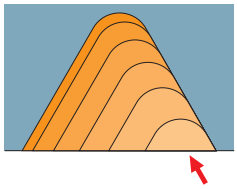
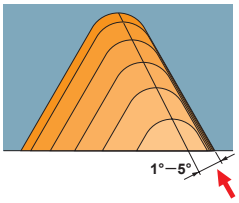
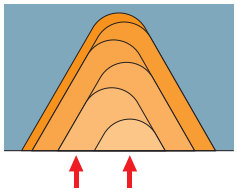
THREADING METHODS

	Right Hand Thread	Left Hand Thread
EXTERNAL	 Holder Reversed	 Holder Reversed
INTERNAL		

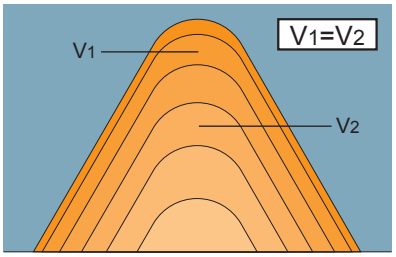
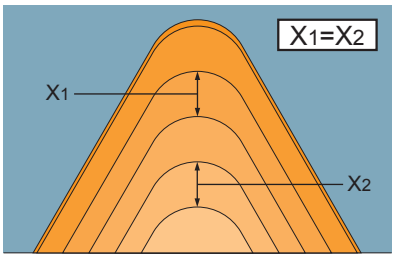
INSERT TYPES

Partial form	Full form	Semi-full form (Trapezoidal threads only)
● The same insert can be used for a range of pitches. ● Shorter tool life because the corner radius of the insert is smaller than that of the full form insert. ● Finishing with another operation is necessary.	● No deburring needed after threading. ● Requires different threading inserts.	● No deburring needed after threading. ● Requires different threading inserts. ● Finishing with another operation is necessary.
		

INFEED METHODS

	Radial Infeed	Flank Infeed	Modified Flank Infeed	Incremental Infeed
				
Features – Advantages	● Easiest to use. (Standard programme for threading) ● Wide application. (Cutting conditions easy to change.) ● Uniform wear of the right and left sides of the cutting edge.	● Relatively easy to use. (Semi-standard program for threading.) ● Reduced cutting force. ● Suitable for large pitch threads or materials that peel easily. ● Good chip discharge.	● Preventing flank wear on the right side of the cutting edge. ● Reduced cutting force. ● Suitable for large pitch threads or materials that peel easily. ● Good chip discharge.	● Uniform flank wear of the right and left sides of the cutting edge. ● Reduced cutting force. ● Suitable for large pitch threads or materials that peel easily.
Features – Disadvantages	● Difficult chip control. ● Subject to vibration in the later in stages of cutting. ● Ineffective for large pitch threading. ● Heavy load on the corner radius.	● Large flank wear on the right side of the cutting edge. ● Relatively difficult to change cutting depth. (Re-programming necessary)	● Complex machining programming. ● Difficult to change cutting depth. (Re-programming necessary)	● Complex machining programming. ● Difficult to change cutting depth. (Re-programming necessary) ● Difficult chip control.

THREADING DEPTH

	Features	
	Advantages	Disadvantages
 Fixed cut area	● Easy to use. (Standard programme for threading.) ● Superior resistance to vibration. (Constant cutting force.)	● Long chips generated during the final pass. ● Complex calculation of cutting depth when changing the number of passes.
 Fixed cutting depth	● Reduced load on corner radius during the first half of the passes. ● Easy chip control. (Optional setting of chip thickness) ● Easy to calculate cutting depth when changing the number of passes. ● Good chip control.	● Subject to vibration in the later stages of cutting. (Increased cutting force) ● In some cases, changing the NC programme is necessary.

* It is recommended to set the depth of cut of the final pass to 0.05mm—0.025mm.
Large cutting depths can cause vibration, leading to a poor surface finish.

FORMULAE

Formulae to calculate infeed for each pass in a reduced series.

$$\triangle ap_n = \frac{ap}{\sqrt{n_{ap}-1}} \times \sqrt{b}$$

$\triangle ap_n$: Depth of cut
n : Actual pass
ap : Total depth of cut
n_{ap} : Number of passes
b : 1st pass 0.3
2nd pass 2—1 = 1
3rd pass 3—1 = 2
•
•
nth pass n—1

(Example)
External threading (ISO Metric)
Pitch : 1.0mm
ap : 0.6mm
n_{ap} : 5 passes

1st Pass $\triangle ap_1 = \frac{0.60}{\sqrt{5-1}} \times \sqrt{0.3} = 0.16 \rightarrow$ **0.16** ($\triangle ap_1$)

2st Pass $\triangle ap_2 = \frac{0.60}{\sqrt{5-1}} \times \sqrt{2-1} = 0.3 \rightarrow$ **0.14** ($\triangle ap_2 - \triangle ap_1$)

3st Pass $\triangle ap_3 = \frac{0.60}{\sqrt{5-1}} \times \sqrt{3-1} = 0.42 \rightarrow$ **0.12** ($\triangle ap_3 - \triangle ap_2$)

4st Pass $\triangle ap_4 = \frac{0.60}{\sqrt{5-1}} \times \sqrt{4-1} = 0.52 \rightarrow$ **0.1** ($\triangle ap_4 - \triangle ap_3$)

5st Pass $\triangle ap_5 = \frac{0.60}{\sqrt{5-1}} \times \sqrt{5-1} = 0.6 \rightarrow$ **0.08** ($\triangle ap_5 - \triangle ap_4$)

NC PROGRAMME FOR MODIFIED FLANK INFEED

Example) M12×1.0 5 passes modified 5°

External Threading	Internal Threading
G00 Z = 5.0 X = 14.0 G92 U—4.34 Z—13.0 F1.0 G00 W—0.07 G92 U—4.64 Z—13.0 F1.0 G00 W—0.06 G92 U—4.88 Z—13.0 F1.0 G00 W—0.05 G92 U—5.08 Z—13.0 F1.0 G00 W—0.03 G92 U—5.20 Z—13.0 F1.0 G00	G00 Z = 5.0 X = 10.0 G92 U4.34 Z—13.0 F1.0 G00 W—0.07 G92 U4.64 Z—13.0 F1.0 G00 W—0.05 G92 U4.84 Z—13.0 F1.0 G00 W—0.04 G92 U5.02 Z—13.0 F1.0 G00 W—0.03 G92 U5.14 Z—13.0 F1.0 G00

SELECTING CUTTING CONDITIONS

		Priority					
		Tool Life	Cutting Force	Surface Finish	Precision of thread	Chip Discharge	Efficiency (Reduced Passes)
Threading Methods	Radial	○		○	○		○
	Flank	(△ : Modified)	○	(△ : Modified)		○	
Cutting Depth	Fixed Cutting Depth					○	
	Fixed Cut Area	○	○	○	○		○

* Tool life and surface finish accuracy can be increased by changing the threading method from flank infeed to modified flank infeed.
* Chip control can be improved by increasing the cutting depth in the later half of passes.

CUTTING DEPTH AND THE NUMBER OF PASSES

Selection of the appropriate cutting depth and the right number of passes is vital for threading.

- For most threading, use a "threading cycle program," which has originally been installed on machines, and specify "total cutting depth" and "cutting depth in the first or final pass."
- Cutting depth and the number of passes are easy to change for the radial infeed method, thus making it easy to determine the appropriate cutting conditions.

FEATURES AND BENEFITS OF MITSUBISHI PRODUCTS

- Insert grades with high wear and plastic deformation resistance, specially produced for threading tools, ensure highly efficient cutting by enabling high-speed machining and a reduced number of passes.

ADVICE ON IMPROVED THREADING

Increasing tool life

- To prevent damage to the corner radius - *Recommended method - Modified flank infeed*
- To have uniform flank wear on both sides of a cutting edge - *Recommended method - Radial infeed*
- To prevent crater wear - *Recommended method - Flank infeed*

Preventing chip problems

- Change to flank or modified infeed.
- During radial infeed cutting, use an inverted holder and change the coolant supply to a downward direction.
- When using the radial infeed method, set the minimum cutting depth at around 0.2mm to make the chips thicker.

To achieve highly efficient machining

- Increase cutting speed. (Dependant on the maximum revolution and rigidity of the machine.)
- Reduce the number of passes. (Reduce by 30-40%.)
- A reduced number of passes can improve chip discharge because of the thicker chips generated.

Preventing vibration

- Change to flank or modified infeed.
- When using radial infeed, reduce cutting depth in the later half of passes and lower the cutting speed.

Increased surface finish accuracy

- A final wiping pass should be performed at the same depth of cut as the last regular pass.
- When using the flank infeed method, change to radial infeed only during the final pass.

GROOVING for GY

Reference material

C-TYPE CIRCLIP STANDARDS LIST

Category	Application		Standard	Width (Tolerance)	
				For shaft	For hole
C-type stop ring	For shaft	For hole	ANSI B27.7/27.8 (US) BS 3673 (UK) DIN 471/472 (De) NF E 22 163 (Fr) UNI 7435/7438 (It) JIS B 2804 (JP)	0.5, 0.7, 0.8, 0.9, 1.1, 1.3, 1.6, 1.85, 2.15, 2.65, 3.15, 4.15, 5.15: +0.14 0 6.2: +0.22 0 0.305, 0.457: +0.051 0 0.737, 0.991, 1.168: +0.076 0 1.422, 1.727: +0.102 0 2.184, 2.616, 3.048: +0.127 0 3.531: +0.152 0 1.15, 1.35, 1.75, 1.95, 2.2, 2.7, 3.2, 4.2: +0.14 0 +0.18 0	9, 1.1, 1.3, 1.6, 1.85, 2.15, 2.65, 3.15, 4.15, 5.15: +0.14 0 +0.18 0 6.2: +0.22 0 0.457: +0.051 0 0.737, 0.991, 1.168: +0.076 0 1.422, 1.727: +0.102 0 2.184, 2.616, 3.048: +0.127 0
C-type concentric stop ring	For shaft	For hole			
E-type stop ring	For shaft		N1*** American	0.32, 0.5: +0.05 0 0.7, 1.0: +0.10 0 1.2, 1.4: +0.14 0 0.305, 0.457, 0.584: +0.051 0 0.737, 0.991, 1.168: +0.076 0 1.422, 1.727: +0.102 0 0.3, 0.4, 0.5: +0.05 0 0.7, 0.9: +0.10 0 1.15, 1.75, 2.2: +0.14 0	

O-RING STANDARDS

Category	Standard	Width (Tolerance)		
		General	For oil pressure	For air pressure
For stable	DIN 3770/3771 (De) JIS B 2401 (JP) ISO 3601	2.54, 3.18, 4.32, 6.1, 8.0: +0.13 0 3.2, 4.0, 7.5, 11.0: +0.2 0 2.5, 3.2, 4.7, 7.5, 11.1: +0.14 0	1.9, 2.3: +0.1 0 2.9: +0.15 0 3.6, 4.5: +0.2 0 5.5, 7.0: +0.3 0 8.6: +0.4 0 10.7: +0.5 0 2.3, 3.1, 3.7, 6.4, 9.0: +0.2 0	
For dynamic	SMS 1586/1588 (Se) BS 1806/4518 (UK) SAE AS-568 (US)	2.39, 3.58, 4.78, 7.14, 9.58: +0.25 0	2.4, 3.6, 4.8, 7.1, 9.5: +0.25 0	2.3, 3.1, 3.7, 6.4, 9.0: +0.2 0 2.2, 3.4, 4.6, 6.9, 9.3: +0.25 0

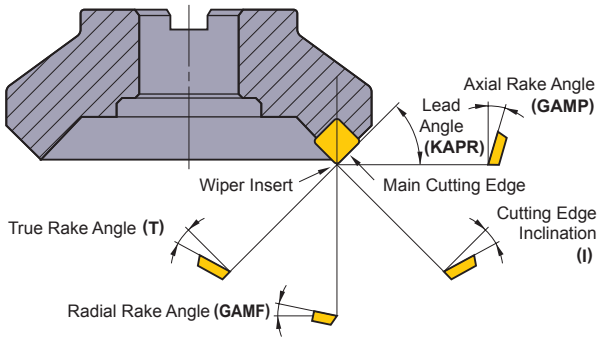
G-class insert with MF breaker is available for single-step machining.
Conventional GY series insert is available for single-step machining.
Machined in multiple steps or by cross feed machining.

TROUBLE SHOOTING FOR FACE MILLING

Trouble	Factors	Solution: Insert Grade Selection				Cutting Conditions						Style and Design of the Tool									Machine, Installation of Tool		
		Select a harder grade	Select a tougher grade	Select a grade with better thermal shock resistance	Select a grade with better adhesion resistance	Cutting speed (Up ↗ / Down ↘)	Feed (Up ↗ / Down ↘)	Depth of cut (Up ↗ / Down ↘)	Engage angle (↗ Up)	Coolant: Do not use water-soluble cutting fluid	Coolant: Determine dry or wet cutting	Rake (Up ↗ / Down ↘)	Corner angle (Up ↗ / Down ↘)	Honing strengthens the cutting edge (Up ↗ / Down ↘)	Cutter diameter (Up ↗ / Down ↘)	Number of teeth (Larger ↗ / Smaller ↘)	Wider chip pocket	Use of a wiper insert	Improve run-out accuracy	Cutter rigidity	Increase clamping rigidity of the tool and workpiece	Decrease overhang	Decrease power and machine backlash
Deterioration of Tool Life	Insert wear quickly generated																						
	Improper tool grade	●																					
	Improper cutting edge geometry											↗●	↗●	●↘					●				
	Improper cutting speed					●↘					●Wet												
	Chipping or fracturing of cutting edge																						
	Improper tool grade		●																				
	Improper cutting conditions						●↘	●↘															
	Lack of cutting edge strength.													↗●									
	Thermal crack occurs			●		●↘	●↘	●↘		●	●Dry												
	Build-up edge occurs				●	↗●	↗●			●	●Wet												
	Lack of rigidity																			●	●	●	●
Deterioration of Surface Finish	Poor finished surface																						
	Improper cutting conditions	●				●↘	●↘	●↘															
	Welding occurs				●	↗●				●	●Wet	↗●		●↘									
	Poor run-out accuracy																	●	●				
	Chattering					●↘	●↘	●↘	↗●			↗●		●↘		●↘				●	●	●	●
	Not parallel or irregular surface																						
	Workpiece bending						●↘	●↘				↗●	●↘	●↘		●↘					●		
	Tool clearance																			●	●	●	●
	Large back force											↗●	●↘	●↘		●↘							
Burr, Workpiece Chipping	Burrs, chipping																						
	Chip thickness is too large					↗●	●↘	●↘															
	Cutter diameter is too large								↗●						●↘								
	Low sharpness											↗●		●↘									
	A large corner angle												●↘										
	Workpiece edge chipping																						
	Improper cutting conditions						●↘	●↘															
	Low sharpness											↗●		●↘									
	A small corner angle												↗●										
	Chattering					●↘	●↘	●↘	↗●			↗●		●↘		●↘				●	●	●	●
Chip Control	Poor chip dispersal, chip jamming and chip packing																						
	Welding occurs					↗●																	
	Chip thickness is too thin					↗●	↗●																
	Cutter diameter is too small														●↘								
	Poor chip disposal									●	●Wet					●↘	●						

FUNCTION OF TOOL FEATURES FOR FACE MILLING

FUNCTION OF EACH CUTTING EDGE ANGLE IN FACE MILLING

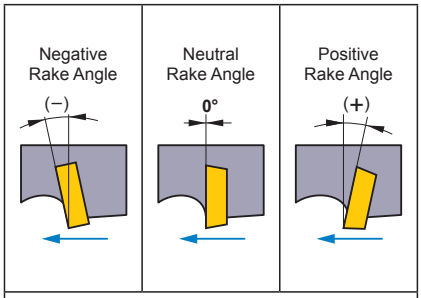


Each Cutting Edge Angle in Face Milling

Type of Angle	Symbol	Function	Effect
Axial Rake Angle	GAMP	Determines chip disposal direction.	**Positive** : Excellent machinability.
Radial Rake Angle	GAMF	Determines sharpness.	**Negative** : Excellent chip disposal.
Lead Angle	KAPR	Determines chip thickness.	**Small** : Thin chips and small cutting impact. Large back force.
True Rake Angle	T	Determines actual sharpness.	**Positive (large)** : Excellent machinability. Minimal welding. **Negative (large)** : Poor machinability. Strong cutting edge.
Cutting Edge Inclination	I	Determines chip disposal direction.	**Positive (large)** : Excellent chip disposal. Low cutting edge strength.

STANDARD INSERTS

Positive and Negative Rake Angle

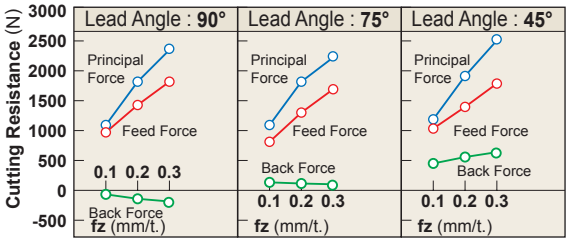


· Insert shape whose cutting edge precedes is a positive rake angle.
· Insert shape whose cutting edge follows is a negative rake angle.

Standard Cutting Edge Shape

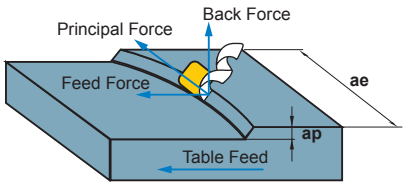
Standard Cutting Edge Combinations		(+) Axial Rake Angle / Radial Rake Angle (+) Double Positive (DP Edge Type)	(–) Axial Rake Angle / Radial Rake Angle (–) Double Negative (DN Edge Type)	(+) Axial Rake Angle / Radial Rake Angle (–) Negative/Positive (NP Edge Type)
Axial Rake Angle (GAMP)		Positive (+)	Negative (–)	Positive (+)
Radial Rake Angle (GAMF)		Positive (+)	Negative (–)	Negative (–)
Insert Used		Positive Insert (One Sided Use)	Negative Insert (Double Sided Use)	Positive Insert (One Sided Use)
Work Material	**Steel**	●	–	●
	Cast Iron	–	●	●
	Aluminium Alloy	●	–	–
	Difficult-to-Cut Material	●	–	●

LEAD ANGLE (KAPR) AND CUTTING CHARACTERISTICS



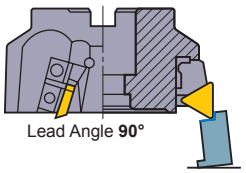
Workpiece : **JIS SCM440 (281HB)**
Tool : **ø125mm** Single Insert
Cutting Conditions : **vc=125.6m/min ap=4mm ae=110mm**

Cutting Resistance Comparison between Different Insert Shapes

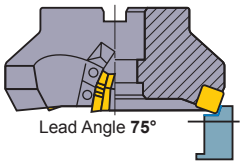


Three Cutting Resistance Forces in Milling

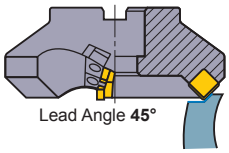
Lead Angle 0°
Back force is in the minus direction. Lifts the workpiece when workpiece clamp rigidity is low.



Lead Angle 15°
Lead angle 75° is recommended for face milling of workpieces with low rigidity such as thin workpieces.



Lead Angle 45°
The largest back force.
Bends thin workpieces and lowers cutting accuracy.
*Prevents workpiece edge chipping when cast iron cutting.

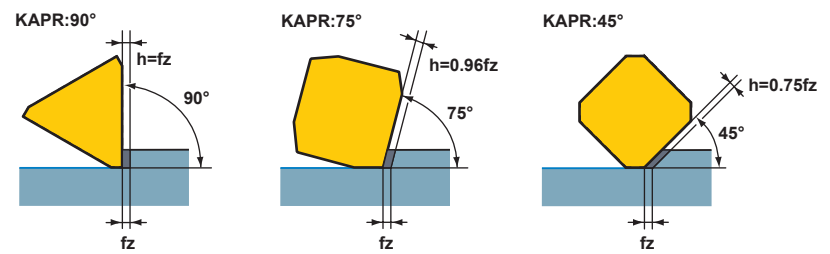


* Principal force : Force is in the opposite direction of face milling rotation.
* Back force : Force that pushes in the axial direction.
* Feed force : Force is in the feed direction and is caused by table feed.

APPROACH ANGLE AND THE TOOL LIFE

Approach Angle and Chip Thickness

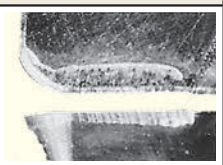
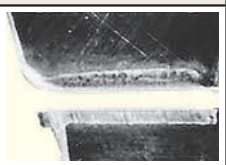
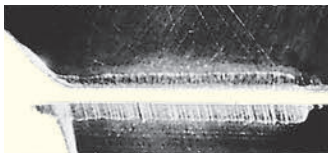
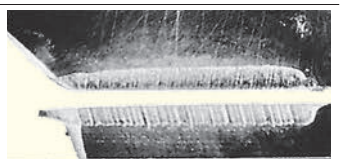
When the depth of cut and feed per tooth, fz, are fixed, the smaller the corner angle (KAPR) is, then the thinner the chip thickness (h) becomes (for a 45° KAPR, it is approx. 75% that of a 90° KAPR). This can be seen in below. Therefore as the KAPR increases, the cutting resistance decreases resulting in longer tool life. Note however, if the chip thickness is too large then the cutting resistance can increase leading to vibrations and shortened tool life.



Effects on chip thickness due to the variation of lead angles

Approach Angle and Face Wear

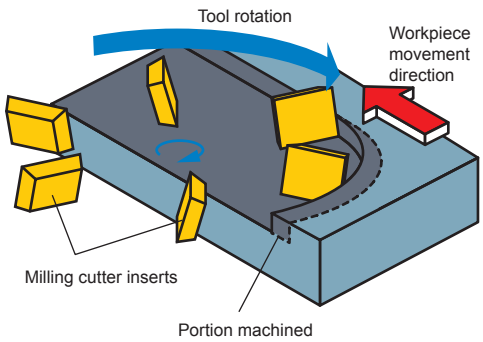
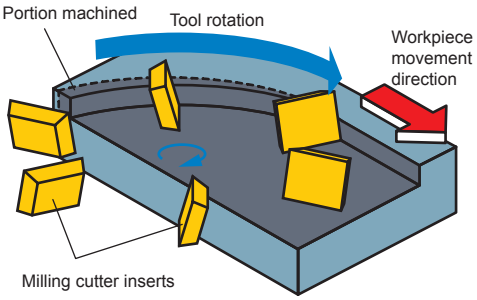
Below shows wear patterns for different lead angles. When comparing crater wear for 90° and 45° lead angles, it can be clearly seen that the ctater wear for 90° lead angle is larger.

	Lead Angle **90°**	Lead Angle **75°**	Lead Angle **45°**
vc=100m/min Tc=69min			
vc=125m/min Tc=55min			
vc=160m/min Tc=31min			

Workpiece : **SNCM439 287HB**
Tools : **DC=125mm**
Insert : **M20**Cemented Carbide
Cutting Conditions : **ap=3.0mm**
ae=110mm
fz=0.2mm/t.
Dry Cutting

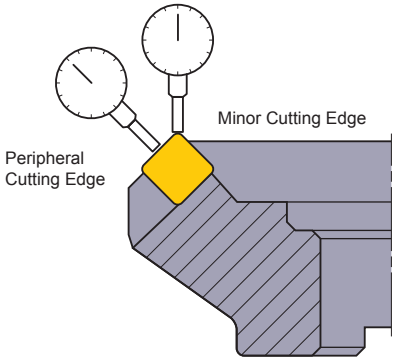
UP AND DOWN CUT (CLIMB) MILLING

When choosing a method to machine, up cutting or down cut milling (climb milling) is decided by the conditions of the machine tool, the milling cutter and the application. However, it is said that in terms of tool life, down cut (climb) milling is more advantageous.

Up Cut	Down Cut
	

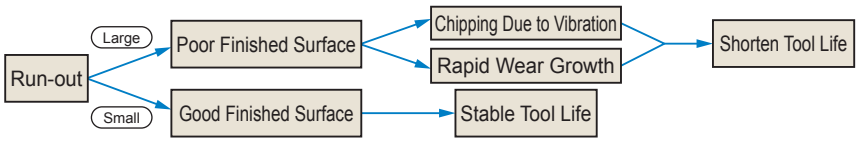
FINISHED SURFACE

Cutting Edge Run-out Accuracy

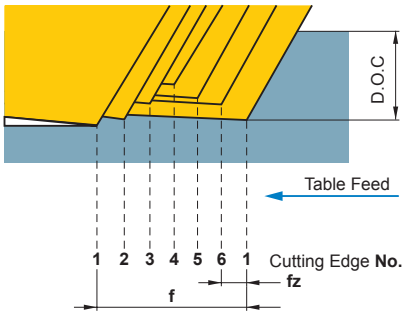


Cutting Edge Run-out and Accuracy in Face Milling

Cutting edge run-out accuracy of indexable inserts on the cutter body greatly affects the surface finish and tool life.



Improve Finished Surface Roughness



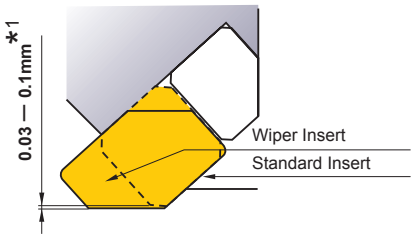
fz : Feed per Tooth
f : Feed per Revolution

Sub Cutting Edge Run-out and Finished Surface

Since Mitsubishi Materials' normal sub cutting edge width is 1.4mm, and the sub cutting edges are set parallel to the face of a milling cutter, theoretically the finished surface accuracy should be maintained even if run-out accuracy is low.

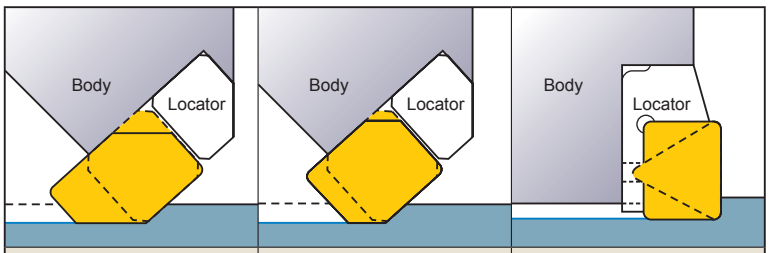
Actual Problems	Countermeasure
· Cutting edge run-out. · Sub cutting edge inclination. · Milling cutter body accuracy. · Spare parts accuracy. · Welding, vibration, chattering.	Wiper Insert

* Machine a surface that has already been per-machined in order to produce smooth finished surface.



· Replace one or two normal inserts with wiper inserts.
· Wiper inserts be set to protrude by 0.03—0.1mm from the standard inserts.
*1.Value depends on the cutting edge and insert combination.

How to Set a Wiper Insert



(a) **One Corner Type**	(b) **Two Corner Type**	(c) **Two Corner Type**
Replace normal insert.	Replace normal insert.	Use locator for wiper insert.

· Sub cutting edge length has to be longer than the feed per revolution.
* Too long sub cutting edge causes chattering.
· When the cutter diameter is large and feed per revolution is longer than the sub cutting edge of the wiper insert, use two or three wiper inserts.
· When using more than 1 wiper inserts, eliminate run-out of wiper inserts.
· Use a high hardness grade (high wear resistance) for wiper inserts.

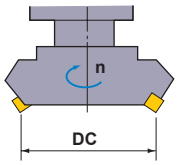
FORMULAE FOR FACE MILLING

CUTTING SPEED (vc)

$$vc = \frac{\pi \cdot DC \cdot n}{1000} \text{ (m/min)}$$

vc (m/min) : Cutting Speed
π (3.14) : Pi
DC (mm) : Cutter Diameter
n (min^{-1}) : Main Axis Spindle Speed

*Divide by 1000 to change to m from mm.



(Problem) What is the cutting speed when main axis spindle speed is 350min^{-1} and the cutter diameter is ϕ125 ?

(Answer) Substitute π=3.14, DC=125, n=350 into the formula.

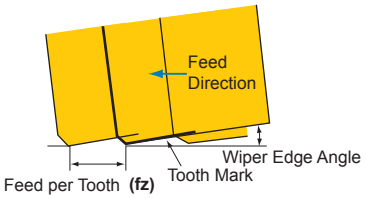
$$vc = \frac{\pi \cdot DC \cdot n}{1000} = \frac{3.14 \times 125 \times 350}{1000} = 137.4 \text{m/min}$$

The cutting speed is 137.4m/min.

FEED PER TOOTH (fz)

$$fz = \frac{vf}{z \cdot n} \text{ (mm/tooth)}$$

fz (mm/tooth) : Feed per Tooth
vf (mm/min) : Table Feed per Min.
n (min^{-1}) : Main Axis Spindle Speed (Feed per Revolution **f = z x fz**)
z : Insert Number



(Problem) What is the feed per tooth when the main axis spindle speed is 500min^{-1}, number of insert is 10, and table feed is 500mm/min ?

(Answer) Substitute the above figures into the formula.

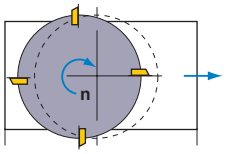
$$fz = \frac{vf}{z \times n} = \frac{500}{10 \times 500} = 0.1 \text{mm/tooth}$$

The answer is 0.1mm/tooth.

TABLE FEED (vf)

$$vf = fz \cdot z \cdot n \text{ (mm/min)}$$

vf (mm/min) : Table Feed per Min.
fz (mm/tooth) : Feed per Tooth
n (min^{-1}) : Main Axis Spindle Speed
z : Insert Number



(Problem) What is the table feed when feed per tooth is 0.1mm/tooth, number of insert is 10, and main axis spindle speed is 500min^{-1}?

(Answer) Substitute the above figures into the formula.

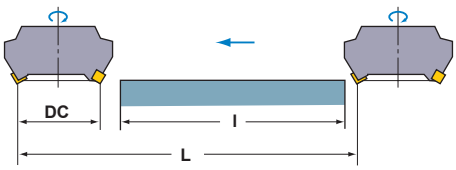
$$vf = fz \times z \times n = 0.1 \times 10 \times 500 = 500 \text{mm/min}$$

The table feed is 500mm/min.

CUTTING TIME (Tc)

$$Tc = \frac{L}{vf} \text{ (min)}$$

Tc (min) : Cutting Time
vf (mm/min) : Table Feed per Min.
L (mm) : Total Table Feed Length (Workpiece Length: (**l**)+Cutter Diameter : (**DC**))



(Problem) What is the cutting time required for finishing 100mm width and 300mm length surface of a cast iron (JIS FC200) block when the cutter diameter is ϕ200mm, the number of inserts is 16, the cutting speed is 125m/min, and feed per tooth is 0.25mm. (spindle speed is 200min^{-1})

(Answer) Calculate table feed per min vf=0.25×16×200=800mm/min
Calculate total table feed length. L=300+200=500mm
Substitute the above answers into the formula.

$$Tc = \frac{500}{800} = 0.625 \text{ (min)}$$

0.625×60=37.5 (sec). The answer is 37.5 sec.

CUTTING POWER (Pc)

$$Pc = \frac{ap \cdot ae \cdot vf \cdot Kc}{60 \times 10^6 \times \eta}$$

Pc (kW)	: Actual Cutting Power	**ap (mm)**	: Depth of Cut
ae (mm)	: Cutting Width	**vf (mm/min)**	: Table Feed per Min.
Kc (MPa)	: Specific Cutting Force	**η**	: (Machine Coefficient)

(Problem) What is the cutting power required for milling tool steel at a cutting speed of 80m/min. With depth of cut 2mm, cutting width 80mm, and table feed 280mm/min by ϕ250 cutter with 12 inserts. Machine coefficient 80%.

(Answer) First, calculate the spindle speed in order to obtain feed per tooth.

$$n = \frac{1000vc}{\pi DC} = \frac{1000 \times 80}{3.14 \times 250} = 101.91 min^{-1}$$

Feed per Tooth $fz = \frac{vf}{z \times n} = \frac{280}{12 \times 101.9} = 0.228 mm/tooth$

Substitute the specific cutting force into the formula.

$$Pc = \frac{2 \times 80 \times 280 \times 1800}{60 \times 10^6 \times 0.8} = 1.68 \text{ kW}$$

Kc

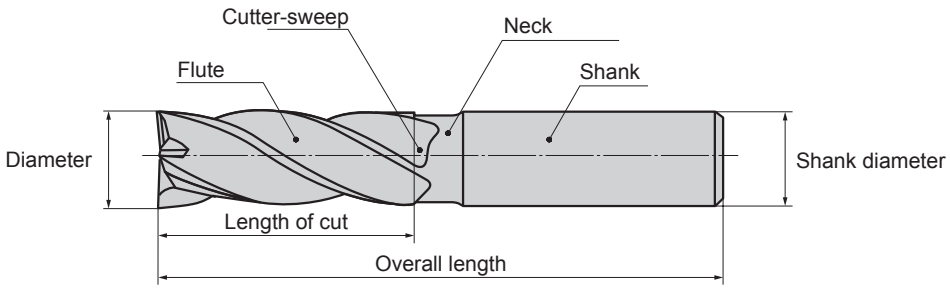
Work Material	Tensile Strength (MPa) and Hardness	Specific Cutting Force Kc (MPa)				
		0.1mm/tooth	0.2mm/tooth	0.3mm/tooth	0.4mm/tooth	0.6mm/tooth
Mild Steel	**520**	2200	1950	1820	1700	1580
Medium Steel	**620**	1980	1800	1730	1600	1570
Hard Steel	**720**	2520	2200	2040	1850	1740
Tool Steel	**670**	1980	1800	1730	1700	1600
Tool Steel	**770**	2030	1800	1750	1700	1580
Chrome Manganese Steel	**770**	2300	2000	1880	1750	1660
Chrome Manganese Steel	**630**	2750	2300	2060	1800	1780
Chrome Molybdenum Steel	**730**	2540	2250	2140	2000	1800
Chrome Molybdenum Steel	**600**	2180	2000	1860	1800	1670
Nickel Chrome Molybdenum Steel	**940**	2000	1800	1680	1600	1500
Nickel Chrome Molybdenum Steel	**352HB**	2100	1900	1760	1700	1530
Austenitic Stainless Steel	**155HB**	2030	1970	1900	1770	1710
Cast Iron	**520**	2800	2500	2320	2200	2040
Hard Cast Iron	**46HRC**	3000	2700	2500	2400	2200
Meehanite Cast Iron	**360**	2180	2000	1750	1600	1470
Grey Cast Iron	**200HB**	1750	1400	1240	1050	970
Brass	**500**	1150	950	800	700	630
Light Alloy (Al-Mg)	**160**	580	480	400	350	320
Light Alloy (Al-Si)	**200**	700	600	490	450	390
Light Alloy (Al-Zn-Mg-Cu)	**570**	880	840	840	810	720

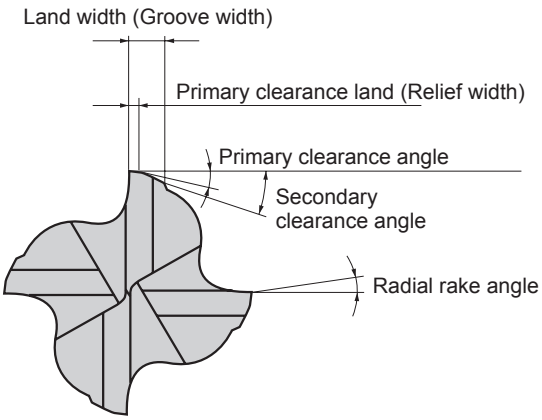
TROUBLE SHOOTING FOR END MILLING

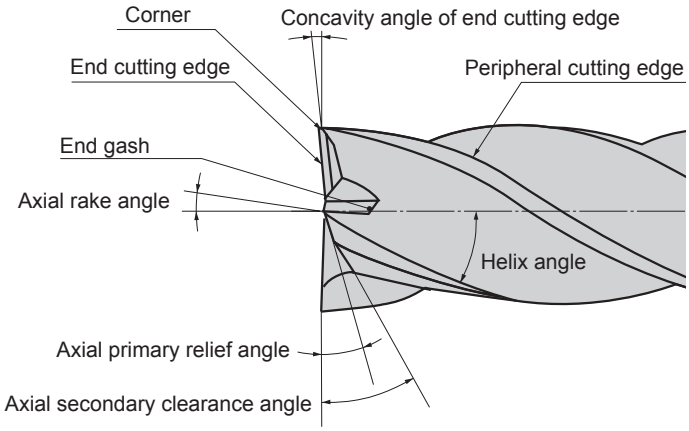
Trouble		Factors \ Solution	Insert Grade Selection: Coated tool	Cutting Conditions: Cutting speed (Up ↗ / Down ↘)	Feed (Up ↗ / Down ↘)	Depth of cut (Up ↗ / Down ↘)	Pick feed (↘ Down)	Down cut	Use air blow	Coolant: Increase coolant quantity	Coolant: Do not use water-soluble cutting fluid	Coolant: Determine dry or wet cutting	Style and Design of the Tool: Helix angle (Up ↗ Larger / Down ↘ Smaller)	Insert number (Up ↗ Larger / Down ↘ Smaller)	Concavity angle of end cutting edge (Up ↗ Larger / Down ↘ Smaller)	Tool diameter (Up ↗ Larger / Down ↘ Smaller)	Cutter rigidity	Wider chip pocket	Machine, Installation of Tool: Shorten tool overhang	Increase tool installation accuracy	Increase spindle collet run-out accuracy	Collet inspection and exchange	Increase chuck clamping power	Increase work clamping rigidity
Deterioration of Tool Life	Large peripheral cutting edge wear	Non-coated end mill is used	●																					
		A small number of cutting edges												↗●										
		Improper cutting conditions		●↘							●													
		Up cut milling is used						Down Cut																
	Severe chipping	Improper cutting conditions																						
		Fragile cutting edge															●							
		Insufficient clamping force																				●	●	
		Low clamping rigidity																	●	●	●	●	●	●
	Breakage during cutting	Improper cutting conditions				●↘																		
		Low end mill rigidity														↗●	●							
		Overhang longer than necessary				●↘													●					
		Chip jamming								●								●						
Deterioration of Surface Finish	Vibration during cutting	Improper cutting conditions		●↘	●↘																			
		Low end mill rigidity											↗●	↗●		↗●	●							
		Low clamping rigidity																	●	●	●	●	●	●
	Poor surface finish on walls	Large cutting edge wear	●																					
		Improper cutting conditions		●↘		●↘																		
		Chip packing.							●	●		●Wet												
	Poor surface finish on faces	The end cutting edge does not have a concave angle			●↘	●↘									↗●									
		Large pick feed					●↘																	
	Out of vertical	Large cutting edge wear	●																					
		Improper cutting conditions			●↘	●↘																		
		Lack of end mill rigidty											↗●	↗●		↗●	●							
	Poor dimensional accuracy	Improper cutting conditions		●↘	●↘	●↘																		
		Low clamping rigidity																	●	●	●	●	●	●
Burrs, Chipping, etc.	Burr or chipping occurs	Improper cutting conditions			●↘	●↘																		
		Large helix angle											●↘											
	Quick bur formation	Notch wear	●																					
		Improper cutting conditions		●↘	↗●																			
Poor Chip Dispersal	Chip packing	Metal removal too large			●↘	●↘																		
		Lack of chip pocket												●↘				●						

END MILL TERMINOLOGY

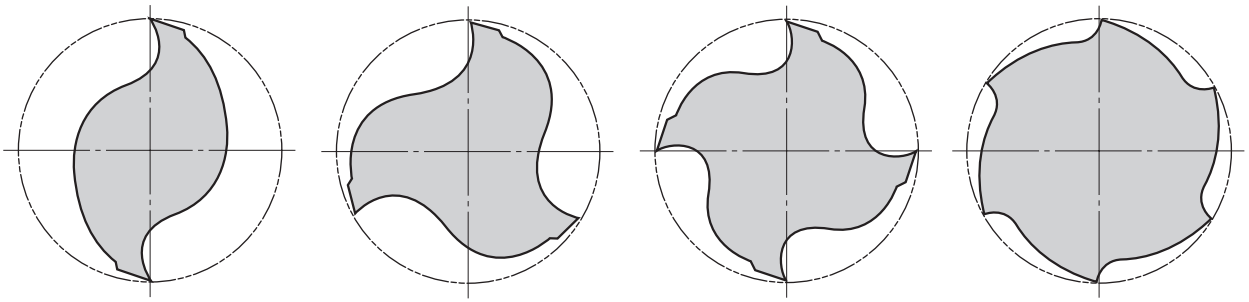
END MILL TERMINOLOGY







COMPARISON OF SECTIONAL SHAPE AREA OF CHIP POCKET



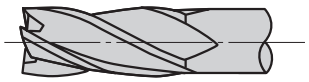
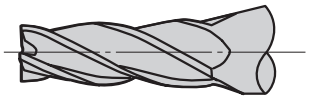
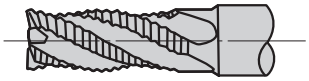
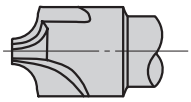
2-flutes 50% | 3-flutes 45% | 4-flutes 40% | 6-flutes 20%

CHARACTERISTICS AND APPLICATIONS OF DIFFERENT-NUMBER-OF-FLUTE END MILLS

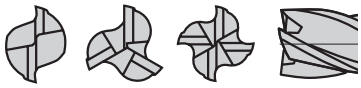
		2-flutes	3-flutes	4-flutes	6-flutes
Feature	Advantage	Chip disposability is excellent. Suitable for sinking. Low cutting resistance.	Chip disposability is excellent. Suitable for sinking.	High rigidity	High rigidity. Superior cutting edge durability.
	Fault	Low rigidity	Diameter is not easily measured.	Chip disposability is poor.	Chip disposability is poor.
Usage		Slotting, side milling, sinking etc. Wide range of use.	Slotting, side milling Heavy cutting, finishing	Shallow slotting, side milling Finishing	High Hardness Material Shallow slotting, side milling

TYPES AND SHAPES OF END MILL

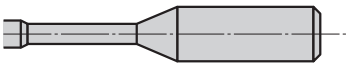
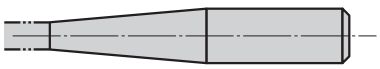
Peripheral Cutting Edge

Kind	Shape	Feature
Ordinary Flute		Ordinary flute type is most generally used for the slotting, side milling, and the shoulder milling, etc. Can be used for roughing, semi-finishing, and the finishing.
Tapered Flute		A tapered fute is used for milling mould drafts and angled faces.
Roughing Flute		Because a roughing tooth has a wave-like form and produces small chips. Cutting resistance is low, and is suitable for roughing. Not suitable for finishing. The tooth face is re-grindable.
Formed Flute		A corner radius cutter is shown. An infinite range of form cutters can be produced.

End Cutting Edge

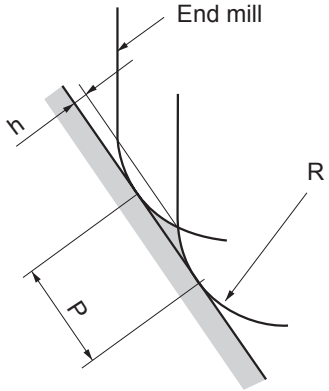
Kind	Shape	Feature
Square End (Centre With Hole)		This is generally used for slotting, side milling, and shoulder milling. Sinking is not possible. Grinding is center supported, making re-grinding accurate.
Square End (Centre Cut)		It is generally used for slotting, side milling, and shoulder milling. Vertical cutting can be performed. Re-grinding is possible.
Ball End		Suitable for profile machining and pick feed milling.
End Radius		For corner radius milling and contouring. Efficient small corner radius milling due to large diameter and small corner radius.

Shank And Neck Parts

Kind	Shape	Feature
Standard (Straight Shank)		For general use.
Long Shank		For deep slotting and has a long shank, so that adjustment of the overhang is possible.
Long Neck		For deep slotting and small diameter end mills, also suitable for boring.
Taper Neck		For best performance in deep slotting and on mould drafts.

PITCH SELECTION OF PICK FEED

PICK FEED MILLING (CONTOURING) WITH BALL NOSE END MILLS AND END MILLS WITH CORNER RADIUS



$$h = R \cdot \left[1 - \cos \left\{ \sin^{-1}\left(\frac{P}{2R} \right) \right\} \right]$$

R : Radius of Ball Nose(RE), Corner Radius(RE)

P : Pick Feed

h : Cusp Height

CORNER R OF END MILLS AND CUSP HEIGHT BY PICK FEED

Unit : mm

R \ P	Pitch of Pick Feed (P)									
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
0.5	0.003	0.010	0.023	0.042	0.067	0.100	—	—	—	—
1	0.001	0.005	0.011	0.020	0.032	0.046	0.063	0.083	0.107	—
1.5	0.001	0.003	0.008	0.013	0.021	0.030	0.041	0.054	0.069	0.086
2	0.001	0.003	0.006	0.010	0.016	0.023	0.031	0.040	0.051	0.064
2.5	0.001	0.002	0.005	0.008	0.013	0.018	0.025	0.032	0.041	0.051
3		0.002	0.004	0.007	0.010	0.015	0.020	0.027	0.034	0.042
4		0.001	0.003	0.005	0.008	0.011	0.015	0.020	0.025	0.031
5		0.001	0.002	0.004	0.006	0.009	0.012	0.016	0.020	0.025
6		0.001	0.002	0.003	0.005	0.008	0.010	0.013	0.017	0.021
8			0.001	0.003	0.004	0.006	0.008	0.010	0.013	0.016
10			0.001	0.002	0.003	0.005	0.006	0.008	0.010	0.013
12.5			0.001	0.002	0.003	0.004	0.005	0.006	0.008	0.010

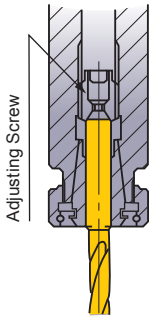
R \ P	Pitch of Pick Feed (P)									
	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0
0.5	—	—	—	—	—	—	—	—	—	—
1	—	—	—	—	—	—	—	—	—	—
1.5	0.104	—	—	—	—	—	—	—	—	—
2	0.077	0.092	0.109	—	—	—	—	—	—	—
2.5	0.061	0.073	0.086	0.100	—	—	—	—	—	—
3	0.051	0.061	0.071	0.083	0.095	0.109	—	—	—	—
4	0.038	0.045	0.053	0.062	0.071	0.081	0.091	0.103	—	—
5	0.030	0.036	0.042	0.049	0.057	0.064	0.073	0.082	0.091	0.101
6	0.025	0.030	0.035	0.041	0.047	0.054	0.061	0.068	0.076	0.084
8	0.019	0.023	0.026	0.031	0.035	0.040	0.045	0.051	0.057	0.063
10	0.015	0.018	0.021	0.025	0.028	0.032	0.036	0.041	0.045	0.050
12.5	0.012	0.014	0.017	0.020	0.023	0.026	0.029	0.032	0.036	0.040

TROUBLE SHOOTING FOR DRILLING

Trouble	Factors \ Solution	Cutting Conditions: Cutting speed (Up ↗ / Down ↘)	Feed (Up ↗ / Down ↘)	Lower feed at initial cutting	Lower feed when breaking through	Step feed	Increase accuracy of prep-hole and depth	Coolant: Increase oil ratio	Increase volume	Increase coolant pressure	Style and Design of the Tool: Chisel width	Honing width	Core thickness (Up ↗ / Down ↘)	Shorten flute length	Decrease lip height	Use internal coolant type drill	Change to a drill with X type thinning	Machine, Installation of Tool: Increase tool installation accuracy	Shorten tool overhang	Flat workpiece face	Increase work clamping rigidity	Reduce machine backlash and increase rigidity
Deterioration of Tool Life	Drill breakage: Lack of drill rigidity												↗ ●	●								
	Drill breakage: Improper cutting conditions		● ↘																			
	Drill breakage: Large deflection of the tool holder																	●				●
	Drill breakage: Workpiece face is inclined																			●		
	Large wear at the peripheral cutting edge and along the land: Improper cutting conditions	● ↘																				
	Large wear at the peripheral cutting edge and along the land: An increase in temperature at the cutting point							●	●							●						
	Large wear at the peripheral cutting edge and along the land: Poor run-out accuracy																	●				
	Chipping of the peripheral cutting edge: Improper cutting conditions		● ↘			●																
	Chipping of the peripheral cutting edge: Large deflection of the tool holder																	●				●
	Chipping of the peripheral cutting edge: chattering, vibration											● ↘							●		●	●
	Chisel edge chipping: The chisel edge width is too wide										● ↘											
	Chisel edge chipping: Poor entry			●																		
	Chisel edge chipping: Chattering, vibration											● ↘							●		●	●
Deterioration of Hole Accuracy	Hole diameter increases: Lack of drill rigidity												↗ ●	●								
	Hole diameter increases: Improper drill geometry														●							
	Hole diameter becomes smaller: An increase in temperature at the cutting point							●	●							●						
	Hole diameter becomes smaller: Improper cutting conditions	● ↘																				
	Hole diameter becomes smaller: Improper drill geometry														●							
	Poor straightness: Lack of drill rigidity												↗ ●	●								
	Poor straightness: Large deflection of the tool holder																	●				●
	Poor straightness: Poor guiding properties						●															
	Poor hole positioning accuracy, roundness and surface finish: Lack of drill rigidity												↗ ●	●								
	Poor hole positioning accuracy, roundness and surface finish: Poor entry																●					
	Poor hole positioning accuracy, roundness and surface finish: Improper cutting conditions			●																		
	Poor hole positioning accuracy, roundness and surface finish: Large deflection of the tool holder																	●				●
Burrs	Burrs at the hole exit: Improper drill geometry											● ↘										
	Burrs at the hole exit: Improper cutting conditions				●																	
Poor Chip Dispersal	Long chips: Improper cutting conditions		↗ ●				●															
	Long chips: Poor chip disposal								●	●			● ↘			●						
	Chip jamming: Improper cutting conditions	● ↘	● ↘				●															
	Chip jamming: Poor chip disposal								●	●			● ↘			●						

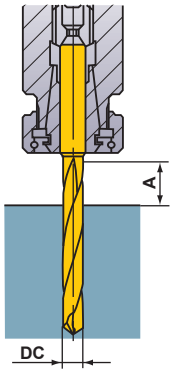
OPERATIONAL GUIDANCE

Drill Holding



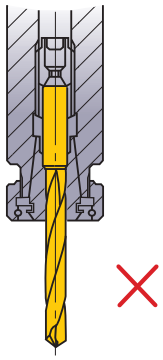
Thrust bearing type collet chuck holds the drill securely.

Drill Length



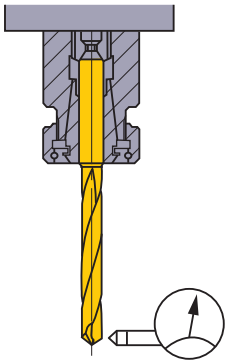
A ≥ DC x 1.5

Drill Installation



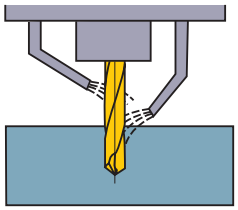
Do not clamp on the flutes.

Installation Tolerance



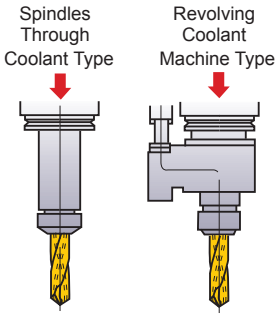
Run-out ≤ 0.03mm

Coolant Method (External Coolant)



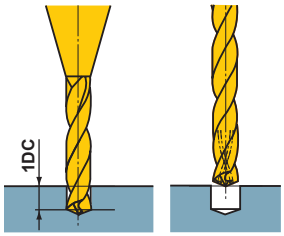
Two coolant positions, at the end and at the center are ideal.

Through Coolant Type (Internal Coolant)



Coolant pressure is approx. 0.5—1MPa (<ϕ5:2—3MPa). Coolant volume is 1.5—4.0l/min.

Drill Installation



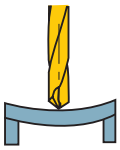
①Pre-prepared hole drilling for 1 DC (DC = diameter)
②Use the prepared hole as a guide when using a drill with an oil hole. Depending on the cutting conditions, peck feed is recommended.

Coolant Handling

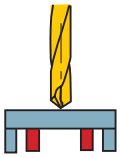
1) Small particles of swarf will jam in the oil hole of small diameter drills. Always use a fine mesh filter as a preventative measure.

2) Dirt and dust particles adhere to the oil in old coolant and prevent an efficient flow. Regular coolant exchange is recommended.

Thin Workpiece

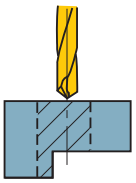


If Bending Occurs ×



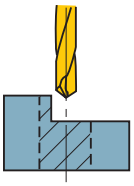
Support the Workpiece ○

Interrupted Cutting



One Process ○

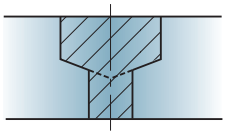
①Lower the feed when drilling the interrupted part.



Requires Prior Machining △

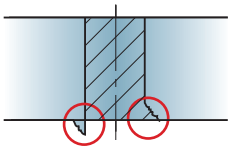
①Spot face with an end mill prior to drilling.

Stepped Holes



①Divide the two processes.
②Drill the larger hole first.
*A tool for machining both chamfer and spot face can be produced to order.

Burring and Workpiece Chipping



①Lower the feed rate by 50% at the end of through cutting.
②Add a 45°chamfer.
③Change the point angle.

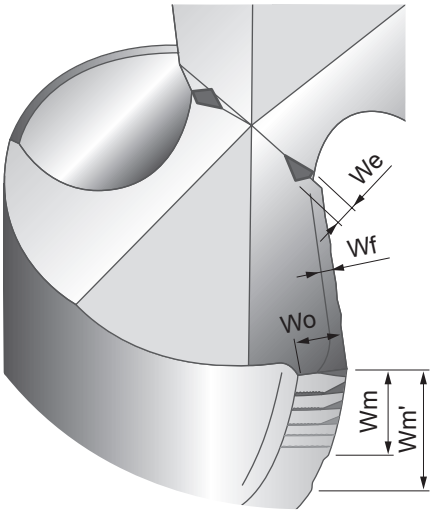
NOTES ON USE

- Please use a fine mesh filter (mesh≤3μm) for coolant to prevent jamming in the oil hole.
- For deep drilling (l/d>3), machining guiding hole is recommended.
- Pick drilling is also effective.

DRILL WEAR AND CUTTING EDGE DAMAGE

DRILL WEAR CONDITION

The table below shows a simple drawing depicting the wear of a drill's cutting edge. The generation and the amount of wear differ according to the workpiece materials and cutting conditions used. But generally, the peripheral wear is largest and determines a drill tool life. When regrinding, the flank wear at the point needs to be ground away completely. Therefore, if there is large wear more material needs to be ground away to renew the cutting edge.



We : **Chisel edge wear width**

Wf : **Flank Wear (The middle of the cutting edge)**

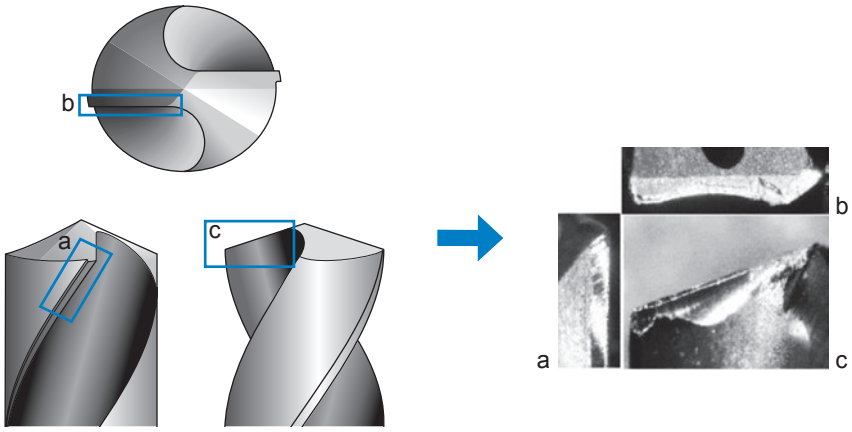
Wo : **Outer corner wear width**

Wm : **Margin wear width**

Wm' : **Margin wear width (Leading edge)**

CUTTING EDGE DAMAGE

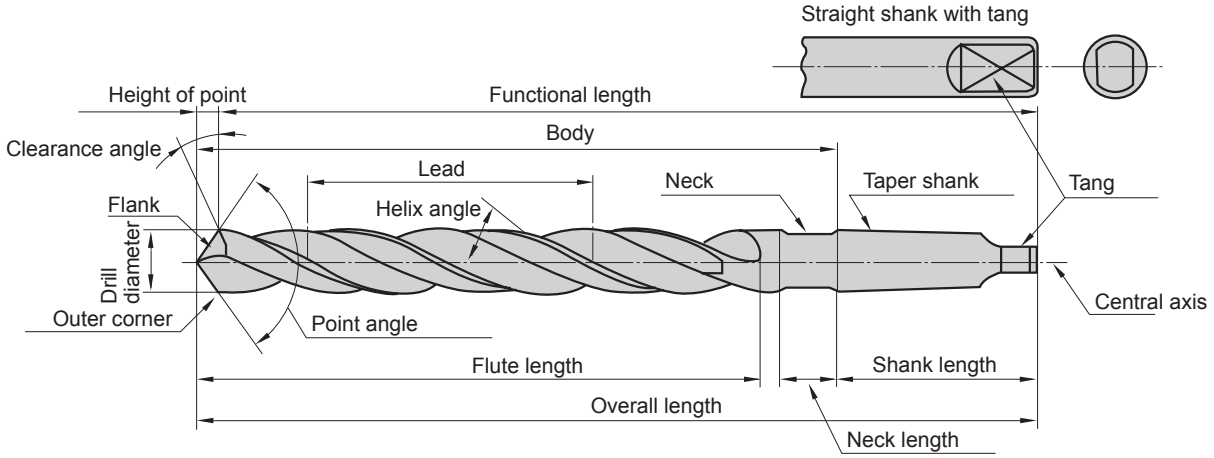
When drilling, the cutting edge of the drill can suffer from chipping, fracture and abnormal damage. In such cases, it is important to take a closer look at the damage, investigate the cause and take countermeasures.

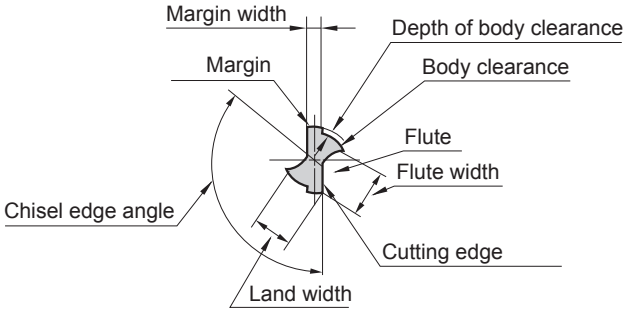


Cutting edge damage

DRILL TERMINOLOGY AND CUTTING CHARACTERISTICS

NAMES OF EACH PART OF A DRILL





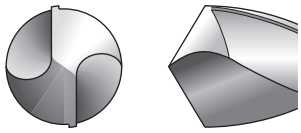
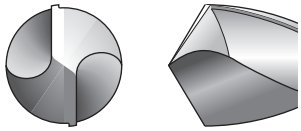
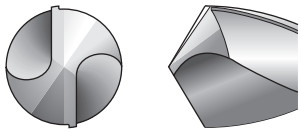
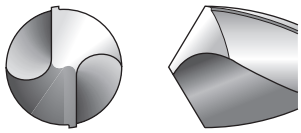
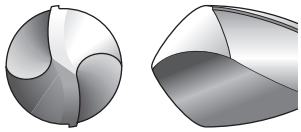
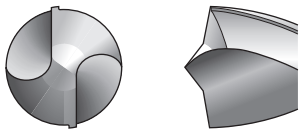
SHAPE SPECIFICATION AND CUTTING CHARACTERISTICS

Helix Angle	Is the inclination of the flute with respect to the axial direction of a drill, which corresponds to the rake angle of a bit. The rake angle of a drill differs according to the position of the cutting edge, and it decreases greatly as the circumference approaches the centre.The chisel edge has a negative rake angle, crushing the work. **High-hardness material** **Small** ◀·· **Rake angle** ··▶ **Large** **Soft material** (Aluminium, etc.)
Flute Length	It is determined by depth of hole, bush length, and regrinding allowance. Since the influence on the tool life is great, it is necessary to minimize it as much as possible.
Point Angle	In general, the angle is 118° which is set differently to various applications. **Soft material with good machinability** **Small** ◀·· **Point angle** ··▶ **Large** **For hard material and high-efficiency machining**
Web Thickness	It is an important element that determines the rigidity and chip raking performance of a drill. The web thickness is set according to applications. Small cutting resistance Low rigidity Good chip raking performance Machinable material } **Thin** ◀·· **Web thickness** ··▶ **Thick** { Large cutting resistance High rigidity Poor chip raking performance High-hardness material, cross hole drilling, etc.
Margin	The tip determines the drill diameter and functions as a drill guide during drilling. The margin width is determined in consideration of friction during hole drilled. **Poor guiding performance** **Small** ◀·· **Margin width** ··▶ **Large** **Good guiding performance**
Diameter Back Taper	To reduce friction with the inside of the drilled hole, the portion from the tip to the shank is tapered slightly. The degree is usually represented by the quantity of reduction in the diameter with respect to the flute length, which is approx. 0.04—0.1mm. It is set at a larger value for high-efficiency drills and the work material that allows drilled holes.

CUTTING EDGE GEOMETRY AND ITS INFLUENCE

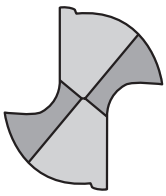
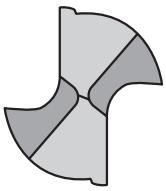
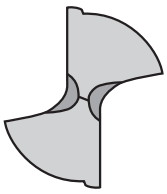
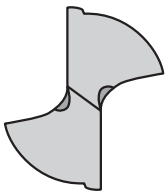
As shown in the table below, it is possible to select the most suitable cutting edge geometry for different applications. If the most suitable cutting edge geometry is selected then higher machining efficiency and higher hole accuracy can be obtained.

Cutting Edge Shapes

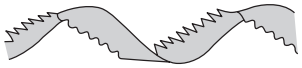
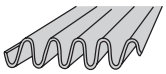
Grinding name	Shape	Features and effect	Application
Conical		• The flank is conical and the clearance angle increases toward the centre of the drill.	• General Use
Flat		• The flank is flat. • Easy grinding.	• Mainly for small diameter drills.
Three flank angles		• As there is no chisel edge, the results are high centripetal force and small hole oversize. • Requires a special grinding machine. • Surface grinding of three sides.	• For drilling operations that require high hole accuracy and positioning accuracy.
Spiral point		• To increase the clearance angle near the centre of the drill, conical grinding combined with irregular helix. • S type chisel edge with high centripetal force and machining accuracy.	• For drilling that requires high accuracy.
Radial lip		• The cutting edge is ground radial with the aim of dispersing load. • High machining accuracy and finished surface roughness. • For through holes, small burrs on the base. • Requires a special grinding machine.	• Cast Iron, Aluminium Alloy • For cast iron plates. • Steel
Centre Point drill		• This geometry has two-stage point angle for better concentricity and a reduction in shock when exiting the workpiece.	• For thin sheet drilling.

WEB THINNING

The rake angle of the cutting edge of a drill reduces toward the centre, and it changes into a negative angle at the chisel edge. During drilling, the centre of a drill crushes the work, generating 50–70% of the cutting resistance. Web thinning is very effective for reduction in the cutting resistance of a drill, early removal of cut chips at the chisel edge, and better initial bite.

Shape	 **X type**	 **XR type**	 **S type**	 **N type**
Features	The thrust load substantially reduces, and the bite performance improves. This is effective when the web is thick.	The initial performance is slightly inferior to that of the X type, but the cutting edge is hard and the applicable range of work is wide.	Popular design, easy cutting type.	Effective when the web is comparatively thick.
Major Applications	General drilling and deep hole drilling.	Long life. General drilling and stainless steel drilling.	General drilling for steel, cast iron, and non-ferrous metal.	Deep hole drilling.

DRILLING CHIPS

Types of Chips	Shape	Features and Ease of Raking
Conical Spiral		Fan-shaped chips cut by the cutting edge are curved by the flute. Chips of this type are produced when the feeding rate of ductile material is small. If the chip breaks after several turns, the chip raking performance is satisfactory.
Long Pitch		The generated chip comes out without coiling. It will easily coil around the drill.
Fan		This is a chip broken by the restraint caused by the drill flute and the wall of a drilled hole. It is generated when the feed rate is high.
Segment		A conical spiral chip that is broken before the chip grows into the long-pitch shape by the restraint caused by the wall of the drilled hole due to the insufficiency of ductility. Excellent chip disposal and chip discharge.
Zigzag		A chip that is buckled and folded because of the shape of flute and the characteristics of the material. It easily causes chip packing at the flute.
Needle		Chips broken by vibration or broken when brittle material is curled with a small radius. The raking performance is satisfactory, but these chips can pack closely creating.

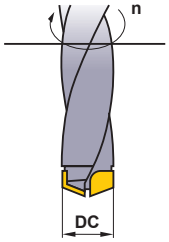
FORMULAE FOR DRILLING

CUTTING SPEED (vc)

$$vc = \frac{\pi \cdot DC \cdot n}{1000} \text{ (m/min)}$$

vc (m/min) : Cutting Speed
π (3.14) : Pi
DC (mm) : Drill Diameter
n (min^{-1}) : Main Axis Spindle Speed

*Divide by 1,000 to change to m from mm.



(Problem) What is the cutting speed when main axis spindle speed is 1350min^{-1} and drill diameter is 12mm ?

(Answer) Substitute π=3.14, DC=12, n=1350 into the formula

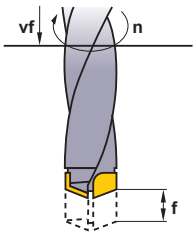
$$vc = \frac{\pi \cdot DC \cdot n}{1000} = \frac{3.14 \times 12 \times 1350}{1000} = 50.9\text{m/min}$$

The cutting speed is 50.9m/min.

FEED OF THE MAIN SPINDLE (vf)

$$vf = fr \cdot n \text{(mm/min)}$$

vf (mm/min) : Feed Speed of the Main Spindle (Z axis)
fr (mm/rev) : Feed per Revolution
n (min^{-1}) : Main Axis Spindle Speed



(Problem) What is the spindle feed (vf) when the feed per revolution is 0.2mm/rev and main axis spindle speed is 1350min^{-1} ?

(Answer) Substitute fr=0.2, n=1350 into the formula

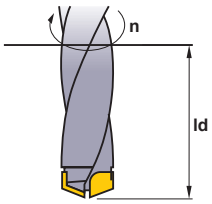
$$vf = fr \times n = 0.2 \times 1350 = 270\text{mm/min}$$

The spindle feed is 270mm/min.

DRILLING TIME (Tc)

$$Tc = \frac{ld \cdot i}{n \cdot fr}$$

Tc (min) : Drilling Time
n (min^{-1}) : Spindle Speed
ld (mm) : Hole Depth
fr (mm/rev) : Feed per Revolution
i : Number of Holes



(Problem) What is the drilling time required for drilling a 30mm length hole in alloy steel (JIS SCM440) at a cutting speed of 50m/min and a feed 0.15mm/rev ?

(Answer) Spindle Speed $n = \frac{50 \times 1000}{15 \times 3.14} = 1061.57\text{min}^{-1}$

$$Tc = \frac{30 \times 1}{1061.57 \times 0.15} = 0.188$$

$$= 0.188 \times 60 \fallingdotseq 11.3 \text{ sec}$$

METALLIC MATERIALS CROSS REFERENCE LIST

CARBON STEEL

Japan	Germany		U.K.		France	Italy	Spain	Sweden	USA	China
JIS	W-nr.	DIN	BS	EN	AFNOR	UNI	UNE	SS	AISI/SAE	GB
STKM 12A STKM 12C	1.0038	RSt.37-2	4360 40 C	–	E 24-2 Ne	–	–	1311	A570.36	15
–	1.0401	C15	080M15	–	CC12	C15, C16	F.111	1350	1015	15
–	1.0402	C22	050A20	2C	CC20	C20, C21	F.112	1450	1020	20
SUM22	1.0715	9SMn28	230M07	1A	S250	CF9SMn28	F.2111 11SMn28	1912	1213	Y15
SUM22L	1.0718	9SMnPb28	–	–	S250Pb	CF9SMnPb28	11SMnPb28	1914	12L13	–
–	1.0722	10SPb20	–	–	10PbF2	CF10Pb20	10SPb20	–	–	–
–	1.0736	9SMn36	240M07	1B	S300	CF9SMn36	12SMn35	–	1215	Y13
–	1.0737	9SMnPb36	–	–	S300Pb	CF9SMnPb36	12SMnP35	1926	12L14	–
S15C	1.1141	Ck15	080M15	32C	XC12	C16	C15K	1370	1015	15
S25C	1.1158	Ck25	–	–	–	–	–	–	1025	25
–	1.8900	StE380	4360 55 E	–	–	FeE390KG	–	2145	A572-60	–
–	1.0501	C35	060A35	–	CC35	C35	F.113	1550	1035	35
–	1.0503	C45	080M46	–	CC45	C45	F.114	1650	1045	45
–	1.0726	35S20	212M36	8M	35MF4	–	F210G	1957	1140	–
–	1.1157	40Mn4	150M36	15	35M5	–	–	–	1039	40Mn
SMn438(H)	1.1167	36Mn5	–	–	40M5	–	36Mn5	2120	1335	35Mn2
SCMn1	1.1170	28Mn6	150M28	14A	20M5	C28Mn	–	–	1330	30Mn
S35C	1.1183	Cf35	060A35	–	XC38TS	C36	–	1572	1035	35Mn
S45C	1.1191	Ck45	080M46	–	XC42	C45	C45K	1672	1045	Ck45
S50C	1.1213	Cf53	060A52	–	XC48TS	C53	–	1674	1050	50
–	1.0535	C55	070M55	9	–	C55	–	1655	1055	55
–	1.0601	C60	080A62	43D	CC55	C60	–	–	1060	60
S55C	1.1203	Ck55	070M55	–	XC55	C50	C55K	–	1055	55
S58C	1.1221	Ck60	080A62	43D	XC60	C60	–	1678	1060	60Mn
–	1.1274	Ck101	060A96	–	XC100	–	F.5117	1870	1095	–
SK3	1.1545	C105W1	BW1A	–	Y105	C36KU	F.5118	1880	W1	–
SUP4	1.1545	C105W1	BW2	–	Y120	C120KU	F.515	2900	W210	–

ALLOY STEEL

Japan	Germany		U.K.		France	Italy	Spain	Sweden	USA	China
JIS	W-nr.	DIN	BS	EN	AFNOR	UNI	UNE	SS	AISI/SAE	GB
SM400A, SM400B SM400C	1.0144	St.44.2	4360 43 C	–	E28-3	–	–	1412	A573-81	–
SM490A, SM490B SM490C	1.0570	St52-3	4360 50 B	–	E36-3	Fe52BFN Fe52CFN	–	2132	–	–
–	1.0841	St52-3	150M19	–	20MC5	Fe52	F.431	2172	5120	–
–	1.0904	55Si7	250A53	45	55S7	55Si8	56Si7	2085	9255	55Si2Mn
–	1.0961	60SiCr7	–	–	60SC7	60SiCr8	60SiCr8	–	9262	–
SUJ2	1.3505	100Cr6	534A99	31	100C6	100Cr6	F.131	2258	ASTM 52100	Gr15, 45G
–	1.5415	15Mo3	1501-240	–	15D3	16Mo3KW	16Mo3	2912	ASTM A204Gr.A	–
–	1.5423	16Mo5	1503-245-420	–	–	16Mo5	16Mo5	–	4520	–
–	1.5622	14Ni6	–	–	16N6	14Ni6	15Ni6	–	ASTM A350LF5	–
–	1.5662	X8Ni9	1501-509-510	–	–	X10Ni9	XBNi09	–	ASTM A353	–
SNC236	1.5710	36NiCr6	640A35	111A	35NC6	–	–	–	3135	–
SNC415(H)	1.5732	14NiCr10	–	–	14NC11	16NiCr11	15NiCr11	–	3415	–
SNC815(H)	1.5752	14NiCr14	655M13	36A	12NC15	–	–	–	3415, 3310	–
SNCM220(H)	1.6523	21NiCrMo2	805M20	362	20NCD2	20NiCrMo2	20NiCrMo2	2506	8620	–
SNCM240	1.6546	40NiCrMo22	311-Type 7	–	–	40NiCrMo2(KB)	40NiCrMo2	–	8740	–
–	1.6587	17CrNiMo6	820A16	–	18NCD6	–	14NiCrMo13	–	–	–
SCr415(H)	1.7015	15Cr3	523M15	–	12C3	–	–	–	5015	15Cr

Japan	Germany		U.K.		France	Italy	Spain	Sweden	USA	China
JIS	W-nr.	DIN	BS	EN	AFNOR	UNI	UNE	SS	AISI/SAE	GB
SCr440	1.7045	42Cr4	–	–	–	–	42Cr4	2245	5140	40Cr
SUP9(A)	1.7176	55Cr3	527A60	48	55C3	–	–	–	5155	20CrMn
SCM415(H)	1.7262	15CrMo5	–	–	12CD4	–	12CrMo4	2216	–	–
–	1.7335	13CrMo4 4	1501-620Gr27	–	15CD3.5 15CD4.5	14CrMo45	14CrMo45	–	ASTM A182 F11, F12	–
–	1.7380	10CrMo910	1501-622 Gr31, 45	–	12CD9 12CD10	12CrMo9 12CrMo10	TU.H	2218	ASTM A182 F.22	–
–	1.7715	14MoV63	1503-660-440	–	–	–	13MoCrV6	–	–	–
–	1.8523	39CrMoV13 9	897M39	40C	–	36CrMoV12	–	–	–	–
–	1.6511	36CrNiMo4	816M40	110	40NCD3	38NiCrMo4(KB)	35NiCrMo4	–	9840	–
–	1.6582	34CrNiMo6	817M40	24	35NCD6	35NiCrMo6(KB)	–	2541	4340	40CrNiMoA
SCr430(H)	1.7033	34Cr4	530A32	18B	32C4	34Cr4(KB)	35Cr4	–	5132	35Cr
SCr440(H)	1.7035	41Cr4	530M40	18	42C4	41Cr4	42Cr4	–	5140	40Cr
–	1.7131	16MnCr5	(527M20)	–	16MC5	16MnCr5	16MnCr5	2511	5115	18CrMn
SCM420 SCM430	1.7218	25CrMo4	1717CDS110 708M20	–	25CD4	25CrMo4(KB)	55Cr3	2225	4130	30CrMn
SCM432 SCCRM3	1.7220	34CrMo4	708A37	19B	35CD4	35CrMo4	34CrMo4	2234	4137 4135	35CrMo
SCM 440	1.7223	41CrMo4	708M40	19A	42CD4TS	41CrMo4	42CrMo4	2244	4140 4142	40CrMoA
SCM440(H)	1.7225	42CrMo4	708M40	19A	42CD4	42CrMo4	42CrMo4	2244	4140	42CrMo 42CrMnMo
–	1.7361	32CrMo12	722M24	40B	30CD12	32CrMo12	F.124.A	2240	–	–
SUP10	1.8159	50CrV4	735A50	47	50CV4	50CrV4	51CrV4	2230	6150	50CrVA
–	1.8509	41CrAlMo7	905M39	41B	40CAD6 40CAD2	41CrAlMo7	41CrAlMo7	2940	–	–
–	1.2067	100Cr6	BL3	–	Y100C6	–	100Cr6	–	L3	CrV, 9SiCr
SKS31 SKS2, SKS3	1.2419	105WCr6	–	–	105WC13	100WCr6 107WCr5KU	105WCr5	2140	–	CrWMo
SKT4	1.2713	55NiCrMoV6	BH224/5	–	55NCDV7	–	F.520.S	–	L6	5CrNiMo
–	1.5662	X8Ni9	1501-509	–	–	X10Ni9	XBNi09	–	ASTM A353	–
–	1.5680	12Ni19	–	–	Z18N5	–	–	–	2515	–
–	1.6657	14NiCrMo134	832M13	36C	–	15NiCrMo13	14NiCrMo131	–	–	–
SKD1	1.2080	X210Cr12	BD3	–	Z200C12	X210Cr13KU X250Cr12KU	X210Cr12	–	D3 ASTM D3	Cr12
SKD11	1.2601	X153CrMoV12	BD2	–	–	X160CrMoV12	–	–	D2	Cr12MoV
SKD12	1.2363	X100CrMoV5	BA2	–	Z100CDV5	X100CrMoV5	F.5227	2260	A2	Cr5Mo1V
SKD61	1.2344	X40CrMoV51 X40CrMoV51	BH13	–	Z40CDV5	X35CrMoV05KU X40CrMoV51KU	X40CrMoV5	2242	H13 ASTM H13	40CrMoV5
SKD2	1.2436	X210CrW12	–	–	–	X215CrW121KU	X210CrW12	2312	–	–
–	1.2542	45WCrV7	BS1	–	–	45WCrV8KU	45WCrSi8	2710	S1	–
SKD5	1.2581	X30WCrV93	BH21	–	Z30WCV9	X28W09KU	X30WCrV9	–	H21	30WCrV9
–	1.2601	X165CrMoV12	–	–	–	X165CrMoW12KU	X160CrMoV12	2310	–	–
SKS43	1.2833	100V1	BW2	–	Y1105V	–	–	–	W210	V
SKH3	1.3255	S 18-1-2-5	BT4	–	Z80WKCV	X78WCo1805KU	HS18-1-1-5	–	T4	W18Cr4VCo5
SKH2	1.3355	S 18-0-1	BT1	–	Z80WCV	X75W18KU	HS18-0-1	–	T1	–
SCMnH/1	1.3401	G-X120Mn12	Z120M12	–	Z120M12	XG120Mn12	X120MN12	–	–	–
SUH1	1.4718	X45CrSi93	401S45	52	Z45CS9	X45CrSi8	F.322	–	HW3	X45CrSi93
SUH3	1.3343	S6-5-2	4959BA2	–	Z40CSD10	15NiCrMo13	–	2715	D3	–
SKH9, SKH51	1.3343	S6/5/2	BM2	–	Z85WDCV	HS6-5-2-2	F.5603	2722	M2	–
–	1.3348	S 2-9-2	–	–	–	HS2-9-2	HS2-9-2	2782	M7	–
SKH55	1.3243	S6/5/2/5	BM35	–	6-5-2-5	HS6-5-2-5	F.5613	2723	M35	–

STAINLESS STEEL (FERRITIC,MARTENSITIC)

Japan	Germany		U.K.		France	Italy	Spain	Sweden	USA	China
JIS	W-nr.	DIN	BS	EN	AFNOR	UNI	UNE	SS	AISI/SAE	GB
SUS403	1.4000	X7Cr13	403S17	–	Z6C13	X6Cr13	F.3110	2301	403	OCr13 1Cr12
–	1.4001	X7Cr14	–	–	–	–	F.8401	–	–	–
SUS416	1.4005	X12CrS13	416S21	–	Z11CF13	X12CrS13	F.3411	2380	416	–
SUS410	1.4006	X10Cr13	410S21	56A	Z10C14	X12Cr13	F.3401	2302	410	1Cr13
SUS430	1.4016	X8Cr17	430S15	60	Z8C17	X8Cr17	F.3113	2320	430	1Cr17
SCS2	1.4027	G-X20Cr14	420C29	56B	Z20C13M	–	–	–	–	–
SUS420J2	1.4034	X46Cr13	420S45	56D	Z40CM Z38C13M	X40Cr14	F.3405	2304	–	4Cr13
–	1.4003	–	405S17	–	Z8CA12	X6CrAl13	–	–	405	–
–	1.4021	–	420S37	–	Z8CA12	X20Cr13	–	2303	420	–
SUS431	1.4057	X22CrNi17	431S29	57	Z15CNi6.02	X16CrNi16	F.3427	2321	431	1Cr17Ni2
SUS430F	1.4104	X12CrMoS17	–	–	Z10CF17	X10CrS17	F.3117	2383	430F	Y1Cr17
SUS434	1.4113	X6CrMo17	434S17	–	Z8CD17.01	X8CrMo17	–	2325	434	1Cr17Mo
SCS5	1.4313	X5CrNi134	425C11	–	Z4CND13.4M	(G)X6CrNi304	–	2385	CA6-NM	–
SUS405	1.4724	X10CrA113	403S17	–	Z10C13	X10CrA112	F.311	–	405	OCr13Al
SUS430	1.4742	X10CrA118	430S15	60	Z10CAS18	X8Cr17	F.3113	–	430	Cr17
SUH4	1.4747	X80CrNiSi20	443S65	59	Z80CSN20.02	X80CrSiNi20	F.320B	–	HNV6	–
SUH446	1.4762	X10CrA124	–	–	Z10CAS24	X16Cr26	–	2322	446	2Cr25N
SUH35	1.4871	X53CrMnNiN219	349S54	–	Z52CMN21.09	X53CrMnNiN219	–	–	EV8	5Cr2Mn9Ni4N
–	1.4521	X1CrMoTi182	–	–	–	–	–	2326	S44400	–
–	1.4922	X20CrMoV12-1	–	–	–	X20CrMoNi1201	–	2317	–	–
–	1.4542	–	–	–	Z7CNU17-04	–	–	–	630	–

STAINLESS STEEL (AUSTENITIC)

Japan	Germany		U.K.		France	Italy	Spain	Sweden	USA	China
JIS	W-nr.	DIN	BS	EN	AFNOR	UNI	UNE	SS	AISI/SAE	GB
SUS304L	1.4306	X2CrNi1911	304S11	–	Z2CN18.10	X2CrNi18.11	–	2352	304L	OCr19Ni10
SUS304	1.4350	X5CrNi189	304S11	58E	Z6CN18.09	X5CrNi1810	F.3551 F.3541 F.3504	2332	304	OCr18Ni9
SUS303	1.4305	X12CrNiS188	303S21	58M	Z10CNF18.09	X10CrNiS18.09	F.3508	2346	303	1Cr18Ni9MoZr
SUS304L	–	–	304C12	–	Z3CN19.10	–	–	2333	–	–
SCS19	1.4306	X2CrNi189	304S12	–	Z2CrNi1810	X2CrNi18.11	F.3503	2352	304L	–
SUS301	1.4310	X12CrNi177	–	–	Z12CN17.07	X12CrNi1707	F.3517	2331	301	Cr17Ni7
SUS304LN	1.4311	X2CrNiN1810	304S62	–	Z2CN18.10	–	–	2371	304LN	–
SUS316	1.4401	X5CrNiMo1810	316S16	58J	Z6CND17.11	X5CrNiMo1712	F.3543	2347	316	0Cr17Ni11Mo2
SCS13	1.4308	G-X6CrNi189	304C15	–	Z6CN18.10M	–	–	–	–	–
SCS14	1.4408	G-X6CrNiMo1810	316C16	–	–	–	F.8414	–	–	–
SCS22	1.4581	G-X5CrNiMoNb1810	318C17	–	Z4CNDNb1812M	XG8CrNiMo1811	–	–	–	–
SUS316LN	1.4429	X2CrNiMoN1813	–	–	Z2CND17.13	–	–	2375	316LN	OCr17Ni13Mo
–	1.4404	–	316S13	–	Z2CND17.12	X2CrNiMo1712	–	2348	316L	–
SCS16 SUS316L	1.4435	X2CrNiMo1812	316S13	–	Z2CND17.12	X2CrNiMo1712	–	2353	316L	OCr27Ni12Mo3
–	1.4436	–	316S13	–	Z6CND18-12-03	X8CrNiMo1713	–	2343, 2347	316	–
SUS317L	1.4438	X2CrNiMo1816	317S12	–	Z2CND19.15	X2CrNiMo1816	–	2367	317L	OOCr19Ni13Mo
–	1.4539	X1NiCrMo	–	–	Z6CNT18.10	–	–	2562	UNS V 0890A	–
SUS321	1.4541	X10CrNiTi189	321S12	58B	Z6CNT18.10	X6CrNiTi1811	F.3553 F.3523	2337	321	1Cr18NI9Ti
SUS347	1.4550	X10CrNiNb189	347S17	58F	Z6CNNb18.10	X6CrNiNb1811	F.3552 F.3524	2338	347	1Cr18Ni11Nb
–	1.4571	X10CrNiMoTi1810	320S17	58J	Z6CNDT17.12	X6CrNiMoTi1712	F.3535	2350	316Ti	Cr18Ni12Mo2T
–	1.4583	X10CrNiMoNb1812	–	–	Z6CNDNb1713B	X6CrNiMoNb1713	–	–	318	Cr17Ni12Mo3Mb

Japan	Germany		U.K.		France	Italy	Spain	Sweden	USA	China
JIS	W-nr.	DIN	BS	EN	AFNOR	UNI	UNE	SS	AISI/SAE	GB
SUH309	1.4828	X15CrNiSi2012	309S24	–	Z15CNS20.12	X6CrNi2520	–	–	309	1Cr23Ni13
SUH310	1.4845	X12CrNi2521	310S24	–	Z12CN2520	X6CrNi2520	F.331	2361	310S	OCr25Ni20
SCS17	1.4406	X10CrNi18.08	–	58C	Z1NCDU25.20	–	F.8414	2370	308	–
–	1.4418	X4CrNiMo165	–	–	Z6CND16-04-01	–	–	–	–	–
–	1.4568 1.4504	–	316S111	–	Z8CNA17-07	X2CrNiMo1712	–	–	17-7PH	–
–	1.4563	–	–	–	Z1NCDU31-27-03 Z1CNDU20-18-06AZ	–	–	2584 2378	NO8028 S31254	–
SUS321	1.4878	X12CrNiTi189	321S32	58B, 58C	Z6CNT18.12B	X6CrNiTi18 11	F.3523	–	321	1Cr18Ni9Ti

HEAT RESISTANT STEELS

Japan	Germany		U.K.		France	Italy	Spain	Sweden	USA	China
JIS	W-nr.	DIN	BS	EN	AFNOR	UNI	UNE	SS	AISI/SAE	GB
SUH330	1.4864	X12NiCrSi3616	–	–	Z12NCS35.16	–	–	–	330	–
SCH15	1.4865	G-X40NiCrSi3818	330C11	–	–	XG50NiCr3919	–	–	HT, HT 50	–

GRAY CAST IRON

Japan	Germany		U.K.		France	Italy	Spain	Sweden	USA	China
JIS	W-nr.	DIN	BS	EN	AFNOR	UNI	UNE	SS	AISI/SAE	GB
–	–	–	–	–	–	–	–	0100	–	–
FC100	–	GG 10	–	–	Ft 10 D	–	–	0110	No 20 B	–
FC150	0.6015	GG 15	Grade 150	–	Ft 15 D	G15	FG15	0115	No 25 B	HT150
FC200	0.6020	GG 20	Grade 220	–	Ft 20 D	G20	–	0120	No 30 B	HT200
FC250	0.6025	GG 25	Grade 260	–	Ft 25 D	G25	FG25	0125	No 35 B	HT250
–	–	–	–	–	–	–	–	–	No 40 B	–
FC300	0.6030	GG 30	Grade 300	–	Ft 30 D	G30	FG30	0130	No 45 B	HT300
FC350	0.6035	GG 35	Grade 350	–	Ft 35 D	G35	FG35	0135	No 50 B	HT350
–	0.6040	GG 40	Grade 400	–	Ft 40 D	–	–	0140	No 55 B	HT400
–	0.6660	GGL NiCr202	L-NiCuCr202	–	L-NC 202	–	–	0523	A436 Type 2	–

DUCTILE CAST IRON

Japan	Germany		U.K.		France	Italy	Spain	Sweden	USA	China
JIS	W-nr.	DIN	BS	EN	AFNOR	UNI	UNE	SS	AISI/SAE	GB
FCD400	0.7040	GGG 40	SNG 420/12	–	FCS 400-12	GS 370-17	FGE 38-17	07 17-02	60-40-18	QT400-18
–	–	GGG 40.3	SNG 370/17	–	FGS 370-17	–	–	07 17-12	–	–
–	0.7033	GGG 35.3	–	–	–	–	–	07 17-15	–	–
FCD500	0.7050	GGG 50	SNG 500/7	–	FGS 500-7	GS 500	FGE 50-7	07 27-02	80-55-06	QT500-7
–	0.7660	GGG NiCr202	Grade S6	–	S-NC202	–	–	07 76	A43D2	–
–	–	GGG NiMn137	L-NiMn 137	–	L-MN 137	–	–	07 72	–	–
FCD600	–	GGG 60	SNG 600/3	–	FGS 600-3	–	–	07 32-03	–	QT600-3
FCD700	0.7070	GGG 70	SNG 700/2	–	FGS 700-2	GS 700-2	FGS 70-2	07 37-01	100-70-03	QT700-18

MALLEABLE CAST IRON

Japan	Germany		U.K.		France	Italy	Spain	Sweden	USA	China
JIS	W-nr.	DIN	BS	EN	AFNOR	UNI	UNE	SS	AISI/SAE	GB
FCMB310	–	–	8 290/6	–	MN 32-8	–	–	08 14	–	–
FCMW330	–	GTS-35	B 340/12	–	MN 35-10	–	–	08 15	32510	–
FCMW370	0.8145	GTS-45	P 440/7	–	Mn 450	GMN45	–	08 52	40010	–
FCMP490	0.8155	GTS-55	P 510/4	–	MP 50-5	GMN55	–	08 54	50005	–
FCMP540	–	GTS-65	P 570/3	–	MP 60-3	–	–	08 58	70003	–
FCMP590	0.8165	GTS-65-02	P 570/3	–	Mn 650-3	GMN 65	–	08 56	A220-70003	–
FCMP690	–	GTS-70-02	P 690/2	–	Mn 700-2	GMN 70	–	08 62	A220-80002	–

DIE STEELS

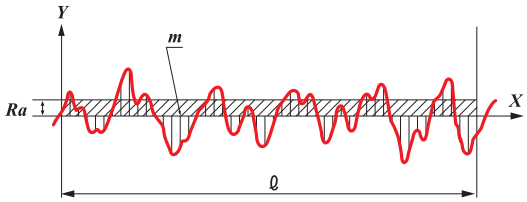
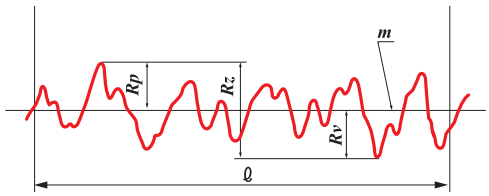
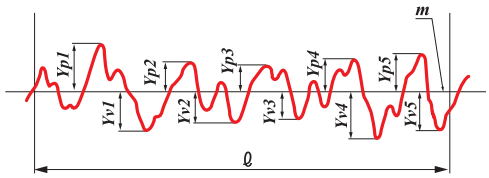
Classification	JIS (Others)	Aichi Steel Works	Uddeholm	Kobe Steel, Ltd.	Sumitomo Metal Industries, Ltd.	Daido Steel Co., Ltd.	Nippon Koshuha	Hitachi Metals, Ltd.	Mitsubishi Steel Manufacturing Co., Ltd.
Carbon Steel for Machine Structure	S50C	AUK1		KTSM2A	SD10	PDS1	KPM1		MT50C
	|			KTSM21	SD17	PXZ			
	S55C			KTSM22	SD21				
Alloy Steel for Machine Structure	SCM440	AUK11		KTSM3A	SD61	PDS3			
	|			KTSM31					
	SCM445		HOLDAX						
Carbon Tool Steel	SK3	SK3				YK3	K3	YC3	
Alloy Tool Steel (For Cold Working)	SKS3	SKS3				GOA	KS3	SGT	
	SKS31					GO31	K31		
	SKS93	SK301				YK30	K3M	YCS3	
	SKD1						KD1	CRD	
	SKD11	SKD11		KAD181		DC11	KD11	SLD	
	SKD11	AUD11				DC3	KD11V	SLD2	
	SKD11						KDQ		
	SKD12		RIGOR			DC12	KD12	SCD	
		SX4							
		SX44							
		SX105V					FH5		
		TCD							
						DC53	KD21	SLD8	
						PD613			
						GO4		ACD37	
						GO5		HMD5	
						GO40F		HPM2T	
								YSM	
								HPM31	
								HMD1	
							KDM5	HMD5	
							KD11S	ACD6	
								ACD8	
								ACD9	
Alloy Tool Steel (For Cold Working and Others)	(P20)		IMPAX	KTSM3M		PX5	KPM30	HPM2	MT24M
	(P20)							HPM7	
	(P21)			KTSM40EF		NAK55	KAP	HPM1	
				KTSM40E		NAK80	KAP2	HPM50	
						GLD2		CENA1	
Alloy Tool Steel (For Hot Working)	SKD4					DH4	KD4	YDC	
	SKD5					DH5	KD5	HDC	
	SKD6					DH6	KD6		
	SKD61	SKD61	Over M Suprem			DHA1	KDA	DAC	
	SKD61						MFA		
	SKD62	SKD62				DH62	KDB	DBC	
	SKT4					GFA	KTV	DM	
	SKD7					DH72	KDH1	YEM	
	(H10)					DH73			
	SKD8					DH41	KDF	MDC	
			QRO80M						
								YHD40	
						DH71			
						DH42			
						DH21			
							KDW		
							KDHM		
							AE31		
								YEM4	
								YHD50	
	SKT4	SKT4A						YHD26	
	6F4	MPH							
	SKT4								
						DH31	KDA1	DAC3	
							KDA5	DAC10	
								DAC40	
						GF78		DAC45	
						DH76		DAC55	
							TD3		
						DH2F	KDAS	FDAC	
								YHD3	
								MDC−K	
								YEM−K	

Classification	JIS (Others)	Aichi Steel Works	Uddeholm	Kobe Steel, Ltd.	Sumitomo Metal Industries, Ltd.	Daido Steel Co., Ltd.	Nippon Koshuha	Hitachi Metals, Ltd.	Mitsubishi Steel Manufacturing Co., Ltd.
High-speed Tool Steel	SKH51					MH51	H51	YXM1	
	SKH55					MH55	HM35	YXM4	
	SKH57					MH57	MV10	XVC5	
						MH8	NK4	YXM60	
						MH24			
						MH7V1			
						MH64			
						VH54	HV2	XVC11	
							HM3	YXM7	
						MH85	KDMV	YXR3	
						MH88	HM9TL	YXR4	
								YXR7	
								YXR35	
Powder High-speed Tool Steel			ASP23	KHA32		DEX20		HAP10	
			ASP30	KHA30		DEX40		HAP40	
				KHA3VN		DEX60		HAP50	
				KHA30N		DEX70		HAP63	
				KHA33N		DEX80		HAP72	
				KHA50					
				KHA77					
			ASP60	KHA60					
Stainless Steel	SUS403					GLD1			
	SUS420		STAVAX			S—STAR	KSP1	HPM38	
	SUS440C		ELMAX (Powder)	KAS440 (Powder)		SUS440C	KSP3		
	SUS420							SUS420	
	SUS630					NAK101	U630	PSL	
	(414)								
Maraging Steel						MAS1C	KMS18—20	YAG	DMG300
Heat Resistant Alloy								HRNC	
Forged Tool								ICD1	
								ICD5	

SURFACE ROUGHNESS

SURFACE ROUGHNESS

(From JIS B 0601-1994)

Type	Code	Determination	Determination Example (Figure)
Arithmetical Mean Roughness	Ra	Ra means the value obtained by the following formula and expressed in micrometer (μm) when sampling only the reference length from the roughness curve in the direction of the mean line, taking X-axis in the direction of mean line and Y-axis in the direction of longitudinal magnification of this sampled part and the roughness curve is expressed by y=f(x): $Ra=\frac{1}{l}\int_0^l\{f(x)\}dx$	
Maximum Height	Rz	Rz shall be that only when the reference length is sampled from the roughness curve in the direction of the mean line, the distance between the top profile peak line and the bottom profile valley line on this sampled portion is measured in the longitudinal magnification direction of roughness curve and the obtained value is expressed in micrometer (μm). (Note) When finding Rz, a portion without an exceptionally high peak or low valley, which may be regarded as a flaw, is selected as the sampling length. $Rz=R_P+Rv$	
Ten-Point Mean Roughness	RzJIS	RzJIS shall be that only when the reference length is sampled from the roughness curve in the direction of its mean line, the sum of the average value of absolute values of the heights of five highest profile peaks (Yp) and the depths of five deepest profile valleys (Yv) measured in the vertical magnification direction from the mean line of this sampled portion and this sum is expressed in micrometer (μm). $Rz_{JIS}=\frac{(Yp1+Yp2+Yp3+Yp4+Yp5)+(Yv1+Yv2+Yv3+Yv4+Yv5)}{5}$	 $Yp1, Yp2, Yp3, Yp4, Yp5$: altitudes of the five highest profile peaks of the sampled portion corresponding to the reference length l. $Yv1, Yv2, Yv3, Yv4, Yv5$: altitudes of the five deepest profile valleys of the sampled portion corresponding to the reference length l.

RELATIONSHIP BETWEEN ARITHMETICAL MEAN (Ra) AND CONVENTIONAL DESIGNATION (REFERENCE DATA)

Arithmetical Mean Roughness Ra		Max. Height Rz	Ten-Point Mean Roughness RzJIS	Sampling Length for Rz • RzJIS l (mm)	Conventional Finish Mark
Standard Series	Cutoff Value λc (mm)	Standard Series			
0.012 a	0.08	0.05s	0.05z	0.08	▽▽▽▽
0.025 a	0.25	0.1 s	0.1 z		
0.05 a		0.2 s	0.2 z	0.25	
0.1 a	0.8	0.4 s	0.4 z		
0.2 a		0.8 s	0.8 z	0.8	
0.4 a		1.6 s	1.6 z		▽▽▽
0.8 a		3.2 s	3.2 z		
1.6 a		6.3 s	6.3 z		
3.2 a	2.5	12.5 s	12.5 z	2.5	▽▽
6.3 a		25 s	25 z		
12.5 a	8	50 s	50 z		▽
25 a		100 s	100 z	8	
50 a		200 s	200 z		–
100 a	–	400 s	400 z	–	

*The correlation among the three is shown for convenience and is not exact.
*Ra: The evaluation length of Rz and RzJIS is the cutoff value and sampling length multiplied by 5, respectively.

HARDNESS COMPARISON TABLE

HARDNESS CONVERSION NUMBERS OF STEEL

Brinell Hardness (HB) 10mm Ball,Load: 3,000 kgf		Vickers Hardness	Rockwell Hardness				Shore Hardness	Tensile Strength (Approx.)
Standard Ball	Tungsten Carbide Ball	(HV)	A Scale, Load:60kgf, Diamond Point (HRA)	B Scale, Load:100kgf, 1/16" Ball (HRB)	C Scale, Load:150kgf, Diamond Point (HRC)	D Scale, Load:100kgf, Diamond Point (HRD)	(HS)	Mpa
—	—	940	85.6	—	68.0	76.9	97	—
—	—	920	85.3	—	67.5	76.5	96	—
—	—	900	85.0	—	67.0	76.1	95	—
—	(767)	880	84.7	—	66.4	75.7	93	—
—	(757)	860	84.4	—	65.9	75.3	92	—
—	(745)	840	84.1	—	65.3	74.8	91	—
—	(733)	820	83.8	—	64.7	74.3	90	—
—	(722)	800	83.4	—	64.0	73.8	88	—
—	(712)	—	—	—	—	—	—	—
—	(710)	780	83.0	—	63.3	73.3	87	—
—	(698)	760	82.6	—	62.5	72.6	86	—
—	(684)	740	82.2	—	61.8	72.1	—	—
—	(682)	737	82.2	—	61.7	72.0	84	—
—	(670)	720	81.8	—	61.0	71.5	83	—
—	(656)	700	81.3	—	60.1	70.8	—	—
—	(653)	697	81.2	—	60.0	70.7	81	—
—	(647)	690	81.1	—	59.7	70.5	—	—
—	(638)	680	80.8	—	59.2	70.1	80	—
—	630	670	80.6	—	58.8	69.8	—	—
—	627	667	80.5	—	58.7	69.7	79	—
—	—	677	80.7	—	59.1	70.0	—	—
—	601	640	79.8	—	57.3	68.7	77	—
—	—	640	79.8	—	57.3	68.7	—	—
—	578	615	79.1	—	56.0	67.7	75	—
—	—	607	78.8	—	55.6	67.4	—	—
—	555	591	78.4	—	54.7	66.7	73	2055
—	—	579	78.0	—	54.0	66.1	—	2015
—	534	569	77.8	—	53.5	65.8	71	1985
—	—	533	77.1	—	52.5	65.0	—	1915
—	514	547	76.9	—	52.1	64.7	70	1890
(495)	—	539	76.7	—	51.6	64.3	—	1855
—	—	530	76.4	—	51.1	63.9	—	1825
	495	528	76.3	—	51.0	63.8	68	1820
(477)	—	516	75.9	—	50.3	63.2	—	1780
—	—	508	75.6	—	49.6	62.7	—	1740
	477	508	75.6	—	49.6	62.7	66	1740
(461)	—	495	75.1	—	48.8	61.9	—	1680
—	—	491	74.9	—	48.5	61.7	—	1670
	461	491	74.9	—	48.5	61.7	65	1670
444	—	474	74.3	—	47.2	61.0	—	1595
—	—	472	74.2	—	47.1	60.8	—	1585
—	444	472	74.2	—	47.1	60.8	63	1585

Brinell Hardness (HB) 10mm Ball,Load: 3,000 kgf		Vickers Hardness	Rockwell Hardness				Shore Hardness	Tensile Strength (Approx.)
Standard Ball	Tungsten Carbide Ball	(HV)	A Scale, Load:60kgf, Diamond Point (HRA)	B Scale, Load:100kgf, 1/16" Ball (HRB)	C Scale, Load:150kgf, Diamond Point (HRC)	D Scale, Load:100kgf, Diamond Point (HRD)	(HS)	Mpa
429	429	455	73.4	—	45.7	59.7	61	1510
415	415	440	72.8	—	44.5	58.8	59	1460
401	401	425	72.0	—	43.1	57.8	58	1390
388	388	410	71.4	—	41.8	56.8	56	1330
375	375	396	70.6	—	40.4	55.7	54	1270
363	363	383	70.0	—	39.1	54.6	52	1220
352	352	372	69.3	(110.0)	37.9	53.8	51	1180
341	341	360	68.7	(109.0)	36.6	52.8	50	1130
331	331	350	68.1	(108.5)	35.5	51.9	48	1095
321	321	339	67.5	(108.0)	34.3	51.0	47	1060
311	311	328	66.9	(107.5)	33.1	50.0	46	1025
302	302	319	66.3	(107.0)	32.1	49.3	45	1005
293	293	309	65.7	(106.0)	30.9	48.3	43	970
285	285	301	65.3	(105.5)	29.9	47.6	—	950
277	277	292	64.6	(104.5)	28.8	46.7	41	925
269	269	284	64.1	(104.0)	27.6	45.9	40	895
262	262	276	63.6	(103.0)	26.6	45.0	39	875
255	255	269	63.0	(102.0)	25.4	44.2	38	850
248	248	261	62.5	(101.0)	24.2	43.2	37	825
241	241	253	61.8	100	22.8	42.0	36	800
235	235	247	61.4	99.0	21.7	41.4	35	785
229	229	241	60.8	98.2	20.5	40.5	34	765
223	223	234	—	97.3	(18.8)	—	—	—
217	217	228	—	96.4	(17.5)	—	33	725
212	212	222	—	95.5	(16.0)	—	—	705
207	207	218	—	94.6	(15.2)	—	32	690
201	201	212	—	93.8	(13.8)	—	31	675
197	197	207	—	92.8	(12.7)	—	30	655
192	192	202	—	91.9	(11.5)	—	29	640
187	187	196	—	90.7	(10.0)	—	—	620
183	183	192	—	90.0	(9.0)	—	28	615
179	179	188	—	89.0	(8.0)	—	27	600
174	174	182	—	87.8	(6.4)	—	—	585
170	170	178	—	86.8	(5.4)	—	26	570
167	167	175	—	86.0	(4.4)	—	—	560
163	163	171	—	85.0	(3.3)	—	25	545
156	156	163	—	82.9	(0.9)	—	—	525
149	149	156	—	80.8	—	—	23	505
143	143	150	—	78.7	—	—	22	490
137	137	143	—	76.4	—	—	21	460
131	131	137	—	74.0	—	—	—	450
126	126	132	—	72.0	—	—	20	435
121	121	127	—	69.8	—	—	19	415
116	116	122	—	67.6	—	—	18	400
111	111	117	—	65.7	—	—	15	385

(Note 1) Above list is the same as that at AMS Metals Hand book with tensile strength in approximate metric value and Brinell hardness over a recommended range.
(Note 2) 1MPa=1N/mm^2
(Note 3) Figures in ( ) are rarely used and are included for reference. This list has been taken from JIS Handbook Steel I.

FIT TOLERANCE TABLE(HOLE)

Classification of Standard Dimensions (mm)		Class of Geometrical Tolerance Zone of Holes															
>	≤	B10	C9	C10	D8	D9	D10	E7	E8	E9	F6	F7	F8	G6	G7	H6	H7
–	3	+180 +140	+85 +60	+100 +60	+34 +20	+45 +20	+60 +20	+24 +14	+28 +14	+39 +14	+12 +6	+16 +6	+20 +6	+8 +2	+12 +2	+6 0	+10 0
3	6	+188 +140	+100 +70	+118 +70	+48 +30	+60 +30	+78 +30	+32 +20	+38 +20	+50 +20	+18 +10	+22 +10	+28 +10	+12 +4	+16 +4	+8 0	+12 0
6	10	+208 +150	+116 +80	+138 +80	+62 +40	+76 +40	+98 +40	+40 +25	+47 +25	+61 +25	+22 +13	+28 +13	+35 +13	+14 +5	+20 +5	+9 0	+15 0
10	14	+220 +150	+138 +95	+165 +95	+77 +50	+93 +50	+120 +50	+50 +32	+59 +32	+75 +32	+27 +16	+34 +16	+43 +16	+17 +6	+24 +6	+11 0	+18 0
14	18																
18	24	+244 +160	+162 +110	+194 +110	+98 +65	+117 +65	+149 +65	+61 +40	+73 +40	+92 +40	+33 +20	+41 +20	+53 +20	+20 +7	+28 +7	+13 0	+21 0
24	30																
30	40	+270 +170	+182 +120	+220 +120	+119 +80	+142 +80	+180 +80	+75 +50	+89 +50	+112 +50	+41 +25	+50 +25	+64 +25	+25 +9	+34 +9	+16 0	+25 0
40	50	+280 +180	+192 +130	+230 +130													
50	65	+310 +190	+214 +140	+260 +140	+146 +100	+174 +100	+220 +100	+90 +60	+106 +60	+134 +60	+49 +30	+60 +30	+76 +30	+29 +10	+40 +10	+19 0	+30 0
65	80	+320 +200	+224 +150	+270 +150													
80	100	+360 +220	+257 +170	+310 +170	+174 +120	+207 +120	+260 +120	+107 +72	+126 +72	+159 +72	+58 +36	+71 +36	+90 +36	+34 +12	+47 +12	+22 0	+35 0
100	120	+380 +240	+267 +180	+320 +180													
120	140	+420 +260	+300 +200	+360 +200	+208 +145	+245 +145	+305 +145	+125 +85	+148 +85	+185 +85	+68 +43	+83 +43	+106 +43	+39 +14	+54 +14	+25 0	+40 0
140	160	+440 +280	+310 +210	+370 +210													
160	180	+470 +310	+330 +230	+390 +230													
180	200	+525 +340	+355 +240	+425 +240	+242 +170	+285 +170	+355 +170	+146 +100	+172 +100	+215 +100	+79 +50	+96 +50	+122 +50	+44 +15	+61 +15	+29 0	+46 0
200	225	+565 +380	+375 +260	+445 +260													
225	250	+605 +420	+395 +280	+465 +280													
250	280	+690 +480	+430 +300	+510 +300	+271 +190	+320 +190	+400 +190	+162 +110	+191 +110	+240 +110	+88 +56	+108 +56	+137 +56	+49 +17	+69 +17	+32 0	+52 0
280	315	+750 +540	+460 +330	+540 +330													
315	355	+830 +600	+500 +360	+590 +360	+299 +210	+350 +210	+440 +210	+182 +125	+214 +125	+265 +125	+98 +62	+119 +62	+151 +62	+54 +18	+75 +18	+36 0	+57 0
355	400	+910 +680	+540 +400	+630 +400													
400	450	+1010 +760	+595 +440	+690 +440	+327 +230	+385 +230	+480 +230	+198 +135	+232 +135	+290 +135	+108 +68	+131 +68	+165 +68	+60 +20	+83 +20	+40 0	+63 0
450	500	+1090 +840	+635 +480	+730 +480													

(Note) Values shown in the upper portion of respective lines are upper dimensional tolerance, while values shown in the lower portion of respective lines are lower dimensional tolerance.

Units : μm

Class of Geometrical Tolerance Zone of Holes																	
H8	H9	H10	JS6	JS7	K6	K7	M6	M7	N6	N7	P6	P7	R7	S7	T7	U7	X7
+14 0	+25 0	+40 0	±3	±5	0 −6	0 −10	−2 −8	−2 −12	−4 −10	−4 −14	−6 −12	−6 −16	−10 −20	−14 −24	—	−18 −28	−20 −30
+18 0	+30 0	+48 0	±4	±6	+2 −6	+3 −9	−1 −9	0 −12	−5 −13	−4 −16	−9 −17	−8 −20	−11 −23	−15 −27	—	−19 −31	−24 −36
+22 0	+36 0	+58 0	±4.5	±7	+2 −7	+5 −10	−3 −12	0 −15	−7 −16	−4 −19	−12 −21	−9 −24	−13 −28	−17 −32	—	−22 −37	−28 −43
+27 0	+43 0	+70 0	±5.5	±9	+2 −9	+6 −12	−4 −15	0 −18	−9 −20	−5 −23	−15 −26	−11 −29	−16 −34	−21 −39	—	−26 −44	−33 −51 −38 −56
+33 0	+52 0	+84 0	±6.5	±10	+2 −11	+6 −15	−4 −17	0 −21	−11 −24	−7 −28	−18 −31	−14 −35	−20 −41	−27 −48	— −33 −54	−33 −54 −40 −61	−46 −67 −56 −77
+39 0	+62 0	+100 0	±8	±12	+3 −13	+7 −18	−4 −20	0 −25	−12 −28	−8 −33	−21 −37	−17 −42	−25 −50	−34 −59	−39 −64 −45 −70	−51 −76 −61 −86	—
+46 0	+74 0	+120 0	±9.5	±15	+4 −15	+9 −21	−5 −24	0 −30	−14 −33	−9 −39	−26 −45	−21 −51	−30 −60 −32 −62	−42 −72 −48 −78	−55 −85 −64 −94	−76 −106 −91 −121	—
+54 0	+87 0	+140 0	±11	±17	+4 −18	+10 −25	−6 −28	0 −35	−16 −38	−10 −45	−30 −52	−24 −59	−38 −73 −41 −76	−58 −93 −66 −101	−78 −113 −91 −126	−111 −146 −131 −166	—
+63 0	+100 0	+160 0	±12.5	±20	+4 −21	+12 −28	−8 −33	0 −40	−20 −45	−12 −52	−36 −61	−28 −68	−48 −88 −50 −90 −53 −93	−77 −117 −85 −125 −93 −133	−107 −147 −119 −159 −131 −171	—	—
+72 0	+115 0	+185 0	±14.5	±23	+5 −24	+13 −33	−8 −37	0 −46	−22 −51	−14 −60	−41 −70	−33 −79	−60 −106 −63 −109 −67 −113	−105 −151 −113 −159 −123 −169	—	—	—
+81 0	+130 0	+210 0	±16	±26	+5 −27	+16 −36	−9 −41	0 −52	−25 −57	−14 −66	−47 −79	−36 −88	−74 −126 −78 −130	—	—	—	—
+89 0	+140 0	+230 0	±18	±28	+7 −29	+17 −40	−10 −46	0 −57	−26 −62	−16 −73	−51 −87	−41 −98	−87 −144 −93 −150	—	—	—	—
+97 0	+155 0	+250 0	±20	±31	+8 −32	+18 −45	−10 −50	0 −63	−27 −67	−17 −80	−55 −95	−45 −108	−103 −166 −109 −172	—	—	—	—

FIT TOLERANCE TABLE(SHAFTS)

Classification of Standard Dimensions (mm)		Class of Geometrical Tolerance Zone of Shafts														
>	≤	b9	c9	d8	d9	e7	e8	e9	f6	f7	f8	g5	g6	h5	h6	h7
—	3	−140 −165	−60 −85	−20 −34	−20 −45	−14 −24	−14 −28	−14 −39	−6 −12	−6 −16	−6 −20	−2 −6	−2 −8	0 −4	0 −6	0 −10
3	6	−140 −170	−70 −100	−30 −48	−30 −60	−20 −32	−20 −38	−20 −50	−10 −18	−10 −22	−10 −28	−4 −9	−4 −12	0 −5	0 −8	0 −12
6	10	−150 −186	−80 −116	−40 −62	−40 −76	−25 −40	−25 −47	−25 −61	−13 −22	−13 −28	−13 −35	−5 −11	−5 −14	0 −6	0 −9	0 −15
10	14	−150 −193	−95 −138	−50 −77	−50 −93	−32 −50	−32 −59	−32 −75	−16 −27	−16 −34	−16 −43	−6 −14	−6 −17	0 −8	0 −11	0 −18
14	18															
18	24	−160 −212	−110 −162	−65 −98	−65 −117	−40 −61	−40 −73	−40 −92	−20 −33	−20 −41	−20 −53	−7 −16	−7 −20	0 −9	0 −13	0 −21
24	30															
30	40	−170 −232	−120 −182	−80 −119	−80 −142	−50 −75	−50 −89	−50 −112	−25 −41	−25 −50	−25 −64	−9 −20	−9 −25	0 −11	0 −16	0 −25
40	50	−180 −242	−130 −192													
50	65	−190 −264	−140 −214	−100 −146	−100 −174	−60 −90	−60 −106	−60 −134	−30 −49	−30 −60	−30 −76	−10 −23	−10 −29	0 −13	0 −19	0 −30
65	80	−200 −274	−150 −224													
80	100	−220 −307	−170 −257	−120 −174	−120 −207	−72 −107	−72 −126	−72 −159	−36 −58	−36 −71	−36 −90	−12 −27	−12 −34	0 −15	0 −22	0 −35
100	120	−240 −327	−180 −267													
120	140	−260 −360	−200 −300	−145 −208	−145 −245	−85 −125	−85 −148	−85 −185	−43 −68	−43 −83	−43 −106	−14 −32	−14 −39	0 −18	0 −25	0 −40
140	160	−280 −380	−210 −310													
160	180	−310 −410	−230 −330													
180	200	−340 −455	−240 −355	−170 −242	−170 −285	−100 −146	−100 −172	−100 −215	−50 −79	−50 −96	−50 −122	−15 −35	−15 −44	0 −20	0 −29	0 −46
200	225	−380 −495	−260 −375													
225	250	−420 −535	−280 −395													
250	280	−480 −610	−300 −430	−190 −271	−190 −320	−110 −162	−110 −191	−110 −240	−56 −88	−56 −108	−56 −137	−17 −40	−17 −49	0 −23	0 −32	0 −52
280	315	−540 −670	−330 −460													
315	355	−600 −740	−360 −500	−210 −299	−210 −350	−125 −182	−125 −214	−125 −265	−62 −98	−62 −119	−62 −151	−18 −43	−18 −54	0 −25	0 −36	0 −57
355	400	−680 −820	−400 −540													
400	450	−760 −915	−440 −595	−230 −327	−230 −385	−135 −198	−135 −232	−135 −290	−68 −108	−68 −131	−68 −165	−20 −47	−20 −60	0 −27	0 −40	0 −63
450	500	−840 −995	−480 −635													

(Note) Values shown in the upper portion of respective lines are upper dimensional tolerance, while values shown in the lower portion of respective lines are lower dimensional tolerance.

Units : μm

Class of Geometrical Tolerance Zone of Shafts

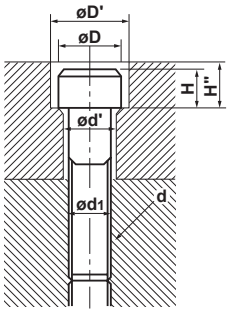
h8	h9	js5	js6	js7	k5	k6	m5	m6	n6	p6	r6	s6	t6	u6	x6
0 −14	0 −25	±2	±3	±5	+4 0	+6 0	+6 +2	+8 +2	+10 +4	+12 +6	+16 +10	+20 +14	—	+24 +18	+26 +20
0 −18	0 −30	±2.5	±4	±6	+6 +1	+9 +1	+9 +4	+12 +4	+16 +8	+20 +12	+23 +15	+27 +19	—	+31 +23	+36 +28
0 −22	0 −36	±3	±4.5	±7	+7 +1	+10 +1	+12 +6	+15 +6	+19 +10	+24 +15	+28 +19	+32 +23	—	+37 +28	+43 +34
0 −27	0 −43	±4	±5.5	±9	+9 +1	+12 +1	+15 +7	+18 +7	+23 +12	+29 +18	+34 +23	+39 +28	—	+44 +33	+51 +40 +56 +45
0 −33	0 −52	±4.5	±6.5	±10	+11 +2	+15 +2	+17 +8	+21 +8	+28 +15	+35 +22	+41 +28	+48 +35	— +54 +41	+54 +41 +61 +48	+67 +54 +77 +64
0 −39	0 −62	±5.5	±8	±12	+13 +2	+18 +2	+20 +9	+25 +9	+33 +17	+42 +26	+50 +34	+59 +43	+64 +48 +70 +54	+76 +60 +86 +70	—
0 −46	0 −74	±6.5	±9.5	±15	+15 +2	+21 +2	+24 +11	+30 +11	+39 +20	+51 +32	+60 +41 +62 +43	+72 +53 +78 +59	+85 +66 +94 +75	+106 +87 +121 +102	—
0 −54	0 −87	±7.5	±11	±17	+18 +3	+25 +3	+28 +13	+35 +13	+45 +23	+59 +37	+73 +51 +76 +54	+93 +71 +101 +79	+113 +91 +126 +104	+146 +124 +166 +144	—
0 −63	0 −100	±9	±12.5	±20	+21 +3	+28 +3	+33 +15	+40 +15	+52 +27	+68 +43	+88 +63 +90 +65 +93 +68	+117 +92 +125 +100 +133 +108	+147 +122 +159 +134 +171 +146	—	—
0 −72	0 −115	±10	±14.5	±23	+24 +4	+33 +4	+37 +17	+46 +17	+60 +31	+79 +50	+106 +77 +109 +80 +113 +84	+151 +122 +159 +130 +169 +140	—	—	—
0 −81	0 −130	±11.5	±16	±26	+27 +4	+36 +4	+43 +20	+52 +20	+66 +34	+88 +56	+126 +94 +130 +98	—	—	—	—
0 −89	0 −140	±12.5	±18	±28	+29 +4	+40 +4	+46 +21	+57 +21	+73 +37	+98 +62	+144 +108 +150 +114	—	—	—	—
0 −97	0 −155	±13.5	±20	±31	+32 +5	+45 +5	+50 +23	+63 +23	+80 +40	+108 +68	+166 +126 +172 +132	—	—	—	—

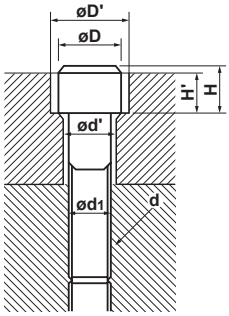
HEXAGON SOCKET HEAD BOLT HOLE SIZE

DIMENSIONS OF COUNTERBORING FOR HEXAGON SOCKET HEAD CAP SCREW AND BOLT HOLE

Unit : mm

Nominal dimensions of thread d	M3	M4	M5	M6	M8	M10	M12	M14	M16	M18	M20	M22	M24	M27	M30
d_1	3	4	5	6	8	10	12	14	16	18	20	22	24	27	30
d'	3.4	4.5	5.5	6.6	9	11	14	16	18	20	22	24	26	30	33
D	5.5	7	8.5	10	13	16	18	21	24	27	30	33	36	40	45
D'	6.5	8	9.5	11	14	17.5	20	23	26	29	32	35	39	43	48
H	3	4	5	6	8	10	12	14	16	18	20	22	24	27	30
H'	2.7	3.6	4.6	5.5	7.4	9.2	11	12.8	14.5	16.5	18.5	20.5	22.5	25	28
H"	3.3	4.4	5.4	6.5	8.6	10.8	13	15.2	17.5	19.5	21.5	23.5	25.5	29	32





TAPER STANDARD

Fig.1
Bolt Grip Taper

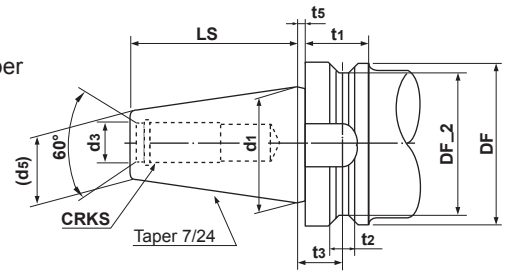


Fig.2
National Taper

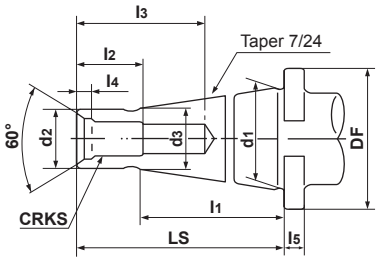


Table 1 Bolt Grip Taper (Fig.1)

Bearing Number	DF	DF_2	t_1	t_2	t_3	t_5	d_1	d_3	LS	CRKS	d_5
BT35	53	43	20	10	13.0	2	38.1	13	56.5	M12×1.75	21.62
BT40	63	53	25	10	16.6	2	44.45	17	65.4	M16×2	25.3
BT45	85	73	30	12	21.2	3	57.15	21	82.8	M20×25	33.1
BT50	100	85	35	15	23.2	3	69.85	25	101.8	M24×3	40.1
BT60	155	135	45	20	28.2	3	107.95	31	161.8	M30×3.5	60.7

Table 2 National Taper (Fig.2)

Bearing Number	d_1	d_2	LS	l_1	CRKS		l_2	l_3	d_3	l_4	DF	l_5
					Metric Screw	Wit Screw						
NT30	31.75	17.4	70	50	M12	W 1/2	24	50	16.5	6	50	8
NT40	44.45	25.3	95	67	M16	W 5/8	30	70	24	7	63	10
NT50	69.85	39.6	130	105	M24	W 1	45	90	38	11	100	13
NT60	107.95	60.2	210	165	M30	W 1¹/4	56	110	58	12	170	15

Fig.3
Morse Taper
(Shank with Tongue)

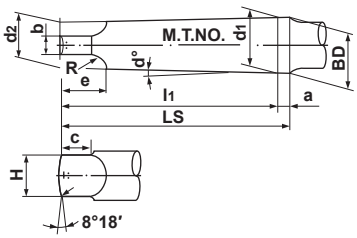


Fig.4
Morse Taper
(Shank with Screw)

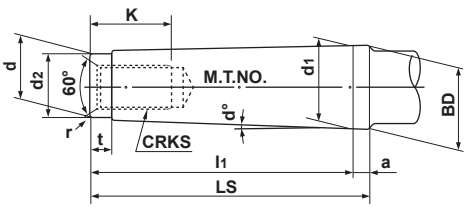


Table 3 Shank with Tongue (Fig.3)

Morse Taper Number	d_1	a	BD	d_2	H	l_1	LS	d	c	e	R	r
0	9.045	3	9.201	6.104	6	56.5	59.5	3.9	6.5	10.5	4	1
1	12.065	3.5	12.240	8.972	8.7	62.0	65.5	5.2	8.5	13.5	5	1.2
2	17.780	5	18.030	14.034	13.5	75.0	80.0	6.3	10	16	6	1.6
3	23.825	5	24.076	19.107	18.5	94.0	99	7.9	13	20	7	2
4	31.267	6.5	31.605	25.164	24.5	117.5	124	11.9	16	24	8	2.5
5	44.399	6.5	44.741	36.531	35.7	149.5	156	15.9	19	29	10	3
6	63.348	8	63.765	52.399	51.0	210.0	218	19	27	40	13	4
7	83.058	10	83.578	68.185	66.8	286.0	296	28.6	35	54	19	5

Table 4 Shank with Screw (Fig.4)

Morse Taper Number	d_1	a	BD	d	d_2	l_1	LS	t	r	CRKS	K
0	9.045	3	9.201	6.442	6	50	53	4	0.2	—	—
1	12.065	3.5	12.240	9.396	9	53.5	57	5	0.2	M6	16
2	17.780	5	18.030	14.583	14	64	69	5	0.2	M10	24
3	23.825	5	24.076	19.759	19	81	86	7	0.6	M12	28
4	31.267	6.5	31.605	25.943	25	102.5	109	9	1.0	M16	32
5	44.399	6.5	44.741	37.584	35.7	129.5	136	9	2.5	M20	40
6	63.348	8	63.765	53.859	51	182	190	12	4.0	M24	50
7	83.058	10	83.578	70.052	65	250	260	18.5	5.0	M33	80

INTERNATIONAL SYSTEM OF UNITS

UNIT CONVERSION TABLE for EASIER CHANGE into SI UNITS (Bold type Indicates SI unit)

Pressure

Pa	**kPa**	**MPa**	bar	kgf/cm^2	atm	mmH$_2$O	mmHg or Torr
1	1×10^{-3}	1×10^{-6}	1×10^{-5}	1.01972×10^{-5}	9.86923×10^{-6}	1.01972×10^{-1}	7.50062×10^{-3}
1×10^{3}	1	1×10^{-3}	1×10^{-2}	1.01972×10^{-2}	9.86923×10^{-3}	1.01972×10^{2}	7.50062
1×10^{6}	1×10^{3}	1	1×10	1.01972×10	9.86923	1.01972×10^{5}	7.50062×10^{3}
1×10^{5}	1×10^{2}	1×10^{-1}	1	1.01972	9.86923×10^{-1}	1.01972×10^{4}	7.50062×10^{2}
9.80665×10^{4}	9.80665×10	9.80665×10^{-2}	9.80665×10^{-1}	1	9.67841×10^{-1}	1×10^{4}	7.35559×10^{2}
1.01325×10^{5}	1.01325×10^{2}	1.01325×10^{-1}	1.01325	1.03323	1	1.03323×10^{4}	7.60000×10^{2}
9.80665	9.80665×10^{-3}	9.80665×10^{-6}	9.80665×10^{-5}	1×10^{-4}	9.67841×10^{-5}	1	7.35559×10^{-2}
1.33322×10^{2}	1.33322×10^{-1}	1.33322×10^{-4}	1.33322×10^{-3}	1.35951×10^{-3}	1.31579×10^{-3}	1.35951×10	1

(Note) 1Pa=1N/m^2

Force

N	dyn	kgf
1	1×10^{5}	1.01972×10^{-1}
1×10^{-5}	1	1.01972×10^{-6}
9.80665	9.80665×10^{5}	1

Stress

Pa	**MPa** or **N/mm^2**	kgf/mm^2	kgf/cm^2
1	1×10^{-6}	1.01972×10^{-7}	1.01972×10^{-5}
1×10^{6}	1	1.01972×10^{-1}	1.01972×10
9.80665×10^{6}	9.80665	1	1×10^{2}
9.80665×10^{4}	9.80665×10^{-2}	1×10^{-2}	1

(Note) 1Pa=1N/m^2

Work / Energy / Quantity of Heat

J	kW•h	kgf•m	kcal
1	2.77778×10^{-7}	1.01972×10^{-1}	2.38889×10^{-4}
3.600×10^{6}	1	3.67098×10^{5}	8.6000×10^{2}
9.80665	2.72407×10^{-6}	1	2.34270×10^{-3}
4.18605×10^{3}	1.16279×10^{-3}	4.26858×10^{2}	1

(Note) 1J=1W•s, 1J=1N•m
1cal=4.18605J
(By the law of weights and measures)

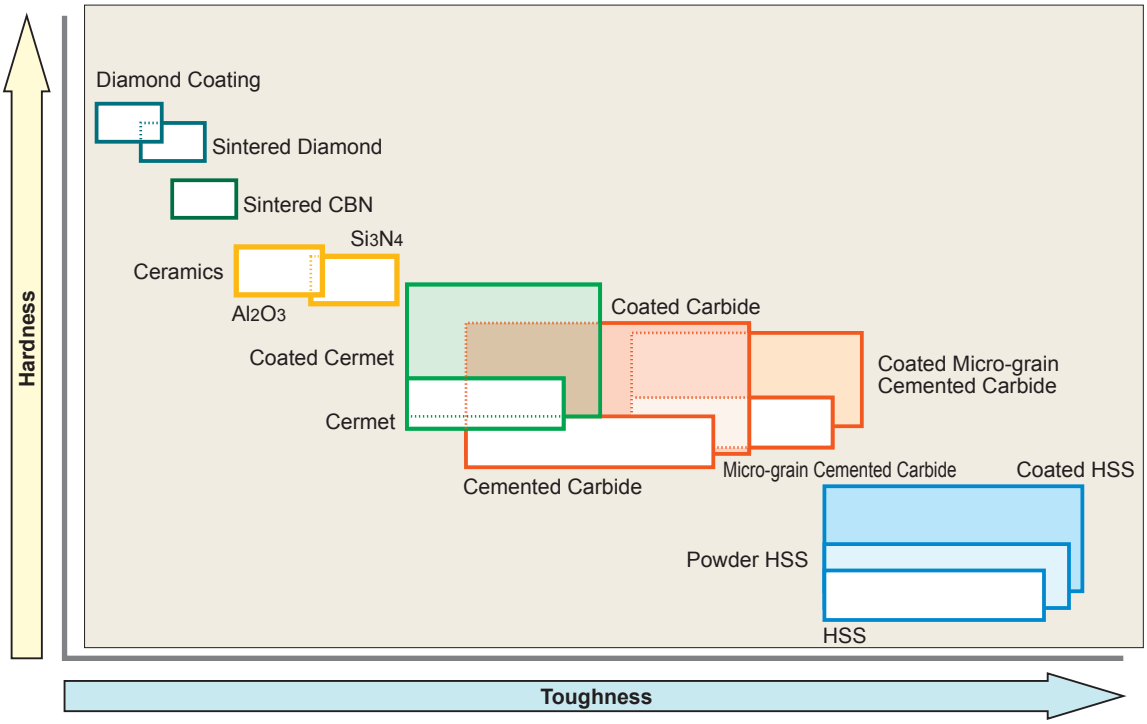
Power (Rate of Production / Motive Power) /Heat Flow Rate

W	kgf•m/s	PS	kcal/h
1	1.01972×10^{-1}	1.35962×10^{-3}	8.6000×10^{-1}
9.80665	1	1.33333×10^{-2}	8.43371
7.355×10^{2}	7.5×10	1	6.32529×10^{2}
1.16279	1.18572×10^{-1}	1.58095×10^{-3}	1

(Note) 1W=1J/s, PS:French horse power
1PS=0.7355kW
(By the enforcement act for the law of weights and measures)
1cal=4.18605J

CUTTING TOOL MATERIALS

The table below shows the relationship between various tool materials, in relation with hardness on a vertical axis and toughness on a horizontal axis. Today, cemented carbide, coated carbide and TiC-TiN-based cermet are key tool materials in the market. This is because they have the best balance of hardness and toughness.



GRADE CHARACTERISTICS

Hard Materials	Hardness (HV)	Energy Formation (kcal/g·atom)	Solubility in Iron (%.1250℃)	Thermal Conductivity (W/m·k)	Thermal Expansion (x 10^{-6}/k)*	Tool Material
Diamond	>9000	–	Highly Soluble	2100	3.1	Sintered Diamond
CBN	>4500	–	–	1300	4.7	Sintered CBN
Si_3N_4	1600	–	–	100	3.4	Ceramics
Al_2O_3	2100	-100	≒0	29	7.8	Ceramics Cemented Carbide
TiC	3200	-35	< 0.5	21	7.4	Cermet Coated Carbide
TiN	2500	-50	–	29	9.4	Cermet Coated Carbide
TaC	1800	-40	0.5	21	6.3	Cemented Carbide
WC	2100	-10	7	121	5.2	Cemented Carbide

*1W/m•K=2.39×10^{-3}cal/cm•sec•℃

GRADE CHAIN

- **For Cutting Tools**
  - **Cemented Carbide**
    - P Steel: UTi20T
    - M Stainless Steel General: UTi20T
    - K Cast Iron: HTi05T, HTi10, UTi20T
    - N Non-Ferrous: HTi10
    - S Heat Resistant Alloy Ti Alloy: RT9005, RT9010, MT9015, TF15
  - **Coated Carbide**
    - P Steel: NEW MS6015 (PVD), UE6105, UE6110, MC6015, UE6020, MC6025, NEW MC6035, MP6120 (PVD), VP15TF (PVD), MP6130 (PVD), VP20RT (PVD), VP30RT (PVD)
    - M Stainless Steel General: MC7015, US7020, MC7025, MP7035, US735, F7030, VP15TF (PVD), MP7130 (PVD), VP20RT, MP7030, MP7140 (PVD), VP30RT (PVD)
    - K Cast Iron: UC5105, MC5005, UC5115, MC5015, MY5015, MC5020, VP15TF (PVD)
    - N Non-Ferrous: LC15TF
    - S Heat Resistant Alloy Ti Alloy: US905, MP9005 (PVD), VP05RT (PVD), VP10RT (PVD), MP9015 (PVD), VP15TF (PVD), MP9120 (PVD), MP9030 (PVD), MP9130 (PVD)
    - H Hardened Materials: MP8010 (PVD), VP15TF (PVD)
  - **Cermet**
    - P Steel: NX2525, NEW MX3030, NX3035, NX4545
    - M Stainless Steel General: NX2525, NEW MX3030, NX4545
    - K Cast Iron: NX2525
  - **Coated Cermet**
    - P Steel: AP25N (PVD), VP25N (PVD), MP3025 (PVD), VP45N (PVD)
    - M Stainless Steel General: AP25N (PVD), VP25N (PVD)
    - K Cast Iron: AP25N (PVD)
  - **Polycrystallines**
    - N Non-Ferrous Non-Metal (Sintered Diamond): MD220
    - Sintered Alloy: MB4020
    - K Cast Iron (Sintered CBN): MB710, MB5015, MB730, MB5140, BC5030
    - H Hardened Materials (Sintered CBN): NEW BC8105, MBC010, BC8110, MBC020, NEW BC8120, BC8020, MB8025, MB825, NEW BC8130, MB835
  - **Micro-grain Cemented Carbide**
    - Steel Cast Iron: SF10, MF07, MF10, TF15, MF20, MF30
- **For Wear Resistance**
  - **Cemented Carbide**
    - General Wear Resistance: GTi05, GTi10, GTi15, GTi20, GTi30, GTi35, GTi40
    - Corrosion Resistance: GC15, GC20, GC30
  - **Micro-grain Cemented Carbide**
    - Special Wear Resistance: TF15, MF10, MF205, GM30
- **For Construction Tools**
  - **Cemented Carbide**
    - General Use: MG10, MG20, MG25, MG30, MG40, MG50, MG60

GRADES COMPARISON TABLE

CEMENTED CARBIDE

	ISO Classification	ISO Symbol	Mitsubishi Carbide	Sumitomo Electric	Tungaloy	Kyocera	Dijet	Mitsubishi Hitachi Tool	Sandvik	Kennametal	Seco Tools	Iscar
Turning	P	P01										
		P10		ST10P	TX10S		SRT	WS10				IC70
		P20	UTi20T	ST20E	UX30		SRT DX30	EX35	SMA			IC70 IC50M
		P30	UTi20T	A30	UX30	PW30	SR30 DX30	EX35	SM30			IC50M IC54
		P40		ST40E			SR30	EX45				IC54
	M	M10		EH510 U10E			UMN	WA10B	H10A	KU10 K313 K68	890	IC07
		M20	UTi20T	EH520 U2	UX30		DX25 UMS	EX35	H13A	KU10 K313 K68	HX	IC07 IC08 IC20
		M30	UTi20T	A30	UX30		DX25 UMS	EX45	H10F SM30		883	IC08 IC20 IC28
		M40					UM40	EX45				IC28
	K	K01	HTi05T	H1 H2	TH03 KS05F		KG03	WH05		KU10 K313 K68		
		K10	HTi10	EH10 EH510	TH10	KW10 GW15	KG10 KT9	WH10	H10 HM	KU10 K313 K68	890	IC20
		K20	UTi20T	G10E EH20 EH520	KS15F KS20	GW25	CR1 KG20	WH20	H13A	KU10 K313 K68	HX	IC20
		K30	UTi20T	G10E			KG30				883	
	N	N01		H1 H2	KS05F	KW10			H10 H13A			
		N10	HTi10	EH10 EH510	TH10	KW10 GW15	KT9	WH10		KU10 K313 K68	H15	IC08 IC20
		N20		G10E EH20 EH520	KS15F		CR1	WH20		KU10 K313 K68	HX	IC08 IC20
		N30									H25	
	S	S01	RT9005			SW05	KG03					
		S10	RT9005 RT9010 MT9015	EH10 EH510	KS05F TH10	SW10	FZ05 KG10		H10 H10A H10F H13A	K10 K313 K68	HX	IC07 IC08
		S20	RT9010 TF15	EH20 EH520	KS15F KS20	SW25	FZ15 KG20			K10 K313 K68	H25	IC07 IC08
		S30	TF15				KG30					
Milling	P	P10					SRT					
		P20	UTi20T	A30N	UX30		SRT DX30	EX35		K125M		IC50M IC28
		P30	UTi20T	A30N	UX30	PW30	SR30 DX30	EX35		GX		IC50M IC28
		P40				PW30	SR30	EX45				IC28
	M	M10					UMN					
		M20	UTi20T	A30N	UX30		DX25 UMS	EX35				IC08 IC20
		M30	UTi20T	A30N	UX30		DX25 UMS	EX45	SM30			IC08 IC28
		M40						EX45				IC28
	K	K01	HTi05T				KG03			K115M,K313		
		K10	HTi10	G10E	TH10	KW10 GW25	KG10	WH10		K115M K313		IC20
		K20	UTi20T	G10E	KS20	GW25	KT9 CR1 KG20	WH20	H13A		HX	IC20
		K30	UTi20T				KG30					

(Note) The above table is selected from a publication. We have not obtained approval from each company.

MICRO GRAIN

	ISO Classification	ISO Symbol	Mitsubishi Carbide	Sumitomo Electric	Tungaloy	Kyocera	Dijet	Mitsubishi Hitachi Tool	Sandvik	Kennametal	Seco Tools
Cutting Tools	Z	Z01	**SF10** **MF07** **MF10**	F0	F MD05F MD1508		FZ05 FB05 FB10	NM08	PN90 6UF,H3F 8UF,H6F		
		Z10	**HTi10** **MF20**	XF1 F1 AFU	MD10 MD0508 MD07F	FW30	FZ10 FZ15 FB15	NM15	H10F		890
		Z20	**TF15** **MF30**	AF0 SF2 AF1			FZ15 FB15 FB20	BRM20 EF20N	H15F		890 883
		Z30		A1 CC			FZ20 FB20	NM25			883

CERMET

	ISO Classification	ISO Symbol	Mitsubishi Carbide	Sumitomo Electric	Tungaloy	Kyocera	Dijet	Mitsubishi Hitachi Tool	Sandvik	Kennametal	Seco Tools	Iscar
Turning	P	P01	**AP25N*** **VP25N***	T110A T1000A	NS520 AT520* GT520* GT720*	TN30 TN610 PV710* PV30* TN6010 PV7010*	LN10 CX50					IC20N IC520N*
		P10	**NX2525** **AP25N*** **VP25N***	T1200A T2000Z* T1500A T1500Z*	NS520 NS730 GT730* NS9530 GT9530*	TN60 TN610 PV710* PV60* TN6010 PV7010*	CX50 CX75 PX75*	CZ25*	CT5015 GC1525*	KT315 KT125	TP1020 TP1030* CM CMP*	IC20N IC520N* IC530N*
		P20	**NX2525** **AP25N*** **VP25N*** **NX3035** **MP3025***	T1200A T2500A T2000Z* T3000Z* T1500A T1500Z*	NS530 NS730 GT730* NS9530 GT9530*	TN60 PV60* TN620 PV720* TN6020 PV7020* PV7025*	CX75 PX75* PX90*	CH550	GC1525*	KT325 KT1120 KT5020*	TP1020 TP1030*	IC20N IC520N* IC30N IC530N* IC75T
		P30	**MP3025*** **VP45N***	T3000Z*		PV7025* PV90*	PX90*					IC75T
	M	M10	**NX2525** **AP25N*** **VP25N***	T110A T1000A T2000Z* T1500Z*	NS520 AT530* GT530* GT720*	TN60 PV60* TN620 PV720* TN6020 PV7020*	LN10 CX50		GC1525*	KT125	TP1020 TP1030* CM CMP*	
		M20	**NX2525** **AP25N*** **VP25N***	T1200A T2000Z* T1500A T1500Z*	NS530 GT730* NS730	TN90 TN6020 TN620 PV720* PV90* PV7020* PV7025*	CX50 CX75	CH550				
		M30										
	K	K01	**NX2525** **AP25N***	T110A T1000A T2000Z* T1500Z*	NS710 NS520 AT520* GT520* GT720*	TN30 PV30* PV7005* TN610 PV710* TN6010 PV7010*	LN10					
		K10	**NX2525** **AP25N***	T1200A T2000Z* T1500A T1500Z*	NS520 GT730* NS730	TN60 PV60* TN6020 TN620 PV720* PV7020* PV7025*	LN10		CT5015	KT325 KT125		
		K20	**NX2525** **AP25N***	T3000Z*			CX75					
Milling	P	P10	**NX2525**			TN60	CX75	MZ1000*			C15M	IC30N
		P20	**NX2525**	T250A	NS530	TN100M TN60	CX75 CX90	CH550 CH7030 MZ1000* MZ2000*	CT530	KT530M HT7 KT605M	C15M MP1020	IC30N
		P30	**MX3030** **NX4545**	T250A T4500A	NS530 NS540 NS740		CX90 CX99	MZ3000* CH7035				IC30N
	M	M10	**NX2525**			TN60						IC30N
		M20	**NX2525**		NS530	TN100M	CX75	CH550 CH7030 MZ1000* MZ2000*	CT530	KT530M HT7 KT605M	C15M	IC30N
		M30	**MX3030** **NX4545**	T250A	NS540 NS740		CX90 CX99	MZ3000* CH7035				
	K	K01										
		K10	**NX2525**		NS530	TN60						
		K20	**NX2525**				CX75			KT530M HT7		

*Coated Cermet

(Note) The above table is selected from a publication. We have not obtained approval from each company.

PVD COATED GRADE

	ISO Classification	ISO Symbol	Mitsubishi Carbide	Sumitomo Electric	Tungaloy	Kyocera	Dijet	Mitsubishi Hitachi Tool	Sandvik	Kennametal	Seco Tools	Iscar
Turning	P	P01				PR1005						
		P10	VP10MF MS6015		AH710 SH725	PR1005 PR930 PR1025 PR1115 PR1225 PR1425			GC1125	KCU10 KC5010 KC5510 KU10T	CP200 TS2000	IC250 IC507 IC570 IC807 IC907 IC908
		P20	VP10RT VP20RT VP15TF VP20MF MS6015	AC520U	AH710 AH725 AH120 SH730 GH730 GH130 SH725	PR930 PR1025 PR1115 PR1225 PR1425 PR1535		IP2000	GC1125 GC15	KCU10 KC5025 KC5525 KU25T	TS2500	IC250 IC308 IC507 IC807 IC808 IC907 IC908 IC1008 IC1028 IC3028
		P30	VP10RT VP20RT VP15TF VP20MF	AC1030U AC530U	AH725 AH120 SH730 GH730 GH130 AH740 J740 SH725	PR1025 PR1225 PR1425 PR1535		IP3000	GC1125	KCU25 KC5525 KU25T	CP500	IC228 IC250 IC328 IC330 IC354 IC528 IC1008 IC1028 IC3028
		P40			AH740 J740	PR1535					CP500 CP600	IC228 IC328 IC528 IC928 IC1008 IC1028 IC3028
	M	M01										
		M10	VP10MF MS6015		AH710 SH725	PR1025 PR1225 PR1425	JC5003 JC8015	IP050S	GC1115 GC15 GC1105	KCU10 KC5010 KC5510	CP200 TS2000	IC354 IC507 IC520 IC807 IC907 IC5080T
		M20	VP10RT VP20RT VP15TF VP20MF	AC520U	AH710 AH725 AH120 SH730 GH730 GH130 GH330 AH630 SH725	PR1025 PR1125 PR1225 PR1425 PR915 PR930 PR1535	JC5003 JC5015 JC8015 JC5118	IP100S	GC1115 GC15 GC1125	KCU10 KC5010 KC5510	TS2500 CP500	IC354 IC808 IC908 IC1008 IC1028 IC3028 IC5080T
		M30	VP10RT VP20RT VP15TF VP20MF MP7035	AC520U AC530U AC1030U AC6040M	GH330 AH725 AH120 SH730 GH730 GH130 J740 AH645 SH725	PR1125 PR1425 PR1535	JC5015 JC8015 JC5118		GC1125 GC2035	KCU25 KC5525	CP500 CP600	IC228 IC250 IC328 IC330 IC1008 IC1028 IC9080T
		M40	MP7035	AC530U AC6040M	J740	PR1535	JC5118		GC2035			IC328 IC928 IC1008 IC1028 IC3028 IC9080T
	K	K01										
		K10		AC510U	GH110 AH110 AH710				GC15	KCU10 KC5010 KC5510	CP200 TS2000	IC350 IC910 IC1008
		K20	VP10RT VP20RT VP15TF		GH110 AH110 AH710 AH725 AH120 GH730 GH130					KCU15 KCU25	CP200 TS2000 TS2500	IC228 IC350 IC808 IC830 IC908 IC1007 IC1008
		K30	VP10RT VP20RT VP15TF		AH725 AH120 GH730 GH130					KCU25 KC5525	CP500	IC228 IC350 IC808 IC830 IC908 IC928 IC1007 IC1008
	S	S01	MP9005 VP05RT		AH905 AH8005	PR1305	JC5003 JC8015	JP9105			TH1000	IC507 IC804 IC807 IC907 IC5080T
		S10	MP9005 MP9015 VP10RT	AC510U	AH905 SH730 AH110 AH8005 AH120	PR1310	JC5003 JC5015 JC8015	JP9115	GC1105 GC15	KCU10 KC5010 KC5410 KC5510	CP200 CP250 TS2000 TS2050 TS2500 TH1000	IC507 IC807 IC903 IC5080T
		S20	MP9015 MT9015 VP20RT	AC510U AC520U	AH120 AH725 AH8015	PR1125 PR1325	JC5015 JC8015 JC5118		GC1125	KCU10 KCU25 KC5025 KC5525	TS2500 CP500	IC228 IC300 IC328 IC808 IC908 IC928 IC3028 IC806 IC9080T
		S30	VP15TF	AC1030U	AH725	PR1125 PR1535	JC5118		GC1125	KC5525	CP600	IC928 IC830
Milling	P	P01					JC8003	ATH80D ATH08M TH308 PN208 JP4105 PN15M				IC903
		P10		ACP200		PR830 PR1225	JC8003 JC8015 JC5015 JC5118	PN15M PN215 PCA12M JP4115	GC1010	KC505M KC715M KC510M KC515M		IC250 IC350 IC808 IC810 IC900 IC903 IC908 IC910 IC950
		P20	MP6120 VP15TF	ACP200	AH725 AH120 GH330 AH330	PR830 PR1225 PR1230 PR1525	JC5015 JC5040 JC6235 JC8015 JC5118 JC6235 JC7560P JC8118P	CY9020 JP4120 CY150	GC1010 GC1030 GC1130 GC2030	KC522M KC525M KC527M KC610M KC620M KC635M KC715M KC720M KC730M KTPK20	F25M MP3000	IC250 IC300 IC328 IC330 IC350 IC808 IC810 IC830 IC900 IC908 IC910 IC928 IC950 IC1008

(Note) The above table is selected from a publication. We have not obtained approval from each company.

	ISO Classification	ISO Symbol	Mitsubishi Carbide	Sumitomo Electric	Tungaloy	Kyocera	Dijet	Mitsubishi Hitachi Tool	Sandvik	Kennametal	Seco Tools	Iscar
Milling	P	P30	**MP6120 VP15TF MP6130 VP30RT**	ACP200 ACP300	AH725 AH120 AH130 AH140 GH130 AH730 AH3035	PR1230 PR1525	JC6235 JC7560 JC8050 JC7560P JC5015 JC8118 JC5040 JC8118P JC8015 JC5118	JS4045 CY250 CY250V CY25 HC844	GC1010 GC1030 GC2030 GC1130	KC735M KC725M KC530M KC537M KCPM40	F25M MP3000 F30M	IC250 IC300 IC328 IC330 IC350 IC830 IC845 IC900 IC928 IC950 IC1008
		P40	**VP30RT**	ACP300	AH140 AH3035	PR1525	JC6235 JC7560 JC8050 JC7560P JC5040 JC8118 JC5118 JC8118P JC5118	JS4060 PTH30E PTH40H JX1060 JS4060	GC2030 GC1030 GC1130	KC735M KC537M KCPM40	F40M T60M	IC300 IC328 IC330 IC830 IC928 IC1008
	M	M01						PN08M PN208				IC907
		M10		ACM100		PR1225		PN15M PN215	GC1025 GC1030 GC1010	KC715M KC515M		IC903
		M20	**VP15TF MP7130 MP7030 VP20RT**	ACP200	AH725 AH120 GH330 AH330 GH110	PR1025 PR1225	JC5015 JC5118 JC8015	JP4120	GC1025 GC1030 GC1040 GC2030 S30T	KC610M KC635M KC730M KC720M KC522M KC525M KCPM40 KTPK20	F25M MP3000	IC250 IC300 IC808 IC830 IC900 IC908 IC928 IC1008
		M30	**VP15TF MP7130 MP7030 VP20RT MP7140 VP30RT**	ACP200 ACP300 ACM300	AH120 AH725 AH130 AH140 GH130 AH730 GH340 AH3135	PR830 PR1225 PR1525 PR1535	JC5015 JC7560 JC8015 JC7560P JC8050 JC8118 JC5118 JC8118P	JS4045 CY250 HC844	S30T GC1040 GC2030	KC537M KC725M KC735M KCPM40 KC530M	F30M F40M MP3000	IC250 IC300 IC328 IC330 IC830 IC928 IC1008 IC380
		M40	**MP7140 VP30RT**	ACP300 ACM300	AH140 AH3135 AH4035	PR1525 PR1535	JC5015 JC7560 JC5118 JC7560P JC8050 JC8118 JC8118P	PTH30E PTH40H JM4160			F40M	IC250 IC300 IC328 IC330 IC1008
	K	K01	**MP8010**		AH110 GH110 AH330		JC8003	ATH80D ATH08M TH308				
		K10	**MP8010**		AH110 GH110 AH725 AH120 GH130 AH330	PR1210 PR1510	JC8015	ATH10E TH315 CY100H	GC1010	KC514M KC515M KC527M KC635M	MK2050	IC350 IC810 IC830 IC900 IC910 IC928 IC950 IC380 IC1008
		K20	**VP15TF VP20RT**	ACK300	GH130	PR1210 PR1510	JC5015 JC8015 JC6235	CY150 JP4120 CY9020 PTH13S	GC1010 GC1020	KTPK20 KC514M KC610M KC520M KC620M KC524M	MK2000 MK2050	IC350 IC808 IC810 IC830 IC900 IC908 IC910 IC928 IC950 IC1008
		K30	**VP15TF VP20RT**	ACK300			JC6235 JC5015 JC8015 JC8118 JC8118P	CY250 JS4045	GC1020	KC522M KC725M KC524M KC735M KC537M	MK2050	IC350 IC808 IC830 IC908 IC928 IC950 IC1008
	S	S01				PR1210	JC8003 JC8015 JC5118	PN08M PN208				IC907 IC908 IC808 IC903
		S10	**MP9120 VP15TF**	EH520Z EH20Z ACM100		PR1210	JC8003 JC5015 JC8015 JC5118	JS1025 JP4120	GC1130 GC1010 GC1030 GC2030	KC510M	MS2050	IC903 IC907 IC908 IC840 IC910 IC808
		S20	**MP9120 VP15TF MP9130 MP9030**	EH520Z EH20Z ACK300 ACP300		PR1535	JC8015 JC5015 JC8050 JC5118	PTH30H	S30T GC2030 GC1030	KC522M KC525M KCSM30 KCPM40	MS2050	IC300 IC908 IC808 IC900 IC830 IC928 IC328 IC330 IC840 IC380
		S30		ACP300 ACM300	AH3135	PR1535	JC8050 JC7560 JC5118	JM4160	GC2030 GC1040	KC725M KCPM40	MS2050 F40M	IC830 IC928
	H	H01	**MP8010 VP05HT**				JC8003 DH103 JC8008 DH102					IC903
		H10	**VP15TF VP10H**				JC8003 JC8008 JC8015 JC5118 JC8118P	JP4105 TH308 PTH08M ATH08M ATH80D	GC1130 GC1010 GC1030	KC505M KC510M	MH1000 F15M	IC900 IC808 IC907 IC905
		H20	**VP15TF**		AH3135		JC8015 JC5118 JC8118P	JP4115 TH315	GC1030 GC1130		F15M	IC900 IC808 IC908 IC380 IC1008
		H30			AH3135			JP4120			MP3000 F30M	IC380 IC900 IC1008

(Note) The above table is selected from a publication. We have not obtained approval from each company.

CVD COATED GRADE

	ISO Classification	ISO Symbol	Mitsubishi Carbide	Sumitomo Electric	Tungaloy	Kyocera	Dijet	Mitsubishi Hitachi Tool	Sandvik	Kennametal	Seco Tools	Iscar
Turning	P	P01	UE6105	AC810P AC700G	T9105 T9005	CA510 CA5505	JC110V	HG8010	GC4305 GC4205 GC4005	KCP05B KCP05 KC9105	TP0501 TP0500 TP1501 TP1500	IC9150 IC8150 IC428
		P10	UE6105 MC6015 UE6110 MY5015	AC810P AC700G AC820P AC2000 AC8025P	T9105 T9005 T9115	CA510 CA5505 CA515 CA5515	JC110V JC215V	HG8010 HG8025 GM8020	GC4315 GC4215 GC4015 GC4325	KCP10B KCP10 KCP25 KC9110	TP1501 TP1500 TP2501 TP2500	IC9150 IC9015 IC8150 IC8250
		P20	MC6015 UE6110 MC6025 UE6020 MY5015	AC820P AC2000 AC8025P AC830P	T9115 T9125	CA515 CA5515 CA525 CA5525 CR9025	JC110V JC215V	HG8025 GM8020 GM25	GC4315 GC4215 GC4015 GC4325 GC4225 GC4025	KCP25B KCP30B KCP25 KC9125	TP2501 TP2500	IC9015 IC8250 IC9025 IC9250 IC8350
		P30	MC6025 UE6020 MC6035 UE6035 UH6400	AC830P AC630M	T9125 T9135 T9035	CA525 CA5525 CA530 CA5535 CR9025	JC215V JC325V	GM25 GM8035	GC4325 GC4225 GC4025 GC4235 GC4035	KCP30B KCP40B KCP30 KCP40 KC8050	TP3500 TP3000	IC8350 IC9250 IC9350
		P40	MC6035 UE6035 UH6400	AC630M	T9135 T9035	CA530 CA5535	JC325V JC450V	GM8035 GX30	GC4235 GC4035	KCP30 KCP40 KC9140 KC9040 KC9240 KC9245	TP3500 TP3000	IC9350
	M	M10	MC7015 US7020	AC610M	T6120 T9115	CA6515	JC110V		GC2015	KCM15B KCM15	TM2000	IC9250 IC6015 IC8250
		M20	MC7015 US7020 MC7025	AC610M AC6030M AC630M	T6120 T6020 T9125	CA6515 CA6525	JC110V	HG8025 GM25	GC2015	KCM15 KC9225 KCM25B	TM2000	IC9250 IC6015 IC9025 IC656
		M30	MC7025 US735	AC6030M AC630M	T6030	CA6525		GM8035 GX30	GC2025	KCM25 KC9230 KCM35B	TM4000	IC9350 IC6025 IC635
		M40	US735	AC6030M AC630M				GX30	GC2025	KCM35B KCM35 KC9240 KC9245	TM4000	IC6025 IC9350
	K	K01	MC5005 UC5105	AC405K AC410K	T515 T5105	CA4505 CA4010 CA310	JC050W JC105V	HX3505 HG3305	GC3205 GC3210	KCK05B KCK05	TK0501 TH1500 TK1001 TK1000	IC5005 IC9007
		K10	MC5015 UC5115 MY5015	AC405K AC410K AC415K AC420K AC700G	T515 T5115	CA315 CA4515 CA4010 CA4115	JC108W JC050W JC105V JC110V	HX3515 HG3315 HG8010	GC3205 GC3210 GC3215	KCK15B KCK15 KCK20 KC9315 KCK20B	TK1001 TK1000 TK2000 TK2001	IC5005 IC5010 IC9150 IC428 IC4028
		K20	MC5015 UC5115 UE6110 MY5015	AC415K AC420K AC700G AC820P	T5115 T5125	CA320 CA4515 CA4115 CA4120	JC108W JC110V JC215V	HG8025 GM8020	GC3215	KCK20 KC9110 KC9325	TK2001 TK2000	IC5010 IC8150 IC9150 IC9015 IC418
		K30	UE6110	AC820P	T5125		JC215	HG8025 GM8020		KC9125 KC9325		IC9015 IC418
	S	S01	US905			CA6515 CA6525 CA6535		HS9105 HS9115	S05F			
Milling	P	P10					JC730U				MP1500	IC9080 IC4100 IC9015
		P20	F7030	ACP100	T3130		JC730U	GX2140	GC4220		MP1500 MP2500	IC5500 IC5100 IC520M
		P30	F7030	ACP100	T3130			GX2140 GX2160	GC4230	KCPK30 KC930M	MP2500	IC5500 IC4050
		P40						GX2030 GX30 GX2160	GC4240	KC935M KC530M		
	M	M10										IC9250
		M20	F7030	ACP100 ACM200	T3130	CA6535	JC730U	AX2040 GX2140		KC925M	MP2500 MM4500	IC520M IC9350
		M30	F7030	ACP100	T3130	CA6535		AX2040 GX2140 GX2160 GX30	GC2040	KC930M	MP2500 MM4500	IC9350 IC4050
		M40						GX2030 GX2160 GX30		KC930M KC935M		IC635
	K	K01					JC600					
		K10	MC5020	ACK100	T1215 T1115 T1015	CA420M	JC600					
		K20	MC5020	ACK200	T1115 T1015		JC610		GC3220 GC3330 K20W	KC915M	MK1500 MK2000	IC5100 IC9150
		K30					JC610	GX30	GC3330 GC3040	KC920M KC925M KCPK30 KC930M KC935M	MK2000 MK3000	IC4100 IC4050 IC520M

(Note) The above table is selected from a publication. We have not obtained approval from each company.

CBN

	ISO Classification	ISO Symbol	Mitsubishi Carbide	Sumitomo Electric	Tungaloy	Kyocera	Dijet	Sandvik	Seco Tools
Turning	H	H01	BC8105 BC8110 MBC010 MB810	BNC100 BNX10 BN1000	BXM10 BX310	KBN050M KBN10M KBN510			CBN060K
		H10	BC8110 MBC020 BC8120 BC8020 MB825 MB8025	BNC160 BNX20 BN2000	BXM20 BX330	KBN25M KBN525	JBN300	CB7015	CBN010
		H20	MBC020 BC8120 BC8020 MB8025	BNC200 BNX25 BN250	BXM20 BX360	KBN30M	JBN245	CB7025 CB20	CBN150 CBN160C
		H30	BC8130 MB835	BNC300 BN350	BXC50 BX380	KBN35M		CB7525	CBN150 CBN160C
	S	S01	MB730	BN700 BN7000	BX950				CBN170
		S10							
		S20							
		S30							
	K	K01	MB710 MB5015	BN500 BNC500	BX930 BX910				
		K10	MB730 MB4020	BN700 BN7500 BN7000	BX850	KBN60M	JBN795	CB7525	
		K20	MB730 MB4020	BN700 BN7000	BX950	KBN60M	JBN500		CBN200
		K30	BC5030 MBS140	BNS800	BX90S BXC90	KBN900		CB7925	CBN300 CBN400C CBN500
	Sintered Alloy		MB4020 MB835	BN7500 BN7000	BX450 BX470 BX480	KBN65B KBN570 KBN65M KBN70M			CBN200

PCD

	ISO Classification	ISO Symbol	Mitsubishi Carbide	Sumitomo Electric	Tungaloy	Kyocera	Dijet	Sandvik	Seco Tools
Turning	N	N01	MD205	DA90	DX180 DX160	KPD001	JDA30 JDA735	CD05	PCD05
		N10	MD220	DA150	DX140	KPD010		CD10	PCD10
		N20	MD220	DA2200	DX120		JDA715		PCD20
		N30	MD230	DA1000	DX110	KPD230	JDA10		PCD30 PCD30M

(Note) The above table is selected from a publication. We have not obtained approval from each company.

INSERT CHIP BREAKER COMPARISON TABLE

NEGATIVE INSERT TYPE

ISO Classification	Cutting Mode	Mitsubishi Carbide	Sumitomo Electric	Tungaloy	Kyocera	Dijet	Mitsubishi Hitachi Tool	Sandvik	Kennametal	Seco Tools	Walter	TaeguTec
P	Finish	PK* FH, FP FY	FA, FB FL	01* TF, 11 ZF	DP* GP, PP XP, XP-T, XF		FE	QF LC	FF	FF1, FF2	FP5	FA
	Light	LP C SA, SH	SU LU, FE SX, SE	NS, 27 TSF, AS	PQ HQ, CQ	PF UR, UA, UT	BE B, BH, CE	XF PF	LF, FN	MF2	MP3 NF3, NF4	FG
	Light (Mild Steel)	SY		17	XQ, XS							FC
	Light (With Wiper)	SW	LUW, SEW	FW, SW AFW, ASW	WF, WE WP, WQ			WL, WF	FW	W-MF2	NF	WS
	Medium	MP MA MH	GU UG GE, UX	NM, ZM TM, AM DM, 33, 37, 38	PG, CJ, GS PS, HS PT	PG UB	CT, AB AH AY, AE	PM QM, XM	P MN	MF3 MF5, M3 M5	MP5	PC, MP MT SM
	Medium (With Wiper)	MW	GUW					WMX, WM	MW, RW	W-M6, W-M3 W-MF5	NM	WT
	Rough	RP GH Std.	MU, MX, ME UZ	TH Std.	PH GT Std.	UD GG	RE	PR, HM XMR	RN, RP	MR6, MR7	RP5, RP7 NM6, NM9	RT
	Heavy	HR, HZ, HL HM, HX HV	MP HG, HP HU, HW, HF	TRS TU TUS	PX	UC	HX HE, H	QR, PR HR, MR	MR RM RH	R4, R5, R6 57, RR6, R7 R8, RR9	NR6, NRF NRR	RX, RH HD, HY, HT HZ, EH
M	Finish Light	SH, LM	SU, EF	SS	MQ, GU		MP, AB, BH	MF	FP LF*	MF1	NF4	SF
	Medium	MS, GM MM, MA ES	EX, EG, UP GU HM	SA, SF SM S	MS, MU SU, HU, TK ST	SF, SZ SG	PV, DE, SE AH	MM QM, XM K	MP	MF4	RM5 NM4	ML EM VF
	Heavy	GH, RM HL, HZ	MU MP	TH, SH			AE	MR MR	UP, RP	M5, MR7 RR6	NR4, NR5	
K	Finish Light	LK, MA		CF	KQ		VA, AH	KF	FN	MF2, MF5 M3, M4	MK5	
	Medium	MK, GK Std.	UZ, GZ, UX	CM Std.	KG, Std., C	PG	V, AE	KM	RP,UN	M5	RK5, NM5	
	Rough	RK			KH, GC	GG	RE	KR			RK7	
	Heavy	Flat Top	Flat Top	CH, Flat Top	ZS, Flat Top	Flat Top	Flat Top		Flat Top	MR3, MR4, MR7 Flat Top	Flat Top	
S	Finish	FJ*	EF		MQ			SF	FS, LF*	MF1		
	Light	LS,MJ,MJ*	SU*	HRF				SGF*	MS	MF4, MF5	NF4, NFT	EA
	Medium	MS	EG, EX, UP	HRM SA, HMM	MS, MU, TK		VI	NGP*, SM	UP, P, NGP*	M1	NMS, NMT	
	Heavy	RS, GJ	MU					SR, SMR	RP	M5, MR3, MR4	NRS, NRT	ET

*Peripheral ground type insert.

(Note) Above charts are based on published data and not authorized by each manufacturer.

7°POSITIVE INSERT TYPE

ISO Classification	Cutting Mode	Mitsubishi Carbide	Sumitomo Electric	Tungaloy	Kyocera	Dijet	Mitsubishi Hitachi Tool	Sandvik	Kennametal	Seco Tools	Walter	TaeguTec
P	Finish	SMG*	FC*, SC*	JS*, 01*	CF*,CK* GQ*,GF* SK*			UM*	LF*			
	Finish Light	FP, FV LP, SV	FP, LU SU	PF, PSF PS, PSS	GP, PP XP		JQ	PF, UF, XF	UF, 11 LF, FP	FF1 F1	PF4	FA, FX FG
	Light (With Wiper)	SW	LUW, SDW		WP			WF	FW	W-F1	PF	WS
	Medium	MV MP, Std.	MU	23 PM, 24	HQ, MF* XQ, GK	FT	JE	XM, PM UM PR, XR	MF, MP	F2, MF2, M5	FP6, PS5 PM5	PC MT
	Medium (With Wiper)	MW						WM	MW	W-F2 W-M3	PM	WT
M	Finish | Light	FM LM	FC*,SI* LU SU	PF, PSF PS, PSS	CF*,CK* GQ*,GF* MQ ,SK		MP	MF	LF, UF FP	F1, F2		
	Medium	MM, Std.	MU	PM	HQ, GK			MM	MP		MM4, RM4	
K	Medium	MK, Std. Flat Top	MU, Flat Top*	Flat Top, CM	Flat Top*			KF, KM, KR	Flat Top	F1, M3, M5	FK6	
N	Medium	AZ*	AG*	AL*	AH*	ASF*,ALU* ACB*		AL*	HP*	AL*	PM2*	SA* FL*
S	Finish Light	FS*, LS* FS-P*, LS-P* FJ* LS, MS	SI*	Std.	MQ				LF* HP*			

*Peripheral ground type insert.
(Note) Above charts are based on published data and not authorized by each manufacturer.

11°POSITIVE INSERT TYPE

ISO Classification	Cutting Mode	Mitsubishi Carbide	Sumitomo Electric	Tungaloy	Kyocera	Dijet	Mitsubishi Hitachi Tool	Sandvik	Kennametal	Seco Tools	Walter	TaeguTec
P	Finish Light	FV, SMG* SV	SI, FK. FB LU, LUW, LB SU,SF	01* PF, PSF PS, PSS	PP, GP* CF XP		JQ	PF	UF, FP FW, LF			FG PC
	Medium	MV	MU	PM 23 24	HQ XQ		JE	PM, UM	MF MP, MW		MP4	
M	Finish | Light	SV	SU	SS* PF, PS	GP, CF*		MP	MF	HP* LF		MM4	
	Medium	MV	MU	PM	HQ			MM				

*Peripheral ground type insert.
(Note) Above charts are based on published data and not authorized by each manufacturer.

Memo

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1LA....1141
1MA....1140
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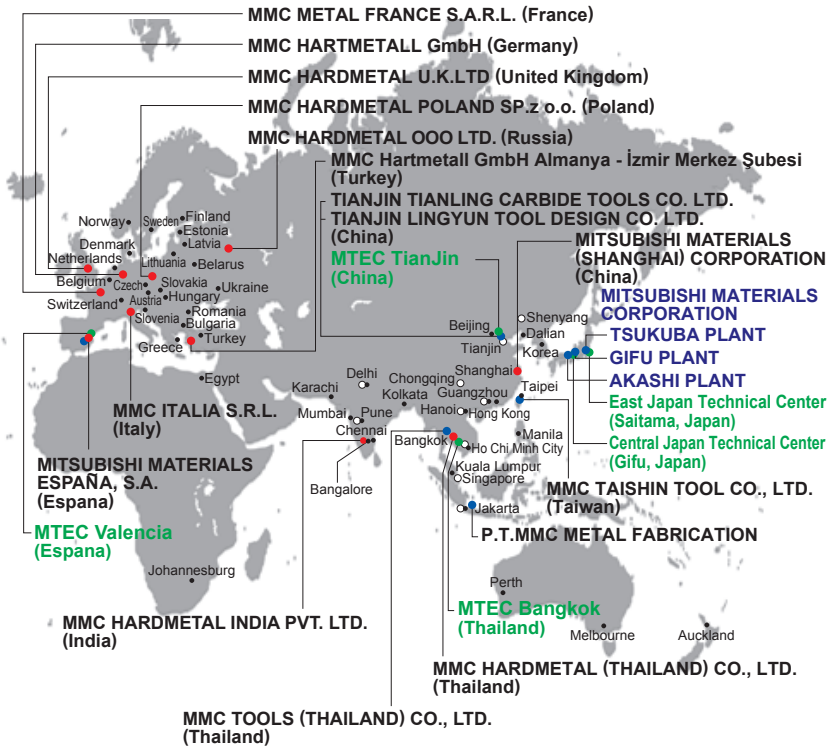

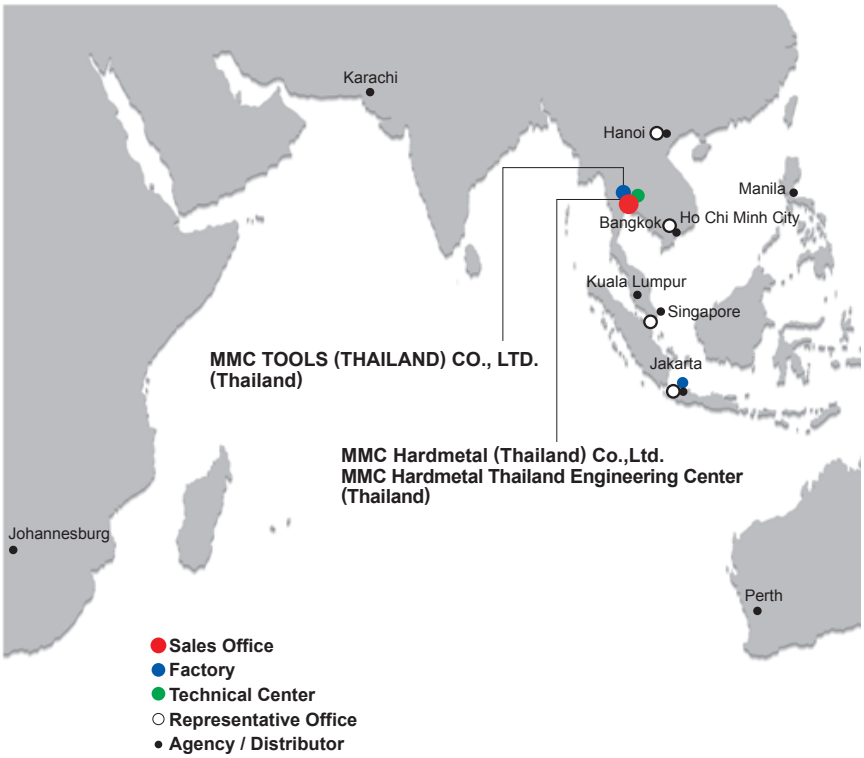

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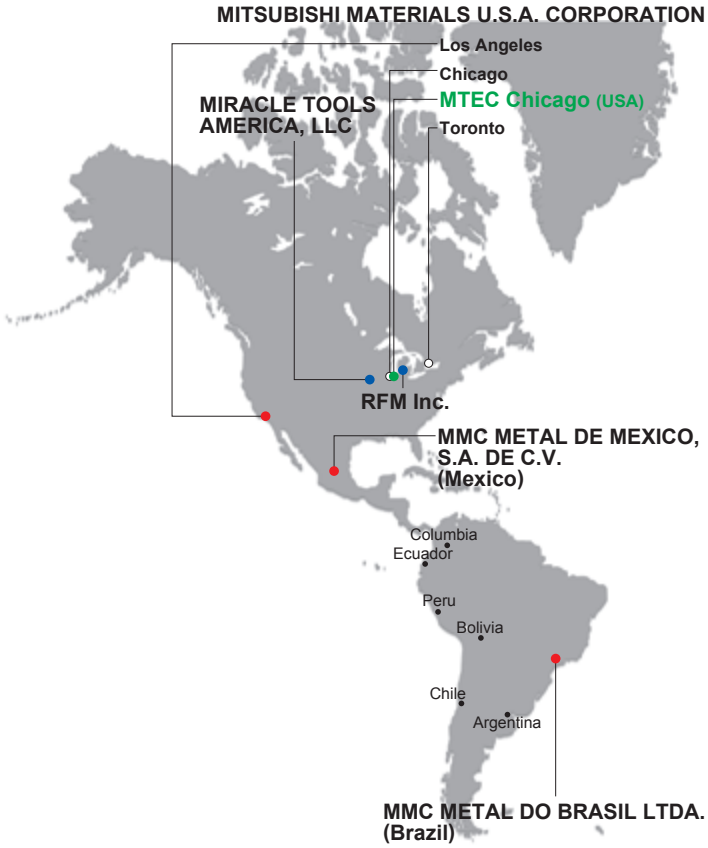

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(JSAQ080) (JSAE036)
The Scope of the Registration: Design, Development and Production of Cemented Carbide Tools and Carbide Blanks

MITSUBISHI MATERIALS GIFU PLANT (JAPAN)

QMS、EMS
ISO 9001 , ISO 14001
(JSAQ094) (JSAE1545)
The Scope of the Registration: Design, Development, and Production of Cutting Tools, Cemented Carbide Blanks, and Coated Products

MITSUBISHI MATERIALS AKASHI PLANT (JAPAN)

ISO 9001
ISO 14001
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