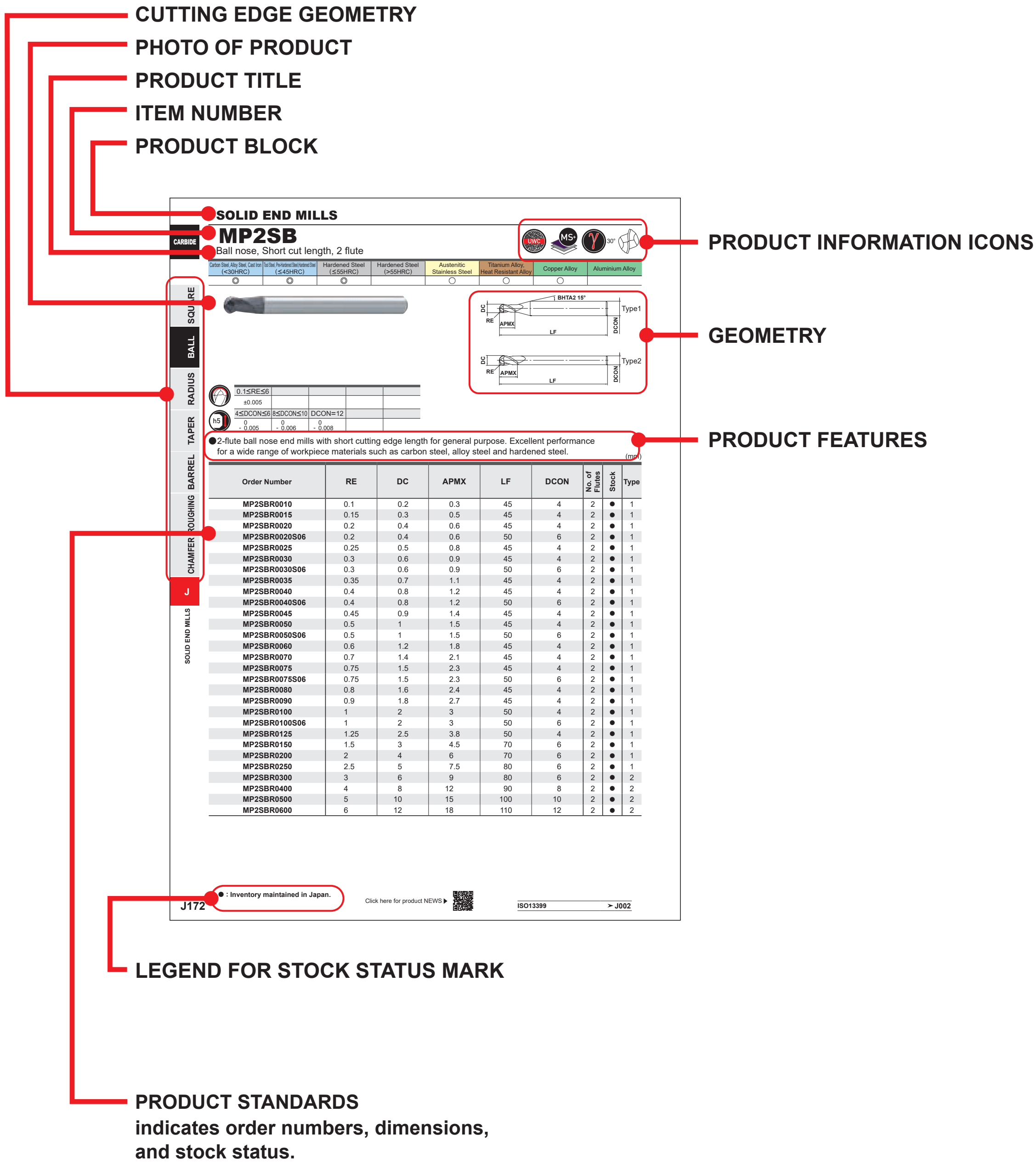
HOW TO READ THE STANDARD OF SOLID END MILLS

●How this section page is organised

①Organised according to cutting mode for milling. (Refer to END MILL LIST.)



●To Order:
For solid end mills, please specify ①order number.

MILLING TOOLS

SOLID END MILLS

IDENTIFICATION J002
SYMBOL DESCRIPTIONS J003
COATING TECHNOLOGY J004
END MILLS SELECTION CHART CARBIDE ... J006
END MILLS SELECTION CHART HSS ... J016

SELECTION CHART BY BLADE DIAMETER
- CARBIDE
  - SQUARE J018
  - BALL J030
  - RADIUS J042
  - OTHERS J052
  - CERAMICS/CBN J052
- HSS J053

SOLID END MILLS STANDARD
- CARBIDE
  - SQUARE J056
  - BALL J171
  - RADIUS J245
  - TAPER BALL J324
  - BARREL J332
  - ROUGHING J336
  - CHAMFER J348
- HSS
  - SQUARE J350
  - ROUGHING J370

*Arranged by Alphabetical order

J351 **1LA**
J350 **1MA**
J360 **2LS**
J362 **2MK**
J358 **2MS**
J356 **2SS**
J368 **4LC**
J366 **4MC**
J113 **A3SA**
J251 **A3SARB**
J092 **C2MA**
J094 **C2MHA**
J116 **C3SA**
J253 **C3SARB**
J330 **C4LATB**
J310 **CE4SRB**
J310 **CE6SRB**
J346 **CMRA**
J208 **CRN2MB**
J248 **CRN2MRB**
J085 **CRN2MS**
J087 **CRN2XL**
J210 **CRN2XLB**
J249 **CRN2XLRB**
J159 **CRN4JC**
J344 **CSRA**
J213 **DC2SB**
J215 **DC2XLB**
J217 **DF2XLB**
J220 **DF2XLBF**
J160 **DF4JC**
J161 **DFC4JC**
J170 **DFCJRT**
J114 **DLC3SA**
J255 **DLC3SARB**

J328 **DLC4LATB**
J349 **GBE**
J074 **MP2ES**
J173 **MP2MB**
J172 **MP2SB**
J175 **MP2SDB**
J171 **MP2SSB**
J177 **MP2XLB**
J098 **MP3ES**
J222 **MP3XB**
J138 **MP4EC**
J122 **MPJHV**
J118 **MPMHV**
J257 **MPMHVRB**
J261 **MPXLRB**
J376 **MR**
J077 **MS2ES**
J062 **MS2JS**
J064 **MS2LS**
J060 **MS2MD**
J245 **MS2MRB**
J057 **MS2MS**
J056 **MS2SS**
J066 **MS2XL**
J070 **MS2XL6**
J101 **MS3ES**
J141 **MS4EC**
J132 **MS4JC**
J130 **MS4MC**
J267 **MS4MRB**
J128 **MS4SC**
J134 **MS4XL**
J125 **MSMHD**
J096 **MSMHZD**
J124 **MSSHD**

J363 **S2SDA**
J089 **SED2KMG**
J090 **SED2KPG**
J162 **SEG4SA**
J354 **VA2MS**
J352 **VA2SS**
J364 **VA4MC**
J372 **VAMFPR**
J374 **VAMR**
J370 **VASFPR**
J348 **VC2C**
J308 **VC4JRB**
J324 **VC4STB**
J168 **VCLD**
J157 **VCMDSC**
J302, J306 **VCPSRB**
J079 **VF2MD**
J081 **VF2MV**
J199 **VF2WB**
J083 **VF2XL**
J202 **VF2XLB**
J200 **VF2XLBS**
J228 **VF3XB**
J243 **VF4MB**
J153 **VF4MD**
J155 **VF4MV**
J164 **VF6MHV**
J316 **VF6MHVRB**
J343 **VF6SVRCH**
J169 **VF8MHVCH**
J322 **VF8MHVRBCH**
J300 **VFFDRB**
J290, J296 **VFHVRB**
J166 **VFMD**
J320 **VFMDRB**

J342 **VFMFPR**
J156 **VFMHVCH**
J288 **VFMHVRBCH**
J191 **VFR2SB**
J193 **VFR2SBF**
J189 **VFR2SSB**
J195 **VFR2XLB**
J283 **VFRPSRB**
J165 **VFSD**
J318 **VFSDRB**
J339 **VFSFPR**
J341 **VFSFPRCH**
J187 **VQ2XLB**
J234 **VQ4SVB**
J236 **VQ4WB**
J163 **VQ6MHVCH**
J314 **VQ6MHVRBCH**
J281 **VQFDRB**
J279 **VQHVRB**
J147 **VQJHV**
J143 **VQMHV**
J270 **VQMHVRB**
J275 **VQMHVRBF**
J103 **VQMHZV**
J109 **VQMHZVOH**
J185 **VQN2MB**
J239 **VQN4MB**
J241 **VQN4MBF**
J277 **VQN4MVRB**
J277 **VQN6MVRB**
J336 **VQSVR**
J312 **VQT5MVRB**
J332 **VQT6UR**
J149 **VQXL**

IDENTIFICATION

ORDER NUMBER OF END MILLS

VQ 4 S VB R0100 * * *

End Mill Names

- **VQ** : SMART MIRACLE end mills
- **VQT** : SMART MIRACLE end mills focused on machining Ti-alloys
- **VQN** : SMART MIRACLE end mills focused on machining Ni-based alloys
- **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
- **A** : ALIMASTER end mills
- **DFC** : CVD diamond coated end mills
- **DF** : Diamond coated end mills
- **DC** : Diamond coated end mills
- **CE** Ceramic end mills
- **C** : Carbide end mills
- **VA** : Violet end mills
- **S** : KHAS end mills (High-grade powder high-speed steel)
- **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

Features

- **S** : General-use
- **U** : For stainless steel
- **K** : For keyway
- **A** : For light alloy
- **C** : Center cut, chamfering
- **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
- **WB** : Wide ball nose
- **RB** : Corner radius
- **FDRB** : Duplex corner radius
- **CH** : Coolant holes (side)
- **OH** : Coolant holes (end)
- **UR** : Multi step radius
- **Z** : Drilling
- **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

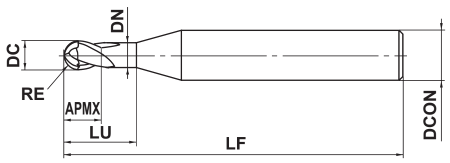
- **S**** : Shank diameter

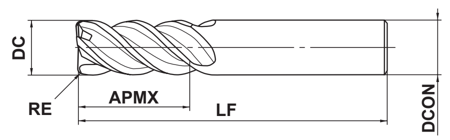
ex.
S03 →ϕ3
S10 →ϕ10

- **N***** : Neck length
- **T****** : Taper angle one side
- **L**** : Flute length
- **A***** : Overall Length
- ****C** : Coolant holes (center)

*Other types are available by special order.

GUIDE FOR ISO13399 SYMBOLS





Symbol	Content
APMX	Depth of cut maximum
DC	Cutting diameter
DN	Neck diameter
LF	Functional length
LU	Usable length
RE	Corner radius

*There are exceptions other than those listed above. For more details, please refer to the technical data (page Q002).

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.
CO HSS	**Ultra Micro Grain HSS** 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 Tolerance
Indicates the radial tolerance of a ball nose end mill.

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.

Angle, Coolant hole, Sharp corner edge and Gash land

γ **Helix Angle**
Indicates the helix angle of the end mill.

End Cutting Edge with Coolant Hole

Peripheral Cutting Edge with Coolant Hole

Sharp Corner Edge
Indicates the end mill has a sharp corner edge.

Gash Land
Indicates the end mill cutting edge has a gash land.

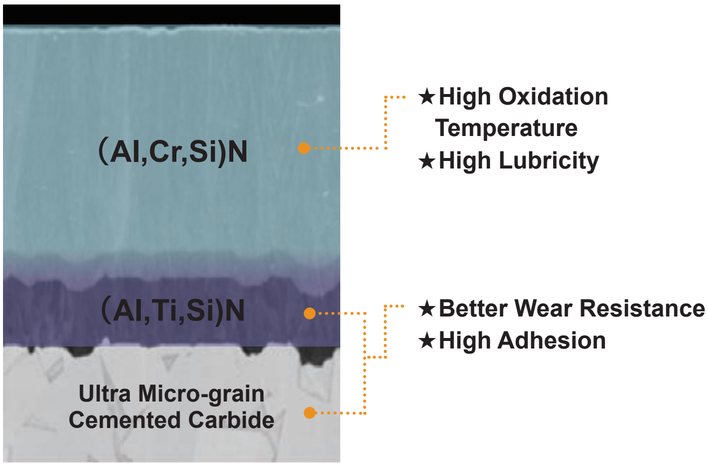
Coating

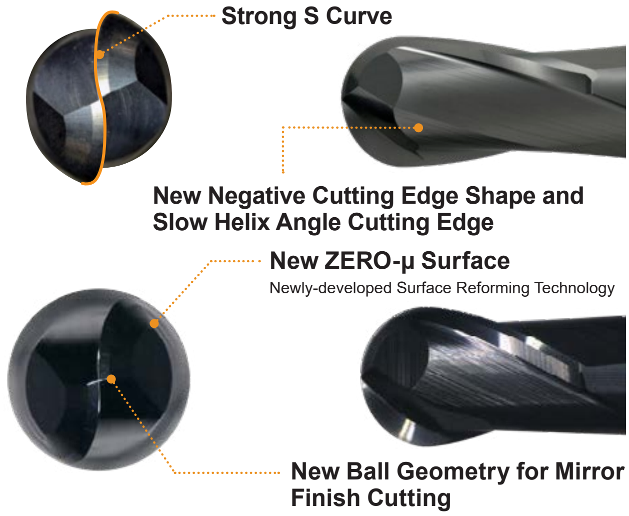
VQ	**SMART MIRACLE Coating** (Al, Cr)N Coaitng optimum for difficult-to-cut materials.
VQT	**SMART MIRACLE VQT Coating** (Al, Cr)N coating optimum for Ti-alloys.
NEW VQN	**SMART MIRACLE VQN Coating** (Al, Ti, Si)N coating optimum for Ni-based alloys.
VFR	**IMPACT MIRACLE REVOLUTION Coating** A coating 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+	**MS PLUS Coating** Offers higher versatility for carbon steel, alloy steel and hardened steel.
MS	**MS Coating** PVD offers higher versatility.
VC	**MIRACLE Coating** The original Miracle (Al, Ti)N coating also suitable for dry cutting of carbon steels and hardened steels.
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	**CVD Diamond Coated End Mills** High performance coating for hard brittle materials excelling in film adhesion to the substrate.
DF	**Diamond Coating** Suitable for graphite machining.
V	**VIOLET Coating** The original Miracle (Al, Ti)N coating achieves longer tool life.

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.





VF IMPACT 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.

Properties of IMPACT MIRACLE COATING

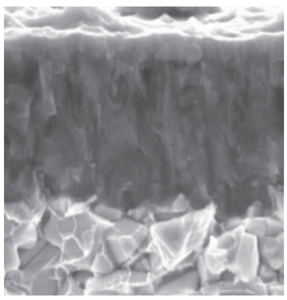
	IMPACT MIRACLE Single-phase nano coating (Al,Ti,Si)N	(Al,Ti,Si)N	(Al,Ti)N
Hardness (HV)	**3700**	3200	2800
Oxidation Temperature (℃)	**1300**	1100	840
Adhesion (N)[1]	**100**	80	80
Wear Coefficient[2] (800℃)	**0.48**	0.53	0.58

1) Adhesion : Measured by critical load scratch test.
2) Coefficient of friction : Measured by ball-on-disk method.
(Counter gear : AISI D2 60HRC)

MS+ MS plus Coating

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 MS plus coating

	(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

Note 1) The composition of the coating is optimized according to the diameter.

SMART MIRACLE Coating

SMART MIRACLE Coating (For machining Ti-based alloys)

Newly-developed (Al,Cr)N coating with improved wear resistance.
The smoothening 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.

SMART MIRACLE Coating

ZERO- μ Surface

The original surface treatment technology offers smooth coating layer. A good balance of smooth surface and sharp edge allows smooth chip discharge and reduces the cutting resistance. Machining efficiency and tool life is improved.

SMART MIRACLE Coating (For machining Ni-based, super heat resistant alloys)

The (Al, Ti, Si) based coatings maintain their film hardness and heat resistant properties under the harshest of conditions, making it highly suitable for applying to end mills for machining heat resistant super alloys.

DLC Coating

Newly developed DLC coating.
Hardness similar to that of CVD diamond coating achieved with high adhesion strength.

Mitsubishi Materials and SHINMAYWA INDUSTRIES, LTD. have jointly developed a unique DLC coating that has substantially increased "adhesion strength" compared to previous DLC coating.

Diamond Coating (DC)

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.
Suitable for cutting hard brittle materials such as cemented carbide.

Diamond Coating (DF)

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.

VIOLET Coating

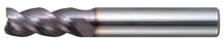
(Al,Ti)N coating, excellent adhesion strength for HSS tools.

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.

Note 1) The composition of the coating is optimized according to the diameter.

CARBIDE

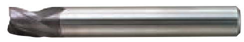
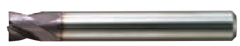
END MILLS SELECTION CHART CARBIDE(By Shape)

Type	No. of Flutes	Applications, Features	Coating or Substrate	Product Code	Shape	Size Range	P: Carbon Steel, Alloy Steel, Cast Iron	P: Tool steel, Pre-Hardened Steel, Hardened Steel	H: Hardened Steel(-55HRC)	H: Hardened Steel(55HRC-)	M: Austenitic Stainless Steel	S: Titanium Alloy, Heat Resistant Alloy	N: Copper Alloy	N: Aluminium Alloy	Page
SQUARE															
	1	For Hardened Steels	CBN	GBE	 End mill, 1 flute, Brazed type (CBN)	DC 6–12				◎					J349
	2	General Use	MS	MS2SS	 End mill, Short cut length, 2 flute	DC 0.1–12	◎	◎	○		○	○	○		J056
	2	General Use	MS	MS2MS	 End mill, Medium cut length, 2 flute	DC 0.2–20	◎	◎	○		○	○	○		J057
	2	General Use	MS	MS2MD	 End mill, Medium cut length, 2 flute, Strong geometry type	DC 1–12	◎	◎	○		○	○			J060
	2	General Use	MS	MS2JS	 End mill, Semi long cut length, 2 flute	DC 0.1–12	◎	◎	○		○	○	○		J062
	2	General Use	MS	MS2LS	 End mill, Long cut length, 2 flute	DC 0.2–12	◎	◎	○		○	○	○		J064
	2	For Key Way Slotting	MS	SED2KPG	 End mill, Medium cut length, 2 flute, + Tolerance	DC 2–16	◎	◎			○				J090
	2	For Key Way Slotting	MS	SED2KMG	 End mill, Medium cut length, 2 flute, + Tolerance	DC 2–16	◎	◎			○				J089
	2	For Small Automatic Lathes	MS+	NEW MP2ES	 End mill, For small automatic lathes, 2 flute	DC 3–10	◎	◎	○		○	○	○		J074
	2	For Small Automatic Lathes	MS	MS2ES	 End mill, 2 flute, For small automatic lathes	DC 3–12	◎	◎	○		○	○	○		J077
	2	For Hardened Steels	VF	VF2MD	 End mill, Medium cut length, 2 flute, For hardened materials	DC 0.5–6		○	◎	◎					J079
	2	For Hardened Steels	VF	VF2MV	 End mill, Medium cut length, 2 flute, Irregular helix flutes	DC 0.5–6		○	◎	◎					J081
	2	For Copper Electrodes	CRN	CRN2MS	 End mill, Medium cut length, 2 flute, For copper electrodes	DC 0.2–12							◎	○	J085
	2	For Aluminium Alloys	UWC	C2MA	 End mill, Medium cut length, 2 flute, For aluminium alloy	DC 1–20								◎	J092
	2	For Aluminium Alloys	UWC	C2MHA	 End mill, Medium cut length, 2 flute, For aluminium alloy	DC 3–25								◎	J094
	3	General Use	MS	MSMHZD	 Slotting, Medium cut length, 3 flute	DC 1–20	◎	◎	○		○	○	○		J096

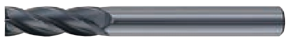
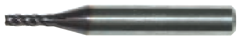
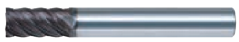
* DC : Cutting Diameter

J

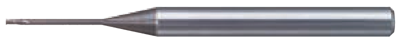
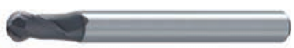
SOLID END MILLS

Type	No. of Flutes	Applications, Features	Coating or Substrate	Product Code	Shape	Size Range	Workpiece Material P: Carbon Steel, Alloy Steel, Cast Iron	P: Tool steel, Pre-Hardened Steel, Hardened Steel	H: Hardened Steel(-55HRC)	H: Hardened Steel(55HRC-)	M: Austenitic Stainless Steel	S: Titanium Alloy, Heat Resistant Alloy	N: Copper Alloy	N: Aluminium Alloy	Page
	3	For Small Automatic Lathes	MS+	NEW MP3ES	 End mill, For small automatic lathes, 3 flute	DC 3–12	◎	◎	○		○	○	○		J101
	3	For Small Automatic Lathes	MS	MS3ES	 End mill, 3 flute, For small automatic lathes	DC 3–12	◎	◎	○		○	○	○		J101
	3	For Difficult-to-cut Materials	VQ	VQMHZV	 End mill, Medium cutting length, 3 flute for drilling and slotting	DC 1–20	◎	◎			◎	◎	○		J103
	3	For Difficult-to-cut Materials	VQ	VQMHZVOH	 End mill, Medium cutting length, 3 flute for drilling and slotting with internal through coolant holes	DC 6–16	◎	◎			◎	◎	○		J109
	3	For Aluminium Alloys	DLC	NEW DLC3SA	 End mill, Short cut length, 3 flute, with multiple internal through coolant holes	DC 12–25								◎	J114
	3	For Aluminium Alloys	UWC	NEW A3SA	 End mill, Short cut length, 3 flute, with multiple internal through coolant holes	DC 12–25								◎	J113
	3	For Aluminium Alloys	UWC	C3SA	 End mill, Short cut length, 3 flute, For aluminium alloy	DC 10–26								◎	J116
	4	General Use	MS+	MPMHV	 End mill, Medium cut length, 4 flute, Irregular helix flutes	DC 1–22	◎	◎	○		◎	○	○		J118
	4	General Use	MS+	MPJHV	 End mill, Semi long cut length, 4 flute, Irregular helix flutes	DC 1–20	◎	◎	○		◎	○	○		J122
	4	General Use	MS	MS4SC	 End mill, Short cut length, 4 flute	DC 1–12	◎	◎	○		○	○	○		J128
	4	General Use	MS	MS4MC	 End mill, Medium cut length, 4 flute	DC 1–20	◎	◎	○		○	○	○		J130
	4	General Use	MS	MS4JC	 End mill, Semi long cut length, 4 flute	DC 1–12	◎	◎	○		○	○	○		J132
	4	General Use	MS	MSSHD	 High power, Short cut length, 4 flute	DC 3–20	◎	◎	○		○	○	○		J124
	4	General Use	MS	MSMHD	 High power, Medium cut length, 4 flute	DC 2–25	◎	◎	○		○	○	○		J125
	4	For Small Automatic Lathes	MS+	NEW MP4EC	 End mill, For small automatic lathes, 4 flute	DC 3–14	◎	◎	○		○	○	○		J138
	4	For Small Automatic Lathes	MS	MS4EC	 End mill, 4 flute, For small automatic lathes	DC 3–14	◎	◎	○		○	○	○		J141
	4	For Hardened Steels	VF	VF4MD	 End mill, Medium cut length, 4 flute, For hardened materials	DC 1–20		○	◎	◎					J153
	4	For Hardened Steels	VF	VF4MV	 End mill, Medium cut length, 4 flute, Irregular helix flutes	DC 6–20		○	◎	◎					J155

END MILLS SELECTION CHART CARBIDE(By Shape)

Type	No. of Flutes	Applications, Features	Coating or Substrate	Product Code	Shape	Size Range	P: Carbon Steel, Alloy Steel, Cast Iron	P: Tool steel, Pre-Hardened Steel, Hardened Steel	H: Hardened Steel(-55HRC)	H: Hardened Steel(55HRC-)	M: Austenitic Stainless Steel	S: Titanium Alloy, Heat Resistant Alloy	N: Copper Alloy	N: Aluminium Alloy	Page
SQUARE															
	4	For Difficult-to-cut Materials	VQ	VQMHV	 End mill, Medium cutting length, 4 flute, Irregular helix flutes	DC 1–25	◎	◎			◎	◎	○		J143
	4	For Difficult-to-cut Materials	VQ	VQJHV	 End mill, Semi long cut length, 4 flute, Irregular helix flutes	DC 1–20	◎	◎			◎	◎	○		J147
	4	For Difficult-to-cut Materials	VF	VFMHVCH	 End mill, Medium cut length, 4 flute, Irregular helix flutes, with multiple internal through coolant holes	DC 16,20	○	○			◎	◎			J156
	4	For Copper Electrodes	CRN	CRN4JC	 End mill, Semi long cut length, 4 flute, For copper electrodes	DC 3–12							◎	○	J159
	4	For CFRP	DFC	DFC4JC	 End mill, Semi long cut length, 4 flute	DC 6–12	CFRP : ◎								J161
	4	For Graphite	DF	DF4JC	 End mill, Semi long cut length, 4 flute, For graphite	DC 3–12	Graphite : ◎ GFRP/CFRP : ○ Machineable Ceramics : ○						◎	○	J160
	4	For Aluminium Alloys	UWC	SEG4SA	 End mill, Medium cut length, 4 flute, Irregular spiral helix angle, For aluminium alloy	DC 6–25							○	◎	J162
	4 6	For Hardened Steels	VF	VFSD	 End mill, Short cut length, For hardened materials	DC 1–12		○	◎	◎					J165
	4 6	For Hardened Steels	VF	VFMD	 End mill, Medium cut length, For hardened materials	DC 1–25		○	◎	◎					J166
	4 6	For Hardened Steels	VC	VCMDSC	 End mill, Medium cut length, 4–6 flute	DC 0.5–3		○	◎	◎					J157
	6	For Hardened Steels	VC	VCLD	 End mill, Long cut length, 6 flute	DC 6–25		○	◎	◎					J168
	6	For Difficult-to-cut Materials	VF	VF6MHV	 End mill, Medium cut length, 6 flute, Irregular helix flutes	DC 6–20	○	○			◎	◎			J164
	6	For Difficult-to-cut Materials	VQ	VQ6MHVCH	 End mill, Medium cut length, 6 flute, Irregular helix flutes, With multiple internal through coolant	DC 10–20	○	○			◎	◎	○		J163
	8	For Difficult-to-cut Materials	VF	VF8MHVCH	 End mill, Medium cut length, Irregular helix flutes, with multiple internal through coolant holes	DC 16,20	○	○			◎	◎			J169
	10 12	For CFRP	DFC	DFCJRT	 Diamond coating endmill with cross-nick	DC 6–12	CFRP : ◎								J170

* DC : Cutting Diameter
* RE : Ball Nose End Mill Radius

Type	No. of Flutes	Applications, Features	Coating or Substrate	Product Code	Shape	Size Range	P: Carbon Steel, Alloy Steel, Cast Iron	P: Tool steel, Pre-Hardened Steel, Hardened Steel	H: Hardened Steel(-55HRC)	H: Hardened Steel(55HRC-)	M: Austenitic Stainless Steel	S: Titanium Alloy, Heat Resistant Alloy	N: Copper Alloy	N: Aluminium Alloy	Page
LONG NECK SQUARE															
	3 4	For Difficult-to-cut Materials	VQ	VQXL	 End mill, Short cut length, 3–4 flute, Long neck	DC 0.2–1	◎	◎			◎	◎	○		J149
	2	For Deep Slotting	MS	MS2XL	 End mill, Short cut length, 2 flute, Long neck	DC 0.2–6	◎	◎	○		○	○	○		J066
	2	For Deep Slotting	MS	MS2XL6	 End mill, Short cut length, 2 flute, 6mm shank	DC 0.3–2.5	◎	◎	○		○	○	○		J070
	2	For Deep Slotting – Hardened Steels	VF	VF2XL	 End mill, 2 flute, Long neck	DC 0.1–3	○	◎	◎	◎					J083
	2	For Deep Slotting – Copper electrodes	CRN	CRN2XL	 End mill, Medium cut length, 2 flute, Long neck, For copper electrodes	DC 0.2–6							◎	○	J087
	4	For Deep Slotting – General Use	MS	MS4XL	 End mill, Short cut length, 4 flute, Long neck	DC 1–10	◎	◎	○		○	○	○		J134
BALL															
	2	General Use	MS+	MP2SSB	 Ball nose, Short cut length, 2 flute, Short shank	RE 0.1–6	◎	◎	◎		○	○	○		J171
	2	General Use	MS+	MP2SB	 Ball nose, Short cut length, 2 flute	RE 0.1–6	◎	◎	◎		○	○	○		J172
	2	General Use	MS+	MP2MB	 Ball nose, Medium cutting length, 2 flute	RE 0.25–6	◎	◎	◎		○	○	○		J173
	2	General Use	MS+	MP2SDB	 Ball nose, Short cut length, 2 flute, High strength	RE 0.5–6	○	◎	◎						J175
	2	For Hardened Steels	VFR	VFR2SSB	 Ball nose, Short cut length, 2 flute, Short shank	RE 0.5–6		○	◎	◎					J189
	2	For Hardened Steels	VFR	VFR2SB	 Ball nose, Short cut length, 2 flute	RE 0.1–10		○	◎	◎					J191
	2	For Hardened Steels	VFR	VFR2SBF	 Ball nose, Short cut length, 2 flute, For Mirror finish cutting	RE 0.5–3		○	◎	◎					J193
	2	For Difficult-to-cut Materials	VQN	NEW VQN2MB	 Ball nose, Medium cut length, 2 flute	RE 0.5–6						◎			J185
	2	For Copper Electrodes	CRN	CRN2MB	 Ball nose, Medium cut length, 2 flute, For copper electrodes	RE 0.2–6							◎	○	J208

CARBIDE

END MILLS SELECTION CHART CARBIDE(By Shape)

Type	No. of Flutes	Applications, Features	Coating or Substrate	Product Code	Shape	Size Range	P: Carbon Steel, Alloy Steel, Cast Iron	P: Tool steel, Pre-Hardened Steel, Hardened Steel	H: Hardened Steel(-55HRC)	H: Hardened Steel(55HRC-)	M: Austenitic Stainless Steel	S: Titanium Alloy, Heat Resistant Alloy	N: Copper Alloy	N: Aluminium Alloy	Page
BALL															
	2	For Hard Brittle Materials	DC	DC2SB	Ball nose, Short cut length, 2 flute, For hard brittle materials	RE 0.1–3	Cemented Carbide : ◎ Alumina / Zirconia : ○ Silicon Carbide / Nitride : ○ Quartz Glass : ○								J213
	4	For Hardened Steels	VF	VF4MB	Ball nose, Medium cut length, 4 flute	RE 0.5–6		○	◎	◎					J243
	4	For Difficult-to-cut Materials	VQN	NEW VQN4MB	Ball nose, Medium cut length, 4 flute	RE 1–6						◎			J239
	4	For Difficult-to-cut Materials	VQN	NEW VQN4MBF	Ball nose, Medium cut length, 4 flute	RE 1–6						◎			J241
	4	For Difficult-to-cut Materials	VQ	VQ4SVB	Ball nose, Short cut length, 4 flute	RE 1–6	◎	◎			◎	◎	○		J234
LONG NECK BALL															
	2	General Use	MS+	MP2XLB	Ball nose, Short cut length, 2 flute, Long neck	RE 0.05–3	◎	◎	◎		○	○	○		J177
	2	For Profiling of Special Geometry	VF	VF2WB	Wide ball nose, Medium cut length, 2 flute	RE 1–3	○	○	○		◎	◎			J199
	2	For Deep Slotting of Hardened Steels	VFR	NEW VFR2XLB	Ball nose, Long neck, 2 flute	RE 0.1–3		○	◎	◎					J195
	2	For Deep Slotting of Hardened Steels	VF	VF2XLBS	Ball nose, Medium cut length, 2 flute, Short shank	RE 0.2–1	○	◎	◎	◎					J200
	2	For Deep Slotting of Hardened Steels	VF	VF2XLB	Ball nose, 2 flute, Long neck	RE 0.1–3	○	◎	◎	◎					J202
	2	For Deep Slotting of Hardened Steels	VQ	NEW VQ2XLB	Ball nose, Short cut length, 2 flute, Long neck	RE 0.5–1.5						◎			J187
	2	For Copper Electrodes	CRN	CRN2XLB	Ball nose, Medium cut length, 2 flute, Long neck, For copper electrodes	RE 0.1–3							◎	○	J210
	2	For Hard Brittle Materials	DC	DC2XLB	Ball nose, Short cut length, 2 flute, For hard brittle materials	RE 0.1–3	Cemented Carbide : ◎ Alumina / Zirconia : ○ Silicon Carbide / Nitride : ○ Quartz Glass : ○								J215
	2	For Graphite	DF	DF2XLB	Ball nose, Medium cut length, 2 flute, Long neck, For graphite	RE 0.1–3	Graphite : ◎ GFRP/CFRP : ○ Machineable Ceramics : ○						◎	○	J217
	2	For Graphite	DF	DF2XLBF	Ball nose, Medium cut length, 2 flute, Long neck, For graphite	RE 0.3–1.5	Graphite : ◎ Zirconia : ◎ Rigid Composite Resin : ◎ Machineable Ceramics : ○						◎	○	J220
	4	For Profiling of Special Geometry	VQ	NEW VQ4WB	Multi-functional lollipop, Short cut length, 4 flute	RE 0.5–3	◎	◎			◎	◎	○		J236

* DC : Cutting Diameter
* RE : Ball Nose End Mill Radius

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SOLID END MILLS

Group	No. of Flutes	Applications, Features		Coating or Substrate	Product Code	Shape	Size Range	Workpiece Material P: Carbon Steel, Alloy Steel, Cast Iron	P: Tool steel, Pre-Hardened Steel, Hardened Steel	H: Hardened Steel(-55HRC)	H: Hardened Steel(55HRC-)	M: Austenitic Stainless Steel	S: Titanium Alloy, Heat Resistant Alloy	N: Copper Alloy	N: Aluminium Alloy	Page
TAPER NECK BALL																
	3	For Deep Slotting	General Use	MS+	**MP3XB**	Ball nose, 3 flute, Taper neck	RE 0.5–6	◎	◎	◎		○	○	○		**J222**
	3	For Deep Slotting	Hardened Steels	VF	**VF3XB**	Ball nose, Medium cut length, 3 flute, Taper neck	RE 0.4–2.5	○	◎	◎	◎					**J228**
RADIUS																
	2	General Use		MS	**MS2MRB**	Corner radius end mill, Medium cut length, 2 flute	DC 1–12	◎	◎	○		○	○	○		**J245**
	2	For Copper Electrodes		CRN	**CRN2MRB**	Corner radius, Medium cut length, 2 flute, For copper electrodes	DC 6–12							◎	○	**J248**
	3	For Aluminium Alloys		DLC	NEW **DLC3SARB**	Corner radius end mill, Short cut length, 3 flute, with multiple internal through coolant holes	DC 12–25								◎	**J255**
	3	For Aluminium Alloys		UWC	NEW **A3SARB**	Corner radius end mill, Short cut length, 3 flute, with multiple internal through coolant holes	DC 12–25								◎	**J251**
	3	For Aluminium Alloys		UWC	**C3SARB**	Corner radius, Short cut length, 3 flute, For aluminium alloy	DC 12–25								◎	**J253**
	2 4	For High-Precision Machining		VC	**VCPSRB**	Corner radius end mill, Short cut length, 2–4 flute, High precision	DC 0.6–12		◎	◎	○					**J302**
	4	General Use		MS+	**MPMHVRB**	End mill, Medium cut length, 4 flute, Irregular helix flutes	DC 1–20	◎	◎	○		◎	○	○		**J257**
	4	For High Efficiency Machining		VF	**VFHVRB**	4 flute, Corner radius, Short cut length,Irregular helix flutes	DC 1–16	◎	◎	◎	○	○	○			**J290**
	4	General Use		MS	**MS4MRB**	Corner radius end mill, Medium cut length, 4 flute	DC 3–20	◎	◎	○		○	○	○		**J267**
	4	General Use		VC	**VC4JRB**	Corner radius end mill, Semi long cut length, 4 flute	DC 3–20	○	◎	○		○	○			**J308**
	4	For Hardened Steels		VFR	NEW **VFRPSRB**	Corner radius end mill, Short cut length, High precision, 4 flute	DC 0.5–12		○	◎	◎					**J283**
	4	For Difficult-to-cut Materials		VQ	NEW **VQHVRB**	Corner radius, Short cut length, 4 flute, Irregular helix flutes	DC 1–4						◎			**J279**
	4	For Difficult-to-cut Materials		VQ	NEW **VQFDRB**	Duplex corner radius end mill for high-speed cutting	DC 3–6						◎			**J281**

CARBIDE

END MILLS SELECTION CHART CARBIDE(By Shape)

Type	No. of Flutes	Applications, Features	Coating or Substrate	Product Code	Shape	Size Range	P: Carbon Steel, Alloy Steel, Cast Iron	P: Tool steel, Pre-Hardened Steel, Hardened Steel	H: Hardened Steel(-55HRC)	H: Hardened Steel(55HRC-)	M: Austenitic Stainless Steel	S: Titanium Alloy, Heat Resistant Alloy	N: Copper Alloy	N: Aluminium Alloy	Page
RADIUS															
	4	For Difficult-to-cut Materials	VQ	VQMHVRB	Corner radius end mill, Medium cutting length, 4 flute, Irregular helix flutes	DC 2–20	◎	◎			◎	◎	○		J270
	4	For Difficult-to-cut Materials	VQ	VQMHVRBF	Corner radius end mill, Medium cutting length, 4 flute, Irregular helix flutes (for finishing)	DC 6–16	◎	◎			◎	◎	○		J275
	4	For Difficult-to-cut Materials	VF	VFMHVRBCH	Corner radius end mill, Medium cut length, 4 flute, Irregular helix flutes, with multiple internal through coolant holes	DC 16,20	○	○			◎	◎			J288
	4 6	For Hardened Steels	VF	VFFDRB	Multi-task corner radius end mill for impact miracle high speed cutting	DC 3–12		○	◎	◎					J300
	4 6	For Difficult-to-cut Materials	VQN	NEW VQN4MVRB/ VQN6MVRB	Corner Radius, Medium cut length, 4, 6 flute	DC 3–12						◎			J277
	6	For Hardened Steels	VF	VFSDRB	Corner radius end mill, 6 flute (S)	DC 3–12		○	◎	◎					J318
	6	For Hardened Steels	VF	VFMDRB	Corner radius, Medium cut length, 6 flute, For hardened materials	DC 3–20		○	◎	◎					J320
	6	For Difficult-to-cut Materials	VF	VF6MHVRB	Corner radius, Medium cut length, 6 flute, Irregular helix flutes	DC 6–20	○	○			◎	◎			J316
	6	For Difficult-to-cut Materials	VQ	VQ6MHVRBCH	Corner radius end mill, Medium cut length, 6 flute, Irregular helix flutes, with multiple internal through coolant holes	DC 10–20	○	○			◎	◎	○		J314
	5	For Difficult-to-cut Materials	VQT	VQT5MVRB	Corner radius, Medium cut length, 5 flute, Irregular helix flutes, With coolant hole	DC 16,20,25						◎			J312
	8	For Difficult-to-cut Materials	VF	VF8MHVRBCH	Corner radius end mill, Medium cut length, 8 flute, Irregular helix flutes, with multiple internal through coolant holes	DC 16,20	○	○			◎	◎			J322
	4	For Heat Resistant Alloy	CERAMIC	CE4SRB	Corner radius end mill, short cut length, 4 flute	DC 6–12						◎			J310
	6	For Heat Resistant Alloy	CERAMIC	CE6SRB	Corner radius end mill, short cut length, 6 flute	DC 6–12						◎			J310

⁎ DC : Cutting Diameter
⁎ RE : Ball Nose End Mill Radius

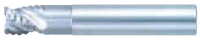
J

SOLID END MILLS

Type	No. of Flutes	Applications, Features	Coating or Substrate	Product Code	Shape	Size Range	P: Carbon Steel, Alloy Steel, Cast Iron	P: Tool steel, Pre-Hardened Steel, Hardened Steel	H: Hardened Steel(-55HRC)	H: Hardened Steel(55HRC-)	M: Austenitic Stainless Steel	S: Titanium Alloy, Heat Resistant Alloy	N: Copper Alloy	N: Aluminium Alloy	Page
LONG NECK CORNER RADIUS															
	2	For Copper Electrodes	CRN	CRN2XLRB	 Corner radius, Medium cut length, 2 flute, For copper electrodes	DC 0.5–6							◎	○	J249
	2 4	General Use	MS+	MPXLRB	 Corner radius, short cut length, long neck	DC 0.2–6	◎	◎	◎		○	○	○		J261
TAPER NECK RADIUS															
	2 4	For High-Precision Machining	VC	VCPSRB	 Corner radius end mill, Short cut length, 2–4 flute, High precision	DC 1.5–12		◎	◎	○					J306
	4	For High Efficiency Machining	VF	VFHVRB	 4 flute, Corner radius, Short cut length, Irregular helix flutes	DC 1–12	◎	◎	◎	○	○	○			J296
TAPER BALL															
	4	For Hardened Steels	VC	VC4STB	 Ball nose taper end mill, Short cut length, 4 flute	RE 0.3–4		○	◎	◎					J324
	4	For Aluminium Alloys	DLC	NEW DLC4LATB	 Ball nose taper end mill, Long cut length, 4 flute, For aluminum impellers	RE 0.5–2								◎	J328
	4	For Aluminium Alloys	UWC	C4LATB	 Ball nose taper end mill, Long cut length, 4 flute, For aluminum impellers	RE 0.5–2								◎	J330
BARREL ENDMILL															
	6	For Profiling of Special Geometry	VQT	VQT6UR	 Barrel, Medium cut length, 6 flute	DC 8–12					○	◎		○	J332

CARBIDE

END MILLS SELECTION CHART CARBIDE(By Shape)

Type	No. of Flutes	Applications, Features	Coating or Substrate	Product Code	Shape	Size Range	Workpiece Material P: Carbon Steel, Alloy Steel, Cast Iron	P: Tool steel, Pre-Hardened Steel, Hardened Steel	H: Hardened Steel(-55HRC)	H: Hardened Steel(55HRC-)	M: Austenitic Stainless Steel	S: Titanium Alloy, Heat Resistant Alloy	N: Copper Alloy	N: Aluminium Alloy	Page
ROUGHING															
	3 4	For Difficult-to-cut Materials	VQ	VQSVR	 Roughing end mill, Short cut length, 3–4 flute, Irregular helix flutes	DC 3–20	◎	◎			◎	◎	○		J336
			VF	VFSFPR	 Roughing end mill, Short cut length, 3–4 flute	DC 3–20	○	○			◎	◎			J339
	4		VF	VFMFPR	 Roughing end mill, Medium cut length, 4 flute	DC 5–20	○	○			◎	◎			J342
			VF	VFSFPRCH	 Roughing end mill, Short cut length, 4 flute, with multiple internal through coolant holes	DC 16,20	○	○			◎	◎			J341
	6		VF	VF6SVRCH	 Roughing end mill, Short cut length, 6 flute, Irregular helix flutes, with multiple internal through coolant holes	DC 16,20	○	○			◎	◎			J343
	3	For Aluminium Alloys	UWC	CSRA	 Roughing end mill, Short cut length, 3 flute, For aluminium alloy	DC 10–25								◎	J344
			UWC	CMRA	 Roughing end mill, Medium cut length, 3 flute, For aluminium alloy	DC 3–25								◎	J346
CHAMFER CUTTER															
	2	For Chamfering	VC	VC2C	 Chamfer cutter, 2 flute	DC 2–12	◎	◎	○		◎	◎	○	○	J348

⋆ DC : Cutting Diameter

J

SOLID END MILLS

Memo

END MILLS SELECTION CHART HSS (By Shape)

Type	No. of Flutes	Applications, Features	Coating or Substrate	Product Code	Shape	Size Range	P: Carbon Steel, Alloy Steel, Cast Iron	P: Tool steel, Pre-Hardened Steel, Hardened Steel	H: Hardened Steel(-55HRC)	H: Hardened Steel(55HRC-)	M: Austenitic Stainless Steel	S: Titanium Alloy, Heat Resistant Alloy	N: Copper Alloy	N: Aluminium Alloy	Page
SQUARE															
	1	For Aluminium Sashes	HSS	1MA	 End mill, Medium cut length, 1 flute	DC 3–8								◎	J350
			HSS	1LA	 End mill, Long cut length, 1 flute	DC 4–12								◎	J351
	2	General Use	V	VA2SS	 End mill, Short cut length, 2 flute	DC 3–20	◎	○			○	○			J352
			V	VA2MS	 End mill, Medium cut length, 2 flute	DC 3–40	◎	○			○	○			J354
			CO HSS	2SS	 End mill, Short cut length, 2 flute	DC 0.5–20	◎	○			○	○		○	J356
			CO HSS	2MS	 End mill, Medium cut length, 2 flute	DC 1–60	◎	○			○	○		○	J358
			CO HSS	2LS	 End mill, Long cut length, 2 flute	DC 1–40	◎	○			○	○		○	J360
		For Key Way Slotting	CO HSS	2MK	 End mill, Short cut length, 2 flute, For key ways	DC 3–20	◎	○			○			○	J362
		For Aluminium Alloys	KHA S	S2SDA	 End mill, Short cut length, 2 flute, For aluminium alloy	DC 3–20							○	◎	J363
	4	General Use	V	VA4MC	 End mill, Medium cut length, 4 flute	DC 3–30	◎	○			○	○			J364
			CO HSS	4MC	 End mill, Medium cut length, 4 flute, Center cutting	DC 2.5–40	◎	○			○	○		○	J366
			CO HSS	4LC	 End mill, Long cut length, 4 flute, Center cutting	DC 3–40	◎	○			○	○		○	J368

* DC : Cutting Diameter

Type	No. of Flutes	Applications, Features	Coating or Substrate	Product Code	Shape	Size Range	Workpiece Material: P: Carbon Steel, Alloy Steel, Cast Iron	P: Tool steel, Pre-Hardened Steel, Hardened Steel	H: Hardened Steel(-55HRC)	H: Hardened Steel(55HRC-)	M: Austenitic Stainless Steel	S: Titanium Alloy, Heat Resistant Alloy	N: Copper Alloy	N: Aluminium Alloy	Page
ROUGHING															
	4 5	For Roughing	V	**VASFPR**	 Roughing end mill, Short cut length, 4–6 flute, Fine pitch form	DC 5–50	◎	○			◎	○			**J370**
	4 5 6		V	**VAMFPR**	 Roughing end mill, Medium cut length, 4–6 flute, Fine pitch form	DC 5–50	◎	○			◎	○			**J372**
	4 5		V	**VAMR**	 Roughing end mill, Medium cut length, 4–6 flute	DC 5–50	◎	○			◎	○			**J374**
			CO HSS	**MR**	 Roughing end mill, Medium cut length, 4–6 flute	DC 5–50	◎	○			○	○		○	**J376**

CARBIDE

SELECTION CHART BY BLADE DIAMETER

CARBIDE/SQUARE

Order Number	DC	LU	APMX	LF	DCON	Page
MS2SSD0010	0.1	—	0.15	40	4	J056
MS2JSD0010	0.1	—	0.3	40	4	J062
MS2XLD0020N005	0.2	0.5	0.3	45	4	J066
VQXLD0020N006	0.2	0.6	0.3	40	4	J149
VF2XLD0020N006	0.2	0.6	0.3	45	4	J083
MS2XLD0020N010	0.2	1	0.3	45	4	J066
MS2XLD0020N015	0.2	1.5	0.3	45	4	J066
MS2SSD0020	0.2	—	0.3	40	4	J056
CRN2MSD0020S04	0.2	—	0.4	40	4	J085
MS2MSD0020	0.2	—	0.4	40	4	J057
MS2JSD0020	0.2	—	0.6	40	4	J062
MS2LSD0020	0.2	—	0.8	40	4	J064
VQXLD0030N009	0.3	0.9	0.5	40	4	J149
MS2XLD0030N010	0.3	1	0.4	45	4	J066
VF2XLD0030N010	0.3	1	0.5	45	4	J083
CRN2XLD0030N010S04	0.3	1	0.5	50	4	J087
VQXLD0030N015	0.3	1.5	0.5	40	4	J149
MS2XL6D0030N015	0.3	1.5	0.5	50	6	J070
MS2XLD0030N020	0.3	2	0.4	45	4	J066
MS2XLD0030N030	0.3	3	0.4	45	4	J066
CRN2XLD0030N030S04	0.3	3	0.5	50	4	J087
MS2XLD0030N060	0.3	6	0.4	45	4	J066
MS2XLD0030N090	0.3	9	0.4	45	4	J066
MS2SSD0030	0.3	—	0.45	40	4	J056
CRN2MSD0030S04	0.3	—	0.6	40	4	J085
MS2MSD0030	0.3	—	0.6	40	4	J057
MS2XL6D0030N008	0.3	—	0.8	50	6	J070
MS2JSD0030	0.3	—	0.9	40	4	J062
MS2LSD0030	0.3	—	1.2	40	4	J064
VQXLD0040N010	0.4	1	0.6	40	4	J149
VF2XLD0040N010	0.4	1	0.6	45	4	J083
MS2XL6D0040N010	0.4	1	0.6	50	6	J070
VQXLD0040N018	0.4	1.8	0.6	40	4	J149
MS2XLD0040N020	0.4	2	0.6	45	4	J066
VF2XLD0040N020	0.4	2	0.6	45	4	J083
CRN2XLD0040N020S04	0.4	2	0.6	50	4	J087
MS2XL6D0040N020	0.4	2	0.6	50	6	J070
MS2XLD0040N030	0.4	3	0.6	45	4	J066
MS2XLD0040N040	0.4	4	0.6	45	4	J066
MS2XLD0040N080	0.4	8	0.6	45	4	J066
MS2XLD0040N120	0.4	12	0.6	45	4	J066
MS2SSD0040	0.4	—	0.6	40	4	J056
CRN2MSD0040S04	0.4	—	0.8	40	4	J085
MS2MSD0040	0.4	—	0.8	40	4	J057
MS2JSD0040	0.4	—	1.2	40	4	J062
MS2LSD0040	0.4	—	1.6	40	4	J064
MS2XL6D0050N013	0.5	1.3	0.8	50	6	J070
VQXLD0050N015	0.5	1.5	0.7	40	4	J149
MS2XLD0050N020	0.5	2	0.7	45	4	J066
VF2XLD0050N020	0.5	2	0.8	45	4	J083
CRN2XLD0050N020S04	0.5	2	0.8	50	4	J087
VQXLD0050N025	0.5	2.5	0.7	40	4	J149
MS2XL6D0050N025	0.5	2.5	0.8	50	6	J070
VQXLD0050N030	0.5	3	0.7	40	4	J149
MS2XLD0050N040	0.5	4	0.7	45	4	J066
VF2XLD0050N040	0.5	4	0.8	45	4	J083
CRN2XLD0050N040S04	0.5	4	0.8	50	4	J087
MS2XLD0050N060	0.5	6	0.7	45	4	J066
CRN2XLD0050N060S04	0.5	6	0.8	50	4	J087
MS2XLD0050N080	0.5	8	0.7	50	4	J066
MS2XLD0050N100	0.5	10	0.7	50	4	J066
MS2XLD0050N150	0.5	15	0.7	50	4	J066
MS2SSD0050	0.5	—	0.75	40	4	J056
CRN2MSD0050S04	0.5	—	1	40	4	J085
MS2MSD0050	0.5	—	1	40	4	J057
VCMDSCD0050	0.5	—	1	45	6	J157
VF2MDD0050	0.5	—	1.3	40	4	J079
VF2MVD0050	0.5	—	1.3	40	4	J081
MS2JSD0050	0.5	—	1.5	40	4	J062
MS2LSD0050	0.5	—	2	40	4	J064
MS2XL6D0060N015	0.6	1.5	0.9	50	6	J070
MS2XLD0060N020	0.6	2	0.9	45	4	J066
VF2XLD0060N020	0.6	2	0.9	45	4	J083
VQXLD0060N030	0.6	3	0.9	40	4	J149
MS2XL6D0060N030	0.6	3	0.9	50	6	J070
MS2XLD0060N040	0.6	4	0.9	45	4	J066
VF2XLD0060N040	0.6	4	0.9	45	4	J083
MS2XLD0060N060	0.6	6	0.9	45	4	J066
MS2XLD0060N080	0.6	8	0.9	50	4	J066
MS2XLD0060N100	0.6	10	0.9	50	4	J066
MS2XLD0060N120	0.6	12	0.9	50	4	J066
MS2XLD0060N180	0.6	18	0.9	50	4	J066
MS2SSD0060	0.6	—	0.9	40	4	J056
CRN2MSD0060S04	0.6	—	1.2	40	4	J085
MS2MSD0060	0.6	—	1.2	40	4	J057
MS2JSD0060	0.6	—	1.8	40	4	J062
MS2LSD0060	0.6	—	2.4	40	4	J064
MS2XL6D0070N018	0.7	1.8	1.1	50	6	J070
MS2XLD0070N020	0.7	2	1	45	4	J066
VQXLD0070N035	0.7	3.5	1	40	4	J149
MS2XL6D0070N035	0.7	3.5	1.1	50	6	J070
MS2XLD0070N040	0.7	4	1	45	4	J066
MS2XLD0070N060	0.7	6	1	45	4	J066
MS2XLD0070N080	0.7	8	1	50	4	J066
MS2XLD0070N100	0.7	10	1	50	4	J066
MS2SSD0070	0.7	—	1.1	40	4	J056
CRN2MSD0070S04	0.7	—	1.4	40	4	J085
MS2MSD0070	0.7	—	1.4	40	4	J057
MS2JSD0070	0.7	—	2.1	40	4	J062
MS2LSD0070	0.7	—	2.8	40	4	J064

DC = Cutting diameter LU = Usable length APMX = Depth of cut maximum LF = Functional length DCON = Connection diameter

Order Number	DC	LU	APMX	LF	DCON	Page
MS2XL6D0080N020	0.8	2	1.2	50	6	J070
VQXLD0080N024	0.8	2.4	1.2	40	4	J149
VQXLD0080N030	0.8	3	1.2	40	4	J149
VQXLD0080N040	0.8	4	1.2	40	4	J149
MS2XLD0080N040	0.8	4	1.2	45	4	J066
VF2XLD0080N040	0.8	4	1.2	45	4	J083
CRN2XLD0080N040S04	0.8	4	1.2	50	4	J087
MS2XL6D0080N040	0.8	4	1.2	50	6	J070
MS2XLD0080N060	0.8	6	1.2	45	4	J066
VF2XLD0080N060	0.8	6	1.2	45	4	J083
MS2XLD0080N080	0.8	8	1.2	50	4	J066
MS2XLD0080N100	0.8	10	1.2	50	4	J067
MS2XLD0080N120	0.8	12	1.2	50	4	J067
MS2XLD0080N160	0.8	16	1.2	50	4	J067
MS2XLD0080N240	0.8	24	1.2	60	4	J067
MS2SSD0080	0.8	—	1.2	40	4	J056
CRN2MSD0080S04	0.8	—	1.6	40	4	J085
MS2MSD0080	0.8	—	1.6	40	4	J057
MS2JSD0080	0.8	—	2.4	40	4	J062
MS2LSD0080	0.8	—	3.2	40	4	J064
MS2XL6D0090N023	0.9	2.3	1.4	50	6	J070
MS2XL6D0090N045	0.9	4.5	1.4	50	6	J070
MS2XLD0090N060	0.9	6	1.4	45	4	J067
MS2XLD0090N080	0.9	8	1.4	50	4	J067
MS2XLD0090N100	0.9	10	1.4	50	4	J067
MS2XLD0090N150	0.9	15	1.4	60	4	J067
MS2SSD0090	0.9	—	1.4	40	4	J056
MS2MSD0090	0.9	—	1.8	40	4	J057
MS2JSD0090	0.9	—	2.7	40	4	J062
MS2LSD0090	0.9	—	3.6	40	4	J064
MS2XL6D0100N025	1	2.5	1.5	50	6	J070
MS4XLD0100N040	1	4	1	50	4	J134
MS2XLD0100N040	1	4	1.5	50	4	J067
VF2XLD0100N040	1	4	1.5	50	4	J083
VQXLD0100N050	1	5	1.5	40	4	J149
MS2XL6D0100N050	1	5	1.5	50	6	J070
MS4XLD0100N060	1	6	1	50	4	J134
CRN2XLD0100N060S04	1	6	1.5	50	4	J087
MS2XLD0100N060	1	6	1.5	50	4	J067
VF2XLD0100N060	1	6	1.5	50	4	J083
CRN2XLD0100N060S06	1	6	1.5	50	6	J087
MS4XLD0100N080	1	8	1	50	4	J134
CRN2XLD0100N080S04	1	8	1.5	50	4	J087
MS2XLD0100N080	1	8	1.5	50	4	J067
VF2XLD0100N080	1	8	1.5	50	4	J083
MS4XLD0100N100	1	10	1	50	4	J134
CRN2XLD0100N100S04	1	10	1.5	50	4	J087
MS2XLD0100N100	1	10	1.5	50	4	J067
MS4XLD0100N120	1	12	1	50	4	J134
CRN2XLD0100N120S04	1	12	1.5	50	4	J087

Order Number	DC	LU	APMX	LF	DCON	Page
MS2XLD0100N120	1	12	1.5	50	4	J067
VF2XLD0100N120	1	12	1.5	50	4	J083
MS4XLD0100N160	1	16	1	60	4	J134
MS2XLD0100N160	1	16	1.5	60	4	J067
MS2XLD0100N200	1	20	1.5	60	4	J067
MS2XLD0100N250	1	25	1.5	70	4	J067
MS2XLD0100N300	1	30	1.5	70	4	J067
MS2SSD0100	1	—	1.5	40	4	J056
MS4SCD0100	1	—	1.5	40	4	J128
MS2MSD0100	1	—	2	40	4	J057
MSMHZDD0100	1	—	2	45	4	J096
VQMHVD0100	1	—	2	45	4	J143
VQMHZVD0100	1	—	2	45	4	J103
VFSDD0100	1	—	2	45	6	J165
C2MAD0100	1	—	2.5	40	4	J092
CRN2MSD0100S04	1	—	2.5	40	4	J085
MS2MDD0100	1	—	2.5	40	4	J060
MS4MCD0100	1	—	2.5	40	4	J130
VF2MDD0100	1	—	2.5	40	4	J079
VF2MVD0100	1	—	2.5	40	4	J081
VF4MDD0100	1	—	2.5	40	4	J153
MPMHVD0100	1	—	2.5	45	4	J118
CRN2MSD0100S06	1	—	2.5	45	6	J085
VCMDSCD0100	1	—	2.5	45	6	J157
MS2JSD0100	1	—	3	40	4	J062
VFMDD0100	1	—	3.5	60	6	J166
MS2LSD0100	1	—	4	40	4	J064
MS4JCD0100	1	—	4	40	4	J132
MPJHVD0100AP04	1	—	4	45	4	J122
VQJHVD0100	1	—	4	45	4	J147
MS2XL6D0110N028	1.1	2.8	1.7	50	6	J070
MS2XL6D0110N055	1.1	5.5	1.7	50	6	J070
MS4XLD0110N060	1.1	6	1.1	50	4	J134
MS4XLD0110N100	1.1	10	1.1	50	4	J134
MS4XLD0110N160	1.1	16	1.1	60	4	J134
MS2MSD0110	1.1	—	2.2	40	4	J057
VQMHZVD0110	1.1	—	2.2	45	4	J103
MS2XL6D0120N030	1.2	3	1.8	50	6	J070
MS4XLD0120N060	1.2	6	1.2	50	4	J134
MS2XLD0120N060	1.2	6	1.8	50	4	J067
MS2XL6D0120N060	1.2	6	1.8	50	6	J070
MS4XLD0120N080	1.2	8	1.2	50	4	J134
MS2XLD0120N080	1.2	8	1.8	50	4	J067
MS4XLD0120N100	1.2	10	1.2	50	4	J134
MS2XLD0120N100	1.2	10	1.8	50	4	J067
MS4XLD0120N120	1.2	12	1.2	50	4	J134
MS2XLD0120N120	1.2	12	1.8	50	4	J067
MS4XLD0120N160	1.2	16	1.2	60	4	J134
MS2XLD0120N160	1.2	16	1.8	60	4	J067
MS2XLD0120N200	1.2	20	1.8	60	4	J067

DC = Cutting diameter   LU = Usable length   APMX = Depth of cut maximum   LF = Functional length   DCON = Connection diameter

CARBIDE

SELECTION CHART BY BLADE DIAMETER

CARBIDE/SQUARE

Order Number	DC	LU	APMX	LF	DCON	Page
MS2SSD0120	1.2	—	1.8	40	4	J056
MS2MSD0120	1.2	—	2.4	40	4	J057
VQMHZVD0120	1.2	—	2.4	45	4	J103
MS2JSD0120	1.2	—	3.6	40	4	J062
MS2XL6D0130N033	1.3	3.3	2	50	6	J070
MS4XLD0130N060	1.3	6	1.3	50	4	J134
MS2XL6D0130N065	1.3	6.5	2	50	6	J070
MS4XLD0130N120	1.3	12	1.3	50	4	J134
MS4XLD0130N180	1.3	18	1.3	60	4	J134
MS2MSD0130	1.3	—	2.6	40	4	J057
VQMHZVD0130	1.3	—	2.6	45	4	J103
MS2XL6D0140N035	1.4	3.5	2.1	50	6	J070
MS4XLD0140N060	1.4	6	1.4	50	4	J134
MS2XL6D0140N070	1.4	7	2.1	50	6	J070
MS4XLD0140N080	1.4	8	1.4	50	4	J134
MS4XLD0140N100	1.4	10	1.4	50	4	J134
MS4XLD0140N120	1.4	12	1.4	50	4	J134
MS4XLD0140N140	1.4	14	1.4	60	4	J134
MS4XLD0140N160	1.4	16	1.4	60	4	J134
MS4XLD0140N220	1.4	22	1.4	60	4	J134
MS2MSD0140	1.4	—	2.8	40	4	J057
VQMHZVD0140	1.4	—	2.8	45	4	J103
MS2XL6D0150N038	1.5	3.8	2.3	50	6	J070
MS4XLD0150N060	1.5	6	1.5	50	4	J134
CRN2XLD0150N060S04	1.5	6	2.3	50	4	J087
MS2XLD0150N060	1.5	6	2.3	50	4	J067
VF2XLD0150N060	1.5	6	2.3	50	4	J083
MS2XL6D0150N075	1.5	7.5	2.3	50	6	J070
MS4XLD0150N080	1.5	8	1.5	50	4	J134
CRN2XLD0150N080S04	1.5	8	2.3	50	4	J087
MS2XLD0150N080	1.5	8	2.3	50	4	J067
VF2XLD0150N080	1.5	8	2.3	50	4	J083
MS4XLD0150N100	1.5	10	1.5	50	4	J134
CRN2XLD0150N100S04	1.5	10	2.3	50	4	J087
MS2XLD0150N100	1.5	10	2.3	50	4	J067
VF2XLD0150N100	1.5	10	2.3	50	4	J083
MS4XLD0150N120	1.5	12	1.5	50	4	J134
CRN2XLD0150N120S04	1.5	12	2.3	50	4	J087
MS2XLD0150N120	1.5	12	2.3	50	4	J067
VF2XLD0150N120	1.5	12	2.3	50	4	J083
MS4XLD0150N140	1.5	14	1.5	60	4	J134
MS2XLD0150N140	1.5	14	2.3	60	4	J067
MS4XLD0150N160	1.5	16	1.5	60	4	J134
MS2XLD0150N160	1.5	16	2.3	60	4	J067
VF2XLD0150N160	1.5	16	2.3	60	4	J083
MS4XLD0150N180	1.5	18	1.5	60	4	J134
MS2XLD0150N180	1.5	18	2.3	60	4	J067
MS4XLD0150N200	1.5	20	1.5	60	4	J134
MS2XLD0150N200	1.5	20	2.3	60	4	J067
MS2XLD0150N250	1.5	25	2.3	70	4	J067

Order Number	DC	LU	APMX	LF	DCON	Page
MS2XLD0150N300	1.5	30	2.3	70	4	J067
MS2XLD0150N380	1.5	38	2.3	80	4	J067
MS2XLD0150N450	1.5	45	2.3	80	4	J067
MS2SSD0150	1.5	—	2.3	40	4	J056
MS4SCD0150	1.5	—	2.3	40	4	J128
MS2MSD0150	1.5	—	3	40	4	J057
MSMHZDD0150	1.5	—	3	45	4	J096
VQMHVD0150	1.5	—	3	45	4	J143
VQMHZVD0150	1.5	—	3	45	4	J103
VFSDD0150	1.5	—	3	45	6	J165
MS2MDD0150	1.5	—	3.8	40	4	J060
MS4MCD0150	1.5	—	3.8	40	4	J130
VF2MDD0150	1.5	—	3.8	40	4	J079
VF2MVD0150	1.5	—	3.8	40	4	J081
VF4MDD0150	1.5	—	3.8	40	4	J153
MPMHVD0150	1.5	—	3.8	45	4	J118
C2MAD0150	1.5	—	4	40	4	J092
CRN2MSD0150S04	1.5	—	4	40	4	J085
CRN2MSD0150S06	1.5	—	4	45	6	J085
VCMDSCD0150	1.5	—	4	45	6	J157
MS2JSD0150	1.5	—	4.5	40	4	J062
VFMDD0150	1.5	—	5	60	6	J166
MS2LSD0150	1.5	—	6	40	4	J064
MS4JCD0150	1.5	—	6	40	4	J132
MPJHVD0150AP06	1.5	—	6	45	4	J122
VQJHVD0150	1.5	—	6	45	4	J147
MS2XL6D0160N040	1.6	4	2.4	50	6	J070
MS4XLD0160N060	1.6	6	1.6	50	4	J134
MS4XLD0160N080	1.6	8	1.6	50	4	J134
MS2XL6D0160N080	1.6	8	2.4	50	6	J070
MS4XLD0160N100	1.6	10	1.6	50	4	J135
MS4XLD0160N120	1.6	12	1.6	50	4	J135
MS4XLD0160N140	1.6	14	1.6	60	4	J135
MS4XLD0160N160	1.6	16	1.6	60	4	J135
MS4XLD0160N180	1.6	18	1.6	60	4	J135
MS4XLD0160N200	1.6	20	1.6	60	4	J135
MS4XLD0160N260	1.6	26	1.6	70	4	J135
MS2MSD0160	1.6	—	3.2	40	4	J057
VQMHZVD0160	1.6	—	3.2	45	4	J103
MS2XL6D0170N043	1.7	4.3	2.6	50	6	J070
MS4XLD0170N060	1.7	6	1.7	50	4	J135
MS2XL6D0170N085	1.7	8.5	2.6	50	6	J070
MS4XLD0170N140	1.7	14	1.7	60	4	J135
MS4XLD0170N240	1.7	24	1.7	70	4	J135
MS2MSD0170	1.7	—	3.4	40	4	J057
VQMHZVD0170	1.7	—	3.4	45	4	J103
CRN2MSD0170S04	1.7	—	4	40	4	J085
MS2XL6D0180N045	1.8	4.5	2.7	50	6	J070
MS4XLD0180N060	1.8	6	1.8	50	4	J135
MS4XLD0180N080	1.8	8	1.8	50	4	J135

DC = Cutting diameter LU = Usable length APMX = Depth of cut maximum LF = Functional length DCON = Connection diameter

Order Number	DC	LU	APMX	LF	DCON	Page
MS2XL6D0180N090	1.8	9	2.7	50	6	J070
MS4XLD0180N100	1.8	10	1.8	50	4	J135
MS4XLD0180N120	1.8	12	1.8	50	4	J135
MS4XLD0180N140	1.8	14	1.8	60	4	J135
MS4XLD0180N160	1.8	16	1.8	60	4	J135
MS4XLD0180N180	1.8	18	1.8	60	4	J135
MS4XLD0180N200	1.8	20	1.8	60	4	J135
MS4XLD0180N250	1.8	25	1.8	70	4	J135
MS2SSD0180	1.8	—	2.7	40	4	J056
MS2MSD0180	1.8	—	3.6	40	4	J057
VQMHZVD0180	1.8	—	3.6	45	4	J103
MS2JSD0180	1.8	—	5.4	40	4	J062
MS2XL6D0190N048	1.9	4.8	2.9	50	6	J070
MS4XLD0190N060	1.9	6	1.9	50	4	J135
MS2XL6D0190N095	1.9	9.5	2.9	50	6	J070
MS4XLD0190N160	1.9	16	1.9	60	4	J135
MS4XLD0190N280	1.9	28	1.9	70	4	J135
MS2MSD0190	1.9	—	3.8	40	4	J057
VQMHZVD0190	1.9	—	3.8	45	4	J103
MS2XL6D0200N050	2	5	3	50	6	J071
MS4XLD0200N060	2	6	2	50	4	J135
MS2XLD0200N060	2	6	3	50	4	J067
VF2XLD0200N060	2	6	3	50	4	J083
CRN2XLD0200N060S06	2	6	3	50	6	J087
MS4XLD0200N080	2	8	2	50	4	J135
MS2XLD0200N080	2	8	3	50	4	J067
CRN2XLD0200N080S06	2	8	3	50	6	J087
MS4XLD0200N100	2	10	2	50	4	J135
MS2XLD0200N100	2	10	3	50	4	J067
VF2XLD0200N100	2	10	3	50	4	J083
CRN2XLD0200N100S06	2	10	3	50	6	J087
MS2XL6D0200N100	2	10	3	50	6	J071
MS4XLD0200N120	2	12	2	50	4	J135
MS2XLD0200N120	2	12	3	50	4	J067
VF2XLD0200N120	2	12	3	50	4	J083
CRN2XLD0200N120S06	2	12	3	50	6	J087
MS4XLD0200N140	2	14	2	60	4	J135
MS2XLD0200N140	2	14	3	60	4	J067
MS4XLD0200N160	2	16	2	60	4	J135
MS2XLD0200N160	2	16	3	60	4	J067
VF2XLD0200N160	2	16	3	60	4	J083
MS4XLD0200N180	2	18	2	60	4	J135
MS2XLD0200N180	2	18	3	60	4	J067
MS4XLD0200N200	2	20	2	60	4	J135
MS2XLD0200N200	2	20	3	60	4	J067
VF2XLD0200N200	2	20	3	60	4	J083
CRN2XLD0200N200S06	2	20	3	60	6	J087
MS4XLD0200N250	2	25	2	70	4	J135
MS2XLD0200N250	2	25	3	70	4	J067
MS4XLD0200N300	2	30	2	70	4	J135
MS2XLD0200N300	2	30	3	70	4	J067
MS2XLD0200N350	2	35	3	80	4	J067
MS2XLD0200N400	2	40	3	90	4	J067
MS2XLD0200N500	2	50	3	100	4	J067
MS2XLD0200N600	2	60	3	110	4	J067
MS2SSD0200	2	—	3	40	4	J056
MS4SCD0200	2	—	3	40	4	J128
SED2020KMG	2	—	3	45	4	J089
SED2020KPG	2	—	3	45	4	J090
MS2MSD0200	2	—	4	40	4	J057
MSMHDD0200	2	—	4	45	4	J125
VQMHVD0200	2	—	4	45	4	J143
VFSDD0200	2	—	4	45	6	J165
MSMHZDD0200	2	—	4	50	6	J096
VQMHZVD0200	2	—	4	50	6	J103
MS2MDD0200	2	—	5	40	4	J060
MS4MCD0200	2	—	5	40	4	J130
VF2MDD0200	2	—	5	40	4	J079
VF2MVD0200	2	—	5	40	4	J081
VF4MDD0200	2	—	5	40	4	J153
MPMHVD0200	2	—	5	45	4	J118
C2MAD0200	2	—	6	40	4	J092
MS2JSD0200	2	—	6	40	4	J062
CRN2MSD0200S06	2	—	6	45	6	J085
VCMDSCD0200	2	—	6	45	6	J157
MPJHVD0200AP06	2	—	6.5	60	6	J122
VFMDD0200	2	—	7	60	6	J166
MS2LSD0200	2	—	8	40	4	J064
MS4JCD0200	2	—	8	40	4	J132
MPJHVD0200AP08	2	—	8	60	6	J122
VQJHVD0200	2	—	8	60	6	J147
MS2XL6D0210N053	2.1	5.3	3.2	50	6	J071
MS2XL6D0210N105	2.1	10.5	3.2	60	6	J071
MS2MSD0210	2.1	—	4.2	40	4	J057
VQMHZVD0210	2.1	—	4.2	50	6	J103
MSMHDD0210	2.1	—	5	45	4	J125
MS2XL6D0220N055	2.2	5.5	3.3	50	6	J071
MS2XL6D0220N110	2.2	11	3.3	60	6	J071
MS2MSD0220	2.2	—	4.4	40	4	J057
VQMHZVD0220	2.2	—	4.4	50	6	J103
MSMHDD0220	2.2	—	5	45	4	J125
MS2XL6D0230N058	2.3	5.8	3.5	50	6	J071
MS2XL6D0230N115	2.3	11.5	3.5	60	6	J071
MS2MSD0230	2.3	—	4.6	40	4	J057
VQMHZVD0230	2.3	—	4.6	50	6	J103
MSMHDD0230	2.3	—	5	45	4	J125
MS2XL6D0240N060	2.4	6	3.6	50	6	J071
MS2XL6D0240N120	2.4	12	3.6	60	6	J071
MS2MSD0240	2.4	—	4.8	40	4	J057
VQMHZVD0240	2.4	—	4.8	50	6	J103

DC = Cutting diameter LU = Usable length APMX = Depth of cut maximum LF = Functional length DCON = Connection diameter

CARBIDE

SELECTION CHART BY BLADE DIAMETER

CARBIDE/SQUARE

Order Number	DC	LU	APMX	LF	DCON	Page
MSMHDD0240	2.4	—	5	45	4	J125
MS2XL6D0250N063	2.5	6.3	3.8	50	6	J071
MS4XLD0250N080	2.5	8	2.5	50	4	J135
MS2XLD0250N080	2.5	8	3.7	50	4	J067
MS4XLD0250N120	2.5	12	2.5	50	4	J135
MS2XLD0250N120	2.5	12	3.7	50	4	J067
MS2XL6D0250N125	2.5	12.5	3.8	60	6	J071
MS4XLD0250N160	2.5	16	2.5	60	4	J135
MS2XLD0250N160	2.5	16	3.7	60	4	J067
MS4XLD0250N200	2.5	20	2.5	60	4	J135
MS2XLD0250N200	2.5	20	3.7	60	4	J068
CRN2XLD0250N200S06	2.5	20	3.8	65	6	J087
MS4XLD0250N250	2.5	25	2.5	70	4	J135
MS2XLD0250N250	2.5	25	3.7	70	4	J068
MS2XLD0250N300	2.5	30	3.7	70	4	J068
MS2XLD0250N400	2.5	40	3.7	90	4	J068
MS2XLD0250N500	2.5	50	3.7	100	4	J068
MS2SSD0250	2.5	—	3.8	40	4	J056
MS4SCD0250	2.5	—	3.8	40	4	J128
MS2MSD0250	2.5	—	5	40	4	J057
MSMHDD0250	2.5	—	5	45	4	J125
VQMHVD0250	2.5	—	5	45	4	J143
VFSDD0250	2.5	—	5	45	6	J165
MSMHZDD0250	2.5	—	5	50	6	J096
VQMHZVD0250	2.5	—	5	50	6	J103
MS2MDD0250	2.5	—	6.3	40	4	J060
MS4MCD0250	2.5	—	6.3	40	4	J130
VF2MDD0250	2.5	—	6.3	40	4	J079
VF2MVD0250	2.5	—	6.3	40	4	J081
VF4MDD0250	2.5	—	6.3	40	4	J153
MPMHVD0250	2.5	—	6.3	45	4	J118
MS2JSD0250	2.5	—	7.5	40	4	J062
C2MAD0250	2.5	—	8	40	4	J092
CRN2MSD0250S06	2.5	—	8	45	6	J085
VCMDSCD0250	2.5	—	8	45	6	J157
VFMDD0250	2.5	—	8	60	6	J166
MS2LSD0250	2.5	—	10	50	4	J064
MS4JCD0250	2.5	—	10	50	4	J132
MPJHVD0250AP10	2.5	—	10	60	6	J122
VQJHVD0250	2.5	—	10	60	6	J147
MS2MSD0260	2.6	—	5.2	40	4	J057
VQMHZVD0260	2.6	—	5.2	50	6	J103
MSMHDD0260	2.6	—	6	45	4	J125
MS2MSD0270	2.7	—	5.4	40	4	J057
VQMHZVD0270	2.7	—	5.4	50	6	J103
MSMHDD0270	2.7	—	6	45	4	J125
MS2MSD0280	2.8	—	5.6	40	4	J057
VQMHZVD0280	2.8	—	5.6	50	6	J103
MSMHDD0280	2.8	—	6	45	4	J125
MS2MSD0290	2.9	—	5.8	40	4	J057
VQMHZVD0290	2.9	—	5.8	50	6	J103
MSMHDD0290	2.9	—	6	45	4	J125
MS4XLD0300N080	3	8	3	50	6	J135
MS2XLD0300N080	3	8	4.5	50	6	J068
MS4XLD0300N120	3	12	3	50	6	J135
MS2XLD0300N120	3	12	4.5	50	6	J068
VF2XLD0300N120	3	12	4.5	50	6	J083
MS4XLD0300N160	3	16	3	60	6	J135
MS2XLD0300N160	3	16	4.5	60	6	J068
MS4XLD0300N200	3	20	3	60	6	J135
MS2XLD0300N200	3	20	4.5	60	6	J068
VF2XLD0300N200	3	20	4.5	60	6	J083
CRN2XLD0300N200S06	3	20	4.5	65	6	J087
MS4XLD0300N250	3	25	3	70	6	J135
MS2XLD0300N250	3	25	4.5	70	6	J068
MS4XLD0300N300	3	30	3	70	6	J135
MS2XLD0300N300	3	30	4.5	70	6	J068
MS2XLD0300N400	3	40	4.5	90	6	J068
MS2XLD0300N500	3	50	4.5	100	6	J068
MS2ESD0300L35S04	3	—	3	35	4	J077
MS3ESD0300L35S04	3	—	3	35	4	J101
MS4ECD0300L35S04	3	—	3	35	4	J141
MS2ESD0300L45S04	3	—	3	45	4	J077
MS3ESD0300L45S04	3	—	3	45	4	J101
MS4ECD0300L45S04	3	—	3	45	4	J141
MS2SSD0300	3	—	4.5	45	6	J056
MSSHDD0300	3	—	4.5	45	6	J124
NEW MP2ESD0300S04	3	—	4.5	50	4	J074
NEW MP3ESD0300S04	3	—	4.5	50	4	J098
NEW MP4ECD0300S04	3	—	4.5	50	4	J138
MS4SCD0300	3	—	4.5	50	6	J128
SED2030KMG	3	—	5	45	6	J089
SED2030KPG	3	—	5	45	6	J090
MS2MSD0300	3	—	6	45	6	J057
VFSDD0300	3	—	6	45	6	J165
MSMHZDD0300	3	—	6	50	6	J096
VFSFPRD0300	3	—	6	50	6	J339
VQMHZVD0300	3	—	6	50	6	J103
VQSVRD0300	3	—	6	60	6	J336
MPMHVD0300	3	—	7.5	45	6	J118
MS2MDD0300	3	—	7.5	50	6	J060
MS4MCD0300	3	—	7.5	50	6	J130
VF2MDD0300	3	—	7.5	50	6	J079
VF2MVD0300	3	—	7.5	50	6	J081
VF4MDD0300	3	—	7.5	50	6	J153
C2MAD0300	3	—	8	45	6	J092
CRN2MSD0300S06	3	—	8	45	6	J085
MSMHDD0300	3	—	8	45	6	J125
VCMDSCD0300	3	—	8	45	6	J157
VQMHVD0300	3	—	8	45	6	J143

DC = Cutting diameter LU = Usable length APMX = Depth of cut maximum LF = Functional length DCON = Connection diameter

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SOLID END MILLS

	Order Number	DC	LU	APMX	LF	DCON	Page
	CMRAD0300	3	—	8	50	6	J346
	MS2JSD0300	3	—	9	45	6	J062
	C2MHAD0300	3	—	9	60	6	J094
	MPJHVD0300AP10	3	—	10	60	6	J122
	VFMDD0300	3	—	10	60	6	J166
	CRN4JCD0300	3	—	12	50	6	J159
	MS2LSD0300	3	—	12	50	6	J064
	MS4JCD0300	3	—	12	50	6	J132
	DF4JCD0300	3	—	12	60	6	J160
	MPJHVD0300AP12	3	—	12	60	6	J122
	VQJHVD0300	3	—	12	60	6	J147
	MS2MSD0310	3.1	—	6.2	45	6	J057
	VQMHZVD0310	3.1	—	7	50	6	J103
	MSMHDD0310	3.1	—	8	45	6	J125
	MS2MSD0320	3.2	—	6.4	45	6	J057
	VQMHZVD0320	3.2	—	7	50	6	J103
	MSMHDD0320	3.2	—	8	45	6	J125
	MS2MSD0330	3.3	—	6.6	45	6	J057
	VQMHZVD0330	3.3	—	7	50	6	J103
	MSMHDD0330	3.3	—	8	45	6	J125
	MS2MSD0340	3.4	—	6.8	45	6	J057
	VQMHZVD0340	3.4	—	7	50	6	J103
	MSMHDD0340	3.4	—	8	45	6	J125
	MS4XLD0350N150	3.5	15	3.5	60	6	J135
	MS4XLD0350N250	3.5	25	3.5	70	6	J135
	MS4XLD0350N350	3.5	35	3.5	80	6	J135
	MS2ESD0350L35S04	3.5	—	3.5	35	4	J077
	MS3ESD0350L35S04	3.5	—	3.5	35	4	J101
	MS4ECD0350L35S04	3.5	—	3.5	35	4	J141
	MS2ESD0350L45S04	3.5	—	3.5	45	4	J077
	MS3ESD0350L45S04	3.5	—	3.5	45	4	J101
	MS4ECD0350L45S04	3.5	—	3.5	45	4	J141
NEW	MP4ECD0350S04	3.5	—	5	50	4	J138
	MSSHDD0350	3.5	—	5.3	45	6	J124
	MS2MSD0350	3.5	—	7	45	6	J057
	VFSDD0350	3.5	—	7	45	6	J165
	MSMHDD0350	3.5	—	8	45	6	J125
	VQMHVD0350	3.5	—	8	45	6	J143
	MSMHZDD0350	3.5	—	8	50	6	J096
	VQMHZVD0350	3.5	—	8	50	6	J103
	MS4MCD0350	3.5	—	9	50	6	J130
	VQJHVD0350	3.5	—	14	60	6	J147
	MS2MSD0360	3.6	—	7.2	45	6	J058
	VQMHZVD0360	3.6	—	8	50	6	J103
	MSMHDD0360	3.6	—	11	45	6	J125
	MS2MSD0370	3.7	—	7.4	45	6	J058
	VQMHZVD0370	3.7	—	8	50	6	J103
	MSMHDD0370	3.7	—	11	45	6	J125
	MS2MSD0380	3.8	—	7.6	45	6	J058
	VQMHZVD0380	3.8	—	8	50	6	J103

	Order Number	DC	LU	APMX	LF	DCON	Page
	MSMHDD0380	3.8	—	11	45	6	J125
	MS2MSD0390	3.9	—	7.8	45	6	J058
	VQMHZVD0390	3.9	—	8	50	6	J103
	MSMHDD0390	3.9	—	11	45	6	J125
	MS4XLD0400N120	4	12	4	50	6	J135
	MS2XLD0400N120	4	12	6	50	6	J068
	MS4XLD0400N160	4	16	4	60	6	J135
	MS2XLD0400N160	4	16	6	60	6	J068
	MS4XLD0400N200	4	20	4	60	6	J135
	MS2XLD0400N200	4	20	6	60	6	J068
	CRN2XLD0400N200S06	4	20	6	65	6	J087
	MS4XLD0400N250	4	25	4	70	6	J135
	MS2XLD0400N250	4	25	6	70	6	J068
	MS4XLD0400N300	4	30	4	70	6	J135
	MS2XLD0400N300	4	30	6	70	6	J068
	MS4XLD0400N350	4	35	4	80	6	J135
	MS2XLD0400N350	4	35	6	80	6	J068
	MS4XLD0400N400	4	40	4	90	6	J136
	MS2XLD0400N400	4	40	6	90	6	J068
	MS4XLD0400N450	4	45	4	90	6	J136
	MS2XLD0400N450	4	45	6	90	6	J068
	MS4XLD0400N500	4	50	4	100	6	J136
	MS2XLD0400N500	4	50	6	100	6	J068
	MS2XLD0400N600	4	60	6	110	6	J068
	MS2ESD0400L35S04	4	—	4	35	4	J077
	MS3ESD0400L35S04	4	—	4	35	4	J101
	MS4ECD0400L35S04	4	—	4	35	4	J141
	MS2ESD0400L45S04	4	—	4	45	4	J077
	MS3ESD0400L45S04	4	—	4	45	4	J101
	MS4ECD0400L45S04	4	—	4	45	4	J141
	MSSHDD0400	4	—	6	45	6	J124
	SED2040KMG	4	—	6	45	6	J089
	SED2040KPG	4	—	6	45	6	J090
NEW	MP2ESD0400S04	4	—	6	50	4	J074
NEW	MP3ESD0400S04	4	—	6	50	4	J098
NEW	MP4ECD0400S04	4	—	6	50	4	J138
	MS2SSD0400	4	—	6	50	6	J056
	MS4SCD0400	4	—	6	50	6	J128
	VFSDD0400	4	—	8	45	6	J165
	MS2MSD0400	4	—	8	50	6	J058
	MSMHZDD0400	4	—	8	50	6	J096
	VFSFPRD0400	4	—	8	50	6	J339
	VQMHZVD0400	4	—	8	50	6	J103
	VQSVRD0400	4	—	8	60	6	J336
	MPMHVD0400	4	—	10	45	6	J118
	MS2MDD0400	4	—	10	50	6	J060
	MS4MCD0400	4	—	10	50	6	J130
	VF2MDD0400	4	—	10	50	6	J079
	VF2MVD0400	4	—	10	50	6	J081
	VF4MDD0400	4	—	10	50	6	J153

DC = Cutting diameter LU = Usable length APMX = Depth of cut maximum LF = Functional length DCON = Connection diameter

CARBIDE

SELECTION CHART BY BLADE DIAMETER

CARBIDE/SQUARE

Order Number	DC	LU	APMX	LF	DCON	Page
C2MAD0400	4	—	11	45	6	J092
CRN2MSD0400S06	4	—	11	45	6	J085
MSMHDD0400	4	—	11	45	6	J125
VQMHVD0400	4	—	11	45	6	J143
CMRAD0400	4	—	11	50	6	J346
MS2JSD0400	4	—	12	50	6	J062
C2MHAD0400	4	—	12	60	6	J094
VFMDD0400	4	—	12	60	6	J166
MPJHVD0400AP13	4	—	13	60	6	J122
CRN4JCD0400	4	—	15	50	6	J159
MS2LSD0400	4	—	16	50	6	J064
MS4JCD0400	4	—	16	50	6	J132
DF4JCD0400	4	—	16	60	6	J160
MPJHVD0400AP16	4	—	16	60	6	J122
VQJHVD0400	4	—	16	60	6	J147
MS2MSD0410	4.1	—	8.2	50	6	J058
MSMHDD0410	4.1	—	12	45	6	J125
MS2MSD0420	4.2	—	8.4	50	6	J058
MSMHDD0420	4.2	—	12	45	6	J125
MS2MSD0430	4.3	—	8.6	50	6	J058
MSMHDD0430	4.3	—	12	45	6	J125
MS2MSD0440	4.4	—	8.8	50	6	J058
MSMHDD0440	4.4	—	12	45	6	J125
MSSHDD0450	4.5	—	6.8	45	6	J124
MS2MSD0450	4.5	—	9	50	6	J058
MSMHZDD0450	4.5	—	10	50	6	J096
VQMHZVD0450	4.5	—	10	50	6	J103
MS4MCD0450	4.5	—	11.5	50	6	J130
MSMHDD0450	4.5	—	12	45	6	J125
VQJHVD0450	4.5	—	18	60	6	J147
MS2MSD0460	4.6	—	9.2	50	6	J058
MSMHDD0460	4.6	—	13	50	6	J125
MS2MSD0470	4.7	—	9.4	50	6	J058
MSMHDD0470	4.7	—	13	50	6	J125
MS2MSD0480	4.8	—	9.6	50	6	J058
MSMHDD0480	4.8	—	13	50	6	J125
MS2MSD0490	4.9	—	9.8	50	6	J058
MSMHDD0490	4.9	—	13	50	6	J125
MS4XLD0500N160	5	16	5	60	6	J136
MS2XLD0500N160	5	16	7.5	60	6	J068
MS4XLD0500N250	5	25	5	70	6	J136
CRN2XLD0500N250S06	5	25	7.5	70	6	J087
MS2XLD0500N250	5	25	7.5	70	6	J068
MS4XLD0500N350	5	35	5	80	6	J136
MS2XLD0500N350	5	35	7.5	80	6	J068
MS4XLD0500N500	5	50	5	110	6	J136
MS2XLD0500N500	5	50	7.5	110	6	J068
MS2XLD0500N600	5	60	7.5	120	6	J068
MS2ESD0500L35S05	5	—	5	35	5	J077
MS3ESD0500L35S05	5	—	5	35	5	J101

Order Number	DC	LU	APMX	LF	DCON	Page
MS4ECD0500L35S05	5	—	5	35	5	J141
MS2ESD0500L35S06	5	—	5	35	6	J077
MS3ESD0500L35S06	5	—	5	35	6	J101
MS4ECD0500L35S06	5	—	5	35	6	J141
MS2ESD0500L45S06	5	—	5	45	6	J077
MS3ESD0500L45S06	5	—	5	45	6	J101
MS4ECD0500L45S06	5	—	5	45	6	J141
NEW MP2ESD0500S06	5	—	7.5	50	6	J074
NEW MP3ESD0500S06	5	—	7.5	50	6	J098
NEW MP4ECD0500S06	5	—	7.5	50	6	J138
MS2SSD0500	5	—	7.5	50	6	J056
MS4SCD0500	5	—	7.5	50	6	J128
MSSHDD0500	5	—	7.5	50	6	J124
SED2050KMG	5	—	8	50	6	J089
SED2050KPG	5	—	8	50	6	J090
MS2MSD0500	5	—	10	50	6	J058
MSMHZDD0500	5	—	10	50	6	J096
VFSDD0500	5	—	10	50	6	J165
VFSFPRD0500	5	—	10	50	6	J339
VQMHZVD0500	5	—	10	50	6	J104
VQSVRD0500	5	—	10	60	6	J336
MPMHVD0500	5	—	12.5	50	6	J118
MS2MDD0500	5	—	12.5	50	6	J060
MS4MCD0500	5	—	12.5	50	6	J130
VF2MDD0500	5	—	12.5	50	6	J079
VF2MVD0500	5	—	12.5	50	6	J081
VF4MDD0500	5	—	12.5	50	6	J153
C2MAD0500	5	—	13	50	6	J092
CMRAD0500	5	—	13	50	6	J346
CRN2MSD0500S06	5	—	13	50	6	J085
MSMHDD0500	5	—	13	50	6	J125
VQMHVD0500	5	—	13	50	6	J143
MS2JSD0500	5	—	15	50	6	J062
C2MHAD0500	5	—	15	60	6	J094
VFMDD0500	5	—	15	60	6	J166
VFMFPRD0500	5	—	15	60	6	J342
MPJHVD0500AP17	5	—	17	60	6	J122
MPJHVD0500AP20	5	—	20	60	6	J122
MS2LSD0500	5	—	20	60	6	J064
MS4JCD0500	5	—	20	60	6	J132
VQJHVD0500	5	—	20	60	6	J147
MS2MSD0510	5.1	—	10.2	50	6	J058
MSMHDD0510	5.1	—	13	50	6	J125
MS2MSD0520	5.2	—	10.4	50	6	J058
MSMHDD0520	5.2	—	13	50	6	J125
MS2MSD0530	5.3	—	10.6	50	6	J058
MSMHDD0530	5.3	—	13	50	6	J125
MS2MSD0540	5.4	—	10.8	50	6	J058
MSMHDD0540	5.4	—	13	50	6	J126
MSSHDD0550	5.5	—	8.3	50	6	J124

DC = Cutting diameter LU = Usable length APMX = Depth of cut maximum LF = Functional length DCON = Connection diameter

Order Number	DC	LU	APMX	LF	DCON	Page
MS2MSD0550	5.5	—	11	50	6	J058
MSMHDD0550	5.5	—	13	50	6	J126
MSMHZDD0550	5.5	—	13	50	6	J096
VQMHZVD0550	5.5	—	13	50	6	J104
MS4MCD0550	5.5	—	14	50	6	J130
MS2MSD0560	5.6	—	11.2	50	6	J058
MSMHDD0560	5.6	—	13	50	6	J126
MS2MSD0570	5.7	—	11.4	50	6	J058
MSMHDD0570	5.7	—	13	50	6	J126
MS2MSD0580	5.8	—	11.6	50	6	J058
MSMHDD0580	5.8	—	13	50	6	J126
MS2MSD0590	5.9	—	11.8	50	6	J058
MSMHDD0590	5.9	—	13	50	6	J126
MS4XLD0600N200	6	20	6	80	6	J136
MS2XLD0600N200	6	20	9	80	6	J068
MS4XLD0600N300	6	30	6	90	6	J136
CRN2XLD0600N300S06	6	30	9	70	6	J087
MS2XLD0600N300	6	30	9	90	6	J068
MS4XLD0600N400	6	40	6	100	6	J136
MS2XLD0600N400	6	40	9	100	6	J068
MS4XLD0600N500	6	50	6	110	6	J136
MS2XLD0600N500	6	50	9	110	6	J068
MS2XLD0600N600	6	60	9	120	6	J068
MS2ESD0600L35S05	6	—	6	35	5	J077
MS3ESD0600L35S05	6	—	6	35	5	J101
MS4ECD0600L35S05	6	—	6	35	5	J141
MS2ESD0600L35S06	6	—	6	35	6	J077
MS3ESD0600L35S06	6	—	6	35	6	J101
MS4ECD0600L35S06	6	—	6	35	6	J141
MS2ESD0600L45S06	6	—	6	45	6	J077
MS3ESD0600L45S06	6	—	6	45	6	J101
MS4ECD0600L45S06	6	—	6	45	6	J141
NEW MP2ESD0600S06	6	—	9	50	6	J074
NEW MP3ESD0600S06	6	—	9	50	6	J098
NEW MP4ECD0600S06	6	—	9	50	6	J138
MS2SSD0600	6	—	9	50	6	J056
MS4SCD0600	6	—	9	50	6	J128
MSSHDD0600	6	—	9	50	6	J124
SED2060KMG	6	—	9	50	6	J089
SED2060KPG	6	—	9	50	6	J090
MS2MSD0600	6	—	12	50	6	J058
VFSDD0600	6	—	12	50	6	J165
VFSFPRD0600	6	—	12	50	6	J339
VQSVRD0600	6	—	12	70	6	J336
C2MAD0600	6	—	13	50	6	J092
CMRAD0600	6	—	13	50	6	J346
CRN2MSD0600S06	6	—	13	50	6	J085
MSMHDD0600	6	—	13	50	6	J126
VF6MHVD0600	6	—	13	50	6	J164
VQMHVD0600	6	—	13	50	6	J143
MSMHZDD0600	6	—	13	60	6	J096
VQMHZVD0600	6	—	13	60	6	J104
VQMHZVOHD0600	6	—	13	60	6	J109
SEG4060SA	6	—	14	50	6	J162
MS2MDD0600	6	—	15	50	6	J060
MS4MCD0600	6	—	15	50	6	J130
VF2MDD0600	6	—	15	50	6	J079
VF2MVD0600	6	—	15	50	6	J081
VF4MDD0600	6	—	15	50	6	J153
VF4MVD0600	6	—	15	50	6	J155
MPMHVD0600	6	—	15	60	6	J118
VFMDD0600	6	—	15	60	6	J166
VFMFPRD0600	6	—	17	60	6	J342
MS2JSD0600	6	—	18	50	6	J062
C2MHAD0600	6	—	18	60	6	J094
CRN4JCD0600	6	—	20	60	6	J159
MPJHVD0600AP20	6	—	20	60	6	J122
DFC4JCD0600	6	—	20	70	6	J161
DFCJRTD0600	6	—	20	70	6	J170
DF4JCD0600	6	—	24	60	6	J160
MPJHVD0600AP24	6	—	24	60	6	J122
MS2LSD0600	6	—	24	60	6	J064
MS4JCD0600	6	—	24	60	6	J132
VQJHVD0600	6	—	24	60	6	J147
VCLDD0600	6	—	26	70	6	J168
MSSHDD0650	6.5	—	9.8	60	8	J124
MS2MSD0650	6.5	—	13	60	8	J058
MSMHDD0650	6.5	—	16	60	8	J126
MSMHZDD0650	6.5	—	16	60	8	J096
VQMHZVD0650	6.5	—	16	60	8	J104
MS4MCD0650	6.5	—	16.5	60	8	J130
MS2ESD0700L35S07	7	—	6	35	7	J077
MS3ESD0700L35S07	7	—	6	35	7	J101
MS4ECD0700L35S07	7	—	6	35	7	J141
MS2ESD0700L45S07	7	—	7	45	7	J077
MS3ESD0700L45S07	7	—	7	45	7	J101
MS4ECD0700L45S07	7	—	7	45	7	J141
SED2070KMG	7	—	10	60	8	J089
SED2070KPG	7	—	10	60	8	J090
NEW MP2ESD0700S07	7	—	10.5	50	7	J074
NEW MP3ESD0700S07	7	—	10.5	50	7	J098
NEW MP4ECD0700S07	7	—	10.5	50	7	J138
MS2SSD0700	7	—	10.5	60	8	J056
MSSHDD0700	7	—	10.5	60	8	J124
MS2MSD0700	7	—	14	60	8	J058
MSMHZDD0700	7	—	16	60	8	J096
VQMHZVD0700	7	—	16	60	8	J104
VFSFPRD0700	7	—	17	60	8	J339
VQSVRD0700	7	—	17	80	8	J336
MS4MCD0700	7	—	17.5	60	8	J130

DC = Cutting diameter LU = Usable length APMX = Depth of cut maximum LF = Functional length DCON = Connection diameter

SELECTION CHART BY BLADE DIAMETER

CARBIDE/SQUARE

Order Number	DC	LU	APMX	LF	DCON	Page
MPMHVD0700	7	—	17.5	70	8	J118
MPMHVD0700S06	7	—	17.5	80	6	J118
MSMHDD0700	7	—	19	60	8	J126
VQMHVD0700	7	—	19	60	8	J143
VFMFPRD0700	7	—	22	75	8	J342
VQJHVD0700	7	—	25	80	8	J147
MSSHDD0750	7.5	—	11.3	60	8	J124
MS2MSD0750	7.5	—	15	60	8	J058
MSMHZDD0750	7.5	—	16	60	8	J096
VQMHZVD0750	7.5	—	16	60	8	J104
MS4MCD0750	7.5	—	19	60	8	J130
MSMHDD0750	7.5	—	19	60	8	J126
MS4XLD0800N300	8	30	8	90	8	J136
MS4XLD0800N500	8	50	8	110	8	J136
MS4XLD0800N700	8	70	8	130	8	J136
MS2ESD0800L35S07	8	—	6	35	7	J077
MS3ESD0800L35S07	8	—	6	35	7	J101
MS4ECD0800L35S07	8	—	6	35	7	J141
MS2ESD0800L35S08	8	—	6	35	8	J077
MS3ESD0800L35S08	8	—	6	35	8	J101
MS4ECD0800L35S08	8	—	6	35	8	J141
MS2ESD0800L45S07	8	—	8	45	7	J077
MS3ESD0800L45S07	8	—	8	45	7	J101
MS4ECD0800L45S07	8	—	8	45	7	J141
MS2ESD0800L45S08	8	—	8	45	8	J077
MS3ESD0800L45S08	8	—	8	45	8	J101
MS4ECD0800L45S08	8	—	8	45	8	J141
NEW MP4ECD0800S07	8	—	12	50	7	J138
NEW MP2ESD0800S08	8	—	12	50	8	J074
NEW MP3ESD0800S08	8	—	12	50	8	J098
NEW MP4ECD0800S08	8	—	12	50	8	J138
MS2SSD0800	8	—	12	60	8	J056
MS4SCD0800	8	—	12	60	8	J128
MSSHDD0800	8	—	12	60	8	J124
SED2080KMG	8	—	12	60	8	J089
SED2080KPG	8	—	12	60	8	J090
MS2MSD0800	8	—	16	60	8	J058
VFSDD0800	8	—	16	60	8	J165
VFSFPRD0800	8	—	17	60	8	J339
VQSVRD0800	8	—	17	80	8	J336
C2MAD0800	8	—	19	60	8	J092
CMRAD0800	8	—	19	60	8	J346
CRN2MSD0800S08	8	—	19	60	8	J085
MSMHDD0800	8	—	19	60	8	J126
SEG4080SA	8	—	19	60	8	J162
VF6MHVD0800	8	—	19	60	8	J164
VQMHVD0800	8	—	19	60	8	J143
MSMHZDD0800	8	—	19	70	8	J096
VQMHZVD0800	8	—	19	70	8	J104
VQMHZVOHD0800	8	—	19	70	8	J109

Order Number	DC	LU	APMX	LF	DCON	Page
MS2MDD0800	8	—	20	60	8	J060
MS4MCD0800	8	—	20	60	8	J130
VF4MDD0800	8	—	20	60	8	J153
VF4MVD0800	8	—	20	60	8	J155
MPMHVD0800	8	—	20	70	8	J118
C2MHAD0800	8	—	20	75	8	J094
VFMDD0800	8	—	20	75	8	J166
MPMHVD0800S06	8	—	20	90	6	J118
MS2JSD0800	8	—	24	70	8	J062
CRN4JCD0800	8	—	25	70	8	J159
MPJHVD0800AP26	8	—	26	80	8	J122
DF4JCD0800	8	—	28	70	8	J160
VFMFPRD0800	8	—	28	75	8	J342
VQJHVD0800	8	—	28	80	8	J147
DFC4JCD0800	8	—	30	80	8	J161
DFCJRTD0800	8	—	30	80	8	J170
MS2LSD0800	8	—	32	70	8	J064
MS4JCD0800	8	—	32	70	8	J132
MPJHVD0800AP32	8	—	32	80	8	J122
VCLDD0800	8	—	36	90	8	J168
MSSHDD0850	8.5	—	12.8	70	10	J124
MS2MSD0850	8.5	—	17	70	10	J058
MSMHDD0850	8.5	—	19	70	10	J126
MSMHZDD0850	8.5	—	19	70	10	J096
VQMHZVD0850	8.5	—	19	70	10	J104
MS4MCD0850	8.5	—	21.5	70	10	J130
NEW MP3ESD0900S10	9	—	13.5	50	10	J098
NEW MP4ECD0900S10	9	—	13.5	50	10	J138
MS2SSD0900	9	—	13.5	70	10	J056
MSSHDD0900	9	—	13.5	70	10	J124
MS2MSD0900	9	—	18	70	10	J058
MSMHZDD0900	9	—	19	70	10	J096
VQMHZVD0900	9	—	19	70	10	J104
MSMHDD0900	9	—	22	70	10	J126
VFSFPRD0900	9	—	22	70	10	J339
VQMHVD0900	9	—	22	70	10	J143
VQMHVD0900S08	9	—	22	75	8	J143
VQSVRD0900	9	—	22	90	10	J336
MS4MCD0900	9	—	22.5	70	10	J130
MPMHVD0900S08	9	—	22.5	90	8	J118
VFMFPRD0900	9	—	28	100	10	J342
VQJHVD0900	9	—	32	90	10	J147
MSSHDD0950	9.5	—	14.3	70	10	J124
MS2MSD0950	9.5	—	19	70	10	J058
MSMHZDD0950	9.5	—	19	70	10	J096
VQMHZVD0950	9.5	—	19	70	10	J104
MSMHDD0950	9.5	—	22	70	10	J126
MS4MCD0950	9.5	—	24	70	10	J130
CSRAD1000	10	25	12	75	10	J344
C3SAD1000N300	10	30	12	75	10	J116

DC = Cutting diameter LU = Usable length APMX = Depth of cut maximum LF = Functional length DCON = Connection diameter

Order Number	DC	LU	APMX	LF	DCON	Page
C3SAD1000N350	10	35	12	100	10	J116
MS4XLD1000N400	10	40	10	100	10	J136
MS4XLD1000N600	10	60	10	120	10	J136
MS4XLD1000N800	10	80	10	140	10	J136
MS2ESD1000L35S07	10	–	6	35	7	J077
MS3ESD1000L35S07	10	–	6	35	7	J101
MS4ECD1000L35S07	10	–	6	35	7	J141
MS2ESD1000L35S10	10	–	6	35	10	J077
MS3ESD1000L35S10	10	–	6	35	10	J101
MS4ECD1000L35S10	10	–	6	35	10	J141
MS2ESD1000L45S07	10	–	10	45	7	J077
MS3ESD1000L45S07	10	–	10	45	7	J101
MS4ECD1000L45S07	10	–	10	45	7	J141
MS2ESD1000L45S10	10	–	10	45	10	J077
MS3ESD1000L45S10	10	–	10	45	10	J101
MS4ECD1000L45S10	10	–	10	45	10	J141
C3SAD1000A100S08	10	–	12	100	8	J116
NEW MP4ECD1000S07	10	–	15	50	7	J138
NEW MP2ESD1000S10	10	–	15	50	10	J074
NEW MP3ESD1000S10	10	–	15	50	10	J098
NEW MP4ECD1000S10	10	–	15	50	10	J138
SED2100KMG	10	–	15	65	10	J089
SED2100KPG	10	–	15	65	10	J090
MS2SSD1000	10	–	15	70	10	J056
MS4SCD1000	10	–	15	70	10	J128
MSSHDD1000	10	–	15	70	10	J124
MS2MSD1000	10	–	20	70	10	J058
VFSDD1000	10	–	20	70	10	J165
C2MAD1000	10	–	22	70	10	J092
CRN2MSD1000S10	10	–	22	70	10	J085
MSMHDD1000	10	–	22	70	10	J126
VF6MHVD1000	10	–	22	70	10	J164
VFSFPRD1000	10	–	22	70	10	J339
VQ6MHVCHD1000	10	–	22	70	10	J163
VQMHVD1000	10	–	22	70	10	J143
CMRAD1000	10	–	22	75	10	J346
MSMHZDD1000	10	–	22	80	10	J096
VQMHZVD1000	10	–	22	80	10	J104
VQMHZVOHD1000	10	–	22	80	10	J109
VFSFPRD1000S08	10	–	22	90	8	J339
VQSVRD1000S08	10	–	22	90	8	J336
VQSVRD1000	10	–	22	90	10	J336
VQMHVD1000S08	10	–	22	100	8	J143
SEG4100SA	10	–	24	70	10	J162
MS2MDD1000	10	–	25	70	10	J060
MS4MCD1000	10	–	25	70	10	J130
VF4MDD1000	10	–	25	70	10	J153
VF4MVD1000	10	–	25	70	10	J155
C2MHAD1000	10	–	25	75	10	J094
MPMHVD1000	10	–	25	80	10	J118

Order Number	DC	LU	APMX	LF	DCON	Page
VFMDD1000	10	–	25	80	10	J166
MPMHVD1000S08	10	–	25	100	8	J118
CRN4JCD1000	10	–	30	90	10	J159
DFC4JCD1000	10	–	30	90	10	J161
DFCJRTD1000	10	–	30	90	10	J170
MS2JSD1000	10	–	30	90	10	J062
MPJHVD1000AP33	10	–	33	100	10	J122
VFMFPRD1000	10	–	34	100	10	J342
DF4JCD1000	10	–	35	90	10	J160
VQJHVD1000	10	–	35	90	10	J147
MS2LSD1000	10	–	40	90	10	J064
MS4JCD1000	10	–	40	90	10	J132
MPJHVD1000AP40	10	–	40	100	10	J122
VCLDD1000	10	–	46	100	10	J168
MS2SSD1100	11	–	16.5	75	12	J056
MSSHDD1100	11	–	16.5	75	12	J124
MS2MSD1100	11	–	22	75	12	J058
MSMHZDD1100	11	–	22	80	12	J096
VQMHZVD1100	11	–	22	80	12	J104
MSMHDD1100	11	–	26	75	12	J126
VQMHVD1100	11	–	26	75	12	J143
VQMHVD1100S10	11	–	26	100	10	J143
MS4MCD1100	11	–	27.5	75	12	J130
MPMHVD1100S10	11	–	28	100	10	J118
C3SAD1200N300	12	30	15	75	12	J116
CSRAD1200	12	30	15	75	12	J344
C3SAD1200N350	12	35	15	100	12	J116
NEW A3SA120N36C	12	36	18	80	12	J113
NEW DLC3SA120N36C	12	36	18	80	12	J114
C3SAD1200N400	12	40	15	125	12	J116
MS2ESD1200L35S10	12	–	6	35	10	J077
MS3ESD1200L35S10	12	–	6	35	10	J101
MS4ECD1200L35S10	12	–	6	35	10	J141
MS2ESD1200L45S10	12	–	12	45	10	J077
MS3ESD1200L45S10	12	–	12	45	10	J101
MS4ECD1200L45S10	12	–	12	45	10	J141
NEW MP3ESD1200S10	12	–	15	50	10	J098
NEW MP4ECD1200S10	12	–	15	50	10	J138
NEW MP3ESD1200S12	12	–	15	50	12	J098
NEW MP4ECD1200S12	12	–	15	50	12	J138
SED2120KMG	12	–	15	65	12	J089
SED2120KPG	12	–	15	65	12	J090
C3SAD1200A150S10	12	–	15	150	10	J116
MS2SSD1200	12	–	18	75	12	J056
MS4SCD1200	12	–	18	75	12	J128
MSSHDD1200	12	–	18	75	12	J124
MS2MSD1200	12	–	24	75	12	J058
VFSDD1200	12	–	24	75	12	J165
C2MHAD1200	12	–	25	75	12	J094
MSMHDD1200S10	12	–	26	75	10	J126

DC = Cutting diameter LU = Usable length APMX = Depth of cut maximum LF = Functional length DCON = Connection diameter

SELECTION CHART BY BLADE DIAMETER

CARBIDE/SQUARE

Order Number	DC	LU	APMX	LF	DCON	Page
C2MAD1200	12	—	26	75	12	J092
CMRAD1200	12	—	26	75	12	J346
CRN2MSD1200S12	12	—	26	75	12	J085
MSMHDD1200	12	—	26	75	12	J126
VF6MHVD1200	12	—	26	75	12	J164
VQ6MHVCHD1200	12	—	26	75	12	J163
VQMHVD1200	12	—	26	75	12	J143
MSMHZDD1200	12	—	26	90	12	J096
VQMHZVD1200	12	—	26	90	12	J104
VQMHZVOHD1200	12	—	26	90	12	J109
VQMHVD1200S10	12	—	26	110	10	J143
VFSFPRD1200	12	—	27	75	12	J339
VFSFPRD1200S10	12	—	27	100	10	J339
VQSVRD1200S10	12	—	27	100	10	J336
VQSVRD1200	12	—	27	100	12	J336
SEG4120SA	12	—	29	75	12	J162
CRN4JCD1200	12	—	30	90	12	J159
MS2MDD1200	12	—	30	90	12	J060
MS4MCD1200	12	—	30	90	12	J130
VF4MDD1200	12	—	30	90	12	J153
VF4MVD1200	12	—	30	90	12	J155
DFC4JCD1200	12	—	30	100	12	J161
DFCJRTD1200	12	—	30	100	12	J170
MPMHVD1200	12	—	30	100	12	J118
VFMDD1200	12	—	30	100	12	J166
MPMHVD1200S10	12	—	30	110	10	J118
MS2JSD1200	12	—	36	90	12	J062
DF4JCD1200	12	—	36	110	12	J160
VQJHVD1200	12	—	40	100	12	J147
MPJHVD1200AP40	12	—	40	110	12	J122
VFMFPRD1200	12	—	40	110	12	J342
MPJHVD1200AP48	12	—	48	110	12	J122
MS2LSD1200	12	—	48	110	12	J064
MS4JCD1200	12	—	48	110	12	J132
VCLDD1200	12	—	56	110	12	J168
MSSHDD1300	13	—	19.5	75	12	J124
MSMHDD1300	13	—	26	75	12	J126
VQMHVD1300	13	—	26	75	12	J143
MSMHZDD1300	13	—	26	90	12	J096
VQMHZVD1300	13	—	26	90	12	J104
VQMHVD1300S12	13	—	26	110	12	J143
MPMHVD1300S12	13	—	32	110	12	J118
MS4ECD1400L45S10	14	—	14	45	10	J141
NEW MP4ECD1400S10	14	—	15	50	10	J138
SED2140KMG	14	—	15	70	16	J089
SED2140KPG	14	—	15	70	16	J090
MSSHDD1400	14	—	21	90	16	J124
C2MAD1400	14	—	26	75	12	J092
MSMHZDD1400	14	—	26	90	12	J096
VQMHZVD1400	14	—	26	90	12	J104
VFSFPRD1400	14	—	27	75	12	J339
VQSVRD1400	14	—	27	130	12	J336
MSMHDD1400	14	—	30	90	16	J126
VQMHVD1400	14	—	30	90	16	J143
C2MHAD1400	14	—	32	75	12	J094
VQMHVD1400S12	14	—	32	130	12	J143
MS4MCD1400	14	—	35	90	12	J130
VFMDD1400	14	—	35	105	12	J166
MPMHVD1400S12	14	—	35	130	12	J118
SED2150KMG	15	—	15	70	16	J089
SED2150KPG	15	—	15	70	16	J090
MSSHDD1500	15	—	22.5	90	16	J124
MSMHZDD1500	15	—	26	110	16	J096
VQMHZVD1500	15	—	26	110	16	J104
C2MAD1500	15	—	30	80	16	J092
MSMHDD1500	15	—	35	90	16	J126
VFMDD1500	15	—	40	110	16	J166
C3SAD1600N300	16	30	15	75	16	J116
CSRAD1600	16	35	18	100	16	J344
C3SAD1600N400	16	40	15	100	16	J116
C3SAD1600N450	16	45	15	125	16	J116
NEW A3SA160N48C	16	48	24	90	16	J113
NEW DLC3SA160N48C	16	48	24	90	16	J114
SED2160KMG	16	—	15	70	16	J089
SED2160KPG	16	—	15	70	16	J090
C3SAD1600A200S14	16	—	15	200	14	J116
MSSHDD1600	16	—	24	90	16	J124
MSMHZDD1600	16	—	30	110	16	J096
VQMHZVD1600	16	—	30	110	16	J104
VQMHZVOHD1600	16	—	30	110	16	J109
C2MAD1600	16	—	32	90	16	J092
MS2MSD1600	16	—	32	90	16	J058
VF6MHVD1600	16	—	32	90	16	J164
VF8MHVCHD1600	16	—	32	90	16	J169
VQ6MHVCHD1600	16	—	32	90	16	J163
C2MHAD1600	16	—	32	100	16	J094
CMRAD1600	16	—	32	100	16	J346
VF6SVRCHD1600	16	—	33	90	16	J343
VFSFPRCHD1600	16	—	33	90	16	J341
VFSFPRD1600	16	—	33	90	16	J339
VQSVRD1600	16	—	33	125	16	J336
MSMHDD1600	16	—	35	90	16	J126
VFMHVCHD1600	16	—	35	90	16	J156
VQMHVD1600	16	—	35	90	16	J143
SEG4160SA	16	—	38	90	16	J162
MS4MCD1600	16	—	40	100	16	J130
VF4MDD1600	16	—	40	100	16	J153
VF4MVD1600	16	—	40	100	16	J155
MPMHVD1600	16	—	40	110	16	J118
VFMDD1600	16	—	40	110	16	J166

DC = Cutting diameter LU = Usable length APMX = Depth of cut maximum LF = Functional length DCON = Connection diameter

	Order Number	DC	LU	APMX	LF	DCON	Page
	VFMFPRD1600	16	–	48	125	16	J342
	MPJHVD1600AP53	16	–	53	125	16	J122
	VQJHVD1600	16	–	55	125	16	J147
	MPJHVD1600AP64	16	–	64	125	16	J122
	VCLDD1600	16	–	66	130	16	J168
	C3SAD1700A150S16	17	–	18	150	16	J116
	MSSHDD1700	17	–	25.5	100	16	J124
	MSMHDD1700	17	–	35	100	16	J126
	C3SAD1800A200S16	18	–	18	200	16	J116
	CSRAD1800	18	–	22	100	16	J344
	MSSHDD1800	18	–	27	100	16	J124
	C2MAD1800	18	–	32	90	16	J092
	VFSFPRD1800	18	–	33	90	16	J339
	VQSVRD1800	18	–	33	150	16	J336
	MS2MSD1800	18	–	36	90	16	J058
	MSMHDD1800	18	–	40	100	16	J126
	VQMHVD1800	18	–	40	100	16	J143
	VFMDD1800	18	–	40	120	16	J166
	VQMHVD1800S16	18	–	42	150	16	J143
	MS4MCD1800	18	–	45	100	16	J130
	MPMHVD1800S16	18	–	45	150	16	J118
	MSSHDD1900	19	–	28.5	110	20	J124
	MSMHDD1900	19	–	40	110	20	J126
	C3SAD2000N400	20	40	20	100	20	J116
	CSRAD2000	20	50	25	125	20	J344
NEW	A3SA200N55C	20	55	30	100	20	J113
NEW	DLC3SA200N55C	20	55	30	100	20	J114
	C3SAD2000N600	20	60	20	125	20	J116
	C3SAD2000N850	20	85	20	150	20	J116
	C3SAD2000A200S18	20	–	20	200	18	J116
	MSSHDD2000	20	–	30	110	20	J124
	MSMHZDD2000	20	–	32	140	20	J096
	VQMHZVD2000	20	–	32	140	20	J104
	C2MAD2000	20	–	38	100	20	J092
	VF6MHVD2000	20	–	38	100	20	J164
	VF6SVRCHD2000	20	–	38	100	20	J343
	VF8MHVCHD2000	20	–	38	100	20	J169
	VFSFPRCHD2000	20	–	38	100	20	J341
	VFSFPRD2000	20	–	38	100	20	J339
	VQ6MHVCHD2000	20	–	38	100	20	J163
	C2MHAD2000	20	–	38	125	20	J094
	CMRAD2000	20	–	38	125	20	J346
	VQSVRD2000	20	–	38	140	20	J336
	MS2MSD2000	20	–	40	100	20	J058
	MSMHDD2000	20	–	45	110	20	J126
	VFMHVCHD2000	20	–	45	110	20	J156
	VQMHVD2000	20	–	45	110	20	J143
	VFMDD2000	20	–	45	125	20	J166
	SEG4200SA	20	–	48	110	20	J162
	MS4MCD2000	20	–	50	110	20	J130

	Order Number	DC	LU	APMX	LF	DCON	Page
	VF4MDD2000	20	–	50	110	20	J153
	VF4MVD2000	20	–	50	110	20	J155
	MPMHVD2000	20	–	50	125	20	J118
	VFMFPRD2000	20	–	57	140	20	J342
	MPJHVD2000AP66	20	–	66	140	20	J122
	VQJHVD2000	20	–	70	140	20	J147
	VCLDD2000	20	–	76	140	20	J168
	MPJHVD2000AP80	20	–	80	140	20	J122
	CSRAD2200	22	–	25	125	20	J344
	VFMDD2200	22	–	45	135	20	J166
	MSMHDD2200	22	–	50	125	20	J126
	MPMHVD2200S20	22	–	55	160	20	J118
	C3SAD2500N500	25	50	20	100	25	J116
NEW	A3SA250N55C	25	55	37.5	100	25	J113
NEW	DLC3SA250N55C	25	55	37.5	100	25	J114
	CSRAD2500	25	60	30	125	25	J344
	C3SAD2500N650	25	65	20	125	25	J116
	C3SAD2500N900	25	90	20	150	25	J116
	C2MHAD2500	25	–	38	125	25	J094
	CMRAD2500	25	–	45	125	25	J346
	MSMHDD2500	25	–	55	125	25	J126
	VQMHVD2500	25	–	55	125	25	J143
	SEG4250SA	25	–	59	125	25	J162
	VFMDD2500	25	–	60	160	25	J166
	VCLDD2500	25	–	92	180	25	J168
	C3SAD2600A200S25	26	–	20	200	25	J116

DC = Cutting diameter LU = Usable length APMX = Depth of cut maximum LF = Functional length DCON = Connection diameter

CARBIDE

SELECTION CHART BY BLADE DIAMETER

CARBIDE/BALL

Order Number	RE	LU	APMX	LF	DCON	Page
MP2XLBR0005N003	0.05	0.3	0.08	50	4	J177
MP2XLBR0005N005	0.05	0.5	0.08	50	4	J177
VFR2SBR0010	0.1	0.4	0.2	45	4	J191
VFR2SBR0010S06	0.1	0.4	0.2	50	6	J191
DC2XLBR0010N005	0.1	0.5	0.12	50	4	J215
MP2XLBR0010N005	0.1	0.5	0.15	50	4	J177
NEW VFR2XLBR0010N005	0.1	0.5	0.15	50	4	J195
VF2XLBR0010N005S04	0.1	0.5	0.16	50	4	J202
VF2XLBR0010N005S06	0.1	0.5	0.16	50	6	J202
MP2XLBR0010N008	0.1	0.75	0.15	50	4	J177
VF2XLBR0010N008S04	0.1	0.75	0.16	50	4	J202
MP2XLBR0010N010	0.1	1	0.15	50	4	J177
NEW VFR2XLBR0010N010	0.1	1	0.15	50	4	J195
VF2XLBR0010N010S04	0.1	1	0.16	50	4	J202
VF2XLBR0010N010S06	0.1	1	0.16	50	6	J202
MP2XLBR0010N013	0.1	1.25	0.15	50	4	J177
VF2XLBR0010N013S04	0.1	1.25	0.16	50	4	J202
MP2XLBR0010N015	0.1	1.5	0.15	50	4	J177
VF2XLBR0010N015S04	0.1	1.5	0.16	50	4	J202
VF2XLBR0010N015S06	0.1	1.5	0.16	50	6	J202
MP2XLBR0010N018	0.1	1.75	0.15	50	4	J177
VF2XLBR0010N018S04	0.1	1.75	0.16	50	4	J202
MP2XLBR0010N020	0.1	2	0.15	50	4	J177
VF2XLBR0010N020S04	0.1	2	0.16	50	4	J202
MP2XLBR0010N025	0.1	2.5	0.15	50	4	J177
VF2XLBR0010N025S04	0.1	2.5	0.16	50	4	J202
DC2SBR0010	0.1	—	0.12	50	4	J213
MP2SSBR0010	0.1	—	0.2	40	4	J171
MP2SBR0010	0.1	—	0.3	45	4	J172
MP2XLBR0015N005	0.15	0.5	0.24	50	4	J177
VFR2SBR0015	0.15	0.6	0.3	45	4	J191
VFR2SBR0015S06	0.15	0.6	0.3	50	6	J191
MP2XLBR0015N008	0.15	0.75	0.24	50	4	J177
MP2XLBR0015N010	0.15	1	0.24	50	4	J177
VF2XLBR0015N010S04	0.15	1	0.24	50	4	J202
NEW VFR2XLBR0015N010	0.15	1	0.24	50	4	J195
MP2XLBR0015N010S06	0.15	1	0.24	50	6	J177
VF2XLBR0015N010S06	0.15	1	0.24	50	6	J202
CRN2XLBR0015N010S04	0.15	1	0.3	50	4	J210
MP2XLBR0015N013	0.15	1.25	0.24	50	4	J177
VF2XLBR0015N013S04	0.15	1.25	0.24	50	4	J202
MP2XLBR0015N013S06	0.15	1.25	0.24	50	6	J177
MP2XLBR0015N015	0.15	1.5	0.24	50	4	J177
VF2XLBR0015N015S04	0.15	1.5	0.24	50	4	J202
NEW VFR2XLBR0015N015	0.15	1.5	0.24	50	4	J195
MP2XLBR0015N015S06	0.15	1.5	0.24	50	6	J177
VF2XLBR0015N015S06	0.15	1.5	0.24	50	6	J202
CRN2XLBR0015N015S04	0.15	1.5	0.3	50	4	J210
MP2XLBR0015N018	0.15	1.75	0.24	50	4	J177
VF2XLBR0015N018S04	0.15	1.75	0.24	50	4	J202

Order Number	RE	LU	APMX	LF	DCON	Page
MP2XLBR0015N020	0.15	2	0.24	50	4	J177
VF2XLBR0015N020S04	0.15	2	0.24	50	4	J202
NEW VFR2XLBR0015N020	0.15	2	0.24	50	4	J195
VF2XLBR0015N020S06	0.15	2	0.24	50	6	J202
CRN2XLBR0015N020S04	0.15	2	0.3	50	4	J210
DF2XLBR0015N020	0.15	2	0.3	50	4	J217
MP2XLBR0015N025	0.15	2.5	0.24	50	4	J177
VF2XLBR0015N025S04	0.15	2.5	0.24	50	4	J202
MP2XLBR0015N030	0.15	3	0.24	50	4	J177
VF2XLBR0015N030S04	0.15	3	0.24	50	4	J202
MP2XLBR0015N035	0.15	3.5	0.24	50	4	J177
MP2XLBR0015N040	0.15	4	0.24	50	4	J177
VF2XLBR0015N040S04	0.15	4	0.24	50	4	J202
MP2SBR0015	0.15	—	0.5	45	4	J172
MP2XLBR0020N005	0.2	0.5	0.3	50	4	J177
MP2XLBR0020N008	0.2	0.75	0.3	50	4	J177
VFR2SBR0020	0.2	0.8	0.4	45	4	J191
VFR2SBR0020S06	0.2	0.8	0.4	50	6	J191
DC2XLBR0020N010	0.2	1	0.24	50	4	J215
MP2XLBR0020N010	0.2	1	0.3	50	4	J177
NEW VFR2XLBR0020N010	0.2	1	0.3	50	4	J195
MP2XLBR0020N010S06	0.2	1	0.3	50	6	J177
VF2XLBSR0020N010	0.2	1	0.32	40	4	J200
VF2XLBR0020N010S04	0.2	1	0.32	50	4	J202
VF2XLBR0020N010S06	0.2	1	0.32	50	6	J202
CRN2XLBR0020N010S04	0.2	1	0.4	50	4	J210
MP2XLBR0020N015	0.2	1.5	0.3	50	4	J177
NEW VFR2XLBR0020N015	0.2	1.5	0.3	50	4	J195
VF2XLBR0020N015S04	0.2	1.5	0.32	50	4	J202
VF2XLBR0020N015S06	0.2	1.5	0.32	50	6	J202
CRN2XLBR0020N015S04	0.2	1.5	0.4	50	4	J210
MP2XLBR0020N020	0.2	2	0.3	50	4	J177
NEW VFR2XLBR0020N020	0.2	2	0.3	50	4	J195
MP2XLBR0020N020S06	0.2	2	0.3	50	6	J177
VF2XLBSR0020N020	0.2	2	0.32	40	4	J200
VF2XLBR0020N020S04	0.2	2	0.32	50	4	J202
VF2XLBR0020N020S06	0.2	2	0.32	50	6	J202
CRN2XLBR0020N020S04	0.2	2	0.4	50	4	J210
MP2XLBR0020N025	0.2	2.5	0.3	50	4	J177
NEW VFR2XLBR0020N025	0.2	2.5	0.3	50	4	J195
VF2XLBR0020N025S04	0.2	2.5	0.32	50	4	J202
VF2XLBR0020N025S06	0.2	2.5	0.32	50	6	J202
MP2XLBR0020N030	0.2	3	0.3	50	4	J178
NEW VFR2XLBR0020N030	0.2	3	0.3	50	4	J195
VF2XLBSR0020N030	0.2	3	0.32	40	4	J200
VF2XLBR0020N030S04	0.2	3	0.32	50	4	J202
VF2XLBR0020N030S06	0.2	3	0.32	50	6	J202
CRN2XLBR0020N030S04	0.2	3	0.4	50	4	J210
MP2XLBR0020N035	0.2	3.5	0.3	50	4	J178
MP2XLBR0020N040	0.2	4	0.3	50	4	J178

RE = Ball Nose End Mill Radius LU = Usable length APMX = Depth of cut maximum LF = Functional length DCON = Connection diameter

Order Number	RE	LU	APMX	LF	DCON	Page
NEW VFR2XLBR0020N040	0.2	4	0.3	50	4	J195
VF2XLBSR0020N040	0.2	4	0.32	40	4	J200
VF2XLBR0020N040S04	0.2	4	0.32	50	4	J202
DF2XLBR0020N040	0.2	4	0.6	60	4	J217
MP2XLBR0020N045	0.2	4.5	0.3	50	4	J178
MP2XLBR0020N050	0.2	5	0.3	50	4	J178
VF2XLBR0020N050S04	0.2	5	0.32	50	4	J202
MP2XLBR0020N055	0.2	5.5	0.3	50	4	J178
MP2XLBR0020N060	0.2	6	0.3	50	4	J178
DF2XLBR0020N080	0.2	8	0.6	60	4	J217
DC2SBR0020	0.2	—	0.24	50	4	J213
MP2SSBR0020	0.2	—	0.4	40	4	J171
MP2SBR0020	0.2	—	0.6	45	4	J172
MP2SBR0020S06	0.2	—	0.6	50	6	J172
CRN2MBR0020S04	0.2	—	0.8	45	4	J208
MP2XLBR0025N010	0.25	1	0.37	50	4	J178
MP2XLBR0025N015	0.25	1.5	0.37	50	4	J178
NEW VFR2XLBR0025N015	0.25	1.5	0.37	50	4	J195
MP2XLBR0025N015S06	0.25	1.5	0.37	50	6	J178
VF2XLBR0025N015S04	0.25	1.5	0.4	50	4	J203
VF2XLBR0025N015S06	0.25	1.5	0.4	50	6	J203
CRN2XLBR0025N015S04	0.25	1.5	0.5	50	4	J210
MP2XLBR0025N020	0.25	2	0.37	50	4	J178
NEW VFR2XLBR0025N020	0.25	2	0.37	50	4	J195
MP2XLBR0025N020S06	0.25	2	0.37	50	6	J178
VF2XLBR0025N020S04	0.25	2	0.4	50	4	J203
VF2XLBR0025N020S06	0.25	2	0.4	50	6	J203
CRN2XLBR0025N020S04	0.25	2	0.5	50	4	J210
MP2XLBR0025N025	0.25	2.5	0.37	50	4	J178
NEW VFR2XLBR0025N025	0.25	2.5	0.37	50	4	J195
MP2XLBR0025N025S06	0.25	2.5	0.37	50	6	J178
VF2XLBR0025N025S04	0.25	2.5	0.4	50	4	J203
MP2XLBR0025N030	0.25	3	0.37	50	4	J178
NEW VFR2XLBR0025N030	0.25	3	0.37	50	4	J195
MP2XLBR0025N030S06	0.25	3	0.37	50	6	J178
VF2XLBR0025N030S04	0.25	3	0.4	50	4	J203
VF2XLBR0025N030S06	0.25	3	0.4	50	6	J203
CRN2XLBR0025N030S04	0.25	3	0.5	50	4	J210
CRN2XLBR0025N030S06	0.25	3	0.5	50	6	J210
MP2XLBR0025N035	0.25	3.5	0.37	50	4	J178
VF2XLBR0025N035S04	0.25	3.5	0.4	50	4	J203
MP2XLBR0025N040	0.25	4	0.37	50	4	J178
NEW VFR2XLBR0025N040	0.25	4	0.37	50	4	J195
VF2XLBSR0025N040	0.25	4	0.4	40	4	J200
VF2XLBR0025N040S04	0.25	4	0.4	50	4	J203
VF2XLBR0025N040S06	0.25	4	0.4	50	6	J203
CRN2XLBR0025N040S04	0.25	4	0.5	50	4	J210
DF2XLBR0025N040	0.25	4	0.6	60	4	J217
MP2XLBR0025N045	0.25	4.5	0.37	50	4	J178
MP2XLBR0025N050	0.25	5	0.37	50	4	J178

Order Number	RE	LU	APMX	LF	DCON	Page
VF2XLBR0025N050S04	0.25	5	0.4	50	4	J203
VF2XLBR0025N050S06	0.25	5	0.4	50	6	J203
MP2XLBR0025N055	0.25	5.5	0.37	50	4	J178
MP2XLBR0025N060	0.25	6	0.37	50	4	J178
VF2XLBSR0025N060	0.25	6	0.4	40	4	J200
VF2XLBR0025N060S04	0.25	6	0.4	50	4	J203
VF2XLBR0025N060S06	0.25	6	0.4	60	6	J203
CRN2XLBR0025N060S04	0.25	6	0.5	50	4	J210
MP2XLBR0025N070	0.25	7	0.37	50	4	J178
MP2XLBR0025N080	0.25	8	0.37	50	4	J178
CRN2XLBR0025N080S04	0.25	8	0.5	50	4	J210
DF2XLBR0025N080	0.25	8	0.6	60	4	J217
MP2XLBR0025N090	0.25	9	0.37	50	4	J178
MP2XLBR0025N100	0.25	10	0.37	50	4	J178
MP2SBR0025	0.25	—	0.8	45	4	J172
MP2MBR0025	0.25	—	1	45	4	J173
VFR2SBR0030	0.3	1.2	0.6	45	4	J191
VFR2SBR0030S06	0.3	1.2	0.6	50	6	J191
DC2XLBR0030N015	0.3	1.5	0.36	50	4	J215
MP2XLBR0030N015	0.3	1.5	0.45	50	4	J178
MP2XLBR0030N015S06	0.3	1.5	0.45	50	6	J178
MP2XLBR0030N020	0.3	2	0.45	50	4	J178
NEW VFR2XLBR0030N020	0.3	2	0.45	50	4	J195
MP2XLBR0030N020S06	0.3	2	0.45	50	6	J178
NEW VFR2XLBR0030N020S06	0.3	2	0.45	50	6	J195
VF2XLBSR0030N020	0.3	2	0.48	40	4	J200
VF2XLBR0030N020S04	0.3	2	0.48	50	4	J203
VF2XLBR0030N020S06	0.3	2	0.48	50	6	J203
CRN2XLBR0030N020S04	0.3	2	0.6	50	4	J210
MP2XLBR0030N025	0.3	2.5	0.45	50	4	J178
VF2XLBR0030N025S04	0.3	2.5	0.48	50	4	J203
MP2XLBR0030N030	0.3	3	0.45	50	4	J178
NEW VFR2XLBR0030N030	0.3	3	0.45	50	4	J195
MP2XLBR0030N030S06	0.3	3	0.45	50	6	J178
NEW VFR2XLBR0030N030S06	0.3	3	0.45	50	6	J195
VF2XLBSR0030N030	0.3	3	0.48	40	4	J200
VF2XLBR0030N030S04	0.3	3	0.48	50	4	J203
VF2XLBR0030N030S06	0.3	3	0.48	50	6	J203
MP2XLBR0030N035	0.3	3.5	0.45	50	4	J178
VF2XLBR0030N035S04	0.3	3.5	0.48	50	4	J203
MP2XLBR0030N040	0.3	4	0.45	50	4	J178
NEW VFR2XLBR0030N040	0.3	4	0.45	50	4	J195
MP2XLBR0030N040S06	0.3	4	0.45	50	6	J178
VF2XLBSR0030N040	0.3	4	0.48	40	4	J200
VF2XLBR0030N040S04	0.3	4	0.48	50	4	J203
VF2XLBR0030N040S06	0.3	4	0.48	50	6	J203
CRN2XLBR0030N040S04	0.3	4	0.6	50	4	J210
MP2XLBR0030N045	0.3	4.5	0.45	50	4	J178
MP2XLBR0030N050	0.3	5	0.45	50	4	J178
NEW VFR2XLBR0030N050	0.3	5	0.45	50	4	J195

RE = Ball Nose End Mill Radius LU = Usable length APMX = Depth of cut maximum LF = Functional length DCON = Connection diameter

SELECTION CHART BY BLADE DIAMETER

CARBIDE/BALL

	Order Number	RE	LU	APMX	LF	DCON	Page
	MP2XLBR0030N050S06	0.3	5	0.45	50	6	J178
	VF2XLBR0030N050S04	0.3	5	0.48	50	4	J203
	VF2XLBR0030N050S06	0.3	5	0.48	50	6	J203
	VC4STBR0030T0130N05	0.3	5	1	60	6	J324
	VC4STBR0030T0200N05	0.3	5	1	60	6	J324
	VC4STBR0030T0500N05	0.3	5	1	60	6	J324
	MP2XLBR0030N055	0.3	5.5	0.45	50	4	J178
	MP2XLBR0030N060	0.3	6	0.45	50	4	J178
NEW	VFR2XLBR0030N060	0.3	6	0.45	50	4	J195
	MP2XLBR0030N060S06	0.3	6	0.45	50	6	J178
	VF2XLBSR0030N060	0.3	6	0.48	40	4	J200
	VF2XLBR0030N060S04	0.3	6	0.48	50	4	J203
	VF2XLBR0030N060S06	0.3	6	0.48	50	6	J203
	CRN2XLBR0030N060S04	0.3	6	0.6	50	4	J210
	DF2XLBR0030N060	0.3	6	0.9	60	4	J217
	MP2XLBR0030N065	0.3	6.5	0.45	50	4	J178
	MP2XLBR0030N070	0.3	7	0.45	50	4	J178
	VF2XLBR0030N070S04	0.3	7	0.48	50	4	J203
	MP2XLBR0030N080	0.3	8	0.45	50	4	J178
	MP2XLBR0030N080S06	0.3	8	0.45	50	6	J178
	VF2XLBR0030N080S04	0.3	8	0.48	50	4	J203
	VF2XLBR0030N080S06	0.3	8	0.48	60	6	J203
	CRN2XLBR0030N080S04	0.3	8	0.6	50	4	J210
	MP2XLBR0030N085	0.3	8.5	0.45	50	4	J178
	MP2XLBR0030N090	0.3	9	0.45	50	4	J178
	MP2XLBR0030N095	0.3	9.5	0.45	50	4	J178
	DF2XLBFR0030N100	0.3	10	0.45	50	4	J220
	MP2XLBR0030N100	0.3	10	0.45	50	4	J178
	CRN2XLBR0030N100S04	0.3	10	0.6	50	4	J210
	DF2XLBR0030N100	0.3	10	0.9	60	4	J217
	MP2XLBR0030N110	0.3	11	0.45	50	4	J179
	MP2XLBR0030N120	0.3	12	0.45	50	4	J179
	VC4STBR0030T1000N15	0.3	15	1	60	6	J324
	DC2SBR0030	0.3	—	0.42	50	4	J213
	MP2SSBR0030	0.3	—	0.6	40	4	J171
	MP2SBR0030	0.3	—	0.9	45	4	J172
	MP2SBR0030S06	0.3	—	0.9	50	6	J172
	CRN2MBR0030S04	0.3	—	1.2	45	4	J208
	MP2MBR0030	0.3	—	1.2	45	4	J173
	MP2SBR0035	0.35	—	1.1	45	4	J172
	VF3XBR0040T0024L006	0.4	1.5	0.5	60	4	J228
	VF3XBR0040T0024L008	0.4	1.5	0.5	60	4	J228
	VF3XBR0040T0024L012	0.4	1.5	0.5	60	4	J228
	VF3XBR0040T0054L008	0.4	1.5	0.5	60	4	J228
	VF3XBR0040T0054L012	0.4	1.5	0.5	60	4	J228
	VF3XBR0040T0054L016	0.4	1.5	0.5	60	4	J228
	VFR2SBR0040	0.4	1.6	0.8	45	4	J191
	VFR2SBR0040S06	0.4	1.6	0.8	50	6	J191
	DC2XLBR0040N020	0.4	2	0.48	50	4	J215
	MP2XLBR0040N020	0.4	2	0.6	50	4	J179
	MP2XLBR0040N020S06	0.4	2	0.6	50	6	J179
	VF2XLBR0040N020S04	0.4	2	0.64	50	4	J203
	VF2XLBR0040N020S06	0.4	2	0.64	50	6	J203
	CRN2XLBR0040N020S04	0.4	2	0.8	50	4	J210
	MP2XLBR0040N024S06	0.4	2.4	0.6	50	6	J179
	MP2XLBR0040N030	0.4	3	0.6	50	4	J179
NEW	VFR2XLBR0040N030	0.4	3	0.6	50	4	J195
	MP2XLBR0040N030S06	0.4	3	0.6	50	6	J179
	VF2XLBR0040N030S04	0.4	3	0.64	50	4	J203
	VF2XLBR0040N030S06	0.4	3	0.64	50	6	J203
	MP2XLBR0040N040	0.4	4	0.6	50	4	J179
NEW	VFR2XLBR0040N040	0.4	4	0.6	50	4	J195
	MP2XLBR0040N040S06	0.4	4	0.6	50	6	J179
	VF2XLBSR0040N040	0.4	4	0.64	40	4	J200
	VF2XLBR0040N040S04	0.4	4	0.64	50	4	J203
	VF2XLBR0040N040S06	0.4	4	0.64	50	6	J203
	CRN2XLBR0040N040S04	0.4	4	0.8	50	4	J210
	MP2XLBR0040N050	0.4	5	0.6	50	4	J179
	VF2XLBR0040N050S04	0.4	5	0.64	50	4	J203
	MP2XLBR0040N060	0.4	6	0.6	50	4	J179
NEW	VFR2XLBR0040N060	0.4	6	0.6	50	4	J195
	VF2XLBSR0040N060	0.4	6	0.64	40	4	J200
	VF2XLBR0040N060S04	0.4	6	0.64	50	4	J203
	VF2XLBR0040N060S06	0.4	6	0.64	50	6	J203
	CRN2XLBR0040N060S04	0.4	6	0.8	50	4	J210
	MP2XLBR0040N070	0.4	7	0.6	50	4	J179
	VF2XLBR0040N070S04	0.4	7	0.64	50	4	J203
	MP2XLBR0040N080	0.4	8	0.6	50	4	J179
NEW	VFR2XLBR0040N080	0.4	8	0.6	50	4	J195
	VF2XLBR0040N080S04	0.4	8	0.64	50	4	J203
	VF2XLBR0040N080S06	0.4	8	0.64	50	6	J203
	CRN2XLBR0040N080S04	0.4	8	0.8	50	4	J210
	DF2XLBR0040N080	0.4	8	1.2	60	4	J217
	MP2XLBR0040N090	0.4	9	0.6	50	4	J179
	MP2XLBR0040N100	0.4	10	0.6	50	4	J179
	VF2XLBR0040N100S04	0.4	10	0.64	50	4	J203
	VF2XLBR0040N100S06	0.4	10	0.64	60	6	J203
	CRN2XLBR0040N100S04	0.4	10	0.8	50	4	J210
	VC4STBR0040T0130N10	0.4	10	2	60	6	J324
	VC4STBR0040T0200N10	0.4	10	2	60	6	J324
	VC4STBR0040T0500N10	0.4	10	2	60	6	J324
	VC4STBR0040T0700N10	0.4	10	7	60	6	J324
	MP2XLBR0040N120	0.4	12	0.6	50	4	J179
	VC4STBR0040T0130N15	0.4	15	2	60	6	J324
	VC4STBR0040T1000N15	0.4	15	3	60	6	J324
	DC2SBR0040	0.4	—	0.56	50	4	J213
	MP2SSBR0040	0.4	—	0.8	40	4	J171
	MP2SBR0040	0.4	—	1.2	45	4	J172
	MP2SBR0040S06	0.4	—	1.2	50	6	J172
	CRN2MBR0040S04	0.4	—	1.6	45	4	J208

RE = Ball Nose End Mill Radius LU = Usable length APMX = Depth of cut maximum LF = Functional length DCON = Connection diameter

Order Number	RE	LU	APMX	LF	DCON	Page
MP2MBR0040	0.4	–	1.6	45	4	J173
MP2SBR0045	0.45	–	1.4	45	4	J172
VFR2SSBR0050S04	0.5	2	1	40	4	J189
VFR2SSBR0050	0.5	2	1	40	6	J189
MP2SDBR0050	0.5	2	1	45	4	J175
VFR2SBFR0050	0.5	2	1	45	4	J193
VFR2SBR0050	0.5	2	1	45	4	J191
VFR2SBR0050S06	0.5	2	1	50	6	J191
MP3XBR0050N008T05	0.5	2.3	0.8	60	6	J222
MP3XBR0050N010T10	0.5	2.3	0.8	60	6	J222
MP3XBR0050N010T15	0.5	2.3	0.8	60	6	J222
MP3XBR0050N010T30	0.5	2.3	0.8	60	6	J222
MP3XBR0050N012T05	0.5	2.3	0.8	60	6	J222
MP3XBR0050N016T05	0.5	2.3	0.8	60	6	J222
MP3XBR0050N016T10	0.5	2.3	0.8	60	6	J222
MP3XBR0050N016T15	0.5	2.3	0.8	60	6	J222
MP3XBR0050N020T05	0.5	2.3	0.8	60	6	J222
MP3XBR0050N020T10	0.5	2.3	0.8	60	6	J222
MP3XBR0050N020T15	0.5	2.3	0.8	60	6	J222
MP3XBR0050N020T30	0.5	2.3	0.8	60	6	J222
MP3XBR0050N025T50	0.5	2.3	0.8	60	6	J222
VF3XBR0050T0024L008	0.5	2.3	0.8	60	6	J228
VF3XBR0050T0024L010	0.5	2.3	0.8	60	6	J228
VF3XBR0050T0024L012	0.5	2.3	0.8	60	6	J228
VF3XBR0050T0054L008	0.5	2.3	0.8	60	6	J228
VF3XBR0050T0054L012	0.5	2.3	0.8	60	6	J228
VF3XBR0050T0130L012	0.5	2.3	0.8	60	6	J228
MP3XBR0050N023T15	0.5	2.3	0.8	70	6	J222
MP3XBR0050N025T05	0.5	2.3	0.8	70	6	J222
MP3XBR0050N025T10	0.5	2.3	0.8	70	6	J222
MP3XBR0050N025T15	0.5	2.3	0.8	70	6	J222
MP3XBR0050N030T05	0.5	2.3	0.8	70	6	J222
MP3XBR0050N030T10	0.5	2.3	0.8	70	6	J222
MP3XBR0050N030T30	0.5	2.3	0.8	70	6	J222
VF3XBR0050T0024L016	0.5	2.3	0.8	70	6	J228
VF3XBR0050T0024L020	0.5	2.3	0.8	70	6	J228
VF3XBR0050T0024L025	0.5	2.3	0.8	70	6	J228
VF3XBR0050T0054L016	0.5	2.3	0.8	70	6	J228
VF3XBR0050T0054L020	0.5	2.3	0.8	70	6	J228
VF3XBR0050T0054L025	0.5	2.3	0.8	70	6	J228
VF3XBR0050T0130L016	0.5	2.3	0.8	70	6	J228
VF3XBR0050T0130L020	0.5	2.3	0.8	70	6	J228
VF3XBR0050T0130L025	0.5	2.3	0.8	70	6	J228
VF3XBR0050T0024L030	0.5	2.3	0.8	80	6	J228
VF3XBR0050T0024L035	0.5	2.3	0.8	80	6	J228
VF3XBR0050T0054L030	0.5	2.3	0.8	80	6	J228
VF3XBR0050T0054L035	0.5	2.3	0.8	80	6	J228
VF3XBR0050T0054L040	0.5	2.3	0.8	80	6	J228
VF3XBR0050T0130L030	0.5	2.3	0.8	80	6	J228
VF3XBR0050T0130L035	0.5	2.3	0.8	80	6	J228
MP3XBR0050N035T10	0.5	2.3	0.8	90	6	J222
MP3XBR0050N042T30	0.5	2.3	0.8	90	6	J222
MP3XBR0050N050T05	0.5	2.3	0.8	90	6	J222
MP3XBR0050N050T10	0.5	2.3	0.8	90	6	J222
VF3XBR0050T0054L050	0.5	2.3	0.8	110	6	J228
VF3XBR0050T0054L060	0.5	2.3	0.8	110	6	J228
VF3XBR0050T0054L070	0.5	2.3	0.8	110	6	J228
DC2XLBR0050N025	0.5	2.5	0.6	50	4	J215
MP2XLBR0050N030	0.5	3	0.75	50	4	J179
NEW VFR2XLBR0050N030	0.5	3	0.75	50	4	J195
MP2XLBR0050N030S06	0.5	3	0.75	50	6	J179
NEW VFR2XLBR0050N030S06	0.5	3	0.75	50	6	J195
VF2XLBSR0050N030	0.5	3	0.8	40	4	J200
VF2XLBR0050N030S04	0.5	3	0.8	50	4	J203
VF2XLBR0050N030S06	0.5	3	0.8	50	6	J203
CRN2XLBR0050N030S04	0.5	3	1	50	4	J210
MP2XLBR0050N040	0.5	4	0.75	50	4	J179
NEW VFR2XLBR0050N040	0.5	4	0.75	50	4	J195
MP2XLBR0050N040S06	0.5	4	0.75	50	6	J179
NEW VFR2XLBR0050N040S06	0.5	4	0.75	50	6	J195
VF2XLBSR0050N040	0.5	4	0.8	40	4	J200
VF2XLBR0050N040S04	0.5	4	0.8	50	4	J203
VF2XLBR0050N040S06	0.5	4	0.8	50	6	J203
CRN2XLBR0050N040S04	0.5	4	1	50	4	J210
NEW VQN2MBR0050	0.5	4	1	60	6	J185
DF2XLBR0050N040	0.5	4	1.5	60	4	J217
DC2XLBR0050N050	0.5	5	0.6	50	4	J215
MP2XLBR0050N050	0.5	5	0.75	50	4	J179
MP2XLBR0050N050S06	0.5	5	0.75	50	6	J179
VF2XLBR0050N050S04	0.5	5	0.8	50	4	J203
VF2XLBR0050N050S06	0.5	5	0.8	50	6	J203
CRN2XLBR0050N050S04	0.5	5	1	50	4	J210
CRN2XLBR0050N050S06	0.5	5	1	50	6	J210
MP2XLBR0050N060	0.5	6	0.75	50	4	J179
NEW VFR2XLBR0050N060	0.5	6	0.75	50	4	J195
MP2XLBR0050N060S06	0.5	6	0.75	50	6	J179
NEW VFR2XLBR0050N060S06	0.5	6	0.75	50	6	J196
VF2XLBSR0050N060	0.5	6	0.8	40	4	J200
VF2XLBR0050N060S04	0.5	6	0.8	50	4	J203
VF2XLBR0050N060S06	0.5	6	0.8	50	6	J203
NEW VQ4WBR0050N06E280	0.5	6	0.88	50	4	J236
CRN2XLBR0050N060S04	0.5	6	1	50	4	J210
CRN2XLBR0050N060S06	0.5	6	1	50	6	J210
MP2XLBR0050N070	0.5	7	0.75	50	4	J179
VF2XLBR0050N070S04	0.5	7	0.8	50	4	J203
MP2XLBR0050N080	0.5	8	0.75	50	4	J179
NEW VFR2XLBR0050N080	0.5	8	0.75	50	4	J196
NEW VQ2XLBR0050N080	0.5	8	0.75	50	4	J187
MP2XLBR0050N080S06	0.5	8	0.75	50	6	J179
NEW VQ2XLBR0050N080S06	0.5	8	0.75	50	6	J187

RE = Ball Nose End Mill Radius   LU = Usable length   APMX = Depth of cut maximum   LF = Functional length   DCON = Connection diameter

SELECTION CHART BY BLADE DIAMETER

CARBIDE/BALL

Order Number	RE	LU	APMX	LF	DCON	Page
VF2XLBSR0050N080	0.5	8	0.8	40	4	J200
VF2XLBR0050N080S04	0.5	8	0.8	50	4	J204
VF2XLBR0050N080S06	0.5	8	0.8	50	6	J204
CRN2XLBR0050N080S04	0.5	8	1	50	4	J210
CRN2XLBR0050N080S06	0.5	8	1	50	6	J210
MP2XLBR0050N090	0.5	9	0.75	50	4	J179
VF2XLBR0050N090S04	0.5	9	0.8	50	4	J204
MP2XLBR0050N100	0.5	10	0.75	50	4	J179
NEW VFR2XLBR0050N100	0.5	10	0.75	50	4	J196
NEW VQ2XLBR0050N100	0.5	10	0.75	50	4	J187
NEW VQ2XLBR0050N100S06	0.5	10	0.75	55	6	J187
MP2XLBR0050N100S06	0.5	10	0.75	60	6	J179
VF2XLBR0050N100S04	0.5	10	0.8	50	4	J204
VF2XLBR0050N100S06	0.5	10	0.8	50	6	J204
CRN2XLBR0050N100S04	0.5	10	1	50	4	J210
DF2XLBR0050N100	0.5	10	1.5	60	4	J217
VC4STBR0050T0130N10	0.5	10	2	60	6	J324
VC4STBR0050T0200N10	0.5	10	2	60	6	J324
VC4STBR0050T0500N10	0.5	10	3	60	6	J324
VC4STBR0050T0700N10	0.5	10	7	60	6	J324
MP2XLBR0050N120	0.5	12	0.75	50	4	J179
NEW VFR2XLBR0050N120	0.5	12	0.75	50	4	J196
NEW VQ2XLBR0050N120S06	0.5	12	0.75	55	6	J187
MP2XLBR0050N120S06	0.5	12	0.75	60	6	J179
VF2XLBR0050N120S04	0.5	12	0.8	50	4	J204
VF2XLBR0050N120S06	0.5	12	0.8	60	6	J204
CRN2XLBR0050N120S04	0.5	12	1	50	4	J210
DF2XLBFR0050N120	0.5	12	1.5	50	4	J220
DF2XLBR0050N120	0.5	12	1.5	60	4	J217
MP2XLBR0050N140	0.5	14	0.75	55	4	J179
VF2XLBR0050N140S04	0.5	14	0.8	60	4	J204
VC4STBR0050T1000N14	0.5	14	3	60	6	J324
VC4STBR0050T0130N15	0.5	15	2	60	6	J324
VC4STBR0050T0200N15	0.5	15	2	60	6	J324
VC4STBR0050T0500N15	0.5	15	3	60	6	J324
VC4STBR0050T0700N15	0.5	15	7	60	6	J324
MP2XLBR0050N160	0.5	16	0.75	55	4	J179
MP2XLBR0050N160S06	0.5	16	0.75	65	6	J179
VF2XLBR0050N160S04	0.5	16	0.8	60	4	J204
VF2XLBR0050N160S06	0.5	16	0.8	70	6	J204
CRN2XLBR0050N160S04	0.5	16	1	55	4	J211
DF2XLBFR0050N160	0.5	16	1.5	50	4	J220
DF2XLBR0050N160	0.5	16	1.5	80	4	J217
MP2XLBR0050N180	0.5	18	0.75	55	4	J179
VF2XLBR0050N180S04	0.5	18	0.8	60	4	J204
MP2XLBR0050N200	0.5	20	0.75	55	4	J179
MP2XLBR0050N200S06	0.5	20	0.75	65	6	J179
VF2XLBR0050N200S04	0.5	20	0.8	60	4	J204
VF2XLBR0050N200S06	0.5	20	0.8	70	6	J204
CRN2XLBR0050N200S04	0.5	20	1	55	4	J211

Order Number	RE	LU	APMX	LF	DCON	Page
DF2XLBFR0050N200	0.5	20	1.5	50	4	J220
DF2XLBR0050N200	0.5	20	1.5	80	4	J217
VC4STBR0050T0130N20	0.5	20	2	60	6	J324
VC4STBR0050T0200N20	0.5	20	3	60	6	J324
VC4STBR0050T0500N20	0.5	20	3	60	6	J324
VC4STBR0050T0700N20	0.5	20	7	60	6	J324
DF2XLBR0050N300	0.5	30	1.5	80	4	J217
DC2SBR0050	0.5	—	0.7	50	4	J213
MP2SSBR0050	0.5	—	1	40	4	J171
MP2SSBR0050S06	0.5	—	1	40	6	J171
MP2SBR0050	0.5	—	1.5	45	4	J172
MP2SBR0050S06	0.5	—	1.5	50	6	J172
CRN2MBR0050S04	0.5	—	2.5	45	4	J208
MP2MBR0050	0.5	—	2.5	45	4	J173
CRN2MBR0050S06	0.5	—	2.5	50	6	J208
VF4MBR0050	0.5	—	2.5	50	6	J243
C4LATBR050T040AP20	0.5	—	20	70	6	J330
NEW DLC4LATBR050T040AP20	0.5	—	20	70	6	J328
VFR2SBR0060	0.6	2.4	1.2	45	4	J191
VFR2SBR0060S06	0.6	2.4	1.2	50	6	J191
MP2XLBR0060N060	0.6	6	0.9	50	4	J179
MP2XLBR0060N060S06	0.6	6	0.9	55	6	J179
VF2XLBR0060N060S04	0.6	6	0.96	50	4	J204
VF2XLBR0060N060S06	0.6	6	0.96	50	6	J204
MP2XLBR0060N080	0.6	8	0.9	50	4	J179
MP2XLBR0060N080S06	0.6	8	0.9	55	6	J179
VF2XLBR0060N080S04	0.6	8	0.96	50	4	J204
VF2XLBR0060N080S06	0.6	8	0.96	50	6	J204
MP2XLBR0060N100	0.6	10	0.9	50	4	J179
MP2XLBR0060N100S06	0.6	10	0.9	55	6	J179
VF2XLBR0060N100S04	0.6	10	0.96	50	4	J204
VF2XLBR0060N100S06	0.6	10	0.96	50	6	J204
MP2XLBR0060N120	0.6	12	0.9	50	4	J179
MP2XLBR0060N120S06	0.6	12	0.9	65	6	J179
VF2XLBR0060N120S04	0.6	12	0.96	50	4	J204
VF2XLBR0060N120S06	0.6	12	0.96	50	6	J204
MP2XLBR0060N140	0.6	14	0.9	55	4	J179
VF2XLBR0060N140S04	0.6	14	0.96	60	4	J204
MP2XLBR0060N160	0.6	16	0.9	55	4	J179
MP2XLBR0060N160S06	0.6	16	0.9	65	6	J179
VF2XLBR0060N160S04	0.6	16	0.96	60	4	J204
VF2XLBR0060N160S06	0.6	16	0.96	70	6	J204
MP2XLBR0060N180	0.6	18	0.9	60	4	J179
MP2XLBR0060N200	0.6	20	0.9	60	4	J180
MP2XLBR0060N240	0.6	24	0.9	60	4	J180
MP2SBR0060	0.6	—	1.8	45	4	J172
MP2MBR0060	0.6	—	2.5	45	4	J173
NEW VQ4WBR0065N08E280	0.65	8	1.14	50	4	J236
VFR2SBR0070	0.7	2.8	1.4	45	4	J191
VFR2SBR0070S06	0.7	2.8	1.4	50	6	J191

RE = Ball Nose End Mill Radius LU = Usable length APMX = Depth of cut maximum LF = Functional length DCON = Connection diameter

Order Number	RE	LU	APMX	LF	DCON	Page
MP2XLBR0070N080	0.7	8	1.05	50	4	J180
VF2XLBR0070N080S04	0.7	8	1.12	50	4	J204
MP2XLBR0070N120	0.7	12	1.05	50	4	J180
VF2XLBR0070N120S04	0.7	12	1.12	50	4	J204
MP2XLBR0070N160	0.7	16	1.05	50	4	J180
VF2XLBR0070N160S04	0.7	16	1.12	60	4	J204
MP2SBR0070	0.7	—	2.1	45	4	J172
MP2MBR0070	0.7	—	3	45	4	J173
MP3XBR0075N010T05	0.75	2.7	1.2	60	6	J222
MP3XBR0075N010T10	0.75	2.7	1.2	60	6	J222
MP3XBR0075N010T15	0.75	2.7	1.2	60	6	J223
MP3XBR0075N016T05	0.75	2.7	1.2	60	6	J222
MP3XBR0075N016T10	0.75	2.7	1.2	60	6	J222
MP3XBR0075N016T15	0.75	2.7	1.2	60	6	J223
MP3XBR0075N020T05	0.75	2.7	1.2	60	6	J222
MP3XBR0075N020T10	0.75	2.7	1.2	60	6	J222
MP3XBR0075N020T15	0.75	2.7	1.2	60	6	J223
MP3XBR0075N025T15	0.75	2.7	1.2	80	6	J223
MP3XBR0075N030T05	0.75	2.7	1.2	80	6	J222
MP3XBR0075N030T10	0.75	2.7	1.2	80	6	J222
MP3XBR0075N030T15	0.75	2.7	1.2	80	6	J223
MP3XBR0075N046T30	0.75	2.7	1.2	80	6	J223
VF3XBR0075T0024L010	0.75	2.8	1.3	60	6	J228
VF3XBR0075T0024L015	0.75	2.8	1.3	60	6	J228
VF3XBR0075T0054L015	0.75	2.8	1.3	60	6	J229
VF3XBR0075T0130L015	0.75	2.8	1.3	60	6	J229
VF3XBR0075T0024L020	0.75	2.8	1.3	70	6	J228
VF3XBR0075T0054L020	0.75	2.8	1.3	70	6	J229
VF3XBR0075T0130L020	0.75	2.8	1.3	70	6	J229
VF3XBR0075T0024L030	0.75	2.8	1.3	80	6	J229
VF3XBR0075T0054L030	0.75	2.8	1.3	80	6	J229
VF3XBR0075T0054L040	0.75	2.8	1.3	80	6	J229
VF3XBR0075T0130L030	0.75	2.8	1.3	80	6	J229
MP2XLBR0075N030	0.75	3	1.1	50	4	J180
VFR2SSBR0075S04	0.75	3	1.5	40	4	J189
VFR2SSBR0075	0.75	3	1.5	40	6	J189
VFR2SBFR0075	0.75	3	1.5	45	4	J193
VFR2SBR0075	0.75	3	1.5	45	4	J191
MP2SDBR0075S06	0.75	3	1.5	50	6	J175
VFR2SBR0075S06	0.75	3	1.5	50	6	J191
DC2XLBR0075N038	0.75	3.8	0.9	50	4	J215
MP2XLBR0075N040	0.75	4	1.1	50	4	J180
MP2XLBR0075N060	0.75	6	1.1	50	4	J180
NEW VFR2XLBR0075N060	0.75	6	1.1	50	4	J196
MP2XLBR0075N060S06	0.75	6	1.1	50	6	J180
NEW VFR2XLBR0075N060S06	0.75	6	1.1	50	6	J196
VF2XLBR0075N060S04	0.75	6	1.2	50	4	J204
VF2XLBR0075N060S06	0.75	6	1.2	50	6	J204
MP2XLBR0075N080	0.75	8	1.1	50	4	J180
NEW VFR2XLBR0075N080	0.75	8	1.1	50	4	J196

Order Number	RE	LU	APMX	LF	DCON	Page
NEW VFR2XLBR0075N080S06	0.75	8	1.1	50	6	J196
MP2XLBR0075N080S06	0.75	8	1.1	60	6	J180
VF2XLBR0075N080S04	0.75	8	1.2	50	4	J204
VF2XLBR0075N080S06	0.75	8	1.2	50	6	J204
CRN2XLBR0075N080S04	0.75	8	1.5	50	4	J211
CRN2XLBR0075N080S06	0.75	8	1.5	50	6	J211
MP2XLBR0075N100	0.75	10	1.1	50	4	J180
NEW VFR2XLBR0075N100	0.75	10	1.1	50	4	J196
NEW VQ2XLBR0075N100S06	0.75	10	1.1	55	6	J187
MP2XLBR0075N100S06	0.75	10	1.1	60	6	J180
VF2XLBR0075N100S04	0.75	10	1.2	50	4	J204
VF2XLBR0075N100S06	0.75	10	1.2	50	6	J204
CRN2XLBR0075N100S04	0.75	10	1.5	50	4	J211
CRN2XLBR0075N100S06	0.75	10	1.5	50	6	J211
VC4STBR0075T0200N10	0.75	10	3	60	6	J324
MP2XLBR0075N120	0.75	12	1.1	50	4	J180
NEW VFR2XLBR0075N120	0.75	12	1.1	50	4	J196
NEW VQ2XLBR0075N120S06	0.75	12	1.1	55	6	J187
MP2XLBR0075N120S06	0.75	12	1.1	60	6	J180
VF2XLBR0075N120S04	0.75	12	1.2	50	4	J204
VF2XLBR0075N120S06	0.75	12	1.2	50	6	J204
NEW VFR2XLBR0075N140	0.75	14	1.1	50	4	J196
MP2XLBR0075N140	0.75	14	1.1	55	4	J180
VF2XLBR0075N140S04	0.75	14	1.2	50	4	J204
VF2XLBR0075N140S06	0.75	14	1.2	50	6	J204
VC4STBR0075T0500N15	0.75	15	3	60	6	J324
MP2XLBR0075N160	0.75	16	1.1	55	4	J180
NEW VFR2XLBR0075N160	0.75	16	1.1	60	4	J196
MP2XLBR0075N160S06	0.75	16	1.1	60	6	J180
VF2XLBR0075N160S04	0.75	16	1.2	60	4	J204
VF2XLBR0075N160S06	0.75	16	1.2	60	6	J204
CRN2XLBR0075N160S04	0.75	16	1.5	55	4	J211
DF2XLBR0075N160	0.75	16	2.3	80	4	J217
MP2XLBR0075N180	0.75	18	1.1	60	4	J180
VF2XLBR0075N180S04	0.75	18	1.2	60	4	J204
MP2XLBR0075N200	0.75	20	1.1	60	4	J180
VF2XLBR0075N200S04	0.75	20	1.2	60	4	J204
VF2XLBR0075N200S06	0.75	20	1.2	70	6	J204
MP2XLBR0075N220	0.75	22	1.1	60	4	J180
DC2SBR0075	0.75	—	1	50	4	J213
MP2SSBR0075	0.75	—	1.5	40	4	J171
MP2SSBR0075S06	0.75	—	1.5	40	6	J171
MP2SBR0075	0.75	—	2.3	45	4	J172
MP2SBR0075S06	0.75	—	2.3	50	6	J172
CRN2MBR0075S04	0.75	—	4	45	4	J208
MP2MBR0075	0.75	—	4	45	4	J173
VFR2SBR0080	0.8	3.2	1.6	45	4	J191
VFR2SBR0080S06	0.8	3.2	1.6	50	6	J191
MP2XLBR0080N080	0.8	8	1.2	55	4	J180
VF2XLBR0080N080S04	0.8	8	1.28	50	4	J204

RE = Ball Nose End Mill Radius LU = Usable length APMX = Depth of cut maximum LF = Functional length DCON = Connection diameter

CARBIDE

SELECTION CHART BY BLADE DIAMETER

CARBIDE/BALL

Order Number	RE	LU	APMX	LF	DCON	Page
MP2XLBR0080N120	0.8	12	1.2	55	4	J180
VF2XLBR0080N120S04	0.8	12	1.28	50	4	J204
MP2XLBR0080N160	0.8	16	1.2	55	4	J180
VF2XLBR0080N160S04	0.8	16	1.28	60	4	J204
MP2XLBR0080N200	0.8	20	1.2	55	4	J180
VF2XLBR0080N200S04	0.8	20	1.28	60	4	J204
MP2SBR0080	0.8	—	2.4	45	4	J172
MP2MBR0080	0.8	—	4	45	4	J173
VFR2SBR0090	0.9	3.6	1.8	45	4	J191
VFR2SBR0090S06	0.9	3.6	1.8	50	6	J191
NEW VQ4WBR0090N06E280	0.9	6	1.58	50	4	J236
MP2XLBR0090N080	0.9	8	1.4	55	4	J180
VF2XLBR0090N080S04	0.9	8	1.44	50	4	J204
MP2XLBR0090N120	0.9	12	1.4	55	4	J180
VF2XLBR0090N120S04	0.9	12	1.44	50	4	J204
MP2XLBR0090N160	0.9	16	1.4	55	4	J180
VF2XLBR0090N160S04	0.9	16	1.44	60	4	J204
MP2XLBR0090N200	0.9	20	1.4	55	4	J180
VF2XLBR0090N200S04	0.9	20	1.44	60	4	J204
MP2SBR0090	0.9	—	2.7	45	4	J172
MP2MBR0090	0.9	—	5	45	4	J173
MP3XBR0100N016T05	1	3.6	1.6	60	6	J223
MP3XBR0100N016T10	1	3.6	1.6	60	6	J223
MP3XBR0100N016T15	1	3.6	1.6	60	6	J223
MP3XBR0100N020T05	1	3.6	1.6	60	6	J223
MP3XBR0100N020T10	1	3.6	1.6	60	6	J223
MP3XBR0100N020T15	1	3.6	1.6	60	6	J223
MP3XBR0100N020T30	1	3.6	1.6	60	6	J223
MP3XBR0100N027T50	1	3.6	1.6	60	6	J223
MP3XBR0100N025T10	1	3.6	1.6	70	6	J223
MP3XBR0100N025T15	1	3.6	1.6	70	6	J223
MP3XBR0100N030T05	1	3.6	1.6	70	6	J223
MP3XBR0100N030T10	1	3.6	1.6	70	6	J223
MP3XBR0100N030T15	1	3.6	1.6	70	6	J223
MP3XBR0100N030T30	1	3.6	1.6	70	6	J223
VF3XBR0100T0024L016	1	3.6	1.6	70	6	J229
VF3XBR0100T0024L020	1	3.6	1.6	70	6	J229
VF3XBR0100T0024L025	1	3.6	1.6	70	6	J229
VF3XBR0100T0054L020	1	3.6	1.6	70	6	J229
VF3XBR0100T0054L025	1	3.6	1.6	70	6	J229
VF3XBR0100T0130L025	1	3.6	1.6	70	6	J229
MP3XBR0100N035T05	1	3.6	1.6	80	6	J223
MP3XBR0100N035T10	1	3.6	1.6	80	6	J223
MP3XBR0100N035T15	1	3.6	1.6	80	6	J223
MP3XBR0100N040T05	1	3.6	1.6	80	6	J223
MP3XBR0100N040T10	1	3.6	1.6	80	6	J223
MP3XBR0100N040T15	1	3.6	1.6	80	6	J223
MP3XBR0100N042T30	1	3.6	1.6	80	6	J223
VF3XBR0100T0024L030	1	3.6	1.6	80	6	J229
VF3XBR0100T0024L035	1	3.6	1.6	80	6	J229

Order Number	RE	LU	APMX	LF	DCON	Page
VF3XBR0100T0024L040	1	3.6	1.6	80	6	J229
VF3XBR0100T0054L030	1	3.6	1.6	80	6	J229
VF3XBR0100T0054L035	1	3.6	1.6	80	6	J229
VF3XBR0100T0054L040	1	3.6	1.6	80	6	J229
VF3XBR0100T0130L030	1	3.6	1.6	80	6	J229
VF3XBR0100T0130L035	1	3.6	1.6	80	6	J229
VF3XBR0100T0130L040	1	3.6	1.6	80	6	J229
MP3XBR0100N050T10	1	3.6	1.6	110	6	J223
MP3XBR0100N070T10	1	3.6	1.6	110	6	J223
VF3XBR0100T0054L050	1	3.6	1.6	110	6	J229
VF3XBR0100T0054L060	1	3.6	1.6	110	6	J229
VF3XBR0100T0054L070	1	3.6	1.6	110	6	J229
MP2XLBR0100N040	1	4	1.5	50	4	J180
MP2XLBR0100N040S06	1	4	1.5	50	6	J180
VFR2SSBR0100	1	4	2	45	6	J189
MP2SDBR0100	1	4	2	50	4	J175
VFR2SBR0100	1	4	2	50	4	J191
MP2SDBR0100S06	1	4	2	60	6	J175
VFR2SBFR0100	1	4	2	60	6	J193
VFR2SBR0100S06	1	4	2	60	6	J191
VQ4SVBR0100	1	5	3	50	6	J234
DC2XLBR0100N060	1	6	1.2	50	4	J215
VF2WBR0100N060	1	6	1.3	60	6	J199
MP2XLBR0100N060	1	6	1.5	50	4	J180
NEW VFR2XLBR0100N060	1	6	1.5	50	4	J196
MP2XLBR0100N060S06	1	6	1.5	50	6	J180
NEW VFR2XLBR0100N060S06	1	6	1.5	50	6	J196
VF2XLBSR0100N060	1	6	1.6	40	4	J200
VF2XLBR0100N060S04	1	6	1.6	50	4	J204
VF2XLBR0100N060S06	1	6	1.6	50	6	J204
NEW VQ4WBR0100N06E280	1	6	1.76	60	6	J236
NEW VQN2MBR0100	1	6	2	60	6	J185
NEW VQN4MBFR0100	1	6	2	60	6	J241
NEW VQN4MBR0100	1	6	2	60	6	J239
VC4STBR0100T0200N06	1	6	4	60	6	J324
MP2XLBR0100N080	1	8	1.5	50	4	J180
NEW VFR2XLBR0100N080	1	8	1.5	50	4	J196
MP2XLBR0100N080S06	1	8	1.5	50	6	J180
NEW VFR2XLBR0100N080S06	1	8	1.5	50	6	J196
VF2XLBSR0100N080	1	8	1.6	40	4	J200
VF2XLBR0100N080S04	1	8	1.6	50	4	J205
VF2XLBR0100N080S06	1	8	1.6	50	6	J205
CRN2XLBR0100N080S04	1	8	2	50	4	J211
DC2XLBR0100N100	1	10	1.2	50	4	J215
MP2XLBR0100N100	1	10	1.5	50	4	J180
NEW VFR2XLBR0100N100	1	10	1.5	50	4	J196
NEW VQ2XLBR0100N100	1	10	1.5	50	4	J187
MP2XLBR0100N100S06	1	10	1.5	50	6	J180
NEW VFR2XLBR0100N100S06	1	10	1.5	50	6	J196
NEW VQ2XLBR0100N100S06	1	10	1.5	55	6	J187

RE = Ball Nose End Mill Radius LU = Usable length APMX = Depth of cut maximum LF = Functional length DCON = Connection diameter

Order Number	RE	LU	APMX	LF	DCON	Page
VF2XLBSR0100N100	1	10	1.6	40	4	J200
VF2XLBR0100N100S04	1	10	1.6	50	4	J205
VF2XLBR0100N100S06	1	10	1.6	50	6	J205
CRN2XLBR0100N100S04	1	10	2	50	4	J211
CRN2XLBR0100N100S06	1	10	2	50	6	J211
VC4STBR0100T0130N10	1	10	4	60	6	J324
VC4STBR0100T0200N10	1	10	4	60	6	J324
VC4STBR0100T0500N10	1	10	4	60	6	J324
MP2XLBR0100N120	1	12	1.5	50	4	J180
NEW VFR2XLBR0100N120	1	12	1.5	50	4	J196
NEW VQ2XLBR0100N120	1	12	1.5	50	4	J187
NEW VFR2XLBR0100N120S06	1	12	1.5	50	6	J196
NEW VQ2XLBR0100N120S06	1	12	1.5	55	6	J187
MP2XLBR0100N120S06	1	12	1.5	60	6	J180
VF2XLBR0100N120S04	1	12	1.6	50	4	J205
VF2XLBR0100N120S06	1	12	1.6	50	6	J205
CRN2XLBR0100N120S04	1	12	2	50	4	J211
CRN2XLBR0100N120S06	1	12	2	50	6	J211
VC4STBR0100T1000N12	1	12	4	60	6	J325
MP2XLBR0100N140	1	14	1.5	55	4	J180
MP2XLBR0100N140S06	1	14	1.5	60	6	J180
VF2XLBR0100N140S04	1	14	1.6	50	4	J205
VF2XLBR0100N140S06	1	14	1.6	50	6	J205
CRN2XLBR0100N140S06	1	14	2	55	6	J211
VC4STBR0100T0130N15	1	15	4	60	6	J324
VC4STBR0100T0200N15	1	15	4	60	6	J324
VC4STBR0100T0500N15	1	15	4	60	6	J324
MP2XLBR0100N160	1	16	1.5	55	4	J180
NEW VFR2XLBR0100N160	1	16	1.5	60	4	J196
NEW VFR2XLBR0100N160S06	1	16	1.5	60	6	J196
MP2XLBR0100N160S06	1	16	1.5	65	6	J180
VF2XLBR0100N160S04	1	16	1.6	60	4	J205
VF2XLBR0100N160S06	1	16	1.6	60	6	J205
CRN2XLBR0100N160S04	1	16	2	55	4	J211
DF2XLBFR0100N160	1	16	3	50	4	J220
DF2XLBR0100N160	1	16	3	80	4	J217
VC4STBR0100T0700N17	1	17	7	60	6	J325
MP2XLBR0100N180	1	18	1.5	55	4	J180
MP2XLBR0100N180S06	1	18	1.5	65	6	J180
VF2XLBR0100N180S04	1	18	1.6	60	4	J205
VF2XLBR0100N180S06	1	18	1.6	60	6	J205
NEW VFR2XLBR0100N200	1	20	1.5	60	4	J196
NEW VFR2XLBR0100N200S06	1	20	1.5	60	6	J196
MP2XLBR0100N200	1	20	1.5	65	4	J180
MP2XLBR0100N200S06	1	20	1.5	65	6	J180
VF2XLBR0100N200S04	1	20	1.6	60	4	J205
VF2XLBR0100N200S06	1	20	1.6	60	6	J205
CRN2XLBR0100N200S04	1	20	2	60	4	J211
DF2XLBFR0100N200	1	20	3	50	4	J220
DF2XLBR0100N200	1	20	3	80	4	J217

Order Number	RE	LU	APMX	LF	DCON	Page
VC4STBR0100T0130N20	1	20	4	60	6	J324
MP2XLBR0100N220	1	22	1.5	65	4	J180
VF2XLBR0100N220S04	1	22	1.6	60	4	J205
VC4STBR0100T0500N23	1	23	4	60	6	J324
MP2XLBR0100N250	1	25	1.5	65	4	J180
MP2XLBR0100N250S06	1	25	1.5	90	6	J180
VF2XLBR0100N250S04	1	25	1.6	70	4	J205
VF2XLBR0100N250S06	1	25	1.6	70	6	J205
CRN2XLBR0100N250S06	1	25	2	65	6	J211
DF2XLBR0100N250	1	25	3	80	4	J217
MP2XLBR0100N300	1	30	1.5	80	4	J181
MP2XLBR0100N300S06	1	30	1.5	90	6	J181
VF2XLBR0100N300S04	1	30	1.6	70	4	J205
VF2XLBR0100N300S06	1	30	1.6	80	6	J205
CRN2XLBR0100N300S06	1	30	2	70	6	J211
MP2XLBR0100N350	1	35	1.5	80	4	J181
MP2XLBR0100N350S06	1	35	1.5	90	6	J181
VF2XLBR0100N350S04	1	35	1.6	80	4	J205
MP2XLBR0100N400	1	40	1.5	80	4	J181
MP2XLBR0100N400S06	1	40	1.5	90	6	J181
DF2XLBR0100N400	1	40	3	100	4	J217
DC2SBR0100	1	—	1.4	50	4	J213
MP2SSBR0100	1	—	2	45	6	J171
MP2SBR0100	1	—	3	50	4	J172
MP2SBR0100S06	1	—	3	50	6	J172
MP2MBR0100	1	—	6	50	4	J173
CRN2MBR0100S06	1	—	6	50	6	J208
VF4MBR0100	1	—	6	60	6	J243
C4LATBR100T040AP20	1	—	20	70	6	J330
NEW DLC4LATBR100T040AP20	1	—	20	70	6	J328
VF3XBR0125T0054L020	1.25	4.5	2	60	6	J229
VF3XBR0125T0130L020	1.25	4.5	2	60	6	J229
VF3XBR0125T0054L030	1.25	4.5	2	80	6	J229
VF3XBR0125T0054L040	1.25	4.5	2	80	6	J229
VF3XBR0125T0130L030	1.25	4.5	2	80	6	J229
VF3XBR0125T0130L040	1.25	4.5	2	80	6	J229
VFR2SBFR0125	1.25	5	2.5	60	6	J193
VFR2SBR0125S06	1.25	5	2.5	60	6	J191
MP2XLBR0125N100	1.25	10	1.9	55	4	J181
NEW VFR2XLBR0125N100	1.25	10	1.9	60	4	J196
VF2XLBR0125N100S06	1.25	10	2	60	6	J205
MP2XLBR0125N150	1.25	15	1.9	55	4	J181
NEW VFR2XLBR0125N150	1.25	15	1.9	60	4	J196
VF2XLBR0125N150S06	1.25	15	2	60	6	J205
VC4STBR0125T0500N15	1.25	15	4	60	6	J325
MP2XLBR0125N200	1.25	20	1.9	55	4	J181
VF2XLBR0125N200S06	1.25	20	2	70	6	J205
MP2XLBR0125N250	1.25	25	1.9	70	4	J181
VF2XLBR0125N250S06	1.25	25	2	70	6	J205
MP2XLBR0125N300	1.25	30	1.9	70	4	J181

RE = Ball Nose End Mill Radius LU = Usable length APMX = Depth of cut maximum LF = Functional length DCON = Connection diameter

SELECTION CHART BY BLADE DIAMETER

CARBIDE/BALL

Order Number	RE	LU	APMX	LF	DCON	Page
VF2XLBR0125N300S06	1.25	30	2	80	6	J205
MP2XLBR0125N350	1.25	35	1.9	70	4	J181
VF2XLBR0125N350S06	1.25	35	2	80	6	J205
MP2SBR0125	1.25	—	3.8	50	4	J172
MP2MBR0125	1.25	—	6	50	4	J173
NEW VQ4WBR0140N16E280	1.4	16	2.47	60	6	J236
VF3XBR0150T0024L020	1.5	5	2	60	6	J229
VF3XBR0150T0054L020	1.5	5	2	60	6	J229
VF3XBR0150T0024L025	1.5	5	2	80	6	J229
VF3XBR0150T0024L030	1.5	5	2	80	6	J229
VF3XBR0150T0024L040	1.5	5	2	80	6	J229
VF3XBR0150T0054L030	1.5	5	2	80	6	J229
VF3XBR0150T0054L040	1.5	5	2	80	6	J229
VF3XBR0150T0130L040	1.5	5	2	80	6	J229
VF3XBR0150T0024L050	1.5	5	2	100	6	J229
VF3XBR0150T0054L050	1.5	5	2	100	6	J229
VF3XBR0150T0054L060	1.5	5	2	110	8	J229
VF3XBR0150T0130L050	1.5	5	2	110	8	J229
VF3XBR0150T0130L060	1.5	5	2	110	8	J229
VF3XBR0150T0054L070	1.5	5	2	120	8	J229
VF3XBR0150T0130L070	1.5	5	2	120	8	J229
MP3XBR0150N010T05	1.5	5.4	2.4	60	6	J223
MP3XBR0150N020T05	1.5	5.4	2.4	60	6	J223
MP3XBR0150N020T10	1.5	5.4	2.4	60	6	J223
MP3XBR0150N020T15	1.5	5.4	2.4	60	6	J223
MP3XBR0150N025T30	1.5	5.4	2.4	60	6	J223
MP3XBR0150N030T05	1.5	5.4	2.4	70	6	J223
MP3XBR0150N030T10	1.5	5.4	2.4	70	6	J223
MP3XBR0150N030T15	1.5	5.4	2.4	70	6	J223
MP3XBR0150N034T30	1.5	5.4	2.4	70	6	J223
MP3XBR0150N035T15	1.5	5.4	2.4	70	6	J223
MP3XBR0150N035T10	1.5	5.4	2.4	80	6	J223
MP3XBR0150N040T05	1.5	5.4	2.4	80	6	J223
MP3XBR0150N040T10	1.5	5.4	2.4	80	6	J223
MP3XBR0150N040T15	1.5	5.4	2.4	80	6	J223
MP3XBR0150N045T15	1.5	5.4	2.4	80	6	J223
MP3XBR0150N050T05	1.5	5.4	2.4	90	6	J223
MP3XBR0150N050T10	1.5	5.4	2.4	90	6	J223
MP3XBR0150N052T15	1.5	5.4	2.4	90	6	J223
MP3XBR0150N040T30	1.5	5.4	2.4	90	8	J224
MP3XBR0150N054T30	1.5	5.4	2.4	90	8	J224
MP3XBR0150N060T10	1.5	5.4	2.4	110	6	J223
MP3XBR0150N064T15	1.5	5.4	2.4	110	6	J223
MP3XBR0150N070T10	1.5	5.4	2.4	110	6	J223
MP2XLBR0150N060S03	1.5	6	2.3	60	3	J181
VFR2SSBR0150	1.5	6	3	45	6	J189
MP2SDBR0150	1.5	6	3	70	6	J175
VFR2SBFR0150	1.5	6	3	70	6	J193
VFR2SBR0150	1.5	6	3	70	6	J191
VQ4SVBR0150	1.5	7.5	4.5	50	6	J234

Order Number	RE	LU	APMX	LF	DCON	Page
DC2XLBR0150N080	1.5	8	1.8	60	6	J215
VF2WBR0150N080	1.5	8	2	60	6	J199
MP2XLBR0150N080	1.5	8	2.3	60	6	J181
VF2XLBR0150N080S06	1.5	8	2.4	60	6	J205
NEW VQ4WBR0150N08E280	1.5	8	2.64	60	6	J236
NEW VQN2MBR0150	1.5	8	3	60	6	J185
NEW VQN4MBFR0150	1.5	8	3	60	6	J241
NEW VQN4MBR0150	1.5	8	3	60	6	J239
MP2XLBR0150N100	1.5	10	2.3	60	6	J181
NEW VFR2XLBR0150N100	1.5	10	2.3	60	6	J196
VF2XLBR0150N100S06	1.5	10	2.4	60	6	J205
VC4STBR0150T0500N10	1.5	10	4	60	6	J325
NEW VQ2XLBR0150N120	1.5	12	2.3	55	6	J187
MP2XLBR0150N120	1.5	12	2.3	60	6	J181
NEW VFR2XLBR0150N120	1.5	12	2.3	60	6	J196
VF2XLBR0150N120S06	1.5	12	2.4	60	6	J205
MP2XLBR0150N140	1.5	14	2.3	60	6	J181
NEW VQ2XLBR0150N140	1.5	14	2.3	60	6	J187
VF2XLBR0150N140S06	1.5	14	2.4	60	6	J205
VC4STBR0150T0130N15	1.5	15	4	60	6	J325
VC4STBR0150T0300N15	1.5	15	4	60	6	J325
NEW VQ2XLBR0150N160	1.5	16	2.3	60	6	J187
MP2XLBR0150N160	1.5	16	2.3	70	6	J181
NEW VFR2XLBR0150N160	1.5	16	2.3	70	6	J196
VF2XLBR0150N160S06	1.5	16	2.4	60	6	J205
CRN2XLBR0150N160S06	1.5	16	3	60	6	J211
DF2XLBFR0150N160	1.5	16	4.5	50	4	J220
DF2XLBR0150N160	1.5	16	4.5	80	4	J217
VC4STBR0150T0500N18	1.5	18	4	60	6	J325
MP2XLBR0150N200	1.5	20	2.3	70	6	J181
NEW VFR2XLBR0150N200	1.5	20	2.3	70	6	J196
VF2XLBR0150N200S06	1.5	20	2.4	70	6	J205
VC4STBR0150T0130N20	1.5	20	4	60	6	J325
DF2XLBFR0150N200	1.5	20	4.5	50	4	J220
MP2XLBR0150N250	1.5	25	2.3	70	6	J181
NEW VFR2XLBR0150N250	1.5	25	2.3	70	6	J196
VF2XLBR0150N250S06	1.5	25	2.4	70	6	J205
CRN2XLBR0150N250S06	1.5	25	3	70	6	J211
DF2XLBR0150N250	1.5	25	4.5	80	4	J217
MP2XLBR0150N300	1.5	30	2.3	70	6	J181
NEW VFR2XLBR0150N300	1.5	30	2.3	70	6	J196
VF2XLBR0150N300S06	1.5	30	2.4	70	6	J205
MP2XLBR0150N350	1.5	35	2.3	90	6	J181
VF2XLBR0150N350S06	1.5	35	2.4	80	6	J205
CRN2XLBR0150N350S06	1.5	35	3	80	6	J211
MP2XLBR0150N400	1.5	40	2.3	90	6	J181
VF2XLBR0150N400S06	1.5	40	2.4	90	6	J205
DC2SBR0150	1.5	—	2.1	60	6	J213
MP2SSBR0150	1.5	—	3	45	6	J171
VFR2SBR0150S03	1.5	—	3	60	3	J191

RE = Ball Nose End Mill Radius LU = Usable length APMX = Depth of cut maximum LF = Functional length DCON = Connection diameter

Order Number	RE	LU	APMX	LF	DCON	Page
MP2SBR0150	1.5	—	4.5	70	6	J172
MP2MBR0150S03	1.5	—	8	70	3	J173
CRN2MBR0150S06	1.5	—	8	70	6	J208
MP2MBR0150	1.5	—	8	70	6	J173
VF4MBR0150	1.5	—	8	70	6	J243
C4LATBR150T040AP20	1.5	—	20	75	8	J330
NEW DLC4LATBR150T040AP20	1.5	—	20	75	8	J328
MP2XLBR0175N150	1.75	15	2.6	65	6	J181
VC4STBR0175T0500N15	1.75	15	4	60	6	J325
VF2XLBR0175N160S06	1.75	16	2.8	60	6	J205
VF2XLBR0175N200S06	1.75	20	2.8	70	6	J205
MP2XLBR0175N250	1.75	25	2.6	65	6	J181
VF2XLBR0175N250S06	1.75	25	2.8	70	6	J205
VF2XLBR0175N300S06	1.75	30	2.8	80	6	J205
MP2XLBR0175N350	1.75	35	2.6	90	6	J181
VF2XLBR0175N350S06	1.75	35	2.8	80	6	J205
VF2XLBR0175N400S06	1.75	40	2.8	90	6	J205
MP2XLBR0175N450	1.75	45	2.6	90	6	J181
MP2MBR0175	1.75	—	8	70	6	J173
NEW VQ4WBR0190N12E280	1.9	12	3.35	60	6	J236
VF3XBR0200T0054L030	2	6	3	90	8	J229
VF3XBR0200T0054L040	2	6	3	90	8	J229
VF3XBR0200T0054L050	2	6	3	110	8	J229
VF3XBR0200T0054L060	2	6	3	110	8	J229
MP3XBR0200N020T10	2	6.2	3.2	70	6	J224
MP3XBR0200N030T05	2	6.2	3.2	70	6	J224
MP3XBR0200N030T10	2	6.2	3.2	70	6	J224
MP3XBR0200N035T10	2	6.2	3.2	70	6	J224
MP3XBR0200N040T05	2	6.2	3.2	80	6	J224
MP3XBR0200N040T10	2	6.2	3.2	80	6	J224
MP3XBR0200N045T10	2	6.2	3.2	80	6	J224
MP3XBR0200N030T30	2	6.2	3.2	90	8	J224
MP3XBR0200N045T30	2	6.2	3.2	90	8	J224
MP3XBR0200N050T15	2	6.2	3.2	90	8	J224
MP3XBR0200N060T05	2	6.2	3.2	100	6	J224
MP3XBR0200N066T10	2	6.2	3.2	100	6	J224
MP3XBR0200N084T15	2	6.2	3.2	120	8	J224
MP2XLBR0200N080S04	2	8	3	65	4	J181
VFR2SSBR0200	2	8	4	45	6	J189
MP2SDBR0200	2	8	4	60	4	J175
MP2SDBR0200S06	2	8	4	70	6	J175
VFR2SBFR0200	2	8	4	70	6	J193
VFR2SBR0200	2	8	4	70	6	J191
DC2XLBR0200N100	2	10	2.4	60	6	J215
VF2WBR0200N100	2	10	2.6	60	6	J199
MP2XLBR0200N100	2	10	3	65	6	J181
NEW VFR2XLBR0200N100	2	10	3	70	6	J196
VF2XLBR0200N100S06	2	10	3.2	70	6	J205
VQ4SVBR0200	2	10	6	50	6	J234
MP2XLBR0200N120	2	12	3	65	6	J181

Order Number	RE	LU	APMX	LF	DCON	Page
NEW VFR2XLBR0200N120	2	12	3	70	6	J196
VF2XLBR0200N120S06	2	12	3.2	70	6	J205
NEW VQ4WBR0200N12E280	2	12	3.53	60	6	J236
VC4STBR0200T0500N13	2	13	4	60	6	J325
MP2XLBR0200N140	2	14	3	65	6	J181
VF2XLBR0200N140S06	2	14	3.2	70	6	J205
VC4STBR0200T0130N15	2	15	5	60	6	J325
MP2XLBR0200N160	2	16	3	70	6	J181
NEW VFR2XLBR0200N160	2	16	3	70	6	J196
VF2XLBR0200N160S06	2	16	3.2	70	6	J205
CRN2XLBR0200N160S06	2	16	4	70	6	J211
VC4STBR0200T0700N18	2	18	7	60	8	J325
MP2XLBR0200N200	2	20	3	70	6	J181
NEW VFR2XLBR0200N200	2	20	3	70	6	J196
VF2XLBR0200N200S06	2	20	3.2	70	6	J205
CRN2XLBR0200N200S06	2	20	4	70	6	J211
VC4STBR0200T0130N20	2	20	5	60	6	J325
VC4STBR0200T0300N21	2	21	4	60	6	J325
MP2XLBR0200N250	2	25	3	70	6	J181
NEW VFR2XLBR0200N250	2	25	3	70	6	J196
VF2XLBR0200N250S06	2	25	3.2	70	6	J205
NEW VFR2XLBR0200N300	2	30	3	70	6	J196
MP2XLBR0200N300	2	30	3	80	6	J181
VF2XLBR0200N300S06	2	30	3.2	70	6	J205
CRN2XLBR0200N300S06	2	30	4	70	6	J211
DF2XLBR0200N300	2	30	6	80	4	J217
MP2XLBR0200N350	2	35	3	80	6	J181
VF2XLBR0200N350S06	2	35	3.2	80	6	J205
MP2XLBR0200N400	2	40	3	90	6	J181
VF2XLBR0200N400S06	2	40	3.2	90	6	J205
CRN2XLBR0200N400S06	2	40	4	90	6	J211
MP2XLBR0200N450	2	45	3	90	6	J181
VF2XLBR0200N450S06	2	45	3.2	90	6	J205
MP2XLBR0200N500	2	50	3	100	6	J181
VF2XLBR0200N500S06	2	50	3.2	100	6	J206
DF2XLBR0200N600	2	60	6	100	4	J217
DC2SBR0200	2	—	2.8	60	6	J213
MP2SSBR0200	2	—	4	45	6	J171
VFR2SBR0200S04	2	—	4	60	4	J191
MP2SBR0200	2	—	6	70	6	J172
NEW VQN2MBR0200	2	—	8	60	6	J185
NEW VQN4MBFR0200	2	—	8	60	6	J241
NEW VQN4MBR0200	2	—	8	60	6	J239
MP2MBR0200S04	2	—	8	70	4	J173
CRN2MBR0200S06	2	—	8	70	6	J208
MP2MBR0200	2	—	8	70	6	J173
VF4MBR0200	2	—	8	70	6	J243
C4LATBR200T040AP30	2	—	30	75	8	J330
NEW DLC4LATBR200T040AP30	2	—	30	75	8	J328
NEW VQ4WBR0240N16E280	2.4	16	4.23	70	6	J236

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CARBIDE

SELECTION CHART BY BLADE DIAMETER

CARBIDE/BALL

Order Number	RE	LU	APMX	LF	DCON	Page
VF3XBR0250T0054L035	2.5	6.5	3.5	90	8	J229
VF3XBR0250T0054L040	2.5	6.5	3.5	90	8	J230
VF3XBR0250T0054L050	2.5	6.5	3.5	110	8	J230
VF3XBR0250T0054L060	2.5	6.5	3.5	110	8	J230
MP3XBR0250N038T10	2.5	7	4	80	6	J224
MP3XBR0250N036T30	2.5	7	4	90	8	J224
MP3XBR0250N050T10	2.5	7	4	90	8	J224
MP3XBR0250N065T10	2.5	7	4	110	8	J224
MP3XBR0250N066T15	2.5	7	4	110	8	J224
DC2XLBR0250N100	2.5	10	3	60	6	J215
VFR2SSBR0250	2.5	10	5	50	6	J189
MP2SDBR0250	2.5	10	5	80	6	J175
VFR2SBFR0250	2.5	10	5	80	6	J193
VFR2SBR0250	2.5	10	5	80	6	J191
NEW VQ4WBR0250N12E280	2.5	12	4.41	80	6	J236
VQ4SVBR0250	2.5	12.5	7.5	50	6	J234
MP2XLBR0250N150	2.5	15	3.8	70	6	J181
MP2XLBR0250N200	2.5	20	3.8	70	6	J181
NEW VFR2XLBR0250N200	2.5	20	3.8	70	6	J196
VF2XLBR0250N200S06	2.5	20	4	70	6	J206
CRN2XLBR0250N200S06	2.5	20	5	70	6	J211
MP2XLBR0250N250	2.5	25	3.8	70	6	J181
NEW VFR2XLBR0250N250	2.5	25	3.8	70	6	J196
VF2XLBR0250N250S06	2.5	25	4	70	6	J206
MP2XLBR0250N300	2.5	30	3.8	80	6	J181
VF2XLBR0250N300S06	2.5	30	4	80	6	J206
MP2XLBR0250N350	2.5	35	3.8	80	6	J181
VF2XLBR0250N350S06	2.5	35	4	80	6	J206
MP2XLBR0250N400	2.5	40	3.8	90	6	J181
DC2SBR0250	2.5	—	3.5	60	6	J213
MP2SSBR0250	2.5	—	5	50	6	J171
MP2SBR0250	2.5	—	7.5	80	6	J172
NEW VQN2MBR0250	2.5	—	12	60	6	J185
NEW VQN4MBFR0250	2.5	—	12	60	6	J241
NEW VQN4MBR0250	2.5	—	12	60	6	J239
MP2MBR0250	2.5	—	12	80	6	J173
VF4MBR0250	2.5	—	12	80	6	J243
DC2XLBR0300N100	3	10	3.6	60	6	J215
VF2WBR0300N120	3	12	4	80	6	J199
NEW VQ4WBR0300N12E280	3	12	5.29	80	6	J236
VFR2SSBR0300	3	12	6	50	6	J189
MP3XBR0300N032T30	3	12	9	80	8	J224
MP3XBR0300N040T10	3	12	9	80	8	J224
MP3XBR0300N050T10	3	12	9	90	8	J224
MP3XBR0300N053T15	3	12	9	90	8	J224
MP3XBR0300N073T10	3	12	9	110	8	J224
MP3XBR0300N090T10	3	12	9	140	10	J224
VC4STBR0300T0130N15	3	15	6	90	8	J325
VQ4SVBR0300	3	15	9	50	6	J234
NEW VFR2XLBR0300N180	3	18	6	80	6	J196

Order Number	RE	LU	APMX	LF	DCON	Page
MP2SDBR0300	3	18	12	80	6	J175
MP2SDBR0300A120	3	18	12	120	6	J175
MP2XLBR0300N200	3	20	6	70	6	J181
VC4STBR0300T0130N20	3	20	6	90	8	J325
VC4STBR0300T0300N22	3	22	6	90	8	J325
MP2XLBR0300N250	3	25	6	70	6	J181
VF2XLBR0300N300S06	3	30	4.8	80	6	J206
CRN2XLBR0300N300S06	3	30	6	80	6	J211
MP2XLBR0300N300	3	30	6	80	6	J181
NEW VFR2XLBR0300N300	3	30	6	80	6	J196
VF2XLBR0300N400S06	3	40	4.8	90	6	J206
MP2XLBR0300N400	3	40	6	90	6	J181
VF2XLBR0300N500S06	3	50	4.8	100	6	J206
CRN2XLBR0300N500S06	3	50	6	100	6	J211
MP2XLBR0300N500	3	50	6	100	6	J181
DC2SBR0300	3	—	4.2	60	6	J213
MP2SSBR0300	3	—	6	50	6	J171
MP2SBR0300	3	—	9	80	6	J172
NEW VQN2MBR0300	3	—	12	60	6	J185
NEW VQN4MBFR0300	3	—	12	60	6	J241
NEW VQN4MBR0300	3	—	12	60	6	J239
CRN2MBR0300S06	3	—	12	80	6	J208
MP2MBR0300	3	—	12	80	6	J173
VF4MBR0300	3	—	12	80	6	J243
VFR2SBFR0300	3	—	12	80	6	J193
VFR2SBR0300	3	—	12	80	6	J191
VFR2SSBR0400	4	14	8	60	8	J189
VC4STBR0400T0130N15	4	15	8	90	10	J325
MP3XBR0400N035T30	4	15	12	90	10	J224
MP3XBR0400N040T15	4	15	12	90	10	J224
MP3XBR0400N050T10	4	15	12	110	10	J224
MP3XBR0400N056T15	4	15	12	110	10	J224
MP3XBR0400N065T10	4	15	12	130	10	J224
MP3XBR0400N076T10	4	15	12	130	10	J224
MP3XBR0400N090T10	4	15	12	150	12	J224
VQ4SVBR0400	4	20	12	60	8	J234
VC4STBR0400T0300N22	4	22	8	90	10	J325
MP2SDBR0400	4	24	14	90	8	J175
MP2SDBR0400A130	4	24	14	130	8	J175
MP2SSBR0400	4	—	8	60	8	J171
MP2SBR0400	4	—	12	90	8	J172
NEW VQN2MBR0400	4	—	14	70	8	J185
NEW VQN4MBFR0400	4	—	14	70	8	J241
NEW VQN4MBR0400	4	—	14	70	8	J239
CRN2MBR0400S08	4	—	14	90	8	J208
MP2MBR0400	4	—	14	90	8	J173
VF4MBR0400	4	—	14	90	8	J243
VFR2SBR0400	4	—	14	90	8	J191
VFR2SSBR0500	5	18	10	70	10	J189
VQ4SVBR0500	5	25	15	70	10	J234

RE = Ball Nose End Mill Radius   LU = Usable length   APMX = Depth of cut maximum   LF = Functional length   DCON = Connection diameter

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SOLID END MILLS

	Order Number	RE	LU	APMX	LF	DCON	Page
	MP3XBR0500N046T30	5	25	15	100	12	J224
	MP3XBR0500N050T15	5	25	15	100	12	J224
	MP3XBR0500N060T10	5	25	15	120	12	J224
	MP3XBR0500N068T15	5	25	15	120	12	J224
	MP3XBR0500N070T10	5	25	15	120	12	J224
	MP3XBR0500N100T10	5	25	15	160	16	J224
	MP2SDBR0500	5	30	18	100	10	J175
	MP2SDBR0500A140	5	30	18	140	10	J175
	MP2SSBR0500	5	—	10	70	10	J171
	MP2SBR0500	5	—	15	100	10	J172
NEW	VQN2MBR0500	5	—	18	80	10	J185
NEW	VQN4MBFR0500	5	—	18	80	10	J241
NEW	VQN4MBR0500	5	—	18	80	10	J239
	CRN2MBR0500S10	5	—	18	100	10	J208
	MP2MBR0500	5	—	18	100	10	J173
	VF4MBR0500	5	—	18	100	10	J243
	VFR2SBR0500	5	—	18	100	10	J191
	VFR2SSBR0600	6	22	12	75	12	J189
	MP3XBR0600N069T30	6	28	18	130	16	J224
	MP3XBR0600N070T10	6	28	18	130	16	J224
	MP3XBR0600N080T15	6	28	18	130	16	J224
	MP3XBR0600N100T10	6	28	18	160	16	J224
	VQ4SVBR0600	6	30	18	75	12	J234
	MP2SDBR0600	6	36	22	110	12	J175
	MP2SDBR0600A140	6	36	22	140	12	J175
	MP2SSBR0600	6	—	12	75	12	J171
	MP2SBR0600	6	—	18	110	12	J172
NEW	VQN2MBR0600	6	—	22	80	12	J185
NEW	VQN4MBFR0600	6	—	22	80	12	J241
NEW	VQN4MBR0600	6	—	22	80	12	J239
	MP2MBR0600	6	—	22	110	12	J173
	VF4MBR0600	6	—	22	110	12	J243
	VFR2SBR0600	6	—	22	110	12	J191
	VFR2SBR0800	8	—	30	140	16	J191
	VFR2SBR1000	10	—	38	160	20	J191

RE = Ball Nose End Mill Radius LU = Usable length APMX = Depth of cut maximum LF = Functional length DCON = Connection diameter

CARBIDE

SELECTION CHART BY BLADE DIAMETER

CARBIDE/RADIUS

Order Number	DC	RE	LU	APMX	LF	DCON	Page
MPXLRBD0020R005N005	0.2	0.05	0.5	0.2	50	4	J261
MPXLRBD0020R005N010	0.2	0.05	1	0.2	50	4	J261
MPXLRBD0030R005N010	0.3	0.05	1	0.3	50	4	J261
MPXLRBD0030R005N020	0.3	0.05	2	0.3	50	4	J261
MPXLRBD0040R005N020	0.4	0.05	2	0.4	50	4	J261
MPXLRBD0040R005N030	0.4	0.05	3	0.4	50	4	J261
MPXLRBD0040R005N040	0.4	0.05	4	0.4	50	4	J261
MPXLRBD0050R005N020	0.5	0.05	2	0.5	50	4	J261
NEW VFRPSRBD0050R005N020	0.5	0.05	2	0.5	50	6	J283
MPXLRBD0050R005N030	0.5	0.05	3	0.5	50	4	J261
CRN2XLRBD0050R005N04	0.5	0.05	4	0.5	50	4	J249
MPXLRBD0050R005N040	0.5	0.05	4	0.5	50	4	J261
MPXLRBD0050R005N050	0.5	0.05	5	0.5	50	4	J261
NEW VFRPSRBD0050R010N020	0.5	0.1	2	0.5	50	6	J283
CRN2XLRBD0050R010N04	0.5	0.1	4	0.5	50	4	J249
MPXLRBD0060R005N020	0.6	0.05	2	0.6	50	4	J261
VCPSRBD0060N02R005	0.6	0.05	2	0.6	50	6	J302
NEW VFRPSRBD0060R005N020	0.6	0.05	2	0.6	50	6	J283
MPXLRBD0060R005N040	0.6	0.05	4	0.6	50	4	J261
MPXLRBD0060R005N060	0.6	0.05	6	0.6	50	4	J261
VCPSRBD0060N02R01	0.6	0.1	2	0.6	50	6	J302
NEW VFRPSRBD0060R010N020	0.6	0.1	2	0.6	50	6	J283
VCPSRBD0060N04R01	0.6	0.1	4	0.6	50	6	J302
NEW VFRPSRBD0060R010N040	0.6	0.1	4	0.6	50	6	J283
VCPSRBD0060N02R02	0.6	0.2	2	0.6	50	6	J302
NEW VFRPSRBD0060R020N020	0.6	0.2	2	0.6	50	6	J283
VCPSRBD0060N04R02	0.6	0.2	4	0.6	50	6	J302
MPXLRBD0080R005N040	0.8	0.05	4	0.8	50	4	J261
VCPSRBD0080N04R005	0.8	0.05	4	0.8	50	6	J302
NEW VFRPSRBD0080R005N040	0.8	0.05	4	0.8	50	6	J283
MPXLRBD0080R005N060	0.8	0.05	6	0.8	50	4	J261
VCPSRBD0080N04R01	0.8	0.1	4	0.8	50	6	J302
NEW VFRPSRBD0080R010N040	0.8	0.1	4	0.8	50	6	J283
VCPSRBD0080N06R01	0.8	0.1	6	0.8	50	6	J302
VCPSRBD0080N04R02	0.8	0.2	4	0.8	50	6	J302
NEW VFRPSRBD0080R020N040	0.8	0.2	4	0.8	50	6	J283
VCPSRBD0080N06R02	0.8	0.2	6	0.8	50	6	J302
VCPSRBD0080N04R03	0.8	0.3	4	0.8	50	6	J302
NEW VFRPSRBD0080R030N040	0.8	0.3	4	0.8	50	6	J283
VCPSRBD0080N06R03	0.8	0.3	6	0.8	50	6	J302
VCPSRBD0080N08R03	0.8	0.3	8	0.8	50	6	J302
MPXLRBD0100R005N030	1	0.05	3	1	50	4	J261
MPXLRBD0100R005N040	1	0.05	4	1	50	4	J261
VCPSRBD0100N04R005	1	0.05	4	1	50	6	J302
NEW VFRPSRBD0100R005N040	1	0.05	4	1	50	6	J283
MPXLRBD0100R005N050	1	0.05	5	1	50	4	J261
MPXLRBD0100R005N060	1	0.05	6	1	50	4	J261
MPXLRBD0100R005N080	1	0.05	8	1	50	4	J261
MPXLRBD0100R005N100	1	0.05	10	1	50	4	J261
MPXLRBD0100R005N120	1	0.05	12	1	50	4	J261

Order Number	DC	RE	LU	APMX	LF	DCON	Page
MPXLRBD0100R010N030	1	0.1	3	1	50	4	J261
MPXLRBD0100R010N040	1	0.1	4	1	50	4	J261
VCPSRBD0100N04R01	1	0.1	4	1	50	6	J302
NEW VFRPSRBD0100R010N040	1	0.1	4	1	50	6	J283
MPXLRBD0100R010N050	1	0.1	5	1	50	4	J261
MPXLRBD0100R010N060	1	0.1	6	1	50	4	J261
VCPSRBD0100N06R01	1	0.1	6	1	50	6	J302
NEW VFRPSRBD0100R010N060	1	0.1	6	1	50	6	J283
CRN2XLRBD0100R010N08	1	0.1	8	1	50	4	J249
MPXLRBD0100R010N080	1	0.1	8	1	50	4	J261
NEW VQHVRBD0100R01N080	1	0.1	8	1	50	6	J279
MPXLRBD0100R010N100	1	0.1	10	1	50	4	J261
MPXLRBD0100R010N120	1	0.1	12	1	50	4	J261
NEW VQHVRBD0100R01N120	1	0.1	12	1	55	6	J279
MS2MRBD0100R010	1	0.1	—	2	40	4	J245
MPMHVRBD0100R010	1	0.1	—	2.5	45	4	J257
VFHVRBD010R02N006T09	1	0.2	2.5	1	60	6	J296
VFHVRBD010R02N010T09	1	0.2	2.5	1	60	6	J296
VFHVRBD010R02N015T09	1	0.2	2.5	1	60	6	J296
VFHVRBD010R02N020T09	1	0.2	2.5	1	80	6	J296
VFHVRBD010R02N025T09	1	0.2	2.5	1	80	6	J296
VFHVRBD010R02N030T09	1	0.2	2.5	1	80	6	J296
VFHVRBD010R02N035T09	1	0.2	2.5	1	90	6	J296
VFHVRBD010R02N040T09	1	0.2	2.5	1	90	6	J296
VFHVRBD010R02N045T09	1	0.2	2.5	1	90	6	J296
VFHVRBD010R02N050T09	1	0.2	2.5	1	90	6	J296
VCPSRBD0100N04R02	1	0.2	4	1	50	6	J302
NEW VFRPSRBD0100R020N040	1	0.2	4	1	50	6	J283
VFHVRBD0100R02N004	1	0.2	4	1	60	6	J290
VCPSRBD0100N06R02	1	0.2	6	1	50	6	J302
NEW VFRPSRBD0100R020N060	1	0.2	6	1	50	6	J283
VFHVRBD0100R02N006	1	0.2	6	1	60	6	J290
VFHVRBD0100R02N008	1	0.2	8	1	60	6	J290
VFHVRBD0100R02N010	1	0.2	10	1	60	6	J290
VFHVRBD0100R02N015	1	0.2	15	1	60	6	J290
VFHVRBD0100R02N020	1	0.2	20	1	80	6	J290
MS2MRBD0100R020	1	0.2	—	2	40	4	J245
MPMHVRBD0100R020	1	0.2	—	2.5	45	4	J257
VCPSRBD0100N04R03	1	0.3	4	1	50	6	J302
NEW VFRPSRBD0100R030N040	1	0.3	4	1	50	6	J283
VCPSRBD0100N06R03	1	0.3	6	1	50	6	J302
CRN2XLRBD0100R030N08	1	0.3	8	1	50	4	J249
VCPSRBD0100N10R03	1	0.3	10	1	50	6	J302
CRN2XLRBD0100R030N12	1	0.3	12	1	55	4	J249
MS2MRBD0100R030	1	0.3	—	2	40	4	J245
VCPSRBD0100N04R04	1	0.4	4	1	50	6	J302
NEW VFRPSRBD0100R040N040	1	0.4	4	1	50	6	J283
VCPSRBD0100N06R04	1	0.4	6	1	50	6	J302
VCPSRBD0100N10R04	1	0.4	10	1	50	6	J302
MPXLRBD0120R010N100	1.2	0.1	10	1.2	50	4	J261

DC = Cutting diameter　RE = Corner radius　LU = Usable length　APMX = Depth of cut maximum　LF = Functional length　DCON = Usable length

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SOLID END MILLS

Order Number	DC	RE	LU	APMX	LF	DCON	Page
MPXLRBD0120R020N100	1.2	0.2	10	1.2	50	4	J261
VCPSRBD0120N06R05	1.2	0.5	6	1.2	50	6	J302
VCPSRBD0120N10R05	1.2	0.5	10	1.2	50	6	J302
VCPSRBD0120N15R05	1.2	0.5	15	1.2	50	6	J302
VCPSRBD0150N04R01	1.5	0.1	4	1.5	50	6	J302
NEW VFRPSRBD0150R010N040	1.5	0.1	4	1.5	50	6	J283
MPXLRBD0150R010N060	1.5	0.1	6	1.5	50	4	J261
VCPSRBD0150N06R01	1.5	0.1	6	1.5	50	6	J302
NEW VFRPSRBD0150R010N060	1.5	0.1	6	1.5	50	6	J283
VCPSRBD0150N10R01	1.5	0.1	10	1.5	50	6	J303
NEW VFRPSRBD0150R010N100	1.5	0.1	10	1.5	50	6	J283
MPXLRBD0150R010N120	1.5	0.1	12	1.5	50	4	J261
VCPSRBD0150N15R01	1.5	0.1	15	1.5	50	6	J303
MPXLRBD0150R010N180	1.5	0.1	18	1.5	60	4	J262
MS2MRBD0150R010	1.5	0.1	—	3	40	4	J245
VCPSRBD0150N04R02	1.5	0.2	4	1.5	50	6	J302
NEW VFRPSRBD0150R020N040	1.5	0.2	4	1.5	50	6	J283
MPXLRBD0150R020N060	1.5	0.2	6	1.5	50	4	J262
VCPSRBD0150N06R02	1.5	0.2	6	1.5	50	6	J302
NEW VFRPSRBD0150R020N060	1.5	0.2	6	1.5	50	6	J283
VCPSRBD0150N10R02	1.5	0.2	10	1.5	50	6	J303
NEW VFRPSRBD0150R020N100	1.5	0.2	10	1.5	50	6	J283
MPXLRBD0150R020N120	1.5	0.2	12	1.5	50	4	J262
CRN2XLRBD0150R020N12	1.5	0.2	12	1.5	55	4	J249
VCPSRBD0150N15R02	1.5	0.2	15	1.5	50	6	J303
MPXLRBD0150R020N180	1.5	0.2	18	1.5	60	4	J262
MS2MRBD0150R020	1.5	0.2	—	3	40	4	J245
VFHVRBD015R03N010T09	1.5	0.3	3	1.5	60	6	J296
VFHVRBD015R03N015T09	1.5	0.3	3	1.5	60	6	J296
VFHVRBD015R03N020T09	1.5	0.3	3	1.5	80	6	J296
VFHVRBD015R03N030T09	1.5	0.3	3	1.5	80	6	J296
VFHVRBD015R03N040T09	1.5	0.3	3	1.5	90	6	J296
VFHVRBD015R03N050T09	1.5	0.3	3	1.5	90	6	J296
VCPSRBD0150N04R03	1.5	0.3	4	1.5	50	6	J302
NEW VFRPSRBD0150R030N040	1.5	0.3	4	1.5	50	6	J283
VFHVRBD0150R03N004	1.5	0.3	4	1.5	60	6	J290
MPXLRBD0150R030N060	1.5	0.3	6	1.5	50	4	J262
VCPSRBD0150N06R03	1.5	0.3	6	1.5	50	6	J302
NEW VFRPSRBD0150R030N060	1.5	0.3	6	1.5	50	6	J283
VFHVRBD0150R03N006	1.5	0.3	6	1.5	60	6	J290
VCPSRBD0150N10R03	1.5	0.3	10	1.5	50	6	J303
NEW VFRPSRBD0150R030N100	1.5	0.3	10	1.5	50	6	J283
VFHVRBD0150R03N010	1.5	0.3	10	1.5	60	6	J290
MPXLRBD0150R030N120	1.5	0.3	12	1.5	50	4	J262
CRN2XLRBD0150R030N12	1.5	0.3	12	1.5	55	4	J249
VCPSRBD0150N15R03	1.5	0.3	15	1.5	50	6	J303
VFHVRBD0150R03N015	1.5	0.3	15	1.5	60	6	J290
MPXLRBD0150R030N180	1.5	0.3	18	1.5	60	4	J262
VCPSRBD0150N20R03	1.5	0.3	20	1.5	60	6	J303
VFHVRBD0150R03N020	1.5	0.3	20	1.5	80	6	J290
VFHVRBD0150R03N025	1.5	0.3	25	1.5	80	6	J290
VFHVRBD0150R03N030	1.5	0.3	30	1.5	80	6	J290
MS2MRBD0150R030	1.5	0.3	—	3	40	4	J245
VCPSRBD0150N03L06R05	1.5	0.5	3	1.5	50	6	J306
VCPSRBD0150N03L10R05	1.5	0.5	3	1.5	50	6	J306
VCPSRBD0150N04R05	1.5	0.5	4	1.5	50	6	J302
NEW VFRPSRBD0150R050N040	1.5	0.5	4	1.5	50	6	J283
VCPSRBD0150N06R05	1.5	0.5	6	1.5	50	6	J303
NEW VFRPSRBD0150R050N060	1.5	0.5	6	1.5	50	6	J283
VCPSRBD0150N10R05	1.5	0.5	10	1.5	50	6	J303
NEW VFRPSRBD0150R050N100	1.5	0.5	10	1.5	50	6	J283
VCPSRBD0150N15R05	1.5	0.5	15	1.5	50	6	J303
VCPSRBD0150N20R05	1.5	0.5	20	1.5	60	6	J303
MS2MRBD0150R050	1.5	0.5	—	3	40	4	J245
VCPSRBD0200N06R01	2	0.1	6	2	50	6	J303
NEW VFRPSRBD0200R010N060	2	0.1	6	2	50	6	J283
MPXLRBD0200R010N080	2	0.1	8	2	50	4	J262
VCPSRBD0200N10R01	2	0.1	10	2	50	6	J303
NEW VFRPSRBD0200R010N100	2	0.1	10	2	50	6	J283
MPXLRBD0200R010N120	2	0.1	12	2	50	4	J262
CRN2XLRBD0200R010N12	2	0.1	12	2	55	4	J249
VCPSRBD0200N15R01	2	0.1	15	2	50	6	J303
NEW VFRPSRBD0200R010N150	2	0.1	15	2	50	6	J283
MPXLRBD0200R010N160	2	0.1	16	2	60	4	J262
MPXLRBD0200R010N200	2	0.1	20	2	60	4	J262
MPXLRBD0200R010N240	2	0.1	24	2	70	4	J262
MS2MRBD0200R010	2	0.1	—	4	40	4	J245
MPMHVRBD0200R010	2	0.1	—	5	45	4	J257
VCPSRBD0200N06R02	2	0.2	6	2	50	6	J303
NEW VFRPSRBD0200R020N060	2	0.2	6	2	50	6	J283
MPXLRBD0200R020N080	2	0.2	8	2	50	4	J262
VCPSRBD0200N10R02	2	0.2	10	2	50	6	J303
NEW VFRPSRBD0200R020N100	2	0.2	10	2	50	6	J283
MPXLRBD0200R020N120	2	0.2	12	2	50	4	J262
CRN2XLRBD0200R020N12	2	0.2	12	2	55	4	J249
NEW VQHVRBD0200R02N120	2	0.2	12	2	55	6	J279
VCPSRBD0200N15R02	2	0.2	15	2	50	6	J303
NEW VFRPSRBD0200R020N150	2	0.2	15	2	50	6	J284
CRN2XLRBD0200R020N16	2	0.2	16	2	55	4	J249
MPXLRBD0200R020N160	2	0.2	16	2	60	4	J262
NEW VQHVRBD0200R02N160	2	0.2	16	2	60	6	J279
CRN2XLRBD0200R020N20	2	0.2	20	2	60	4	J249
MPXLRBD0200R020N200	2	0.2	20	2	60	4	J262
MPXLRBD0200R020N240	2	0.2	24	2	70	4	J262
MS2MRBD0200R020	2	0.2	—	4	40	4	J245
VQMHVRBD0200R020	2	0.2	—	4	45	4	J270
MPMHVRBD0200R020	2	0.2	—	5	45	4	J257
VCPSRBD0200N06R03	2	0.3	6	2	50	6	J303
NEW VFRPSRBD0200R030N060	2	0.3	6	2	50	6	J284
MPXLRBD0200R030N080	2	0.3	8	2	50	4	J262

DC = Cutting diameter RE = Corner radius LU = Usable length APMX = Depth of cut maximum LF = Functional length DCON = Usable length

SELECTION CHART BY BLADE DIAMETER

CARBIDE/RADIUS

Order Number	DC	RE	LU	APMX	LF	DCON	Page
VCPSRBD0200N10R03	2	0.3	10	2	50	6	J303
NEW VFRPSRBD0200R030N100	2	0.3	10	2	50	6	J284
MPXLRBD0200R030N120	2	0.3	12	2	50	4	J262
CRN2XLRBD0200R030N12	2	0.3	12	2	55	4	J249
VCPSRBD0200N15R03	2	0.3	15	2	50	6	J303
NEW VFRPSRBD0200R030N150	2	0.3	15	2	50	6	J284
CRN2XLRBD0200R030N16	2	0.3	16	2	55	4	J249
MPXLRBD0200R030N160	2	0.3	16	2	60	4	J262
MPXLRBD0200R030N200	2	0.3	20	2	60	4	J262
VCPSRBD0200N20R03	2	0.3	20	2	60	6	J303
NEW VFRPSRBD0200R030N200	2	0.3	20	2	60	6	J284
MPXLRBD0200R030N240	2	0.3	24	2	70	4	J262
VCPSRBD0200N25R03	2	0.3	25	2	60	6	J303
MS2MRBD0200R030	2	0.3	—	4	40	4	J245
VQMHVRBD0200R030	2	0.3	—	4	45	4	J270
MPMHVRBD0200R030	2	0.3	—	5	45	4	J257
VCPSRBD0200N04L10R05	2	0.5	4	2	60	6	J306
VCPSRBD0200N04L15R05	2	0.5	4	2	60	6	J306
VFHVRBD020R05N015T04	2	0.5	4	2	60	6	J296
VFHVRBD020R05N020T04	2	0.5	4	2	80	6	J296
VFHVRBD020R05N020T09	2	0.5	4	2	80	6	J296
VFHVRBD020R05N025T04	2	0.5	4	2	80	6	J296
VFHVRBD020R05N030T04	2	0.5	4	2	80	6	J296
VFHVRBD020R05N035T04	2	0.5	4	2	80	6	J296
VFHVRBD020R05N040T04	2	0.5	4	2	80	6	J296
VFHVRBD020R05N025T09	2	0.5	4	2	90	6	J296
VFHVRBD020R05N030T09	2	0.5	4	2	90	6	J296
VFHVRBD020R05N035T09	2	0.5	4	2	90	6	J296
VFHVRBD020R05N040T09	2	0.5	4	2	90	6	J296
VFHVRBD020R05N045T09	2	0.5	4	2	90	6	J296
VFHVRBD020R05N050T09	2	0.5	4	2	100	6	J296
VFHVRBD020R05N055T09	2	0.5	4	2	100	6	J296
VFHVRBD020R05N060T09	2	0.5	4	2	100	6	J296
VCPSRBD0200N06R05	2	0.5	6	2	50	6	J303
NEW VFRPSRBD0200R050N060	2	0.5	6	2	50	6	J284
VFHVRBD0200R05N006	2	0.5	6	2	60	6	J290
VCPSRBD0200N10R05	2	0.5	10	2	50	6	J303
NEW VFRPSRBD0200R050N100	2	0.5	10	2	50	6	J284
VFHVRBD0200R05N010	2	0.5	10	2	60	6	J290
CRN2XLRBD0200R050N12	2	0.5	12	2	55	4	J249
VCPSRBD0200N15R05	2	0.5	15	2	50	6	J303
NEW VFRPSRBD0200R050N150	2	0.5	15	2	50	6	J284
VFHVRBD0200R05N015	2	0.5	15	2	60	6	J290
VCPSRBD0200N20R05	2	0.5	20	2	60	6	J303
NEW VFRPSRBD0200R050N200	2	0.5	20	2	60	6	J284
VFHVRBD0200R05N020	2	0.5	20	2	80	6	J290
VCPSRBD0200N25R05	2	0.5	25	2	60	6	J303
VFHVRBD0200R05N025	2	0.5	25	2	80	6	J290
VFHVRBD0200R05N030	2	0.5	30	2	80	6	J290
VFHVRBD0200R05N035	2	0.5	35	2	90	6	J290
VFHVRBD0200R05N040	2	0.5	40	2	90	6	J290
MS2MRBD0200R050	2	0.5	—	4	40	4	J245
MPMHVRBD0200R050	2	0.5	—	5	45	4	J257
VCPSRBD0250N08R01	2.5	0.1	8	2.5	50	6	J303
MS2MRBD0250R010	2.5	0.1	—	5	40	4	J245
VCPSRBD0250N08R02	2.5	0.2	8	2.5	50	6	J303
MS2MRBD0250R020	2.5	0.2	—	5	40	4	J245
VCPSRBD0250N08R03	2.5	0.3	8	2.5	50	6	J303
NEW VFRPSRBD0250R030N080	2.5	0.3	8	2.5	50	6	J284
VCPSRBD0250N15R03	2.5	0.3	15	2.5	50	6	J303
NEW VFRPSRBD0250R030N150	2.5	0.3	15	2.5	50	6	J284
MS2MRBD0250R030	2.5	0.3	—	5	40	4	J245
VCPSRBD0250N08R05	2.5	0.5	8	2.5	50	6	J303
NEW VFRPSRBD0250R050N080	2.5	0.5	8	2.5	50	6	J284
VCPSRBD0250N15R05	2.5	0.5	15	2.5	50	6	J303
NEW VFRPSRBD0250R050N150	2.5	0.5	15	2.5	50	6	J284
MS2MRBD0250R050	2.5	0.5	—	5	40	4	J245
VCPSRBD0250N05L12R10	2.5	1	5	2.5	60	6	J306
VCPSRBD0250N05L20R10	2.5	1	5	2.5	60	6	J306
VCPSRBD0250N08R10	2.5	1	8	2.5	50	6	J303
NEW VFRPSRBD0250R100N080	2.5	1	8	2.5	50	6	J284
VCPSRBD0250N15R10	2.5	1	15	2.5	50	6	J303
MPXLRBD0300R010N080	3	0.1	8	3	60	6	J262
VCPSRBD0300N10R01	3	0.1	10	3	60	6	J303
NEW VFRPSRBD0300R010N100	3	0.1	10	3	60	6	J284
MPXLRBD0300R010N120	3	0.1	12	3	60	6	J262
VCPSRBD0300N15R01	3	0.1	15	3	60	6	J303
NEW VFRPSRBD0300R010N150	3	0.1	15	3	60	6	J284
MPXLRBD0300R010N180	3	0.1	18	3	70	6	J262
VCPSRBD0300N20R01	3	0.1	20	3	60	6	J303
MPXLRBD0300R010N240	3	0.1	24	3	70	6	J262
MPXLRBD0300R010N300	3	0.1	30	3	70	6	J262
MPXLRBD0300R010N360	3	0.1	36	3	90	6	J262
MS2MRBD0300R010	3	0.1	—	6	50	6	J245
MPMHVRBD0300R010	3	0.1	—	7.5	45	6	J257
MS4MRBD0300R010	3	0.1	—	8	45	6	J267
VCPSRBD0300N10R02	3	0.2	10	3	60	6	J303
NEW VFRPSRBD0300R020N100	3	0.2	10	3	60	6	J284
MPXLRBD0300R020N120	3	0.2	12	3	60	6	J262
VCPSRBD0300N15R02	3	0.2	15	3	60	6	J303
NEW VFRPSRBD0300R020N150	3	0.2	15	3	60	6	J284
MPXLRBD0300R020N180	3	0.2	18	3	60	6	J262
VCPSRBD0300N20R02	3	0.2	20	3	60	6	J303
NEW VFRPSRBD0300R020N200	3	0.2	20	3	60	6	J284
CRN2XLRBD0300R020N20	3	0.2	20	3	65	6	J249
MPXLRBD0300R020N240	3	0.2	24	3	70	6	J262
MPXLRBD0300R020N300	3	0.2	30	3	70	6	J262
MPXLRBD0300R020N360	3	0.2	36	3	90	6	J262
MS2MRBD0300R020	3	0.2	—	6	50	6	J245
MPMHVRBD0300R020	3	0.2	—	7.5	45	6	J257

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Order Number	DC	RE	LU	APMX	LF	DCON	Page
MS4MRBD0300R020	3	0.2	—	8	45	6	J267
VQMHVRBD0300R020	3	0.2	—	8	45	6	J270
VFSDRBD0300R030	3	0.3	9	3	45	6	J318
VCPSRBD0300N10R03	3	0.3	10	3	60	6	J303
NEW VFRPSRBD0300R030N100	3	0.3	10	3	60	6	J284
MPXLRBD0300R030N120	3	0.3	12	3	60	6	J262
VCPSRBD0300N15R03	3	0.3	15	3	60	6	J303
NEW VFRPSRBD0300R030N150	3	0.3	15	3	60	6	J284
MPXLRBD0300R030N180	3	0.3	18	3	60	6	J262
VCPSRBD0300N20R03	3	0.3	20	3	60	6	J303
NEW VFRPSRBD0300R030N200	3	0.3	20	3	60	6	J284
CRN2XLRBD0300R030N20	3	0.3	20	3	65	6	J249
MPXLRBD0300R030N240	3	0.3	24	3	70	6	J262
MPXLRBD0300R030N300	3	0.3	30	3	70	6	J262
VCPSRBD0300N30R03	3	0.3	30	3	70	6	J303
MPXLRBD0300R030N360	3	0.3	36	3	90	6	J262
VFMDRBD0300R030	3	0.3	—	10	60	6	J320
MS2MRBD0300R030	3	0.3	—	6	50	6	J245
NEW VQN4MVRBD0300R030	3	0.3	—	7	45	6	J277
MPMHVRBD0300R030	3	0.3	—	7.5	45	6	J257
MS4MRBD0300R030	3	0.3	—	8	45	6	J267
VQMHVRBD0300R030	3	0.3	—	8	45	6	J270
VC4JRBD0300R0030	3	0.3	—	12	50	6	J308
VCPSRBD0300N06L15R05	3	0.5	6	3	60	6	J306
VCPSRBD0300N06L20R05	3	0.5	6	3	60	6	J306
NEW VQHVRBD0300R05N100	3	0.5	10	3	55	6	J279
VCPSRBD0300N10R05	3	0.5	10	3	60	6	J303
VFHVRBD0300R05N010	3	0.5	10	3	60	6	J290
NEW VFRPSRBD0300R050N100	3	0.5	10	3	60	6	J284
MPXLRBD0300R050N120	3	0.5	12	3	60	6	J262
VCPSRBD0300N15R05	3	0.5	15	3	60	6	J303
VFHVRBD0300R05N015	3	0.5	15	3	60	6	J290
NEW VFRPSRBD0300R050N150	3	0.5	15	3	60	6	J284
MPXLRBD0300R050N180	3	0.5	18	3	60	6	J262
NEW VQHVRBD0300R05N180	3	0.5	18	3	60	6	J279
VCPSRBD0300N20R05	3	0.5	20	3	60	6	J303
NEW VFRPSRBD0300R050N200	3	0.5	20	3	60	6	J284
CRN2XLRBD0300R050N20	3	0.5	20	3	65	6	J249
VFHVRBD0300R05N020	3	0.5	20	3	80	6	J290
MPXLRBD0300R050N240	3	0.5	24	3	70	6	J262
MPXLRBD0300R050N300	3	0.5	30	3	70	6	J262
VCPSRBD0300N30R05	3	0.5	30	3	70	6	J303
VFHVRBD0300R05N030	3	0.5	30	3	80	6	J290
MPXLRBD0300R050N360	3	0.5	36	3	90	6	J262
MS2MRBD0300R050	3	0.5	—	6	50	6	J245
NEW VQN4MVRBD0300R050	3	0.5	—	7	45	6	J277
MPMHVRBD0300R050	3	0.5	—	7.5	45	6	J257
MS4MRBD0300R050	3	0.5	—	8	45	6	J267
VQMHVRBD0300R050	3	0.5	—	8	45	6	J270
VFHVRBD030R08N020T09	3	0.8	6	3	80	6	J296

Order Number	DC	RE	LU	APMX	LF	DCON	Page
VFHVRBD030R08N025T09	3	0.8	6	3	80	6	J296
VFHVRBD030R08N030T09	3	0.8	6	3	80	6	J296
VFHVRBD030R08N040T09	3	0.8	6	3	90	6	J297
VFHVRBD030R08N050T09	3	0.8	6	3	90	6	J297
VFHVRBD030R08N060T09	3	0.8	6	3	100	6	J297
VFHVRBD0300R08N010	3	0.8	10	3	60	6	J290
VFHVRBD0300R08N015	3	0.8	15	3	60	6	J290
VFHVRBD0300R08N020	3	0.8	20	3	80	6	J290
VFHVRBD0300R08N030	3	0.8	30	3	80	6	J290
VFHVRBD0300R08N040	3	0.8	40	3	90	6	J290
VFHVRBD0300R08N050	3	0.8	50	3	90	6	J290
VCPSRBD0300N06L15R10	3	1	6	3	60	6	J306
VCPSRBD0300N06L20R10	3	1	6	3	60	6	J306
VCPSRBD0300N10R10	3	1	10	3	60	6	J303
NEW VFRPSRBD0300R100N100	3	1	10	3	60	6	J284
VCPSRBD0300N15R10	3	1	15	3	60	6	J303
NEW VFRPSRBD0300R100N150	3	1	15	3	60	6	J284
VCPSRBD0300N20R10	3	1	20	3	60	6	J303
NEW VFRPSRBD0300R100N200	3	1	20	3	60	6	J284
MS2MRBD0300R100	3	1	—	6	50	6	J245
MS4MRBD0300R100	3	1	—	8	45	6	J267
VCPSRBD0400N12R01	4	0.1	12	4	60	6	J304
NEW VFRPSRBD0400R010N120	4	0.1	12	4	60	6	J284
MPXLRBD0400R010N160	4	0.1	16	4	70	6	J262
VCPSRBD0400N20R01	4	0.1	20	4	60	6	J304
NEW VFRPSRBD0400R010N200	4	0.1	20	4	60	6	J284
MPXLRBD0400R010N240	4	0.1	24	4	70	6	J262
MPXLRBD0400R010N320	4	0.1	32	4	70	6	J262
MPXLRBD0400R010N480	4	0.1	48	4	90	6	J262
MS2MRBD0400R010	4	0.1	—	8	50	6	J245
MPMHVRBD0400R010	4	0.1	—	10	45	6	J257
MS4MRBD0400R010	4	0.1	—	11	45	6	J267
VCPSRBD0400N12R02	4	0.2	12	4	60	6	J304
NEW VFRPSRBD0400R020N120	4	0.2	12	4	60	6	J284
MPXLRBD0400R020N160	4	0.2	16	4	70	6	J262
VCPSRBD0400N20R02	4	0.2	20	4	60	6	J304
NEW VFRPSRBD0400R020N200	4	0.2	20	4	60	6	J284
CRN2XLRBD0400R020N20	4	0.2	20	4	65	6	J249
MPXLRBD0400R020N240	4	0.2	24	4	70	6	J262
MPXLRBD0400R020N320	4	0.2	32	4	70	6	J262
MPXLRBD0400R020N480	4	0.2	48	4	90	6	J262
MS2MRBD0400R020	4	0.2	—	8	50	6	J245
MPMHVRBD0400R020	4	0.2	—	10	45	6	J257
MS4MRBD0400R020	4	0.2	—	11	45	6	J267
VQMHVRBD0400R020	4	0.2	—	11	45	6	J270
VFSDRBD0400R030	4	0.3	12	4	45	6	J318
VCPSRBD0400N12R03	4	0.3	12	4	60	6	J304
NEW VFRPSRBD0400R030N120	4	0.3	12	4	60	6	J284
MPXLRBD0400R030N160	4	0.3	16	4	70	6	J262
VCPSRBD0400N20R03	4	0.3	20	4	60	6	J304

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SELECTION CHART BY BLADE DIAMETER

CARBIDE/RADIUS

Order Number	DC	RE	LU	APMX	LF	DCON	Page
NEW VFRPSRBD0400R030N200	4	0.3	20	4	60	6	J284
CRN2XLRBD0400R030N20	4	0.3	20	4	65	6	J249
MPXLRBD0400R030N240	4	0.3	24	4	70	6	J263
VCPSRBD0400N30R03	4	0.3	30	4	70	6	J304
NEW VFRPSRBD0400R030N300	4	0.3	30	4	70	6	J284
MPXLRBD0400R030N320	4	0.3	32	4	70	6	J263
MPXLRBD0400R030N480	4	0.3	48	4	90	6	J263
VFMDRBD0400R030	4	0.3	—	12	60	6	J320
MS2MRBD0400R030	4	0.3	—	8	50	6	J245
MPMHVRBD0400R030	4	0.3	—	10	45	6	J257
NEW VQN4MVRBD0400R030	4	0.3	—	10	45	6	J277
MS4MRBD0400R030	4	0.3	—	11	45	6	J267
VQMHVRBD0400R030	4	0.3	—	11	45	6	J270
VC4JRBD0400R0030	4	0.3	—	15	50	6	J308
VCPSRBD0400N12R05	4	0.5	12	4	60	6	J304
VFHVRBD0400R05N012	4	0.5	12	4	60	6	J290
NEW VFRPSRBD0400R050N120	4	0.5	12	4	60	6	J284
MPXLRBD0400R050N160	4	0.5	16	4	70	6	J263
VCPSRBD0400N20R05	4	0.5	20	4	60	6	J304
NEW VFRPSRBD0400R050N200	4	0.5	20	4	60	6	J284
CRN2XLRBD0400R050N20	4	0.5	20	4	65	6	J249
VFHVRBD0400R05N020	4	0.5	20	4	80	6	J290
MPXLRBD0400R050N240	4	0.5	24	4	70	6	J263
VCPSRBD0400N30R05	4	0.5	30	4	70	6	J304
NEW VFRPSRBD0400R050N300	4	0.5	30	4	70	6	J284
VFHVRBD0400R05N030	4	0.5	30	4	80	6	J290
MPXLRBD0400R050N320	4	0.5	32	4	70	6	J263
MPXLRBD0400R050N480	4	0.5	48	4	90	6	J263
VFHVRBD0400R05N048	4	0.5	48	4	90	6	J291
MS2MRBD0400R050	4	0.5	—	8	50	6	J245
MPMHVRBD0400R050	4	0.5	—	10	45	6	J257
NEW VQN4MVRBD0400R050	4	0.5	—	10	45	6	J277
MS4MRBD0400R050	4	0.5	—	11	45	6	J267
VQMHVRBD0400R050	4	0.5	—	11	45	6	J270
VC4JRBD0400R0050	4	0.5	—	15	50	6	J308
VFHVRBD040R10N025T04	4	1	7	4	80	6	J297
VFHVRBD040R10N030T04	4	1	7	4	80	6	J297
VFHVRBD040R10N035T04	4	1	7	4	80	6	J297
VFHVRBD040R10N040T04	4	1	7	4	80	6	J297
VFHVRBD040R10N025T09	4	1	7	4	90	6	J297
VFHVRBD040R10N030T09	4	1	7	4	90	6	J297
VFHVRBD040R10N045T04	4	1	7	4	90	6	J297
VFHVRBD040R10N050T04	4	1	7	4	90	6	J297
VFHVRBD040R10N040T09	4	1	7	4	100	6	J297
VFHVRBD040R10N050T09	4	1	7	4	100	6	J297
VFHVRBD040R10N060T09	4	1	7	4	100	6	J297
VCPSRBD0400N08L20R10	4	1	8	4	60	6	J306
VCPSRBD0400N08L30R10	4	1	8	4	70	6	J306
NEW VQHVRBD0400R10N120	4	1	12	4	55	6	J279
VCPSRBD0400N12R10	4	1	12	4	60	6	J304

Order Number	DC	RE	LU	APMX	LF	DCON	Page
VFHVRBD0400R10N012	4	1	12	4	60	6	J291
NEW VFRPSRBD0400R100N120	4	1	12	4	60	6	J284
VCPSRBD0400N20R10	4	1	20	4	60	6	J304
NEW VFRPSRBD0400R100N200	4	1	20	4	60	6	J284
NEW VQHVRBD0400R10N200	4	1	20	4	60	6	J279
VFHVRBD0400R10N020	4	1	20	4	80	6	J291
VCPSRBD0400N30R10	4	1	30	4	70	6	J304
NEW VFRPSRBD0400R100N300	4	1	30	4	70	6	J284
VFHVRBD0400R10N030	4	1	30	4	80	6	J291
MS2MRBD0400R100	4	1	—	8	50	6	J245
MPMHVRBD0400R100	4	1	—	10	45	6	J257
MS4MRBD0400R100	4	1	—	11	45	6	J267
MS2MRBD0500R010	5	0.1	—	10	50	6	J245
MPMHVRBD0500R010	5	0.1	—	12.5	50	6	J257
MS4MRBD0500R010	5	0.1	—	13	50	6	J267
MS2MRBD0500R020	5	0.2	—	10	50	6	J245
MPMHVRBD0500R020	5	0.2	—	12.5	50	6	J257
MS4MRBD0500R020	5	0.2	—	13	50	6	J267
VQMHVRBD0500R020	5	0.2	—	13	50	6	J270
VFSDRBD0500R030	5	0.3	15	5	50	6	J318
VFMDRBD0500R030	5	0.3	—	15	60	6	J320
MS2MRBD0500R030	5	0.3	—	10	50	6	J245
MPMHVRBD0500R030	5	0.3	—	12.5	50	6	J257
MS4MRBD0500R030	5	0.3	—	13	50	6	J267
VQMHVRBD0500R030	5	0.3	—	13	50	6	J270
VC4JRBD0500R0030	5	0.3	—	20	60	6	J308
VCPSRBD0500N08L40R05	5	0.5	8	5	90	8	J306
VCPSRBD0500N08L60R05	5	0.5	8	5	110	8	J306
VCPSRBD0500N15R05	5	0.5	15	5	60	6	J304
NEW VFRPSRBD0500R050N150	5	0.5	15	5	60	6	J284
VCPSRBD0500N30R05	5	0.5	30	5	70	6	J304
MS2MRBD0500R050	5	0.5	—	10	50	6	J245
NEW VQN4MVRBD0500R050	5	0.5	—	12	50	6	J277
MPMHVRBD0500R050	5	0.5	—	12.5	50	6	J257
MS4MRBD0500R050	5	0.5	—	13	50	6	J267
VQMHVRBD0500R050	5	0.5	—	13	50	6	J270
VC4JRBD0500R0050	5	0.5	—	20	60	6	J308
VCPSRBD0500N08L40R10	5	1	8	5	90	8	J306
VCPSRBD0500N08L60R10	5	1	8	5	110	8	J306
VCPSRBD0500N15R10	5	1	15	5	60	6	J304
NEW VFRPSRBD0500R100N150	5	1	15	5	60	6	J284
VCPSRBD0500N30R10	5	1	30	5	70	6	J304
MS2MRBD0500R100	5	1	—	10	50	6	J245
MPMHVRBD0500R100	5	1	—	12.5	50	6	J257
MS4MRBD0500R100	5	1	—	13	50	6	J267
VQMHVRBD0500R100	5	1	—	13	50	6	J270
VCPSRBD0600N18R01	6	0.1	18	6	70	6	J304
NEW VFRPSRBD0600R010N180	6	0.1	18	9	70	6	J284
MPXLRBD0600R010N240	6	0.1	24	6	70	6	J263
MPXLRBD0600R010N480	6	0.1	48	6	100	6	J263

DC = Cutting diameter RE = Corner radius LU = Usable length APMX = Depth of cut maximum LF = Functional length DCON = Usable length

Order Number	DC	RE	LU	APMX	LF	DCON	Page
MS2MRBD0600R010	6	0.1	–	12	50	6	J245
MS4MRBD0600R010	6	0.1	–	13	50	6	J267
MPMHVRBD0600R010	6	0.1	–	15	60	6	J257
VCPSRBD0600N18R02	6	0.2	18	6	70	6	J304
NEW VFRPSRBD0600R020N180	6	0.2	18	9	70	6	J284
MPXLRBD0600R020N240	6	0.2	24	6	70	6	J263
CRN2XLRBD0600R020N30	6	0.2	30	6	70	6	J249
MPXLRBD0600R020N480	6	0.2	48	6	100	6	J263
MS2MRBD0600R020	6	0.2	–	12	50	6	J245
CRN2MRBD0600R020	6	0.2	–	13	50	6	J248
MS4MRBD0600R020	6	0.2	–	13	50	6	J267
MPMHVRBD0600R020	6	0.2	–	15	60	6	J257
VFSDRBD0600R030	6	0.3	18	6	50	6	J318
VCPSRBD0600N18R03	6	0.3	18	6	70	6	J304
NEW VFRPSRBD0600R030N180	6	0.3	18	9	70	6	J284
MPXLRBD0600R030N240	6	0.3	24	6	70	6	J263
CRN2XLRBD0600R030N30	6	0.3	30	6	70	6	J249
MPXLRBD0600R030N480	6	0.3	48	6	100	6	J263
VFMDRBD0600R030	6	0.3	–	15	60	6	J320
MS2MRBD0600R030	6	0.3	–	12	50	6	J245
MS4MRBD0600R030	6	0.3	–	13	50	6	J267
VQMHVRBD0600R030	6	0.3	–	13	50	6	J270
VQMHVRBFD0600R030	6	0.3	–	13	50	6	J275
MPMHVRBD0600R030	6	0.3	–	15	60	6	J257
VC4JRBD0600R0030	6	0.3	–	20	60	6	J308
VFSDRBD0600R050	6	0.5	18	6	50	6	J318
VCPSRBD0600N18R05	6	0.5	18	6	70	6	J304
VFHVRBD0600R05N018	6	0.5	18	9	60	6	J291
NEW VFRPSRBD0600R050N180	6	0.5	18	9	70	6	J284
MPXLRBD0600R050N240	6	0.5	24	6	70	6	J263
CRN2XLRBD0600R050N30	6	0.5	30	6	70	6	J249
VFHVRBD0600R05N030	6	0.5	30	9	80	6	J291
VCPSRBD0600N41R05	6	0.5	41	6	90	6	J304
MPXLRBD0600R050N480	6	0.5	48	6	100	6	J263
VFMDRBD0600R050	6	0.5	–	15	60	6	J320
MS2MRBD0600R050	6	0.5	–	12	50	6	J245
CRN2MRBD0600R050	6	0.5	–	13	50	6	J248
MS4MRBD0600R050	6	0.5	–	13	50	6	J267
VF6MHVRBD0600R050	6	0.5	–	13	50	6	J316
VQMHVRBD0600R050	6	0.5	–	13	50	6	J270
VQMHVRBFD0600R050	6	0.5	–	13	50	6	J275
NEW VQN4MVRBD0600R050	6	0.5	–	13	50	6	J277
MPMHVRBD0600R050	6	0.5	–	15	60	6	J257
VC4JRBD0600R0050	6	0.5	–	20	60	6	J308
VFSDRBD0600R100	6	1	18	6	50	6	J318
VCPSRBD0600N18R10	6	1	18	6	70	6	J304
VFHVRBD0600R10N018	6	1	18	9	60	6	J291
NEW VFRPSRBD0600R100N180	6	1	18	9	70	6	J284
CRN2XLRBD0600R100N30	6	1	30	6	70	6	J249
VFHVRBD0600R10N030	6	1	30	9	80	6	J291

Order Number	DC	RE	LU	APMX	LF	DCON	Page
VCPSRBD0600N50R10	6	1	50	6	90	6	J304
VFHVRBD0600R10N054	6	1	54	9	90	6	J291
VFMDRBD0600R100	6	1	–	15	60	6	J320
MS2MRBD0600R100	6	1	–	12	50	6	J246
MS4MRBD0600R100	6	1	–	13	50	6	J267
VF6MHVRBD0600R100	6	1	–	13	50	6	J316
VQMHVRBD0600R100	6	1	–	13	50	6	J270
VQMHVRBFD0600R100	6	1	–	13	50	6	J275
NEW VQN4MVRBD0600R100	6	1	–	13	50	6	J277
MPMHVRBD0600R100	6	1	–	15	60	6	J257
VC4JRBD0600R0100	6	1	–	20	60	6	J308
VFHVRBD060R15N040T09	6	1.5	12	9	110	8	J297
VFHVRBD060R15N050T09	6	1.5	12	9	110	8	J297
VFHVRBD060R15N060T09	6	1.5	12	9	110	8	J297
VFHVRBD060R15N070T09	6	1.5	12	9	110	8	J297
VFHVRBD0600R15N018	6	1.5	18	9	60	6	J291
VFHVRBD0600R15N030	6	1.5	30	9	80	6	J291
VFHVRBD0600R15N042	6	1.5	42	9	90	6	J291
VFHVRBD0600R15N054	6	1.5	54	9	90	6	J291
MS2MRBD0600R150	6	1.5	–	12	50	6	J246
MS4MRBD0600R150	6	1.5	–	13	50	6	J267
VCPSRBD0600N08L40R20	6	2	8	6	70	8	J306
VCPSRBD0600N08L60R20	6	2	8	6	100	8	J306
VCPSRBD0600N18R20	6	2	18	6	70	6	J304
VFHVRBD0600R20N018	6	2	18	9	60	6	J291
NEW VFRPSRBD0600R200N180	6	2	18	9	70	6	J284
VFHVRBD0600R20N030	6	2	30	9	80	6	J291
MS2MRBD0600R200	6	2	–	12	50	6	J246
MS4MRBD0600R200	6	2	–	13	50	6	J267
VFHVRBD0700R15	7	1.5	–	11	80	6	J291
VCPSRBD0800N24R01	8	0.1	24	8	90	8	J304
VCPSRBD0800N24R02	8	0.2	24	8	90	8	J304
NEW VFRPSRBD0800R020N240	8	0.2	24	12	90	8	J284
MS2MRBD0800R020	8	0.2	–	16	60	8	J246
MS4MRBD0800R020	8	0.2	–	19	60	8	J267
MPMHVRBD0800R020	8	0.2	–	20	70	8	J257
VFSDRBD0800R030	8	0.3	24	8	60	8	J318
VCPSRBD0800N24R03	8	0.3	24	8	90	8	J304
NEW VFRPSRBD0800R030N240	8	0.3	24	12	90	8	J284
VFMDRBD0800R030	8	0.3	–	20	75	8	J320
MS2MRBD0800R030	8	0.3	–	16	60	8	J246
MS4MRBD0800R030	8	0.3	–	19	60	8	J267
VQMHVRBD0800R030	8	0.3	–	19	60	8	J270
MPMHVRBD0800R030	8	0.3	–	20	70	8	J257
VC4JRBD0800R0030	8	0.3	–	25	70	8	J308
VFSDRBD0800R050	8	0.5	24	8	60	8	J318
VCPSRBD0800N24R05	8	0.5	24	8	90	8	J304
VFHVRBD0800R05N024	8	0.5	24	12	60	8	J291
NEW VFRPSRBD0800R050N240	8	0.5	24	12	90	8	J284
VFHVRBD0800R05N040	8	0.5	40	12	100	8	J291

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SELECTION CHART BY BLADE DIAMETER

CARBIDE/RADIUS

Order Number	DC	RE	LU	APMX	LF	DCON	Page
VFMDRBD0800R050	8	0.5	—	20	75	8	J320
MS2MRBD0800R050	8	0.5	—	16	60	8	J246
CRN2MRBD0800R050	8	0.5	—	19	60	8	J248
MS4MRBD0800R050	8	0.5	—	19	60	8	J267
VF6MHVRBD0800R050	8	0.5	—	19	60	8	J316
VQMHVRBD0800R050	8	0.5	—	19	60	8	J270
VQMHVRBFD0800R050	8	0.5	—	19	60	8	J275
NEW VQN6MVRBD0800R050	8	0.5	—	19	60	8	J277
MPMHVRBD0800R050	8	0.5	—	20	70	8	J257
VC4JRBD0800R0050	8	0.5	—	25	70	8	J308
VFSDRBD0800R100	8	1	24	8	60	8	J318
VCPSRBD0800N24R10	8	1	24	8	90	8	J304
VFHVRBD0800R10N024	8	1	24	12	60	8	J291
NEW VFRPSRBD0800R100N240	8	1	24	12	90	8	J285
VFHVRBD0800R10N040	8	1	40	12	100	8	J291
VCPSRBD0800N50R10	8	1	50	8	90	8	J304
VFMDRBD0800R100	8	1	—	20	75	8	J320
MS2MRBD0800R100	8	1	—	16	60	8	J246
CRN2MRBD0800R100	8	1	—	19	60	8	J248
MS4MRBD0800R100	8	1	—	19	60	8	J267
VF6MHVRBD0800R100	8	1	—	19	60	8	J316
VQMHVRBD0800R100	8	1	—	19	60	8	J270
VQMHVRBFD0800R100	8	1	—	19	60	8	J275
NEW VQN6MVRBD0800R100	8	1	—	19	60	8	J277
MPMHVRBD0800R100	8	1	—	20	70	8	J257
VC4JRBD0800R0100	8	1	—	25	70	8	J308
MS2MRBD0800R150	8	1.5	—	16	60	8	J246
MS4MRBD0800R150	8	1.5	—	19	60	8	J267
VQMHVRBD0800R150	8	1.5	—	19	60	8	J270
MPMHVRBD0800R150	8	1.5	—	20	70	8	J257
VC4JRBD0800R0150	8	1.5	—	25	70	8	J308
VCPSRBD0800N10L53R20	8	2	10	8	90	10	J306
VCPSRBD0800N10L70R20	8	2	10	8	130	12	J306
VFHVRBD080R20N060T09	8	2	15	12	150	10	J297
VFHVRBD080R20N080T09	8	2	15	12	150	10	J297
VCPSRBD0800N24R20	8	2	24	8	90	8	J304
VFHVRBD0800R20N024	8	2	24	12	60	8	J291
NEW VFRPSRBD0800R200N240	8	2	24	12	90	8	J285
VFHVRBD0800R20N040	8	2	40	12	100	8	J291
VFHVRBD0800R20N056	8	2	56	12	120	8	J291
VFHVRBD0800R20N072	8	2	72	12	120	8	J291
MS2MRBD0800R200	8	2	—	16	60	8	J246
MS4MRBD0800R200	8	2	—	19	60	8	J267
MPMHVRBD0800R200	8	2	—	20	70	8	J257
VC4JRBD0800R0200	8	2	—	25	70	8	J308
MS2MRBD0800R250	8	2.5	—	16	60	8	J246
MS4MRBD0800R250	8	2.5	—	19	60	8	J267
MPMHVRBD0800R250	8	2.5	—	20	70	8	J257
VCPSRBD0800N24R30	8	3	24	8	90	8	J304
VCPSRBD0800N50R30	8	3	50	8	90	8	J304

Order Number	DC	RE	LU	APMX	LF	DCON	Page
MS2MRBD0800R300	8	3	—	16	60	8	J246
MS4MRBD0800R300	8	3	—	19	60	8	J267
MPMHVRBD0800R300	8	3	—	20	70	8	J258
VFHVRBD0900R20	9	2	—	13.5	100	8	J291
MS2MRBD1000R020	10	0.2	—	20	70	10	J246
MS4MRBD1000R020	10	0.2	—	22	70	10	J267
MPMHVRBD1000R020	10	0.2	—	25	80	10	J258
VCPSRBD1000N30R03	10	0.3	30	10	100	10	J304
NEW VFRPSRBD1000R030N300	10	0.3	30	15	100	10	J285
VFMDRBD1000R030	10	0.3	—	25	80	10	J320
MS2MRBD1000R030	10	0.3	—	20	70	10	J246
MS4MRBD1000R030	10	0.3	—	22	70	10	J267
VQMHVRBD1000R030	10	0.3	—	22	70	10	J270
VQMHVRBFD1000R030	10	0.3	—	22	70	10	J275
MPMHVRBD1000R030	10	0.3	—	25	80	10	J258
MPMHVRBD1000R030S08	10	0.3	—	25	100	8	J258
VC4JRBD1000R0030	10	0.3	—	30	90	10	J308
VFSDRBD1000R050	10	0.5	30	10	70	10	J318
VCPSRBD1000N30R05	10	0.5	30	10	100	10	J304
VFHVRBD1000R05N030	10	0.5	30	15	70	10	J291
NEW VFRPSRBD1000R050N300	10	0.5	30	15	100	10	J285
VFHVRBD1000R05N050	10	0.5	50	15	110	10	J291
VQ6MHVRBCHD1000R050	10	0.5	—	22	70	10	J314
VFMDRBD1000R050	10	0.5	—	25	80	10	J320
MS2MRBD1000R050	10	0.5	—	20	70	10	J246
CRN2MRBD1000R050	10	0.5	—	22	70	10	J248
MS4MRBD1000R050	10	0.5	—	22	70	10	J267
VF6MHVRBD1000R050	10	0.5	—	22	70	10	J316
VQMHVRBD1000R050	10	0.5	—	22	70	10	J270
VQMHVRBFD1000R050	10	0.5	—	22	70	10	J275
NEW VQN6MVRBD1000R050	10	0.5	—	22	70	10	J277
MPMHVRBD1000R050	10	0.5	—	25	80	10	J258
MPMHVRBD1000R050S08	10	0.5	—	25	100	8	J258
VC4JRBD1000R0050	10	0.5	—	30	90	10	J308
VFSDRBD1000R100	10	1	30	10	70	10	J318
VCPSRBD1000N30R10	10	1	30	10	100	10	J304
VFHVRBD1000R10N030	10	1	30	15	70	10	J291
NEW VFRPSRBD1000R100N300	10	1	30	15	100	10	J285
VCPSRBD1000N50R10	10	1	50	10	100	10	J304
VFHVRBD1000R10N050	10	1	50	15	110	10	J291
VQ6MHVRBCHD1000R100	10	1	—	22	70	10	J314
VFMDRBD1000R100	10	1	—	25	80	10	J320
MS2MRBD1000R100	10	1	—	20	70	10	J246
CRN2MRBD1000R100	10	1	—	22	70	10	J248
MS4MRBD1000R100	10	1	—	22	70	10	J267
VF6MHVRBD1000R100	10	1	—	22	70	10	J316
VQMHVRBD1000R100	10	1	—	22	70	10	J270
VQMHVRBFD1000R100	10	1	—	22	70	10	J275
NEW VQN6MVRBD1000R100	10	1	—	22	70	10	J277
MPMHVRBD1000R100	10	1	—	25	80	10	J258

DC = Cutting diameter   RE = Corner radius   LU = Usable length   APMX = Depth of cut maximum   LF = Functional length   DCON = Usable length

	Order Number	DC	RE	LU	APMX	LF	DCON	Page
	MPMHVRBD1000R100S08	10	1	—	25	100	8	J258
	VC4JRBD1000R0100	10	1	—	30	90	10	J308
	MS2MRBD1000R150	10	1.5	—	20	70	10	J246
	MS4MRBD1000R150	10	1.5	—	22	70	10	J268
	VQMHVRBD1000R150	10	1.5	—	22	70	10	J270
	MPMHVRBD1000R150	10	1.5	—	25	80	10	J258
	VC4JRBD1000R0150	10	1.5	—	30	90	10	J308
	VFHVRBD100R20N080T09	10	2	18	15	130	16	J297
	VFHVRBD100R20N120T09	10	2	18	15	180	16	J297
	VCPSRBD1000N30R20	10	2	30	10	100	10	J304
	VFHVRBD1000R20N030	10	2	30	15	70	10	J291
NEW	VFRPSRBD1000R200N300	10	2	30	15	100	10	J285
	VFHVRBD1000R20N050	10	2	50	15	110	10	J291
	VFHVRBD1000R20N070	10	2	70	15	150	10	J291
	VFHVRBD1000R20N090	10	2	90	15	150	10	J291
	MS2MRBD1000R200	10	2	—	20	70	10	J246
	MS4MRBD1000R200	10	2	—	22	70	10	J268
	VQMHVRBD1000R200	10	2	—	22	70	10	J270
	VQMHVRBFD1000R200	10	2	—	22	70	10	J275
	MPMHVRBD1000R200	10	2	—	25	80	10	J258
	MPMHVRBD1000R200S08	10	2	—	25	100	8	J258
	VC4JRBD1000R0200	10	2	—	30	90	10	J308
	MS2MRBD1000R250	10	2.5	—	20	70	10	J246
	MS4MRBD1000R250	10	2.5	—	22	70	10	J268
	MPMHVRBD1000R250	10	2.5	—	25	80	10	J258
	VCPSRBD1000N12L55R30	10	3	12	10	100	12	J306
	VCPSRBD1000N12L70R30	10	3	12	10	130	12	J306
	VCPSRBD1000N30R30	10	3	30	10	100	10	J304
NEW	VFRPSRBD1000R300N300	10	3	30	15	100	10	J285
	VCPSRBD1000N50R30	10	3	50	10	100	10	J304
	MS2MRBD1000R300	10	3	—	20	70	10	J246
	MS4MRBD1000R300	10	3	—	22	70	10	J268
	MPMHVRBD1000R300	10	3	—	25	80	10	J258
	VCPSRBD1000N30R40	10	4	30	10	100	10	J304
	VFHVRBD1100R20	11	2	—	16.5	110	10	J291
	MS2MRBD1200R020	12	0.2	—	24	75	12	J246
	MS4MRBD1200R020	12	0.2	—	26	75	12	J268
	VCPSRBD1200N36R03	12	0.3	36	12	110	12	J304
	MS2MRBD1200R030	12	0.3	—	24	75	12	J246
	MS4MRBD1200R030	12	0.3	—	26	75	12	J268
	MPMHVRBD1200R030	12	0.3	—	30	100	12	J258
	MPMHVRBD1200R030S10	12	0.3	—	30	110	10	J258
	VFSDRBD1200R050	12	0.5	36	12	75	12	J318
	VCPSRBD1200N36R05	12	0.5	36	12	110	12	J304
	VFHVRBD1200R05N036	12	0.5	36	18	80	12	J291
NEW	VFRPSRBD1200R050N360	12	0.5	36	18	110	12	J285
	VFHVRBD1200R05N060	12	0.5	60	18	120	12	J291
	VQ6MHVRBCHD1200R050	12	0.5	—	26	75	12	J314
	VFMDRBD1200R050	12	0.5	—	30	100	12	J320
	MS2MRBD1200R050	12	0.5	—	24	75	12	J246

	Order Number	DC	RE	LU	APMX	LF	DCON	Page
	CRN2MRBD1200R050	12	0.5	—	26	75	12	J248
	MS4MRBD1200R050	12	0.5	—	26	75	12	J268
	VF6MHVRBD1200R050	12	0.5	—	26	75	12	J316
	VQMHVRBD1200R050	12	0.5	—	26	75	12	J270
NEW	VQN6MVRBD1200R050	12	0.5	—	26	75	12	J277
	VC4JRBD1200R0050	12	0.5	—	30	90	12	J308
	MPMHVRBD1200R050	12	0.5	—	30	100	12	J258
	MPMHVRBD1200R050S10	12	0.5	—	30	110	10	J258
	C3SARBD1200N0300R100	12	1	30	15	75	12	J253
	VFSDRBD1200R100	12	1	36	12	75	12	J318
	VCPSRBD1200N36R10	12	1	36	12	110	12	J304
NEW	A3SARB120R100N36C	12	1	36	18	80	12	J251
NEW	DLC3SARB120R100N36C	12	1	36	18	80	12	J255
	VFHVRBD1200R10N036	12	1	36	18	80	12	J291
NEW	VFRPSRBD1200R100N360	12	1	36	18	110	12	J285
	C3SARBD1200N0400R100	12	1	40	15	125	12	J253
	VFHVRBD1200R10N060	12	1	60	18	120	12	J291
	VQ6MHVRBCHD1200R100	12	1	—	26	75	12	J314
	VFMDRBD1200R100	12	1	—	30	100	12	J320
	MS2MRBD1200R100	12	1	—	24	75	12	J246
	CRN2MRBD1200R100	12	1	—	26	75	12	J248
	MS4MRBD1200R100	12	1	—	26	75	12	J268
	VF6MHVRBD1200R100	12	1	—	26	75	12	J316
	VQMHVRBD1200R100	12	1	—	26	75	12	J270
	VQMHVRBFD1200R100	12	1	—	26	75	12	J275
NEW	VQN6MVRBD1200R100	12	1	—	26	75	12	J277
	VC4JRBD1200R0100	12	1	—	30	90	12	J308
	MPMHVRBD1200R100	12	1	—	30	100	12	J258
	MPMHVRBD1200R100S10	12	1	—	30	110	10	J258
	MS2MRBD1200R150	12	1.5	—	24	75	12	J246
	MS4MRBD1200R150	12	1.5	—	26	75	12	J268
	VQMHVRBD1200R150	12	1.5	—	26	75	12	J270
	VC4JRBD1200R0150	12	1.5	—	30	90	12	J308
	MPMHVRBD1200R150	12	1.5	—	30	100	12	J258
	VFHVRBD120R20N080T09	12	2	28	18	130	16	J297
	VFHVRBD120R20N120T09	12	2	28	18	180	16	J297
	VCPSRBD1200N36R20	12	2	36	12	110	12	J304
NEW	A3SARB120R200N36C	12	2	36	18	80	12	J251
NEW	DLC3SARB120R200N36C	12	2	36	18	80	12	J255
	VFHVRBD1200R20N036	12	2	36	18	80	12	J291
NEW	VFRPSRBD1200R200N360	12	2	36	18	110	12	J285
	VFHVRBD1200R20N060	12	2	60	18	120	12	J291
	VFHVRBD1200R20N084	12	2	84	18	160	12	J291
	VFHVRBD1200R20N108	12	2	108	18	160	12	J291
	MS2MRBD1200R200	12	2	—	24	75	12	J246
	MS4MRBD1200R200	12	2	—	26	75	12	J268
	VQMHVRBD1200R200	12	2	—	26	75	12	J270
	VQMHVRBFD1200R200	12	2	—	26	75	12	J275
	VC4JRBD1200R0200	12	2	—	30	90	12	J308
	MPMHVRBD1200R200	12	2	—	30	100	12	J258

DC = Cutting diameter RE = Corner radius LU = Usable length APMX = Depth of cut maximum LF = Functional length DCON = Usable length

CARBIDE

SELECTION CHART BY BLADE DIAMETER

CARBIDE/RADIUS

Order Number	DC	RE	LU	APMX	LF	DCON	Page
MPMHVRBD1200R200S10	12	2	—	30	110	10	J258
MS2MRBD1200R250	12	2.5	—	24	75	12	J246
MS4MRBD1200R250	12	2.5	—	26	75	12	J268
VQMHVRBD1200R250	12	2.5	—	26	75	12	J270
VCPSRBD1200N24L70R30	12	3	24	12	130	16	J306
VCPSRBD1200N36R30	12	3	36	12	110	12	J304
NEW A3SARB120R300N36C	12	3	36	18	80	12	J251
NEW DLC3SARB120R300N36C	12	3	36	18	80	12	J255
VFHVRBD1200R30N036	12	3	36	18	80	12	J291
NEW VFRPSRBD1200R300N360	12	3	36	18	110	12	J285
VFHVRBD1200R30N060	12	3	60	18	120	12	J291
MS2MRBD1200R300	12	3	—	24	75	12	J246
MS4MRBD1200R300	12	3	—	26	75	12	J268
VQMHVRBD1200R300	12	3	—	26	75	12	J270
VQMHVRBFD1200R300	12	3	—	26	75	12	J275
MPMHVRBD1200R300	12	3	—	30	100	12	J258
MPMHVRBD1200R300S10	12	3	—	30	110	10	J258
C3SARBD1200N0300R320	12	3.2	30	15	75	12	J253
C3SARBD1200N0400R320	12	3.2	40	15	125	12	J253
VCPSRBD1200N36R40	12	4	36	12	110	12	J304
VCPSRBD1200N36R50	12	5	36	12	110	12	J304
VFHVRBD1300R30	13	3	—	19.5	120	12	J291
MPMHVRBD1600R030	16	0.3	—	40	110	16	J258
VFHVRBD1600R05N042	16	0.5	42	24	100	16	J291
MS4MRBD1600R050	16	0.5	—	32	90	16	J268
MPMHVRBD1600R050	16	0.5	—	40	110	16	J258
VC4JRBD1600R0050	16	0.5	—	50	110	16	J308
C3SARBD1600N0450R100	16	1	45	15	125	16	J253
NEW VQT5MVRB160R100N48C	16	1	48	34	120	16	J312
C3SARBD1600N0700R100	16	1	70	15	150	16	J253
VQ6MHVRBCHD1600R100	16	1	—	32	90	16	J314
VFMHVRBCHD1600R100	16	1	—	35	90	16	J288
VFMDRBD1600R100	16	1	—	40	110	16	J320
MS4MRBD1600R100	16	1	—	32	90	16	J268
VF6MHVRBD1600R100	16	1	—	32	90	16	J316
VF8MHVRBCHD1600R100	16	1	—	32	90	16	J322
VQMHVRBD1600R100	16	1	—	35	90	16	J270
VQMHVRBFD1600R100	16	1	—	35	90	16	J275
MPMHVRBD1600R100	16	1	—	40	110	16	J258
VC4JRBD1600R0100	16	1	—	50	110	16	J308
VFMDRBD1600R150	16	1.5	—	40	110	16	J320
MS4MRBD1600R150	16	1.5	—	32	90	16	J268
VQMHVRBD1600R150	16	1.5	—	35	90	16	J270
VC4JRBD1600R0150	16	1.5	—	50	110	16	J308
VFHVRBD1600R20N042	16	2	42	24	100	16	J291
NEW A3SARB160R200N48C	16	2	48	24	90	16	J251
NEW DLC3SARB160R200N48C	16	2	48	24	90	16	J255
MS4MRBD1600R200	16	2	—	32	90	16	J268
VF6MHVRBD1600R200	16	2	—	32	90	16	J316
VQMHVRBD1600R200	16	2	—	35	90	16	J271

Order Number	DC	RE	LU	APMX	LF	DCON	Page
VQMHVRBFD1600R200	16	2	—	35	90	16	J275
MPMHVRBD1600R200	16	2	—	40	110	16	J258
VC4JRBD1600R0200	16	2	—	50	110	16	J308
MS4MRBD1600R250	16	2.5	—	32	90	16	J268
VQMHVRBD1600R250	16	2.5	—	35	90	16	J271
VFHVRBD1600R30N042	16	3	42	24	100	16	J291
NEW A3SARB160R300N48C	16	3	48	24	90	16	J251
NEW DLC3SARB160R300N48C	16	3	48	24	90	16	J255
NEW VQT5MVRB160R300N48C	16	3	48	34	120	16	J312
VFHVRBD1600R30N080	16	3	80	24	140	16	J291
VFHVRBD1600R30N120	16	3	120	24	175	16	J291
VQ6MHVRBCHD1600R300	16	3	—	32	90	16	J314
VFMHVRBCHD1600R300	16	3	—	35	90	16	J288
MS4MRBD1600R300	16	3	—	32	90	16	J268
VF8MHVRBCHD1600R300	16	3	—	32	90	16	J322
VQMHVRBD1600R300	16	3	—	35	90	16	J271
MPMHVRBD1600R300	16	3	—	40	110	16	J258
C3SARBD1600N0450R320	16	3.2	45	15	125	16	J253
C3SARBD1600N0700R320	16	3.2	70	15	150	16	J253
NEW A3SARB160R400N48C	16	4	48	24	90	16	J251
NEW DLC3SARB160R400N48C	16	4	48	24	90	16	J255
NEW VQT5MVRB160R400N48C	16	4	48	34	120	16	J312
VQ6MHVRBCHD1600R400	16	4	—	32	90	16	J314
VQMHVRBD1600R400	16	4	—	35	90	16	J271
VQMHVRBD1600R500	16	5	—	35	90	16	J271
MPMHVRBD1600R500	16	5	—	40	110	16	J258
VFMDRBD1800R100	18	1	—	40	120	16	J320
C3SARBD1800R100	18	1	—	18	150	16	J253
VFMDRBD1800R150	18	1.5	—	40	120	16	J320
C3SARBD1800R320	18	3.2	—	18	150	16	J253
MPMHVRBD2000R030	20	0.3	—	50	125	20	J258
MS4MRBD2000R050	20	0.5	—	38	100	20	J268
MPMHVRBD2000R050	20	0.5	—	50	125	20	J258
VC4JRBD2000R0050	20	0.5	—	55	110	20	J308
C3SARBD2000N0600R100	20	1	60	20	125	20	J253
NEW VQT5MVRB200R100N60C	20	1	60	44	135	20	J312
C3SARBD2000N0850R100	20	1	85	20	150	20	J253
VQ6MHVRBCHD2000R100	20	1	—	38	100	20	J314
VFMHVRBCHD2000R100	20	1	—	45	110	20	J288
VFMDRBD2000R100	20	1	—	45	125	20	J320
MS4MRBD2000R100	20	1	—	38	100	20	J268
VF6MHVRBD2000R100	20	1	—	38	100	20	J316
VF8MHVRBCHD2000R100	20	1	—	38	100	20	J322
VQMHVRBD2000R100	20	1	—	45	110	20	J271
MPMHVRBD2000R100	20	1	—	50	125	20	J258
VC4JRBD2000R0100	20	1	—	55	110	20	J308
VFMDRBD2000R150	20	1.5	—	45	125	20	J320
MS4MRBD2000R150	20	1.5	—	38	100	20	J268
VQMHVRBD2000R150	20	1.5	—	45	110	20	J271
VC4JRBD2000R0150	20	1.5	—	55	110	20	J308

DC = Cutting diameter RE = Corner radius LU = Usable length APMX = Depth of cut maximum LF = Functional length DCON = Usable length

	Order Number	DC	RE	LU	APMX	LF	DCON	Page
NEW	A3SARB200R200N55C	20	2	55	30	100	20	J251
NEW	DLC3SARB200R200N55C	20	2	55	30	100	20	J255
	VFMDRBD2000R200	20	2	—	45	125	20	J320
	MS4MRBD2000R200	20	2	—	38	100	20	J268
	VF6MHVRBD2000R200	20	2	—	38	100	20	J316
	VQMHVRBD2000R200	20	2	—	45	110	20	J271
	MPMHVRBD2000R200	20	2	—	50	125	20	J258
	VC4JRBD2000R0200	20	2	—	55	110	20	J308
	MS4MRBD2000R250	20	2.5	—	38	100	20	J268
	VQMHVRBD2000R250	20	2.5	—	45	110	20	J271
NEW	A3SARB200R300N55C	20	3	55	30	100	20	J251
NEW	DLC3SARB200R300N55C	20	3	55	30	100	20	J255
NEW	VQT5MVRB200R300N60C	20	3	60	44	135	20	J312
	VQ6MHVRBCHD2000R300	20	3	—	38	100	20	J314
	VFMHVRBCHD2000R300	20	3	—	45	110	20	J288
	MS4MRBD2000R300	20	3	—	38	100	20	J268
	VF8MHVRBCHD2000R300	20	3	—	38	100	20	J322
	VQMHVRBD2000R300	20	3	—	45	110	20	J271
	MPMHVRBD2000R300	20	3	—	50	125	20	J258
	C3SARBD2000N0600R320	20	3.2	60	20	125	20	J253
	C3SARBD2000N0850R320	20	3.2	85	20	150	20	J253
NEW	A3SARB200R400N55C	20	4	55	30	100	20	J251
NEW	DLC3SARB200R400N55C	20	4	55	30	100	20	J255
	C3SARBD2000N0600R400	20	4	60	20	125	20	J253
NEW	VQT5MVRB200R400N60C	20	4	60	44	135	20	J312
	C3SARBD2000N0850R400	20	4	85	20	150	20	J253
	VQ6MHVRBCHD2000R400	20	4	—	38	100	20	J314
	VQMHVRBD2000R400	20	4	—	45	110	20	J271
	VQMHVRBD2000R500	20	5	—	45	110	20	J271
	MPMHVRBD2000R500	20	5	—	50	125	20	J258
NEW	VQT5MVRB200R600N60C	20	6	60	44	135	20	J312
	VQMHVRBD2000R635	20	6.35	—	45	110	20	J271
NEW	VQT5MVRB250R100N75C	25	1	75	54	155	25	J312
NEW	A3SARB250R200N55C	25	2	55	37.5	100	25	J251
NEW	DLC3SARB250R200N55C	25	2	55	37.5	100	25	J255
NEW	A3SARB250R300N55C	25	3	55	37.5	100	25	J251
NEW	DLC3SARB250R300N55C	25	3	55	37.5	100	25	J255
NEW	VQT5MVRB250R300N75C	25	3	75	54	155	25	J312
	C3SARBD2500N0650R320	25	3.2	65	20	125	25	J253
	C3SARBD2500N0900R320	25	3.2	90	20	150	25	J253
NEW	A3SARB250R400N55C	25	4	55	37.5	100	25	J251
NEW	DLC3SARB250R400N55C	25	4	55	37.5	100	25	J255
	C3SARBD2500N0650R400	25	4	65	20	125	25	J253
NEW	VQT5MVRB250R400N75C	25	4	75	54	155	25	J312
	C3SARBD2500N0900R400	25	4	90	20	150	25	J253
NEW	A3SARB250R500N55C	25	5	55	37.5	100	25	J251
NEW	DLC3SARB250R500N55C	25	5	55	37.5	100	25	J255
	C3SARBD2500N0650R500	25	5	65	20	125	25	J253
	C3SARBD2500N0900R500	25	5	90	20	150	25	J253
NEW	VQT5MVRB250R600N75C	25	6	75	54	155	25	J312

DC = Cutting diameter RE = Corner radius LU = Usable length APMX = Depth of cut maximum LF = Functional length DCON = Usable length

SELECTION CHART BY BLADE DIAMETER

CARBIDE/OTHER

Duplex Corner Radius End Mill

	Order Number	DC	RE1	LU	APMX	LF	DCON	Page
NEW	VQFDRBD0300N080	3	0.64	8	0.18	50	6	J281
	VFFDRBD0300	3	0.64	10	0.18	60	6	J300
NEW	VQFDRBD0300N120	3	0.64	12	0.18	55	6	J281
NEW	VQFDRBD0400N120	4	0.71	12	0.25	55	6	J281
	VFFDRBD0400	4	0.71	12	0.25	60	6	J300
NEW	VQFDRBD0400N160	4	0.71	16	0.25	60	6	J281
NEW	VQFDRBD0600N180	6	0.92	18	0.36	60	6	J281
	VFFDRBD0600	6	0.92	18	0.36	80	6	J300
	VFFDRBD0800	8	1.16	24	0.44	90	8	J300
	VFFDRBD1000	10	1.47	30	0.57	100	10	J300
	VFFDRBD1200	12	1.77	36	0.7	110	12	J300

DC = Cutting diameter RE1 = Approx. R LU = Usable length
APMX = Depth of cut maximum LF = Functional length
DCON = Connection diameter

Chamfer End Mill

Order Number	DC	DCN	LU	APMX	LF	DCON	Page
VC2CD0200	2	0.3	6	0.85	50	6	J348
VC2CD0400	4	0.3	12	1.85	50	6	J348
VC2CD0600	6	0.3	—	2.85	50	6	J348
VC2CD0800	8	0.4	—	3.8	60	8	J348
VC2CD1000	10	0.5	—	4.75	70	10	J348
VC2CD1200	12	0.5	—	5.75	75	12	J348

DC = Cutting diameter DCN = Cutting diameter minimum
LU = Usable length APMX = Depth of cut maximum LF = Functional length
DCON = Connection diameter

Barrel End Mill

Order Number	DC	RE1	RE2	APMX	LF	DCON	Page
VQT6URR020R075S08	8	2	75	21	90	8	J333
VQT6URR020R085S10	10	2	85	26	100	10	J333
VQT6URR030R075S10	10	3	75	22	100	10	J333
VQT6URR040R100S12	12	4	100	25	110	12	J333

DC = Cutting diameter RE1 = Nose radius RE2 = Tangential form radius
LU = Usable length APMX = Depth of cut maximum LF = Functional length
DCON = Connection diameter

CERAMICS/CBN

Ceramic End Mill

Order Number	DC	RE	LU	APMX	LF	DCON	Page
CE4SRBD0600R050	6	0.5	12	4.5	50	6	J310
CE6SRBD0600R050	6	0.5	12	4.5	50	6	J310
CE4SRBD0800R100	8	1	16	6	60	8	J310
CE6SRBD0800R100	8	1	16	6	60	8	J310
CE4SRBD1000R100	10	1	20	7.5	65	10	J310
CE6SRBD1000R100	10	1	20	7.5	65	10	J310
CE4SRBD1200R150	12	1.5	24	9	70	12	J310
CE6SRBD1200R150	12	1.5	24	9	70	12	J310

CBN End Mill

Order Number	Grade	DC	LU	APMX	LF	DCON	Page
GBE06S0640	MB730	6	8	3.5	40	6	J349
GBE08S0845	MB730	8	13	6	45	8	J349
GBE10S1050	MB730	10	13	6	50	10	J349
GBE12S1255	MB730	12	13	6	55	12	J349

DC = Cutting diameter RE = Corner radius LU = Usable length APMX = Depth of cut maximum LF = Functional length DCON = Usable length

HSS/SQUARE

Order Number	DC	APMX	LF	DCON	Page
2SSD0050	0.5	0.8	50	6	J356
2SSD0100	1	2	50	6	J356
2MSD0100	1	3	50	6	J358
2LSD0100	1	6	50	6	J360
2SSD0150	1.5	3.5	50	6	J356
2MSD0150	1.5	4.5	50	6	J358
2LSD0150	1.5	7.5	50	6	J360
2SSD0200	2	5	50	6	J356
2MSD0200	2	6	50	6	J358
2LSD0200	2	10	55	6	J360
2SSD0250	2.5	6	50	6	J356
2MSD0250	2.5	7.5	50	6	J358
4MCD0250	2.5	10	50	6	J366
2LSD0250	2.5	15	55	6	J360
2MKND0300	3	5	50	6	J362
2MKNND0300	3	5	50	6	J362
2MKPD0300	3	5	50	6	J362
2SSD0300	3	8	50	6	J356
S2SDAD0300	3	8	50	6	J363
VA2SSD0300	3	8	50	6	J352
2MSD0300	3	10	50	6	J358
4MCD0300	3	10	50	6	J366
VA2MSD0300	3	10	50	6	J354
VA4MCD0300	3	10	50	6	J364
1MAD0300	3	10	60	8	J350
2LSD0300	3	15	55	6	J360
4LCD0300	3	15	55	6	J368
2SSD0350	3.5	8	60	8	J356
2MSD0350	3.5	12	50	6	J358
2LSD0350	3.5	15	55	6	J360
2MKND0400	4	6	60	8	J362
2MKNND0400	4	6	60	8	J362
2MKPD0400	4	6	60	8	J362
2SSD0400	4	8	60	8	J356
S2SDAD0400	4	8	60	8	J363
VA2SSD0400	4	8	60	8	J352
2MSD0400	4	12	50	6	J358
1MAD0400	4	12	60	8	J350
4MCD0400	4	12	60	8	J366
VA2MSD0400	4	12	60	8	J354
VA4MCD0400	4	12	60	8	J364
1LAD0400	4	18	70	8	J351
2LSD0400	4	20	55	6	J360
4LCD0400	4	20	55	8	J368
2SSD0450	4.5	10	60	8	J356
2MSD0450	4.5	15	55	6	J358
4MCD0450	4.5	15	60	8	J366
2LSD0450	4.5	20	55	6	J360
2MKND0500	5	8	60	8	J362
2MKNND0500	5	8	60	8	J362

Order Number	DC	APMX	LF	DCON	Page
2MKPD0500	5	8	60	8	J362
2SSD0500	5	10	60	8	J356
S2SDAD0500	5	10	60	8	J363
VA2SSD0500	5	10	60	8	J352
VASFPRD0500	5	10	80	6	J370
2MSD0500	5	15	55	6	J358
MRD0500	5	15	60	6	J376
VAMRD0500	5	15	60	6	J374
4MCD0500	5	15	60	8	J366
VA2MSD0500	5	15	60	8	J354
VA4MCD0500	5	15	60	8	J364
1MAD0500	5	15	65	8	J350
VAMFPRD0500	5	15	80	6	J372
1LAD0500	5	20	70	8	J351
2LSD0500	5	25	60	6	J360
4LCD0500	5	25	60	8	J368
2SSD0550	5.5	12	60	8	J356
2MSD0550	5.5	15	55	6	J358
2LSD0550	5.5	25	60	6	J360
2MKND0600	6	8	60	8	J362
2MKNND0600	6	8	60	8	J362
2MKPD0600	6	8	60	8	J362
2SSD0600	6	12	60	8	J356
S2SDAD0600	6	12	60	8	J363
VA2SSD0600	6	12	60	8	J352
VASFPRD0600	6	12	80	6	J370
2MSD0600	6	15	55	6	J358
MRD0600	6	15	60	6	J376
VAMRD0600	6	15	60	6	J374
4MCD0600	6	15	60	8	J366
VA2MSD0600	6	15	60	8	J354
VA4MCD0600	6	15	60	8	J364
1MAD0600	6	15	65	8	J350
VAMFPRD0600	6	17	80	6	J372
1LAD0600	6	20	70	8	J351
2LSD0600	6	25	60	6	J360
4LCD0600	6	25	60	8	J368
2SSD0650	6.5	15	65	10	J356
2MSD0650	6.5	20	65	8	J358
4MCD0650	6.5	20	65	10	J366
2MKND0700	7	10	65	10	J362
2MKNND0700	7	10	65	10	J362
2MKPD0700	7	10	65	10	J362
2SSD0700	7	15	65	10	J356
VA2SSD0700	7	15	65	10	J352
VASFPRD0700	7	17	80	8	J370
2MSD0700	7	20	65	8	J358
4MCD0700	7	20	65	10	J366
VA2MSD0700	7	20	65	10	J354
VA4MCD0700	7	20	65	10	J364

DC = Cutting diameter APMX = Depth of cut maximum LF = Functional length DCON = Connection diameter

HSS

SELECTION CHART BY BLADE DIAMETER

HSS/SQUARE

Order Number	DC	APMX	LF	DCON	Page
MRD0700	7	20	70	8	J376
VAMRD0700	7	20	70	8	J374
VAMFPRD0700	7	22	80	8	J372
2LSD0700	7	35	75	8	J360
4LCD0700	7	35	75	10	J368
2SSD0750	7.5	15	65	10	J356
2MSD0750	7.5	20	65	8	J358
2MKND0800	8	10	65	10	J362
2MKNND0800	8	10	65	10	J362
2MKPD0800	8	10	65	10	J362
2SSD0800	8	15	65	10	J356
S2SDAD0800	8	15	65	10	J363
VA2SSD0800	8	15	65	10	J352
VASFPRD0800	8	17	85	8	J370
2MSD0800	8	20	65	8	J358
4MCD0800	8	20	65	10	J366
VA2MSD0800	8	20	65	10	J354
VA4MCD0800	8	20	65	10	J364
MRD0800	8	20	70	8	J376
VAMRD0800	8	20	70	8	J374
1MAD0800	8	20	75	8	J350
VAMFPRD0800	8	28	85	8	J372
1LAD0800	8	30	80	8	J351
2LSD0800	8	35	75	8	J360
4LCD0800	8	35	75	10	J368
2SSD0850	8.5	20	75	10	J356
2MSD0850	8.5	25	75	10	J358
2SSD0900	9	20	75	10	J356
VA2SSD0900	9	20	75	10	J352
VASFPRD0900	9	22	100	10	J370
2MSD0900	9	25	75	10	J358
4MCD0900	9	25	75	10	J366
VA2MSD0900	9	25	75	10	J354
VA4MCD0900	9	25	75	10	J364
MRD0900	9	25	80	10	J376
VAMRD0900	9	25	80	10	J374
VAMFPRD0900	9	28	95	10	J372
2LSD0900	9	45	90	10	J360
2SSD0950S10	9.5	20	75	10	J356
2MSD0950	9.5	25	75	10	J358
2MKND1000	10	15	75	12	J362
2MKNND1000	10	15	75	12	J362
2MKPD1000	10	15	75	12	J362
2SSD1000S10	10	20	75	10	J356
S2SDAD1000	10	20	75	10	J363
2SSD1000S12	10	20	75	12	J356
VA2SSD1000	10	20	75	12	J352
VASFPRD1000	10	22	100	10	J370
2MSD1000	10	25	75	10	J358
4MCD1000	10	25	75	10	J366

Order Number	DC	APMX	LF	DCON	Page
VA2MSD1000	10	25	75	10	J354
VA4MCD1000	10	25	75	10	J364
MRD1000	10	25	80	10	J376
VAMRD1000	10	25	80	10	J374
VAMFPRD1000	10	34	100	10	J372
1LAD1000	10	35	90	10	J351
2LSD1000	10	45	90	10	J360
4LCD1000	10	45	90	10	J368
2SSD1100	11	22	85	12	J356
VA2SSD1100	11	22	85	12	J352
2MSD1100	11	30	85	12	J358
4MCD1100	11	30	85	12	J366
VA2MSD1100	11	30	85	12	J354
VA4MCD1100	11	30	85	12	J364
MRD1100	11	30	110	12	J376
VAMRD1100	11	30	110	12	J374
2LSD1100	11	55	105	12	J360
2MKND1200	12	18	75	12	J362
2MKNND1200	12	18	75	12	J362
2MKPD1200	12	18	75	12	J362
2SSD1200	12	22	85	12	J356
VA2SSD1200	12	22	85	12	J352
VASFPRD1200	12	27	110	12	J370
2MSD1200	12	30	85	12	J358
4MCD1200	12	30	85	12	J366
VA2MSD1200	12	30	85	12	J354
VA4MCD1200	12	30	85	12	J364
MRD1200	12	30	110	12	J376
VAMRD1200	12	30	110	12	J374
VAMFPRD1200	12	40	110	12	J372
1LAD1200	12	45	100	12	J351
2LSD1200	12	55	105	12	J360
4LCD1200	12	55	105	12	J368
2SSD1300	13	26	90	12	J356
2MSD1300	13	35	90	12	J358
4MCD1300	13	35	90	12	J366
VA2MSD1300	13	35	90	12	J354
VA4MCD1300	13	35	90	12	J364
MRD1300	13	35	115	12	J376
VAMRD1300	13	35	115	12	J374
2LSD1300	13	55	105	12	J360
2SSD1400	14	26	90	16	J356
VA2SSD1400	14	26	95	16	J352
VASFPRD1400	14	27	110	12	J370
2MSD1400	14	35	95	16	J358
4MCD1400	14	35	95	16	J366
VA2MSD1400	14	35	95	16	J354
VA4MCD1400	14	35	95	16	J364
MRD1400	14	35	135	16	J376
VAMRD1400	14	35	135	16	J374

DC = Cutting diameter APMX = Depth of cut maximum LF = Functional length DCON = Connection diameter

Order Number	DC	APMX	LF	DCON	Page
VAMFPRD1400	14	40	110	12	J372
2LSD1400	14	55	110	16	J360
VASFPRD1500	15	27	125	16	J370
2SSD1500	15	30	100	16	J356
2MSD1500	15	40	100	16	J358
4MCD1500	15	40	100	16	J366
VA2MSD1500	15	40	100	16	J354
VA4MCD1500	15	40	100	16	J364
VAMFPRD1500	15	40	120	16	J372
MRD1500	15	40	140	16	J376
VAMRD1500	15	40	140	16	J374
2LSD1500	15	65	120	16	J360
2SSD1600	16	32	100	16	J356
VA2SSD1600	16	32	100	16	J352
VASFPRD1600	16	33	125	16	J370
2MSD1600	16	40	100	16	J358
4MCD1600	16	40	100	16	J366
VA2MSD1600	16	40	100	16	J354
VA4MCD1600	16	40	100	16	J364
MRD1600	16	40	140	16	J376
VAMRD1600	16	40	140	16	J374
VAMFPRD1600	16	48	125	16	J372
2LSD1600	16	65	120	16	J360
4LCD1600	16	65	120	16	J368
2MSD1700	17	40	100	16	J358
VA2MSD1700	17	40	100	16	J354
VA4MCD1700	17	40	100	16	J364
VAMRD1700	17	40	140	16	J374
VASFPRD1800	18	33	125	16	J370
2MSD1800	18	40	100	16	J358
4MCD1800	18	40	100	16	J366
VA2MSD1800	18	40	100	16	J354
VA4MCD1800	18	40	100	16	J364
MRD1800	18	40	140	16	J376
VAMRD1800	18	40	140	16	J374
VAMFPRD1800	18	48	125	16	J372
2LSD1800	18	65	120	16	J360
2MSD1900	19	45	115	20	J358
VAMRD1900	19	45	145	20	J374
2SSD2000	20	38	115	20	J356
VA2SSD2000	20	38	120	20	J352
VASFPRD2000	20	38	145	20	J370
2MSD2000	20	45	115	20	J358
4MCD2000	20	45	115	20	J366
VA4MCD2000	20	45	115	20	J364
VA2MSD2000	20	45	120	20	J354
MRD2000	20	45	145	20	J376
VAMRD2000	20	45	145	20	J374
VAMFPRD2000	20	57	145	20	J372
2LSD2000	20	75	140	20	J360

Order Number	DC	APMX	LF	DCON	Page
4LCD2000	20	75	140	20	J368
2MSD2100	21	45	115	20	J358
VASFPRD2200	22	38	145	20	J370
2MSD2200	22	45	115	20	J358
4MCD2200	22	45	115	20	J366
VA4MCD2200	22	45	115	20	J364
VA2MSD2200	22	45	120	20	J354
MRD2200	22	45	145	20	J376
VAMRD2200	22	45	145	20	J374
VAMFPRD2200	22	57	145	20	J372
2MSD2300	23	50	120	25	J358
2MSD2400	24	50	120	25	J358
VASFPRD2500	25	43	150	25	J370
2MSD2500	25	50	120	25	J358
4MCD2500	25	50	120	25	J366
VA4MCD2500	25	50	120	25	J364
MRD2500	25	50	150	25	J376
VAMRD2500	25	50	150	25	J374
VAMFPRD2500	25	68	150	25	J372
4LCD2500	25	90	160	25	J368
2MSD2600	26	50	120	25	J359
4LCD2600	26	90	160	25	J368
2MSD2800	28	55	125	25	J359
VASFPRD3000	30	48	165	25	J370
2MSD3000	30	55	125	25	J359
4MCD3000	30	55	125	25	J366
MRD3000S25	30	55	165	25	J376
VAMRD3000	30	55	165	25	J374
MRD3000S32	30	55	165	32	J376
VAMFPRD3000	30	68	165	25	J372
4LCD3000	30	90	160	25	J368
2MSD3200	32	60	145	32	J359
VAMRD3200	32	60	175	32	J374

DC = Cutting diameter APMX = Depth of cut maximum LF = Functional length DCON = Connection diameter

CARBIDE

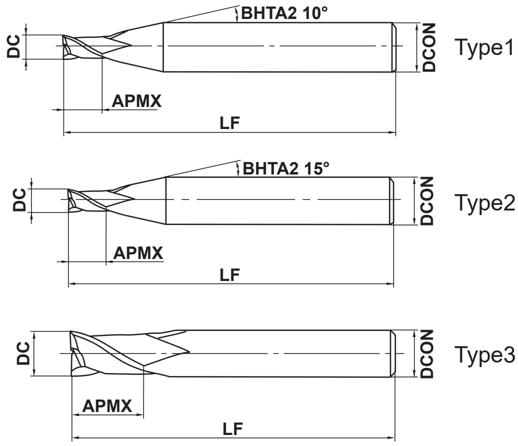
MS2SS

End mill, Short cut length, 2 flute

30°

DC<3 DC≥3

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	○		○	○	○	



	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		

●2 flute end mill for general use.

(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

● : Inventory maintained in Japan.

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ISO13399 ➤J002

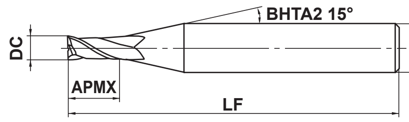
MS2MS

End mill, Medium cut length, 2 flute

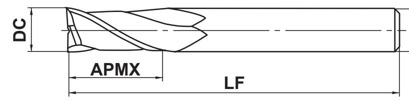
30°

DC<3 DC≥3

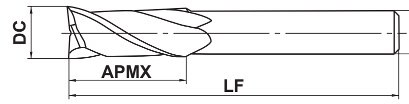
Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	○		○	○	○	



Type1



Type2



Type3

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	

●2 flute end mill for general use.

(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
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

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CARBIDE

MS2MS

End mill, Medium cut length, 2 flute

(mm)

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
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

● : Inventory maintained in Japan.

ISO13399 ➤ J002

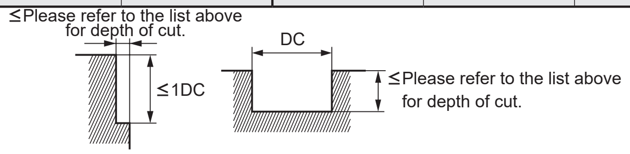
MS2SS
End mill, Short cut length, 2 flute

MS2MS
End mill, Medium cut length, 2 flute

RECOMMENDED CUTTING CONDITIONS

Workpiece 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 (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (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

Depth of cut



DC:Dia.

Note 1) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 2) When slotting with end mills with ϕ3 or larger, reduce the revolution to 50−70% and the feed rate to 40−60%.
Note 3) When drilling, please set the feed rate at 1/3 or below the values above.
Note 4) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

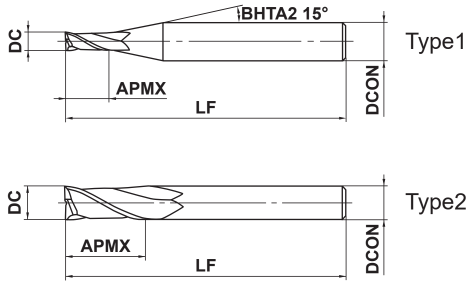
CARBIDE

MS2MD

End mill, Medium cut length, 2 flute

UWC MS 30° DC<3 DC≥3

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	○		○	○		



1≤DC≤12				
0 - 0.020				
4≤DCON≤6	**8≤DCON≤10**	**DCON=12**		
0 - 0.008	0 - 0.009	0 - 0.011		

●Strong edge type, 2 flute end mill with high resistance to corner fracturing.

(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

● : Inventory maintained in Japan.

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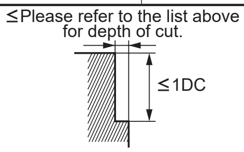
SQUARE BALL RADIUS TAPER BARREL ROUGHING CHAMFER J SOLID END MILLS

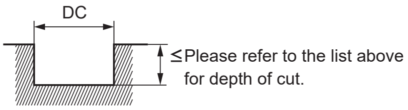
ISO13399 ➤J002

RECOMMENDED CUTTING CONDITIONS

Workpiece 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 (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (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

Depth of cut





DC:Dia.

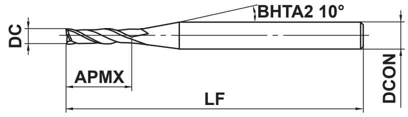
Note 1) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 2) When drilling, please set the feed rate at 1/3 or below the values above.
Note 3) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

MS2JS

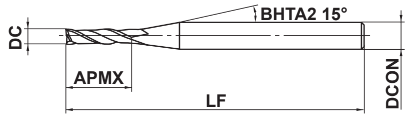
End mill, Semi long cut length, 2 flute

UWC MS 30° DC<3 DC≥3 DC<3 DC≥3

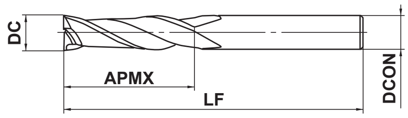
Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	○		○	○	○	



Type1



Type2



Type3

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		

h6

●2 flute end mill for general use.

(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

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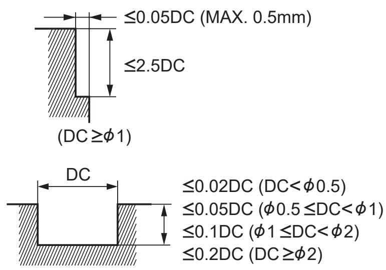
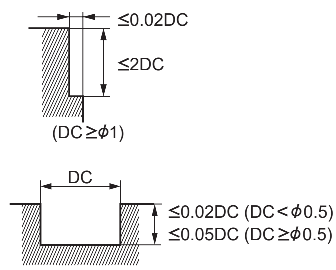
ISO13399 ➤ J002

RECOMMENDED CUTTING CONDITIONS

Workpiece 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)

Depth of cut





( ): Indicates standard revolution and feed rate for slotting.

DC:Dia.

Note 1) When cutting austenitic stainless steels, the use of water-soluble cutting fluid is effective.
Note 2) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 3) When drilling, please set the feed rate at 1/3 or below the values above.
Note 4) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

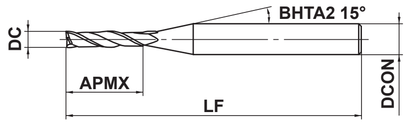
CARBIDE

MS2LS

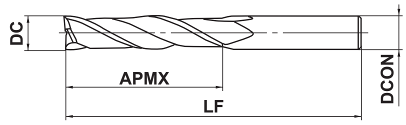
End mill, Long cut length, 2 flute

30° DC<3 DC≥3 DC<3 DC≥3

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	○		○	○	○	



Type1



Type2

0.2≤DC≤12				
0 - 0.020				
4≤DCON≤6	**8≤DCON≤10**	**DCON=12**		
0 - 0.008	0 - 0.009	0 - 0.011		

h6

●2 flute end mill for general use.

(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

● : Inventory maintained in Japan.

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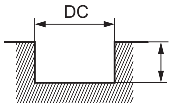
ISO13399 ➢ J002

RECOMMENDED CUTTING CONDITIONS

■Slotting

Workpiece 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 (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (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

Depth of cut



≤Please refer to the list above for depth of cut.

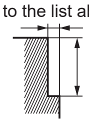
DC:Dia.

■Side milling

Workpiece 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 (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (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

Depth of cut

≤Please refer to the list above for depth of cut.



DC:Dia.

Note 1) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 2) When drilling, please set the feed rate at 1/3 or below the values above.
Note 3) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

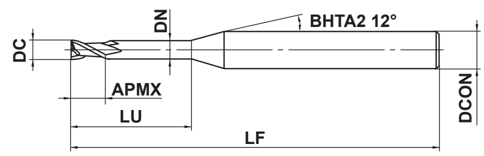
MS2XL

End mill, Short cut length, 2 flute, Long neck

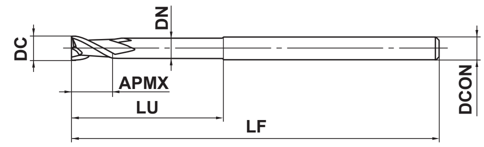
30°

DC<0.4 DC≥0.4

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	○		○	○	○	



Type1



Type2

DC<0.5	DC≥0.5
0 - 0.010	0 - 0.020

h6
4≤DCON≤6
0 - 0.008

● 2 flute long neck end mill.

(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
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

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ISO13399 ➤ J002

(mm)

Order Number	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	Type
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
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

CARBIDE

MS2XL

End mill, Short cut length, 2 flute, Long neck

(mm)

Order Number	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	Type
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

● : Inventory maintained in Japan.

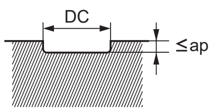
SQUARE BALL RADIUS TAPER BARREL ROUGHING CHAMFER J SOLID END MILLS

ISO13399 ➤J002

RECOMMENDED CUTTING CONDITIONS

Workpiece 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

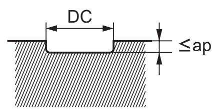
Depth of cut



DC:Dia.

Workpiece 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)
1.5	**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
	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

Depth of cut



DC:Dia.

Note 1) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 2) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

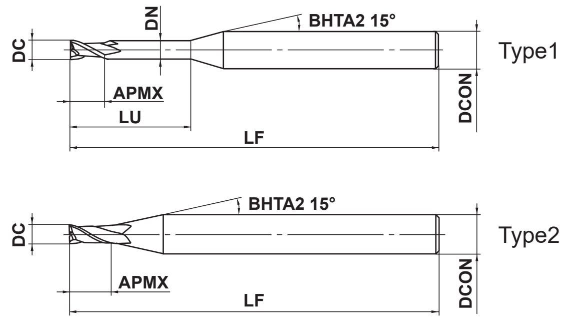
CARBIDE

MS2XL6

End mill, Short cut length, 2 flute, 6mm shank

UWC MS 30°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	○		○	○	○	



0.3≤DC≤2.5			
0 - 0.020			
DCON=6			
0 - 0.008			

h6

●2 flute long neck end mill.

●ϕ6 shank type.

(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
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

● : Inventory maintained in Japan.

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SQUARE BALL RADIUS TAPER BARREL ROUGHING CHAMFER J SOLID END MILLS

ISO13399 ➤ J002

(mm)

Order Number	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	Type
MS2XL6D0200N050	2	3	5	1.90	50	6	2	●	1
MS2XL6D0200N100	2	3	10	1.90	50	6	2	●	1
MS2XL6D0210N053	2.1	3.2	5.3	2.00	50	6	2	●	1
MS2XL6D0210N105	2.1	3.2	10.5	2.00	60	6	2	●	1
MS2XL6D0220N055	2.2	3.3	5.5	2.10	50	6	2	●	1
MS2XL6D0220N110	2.2	3.3	11	2.10	60	6	2	●	1
MS2XL6D0230N058	2.3	3.5	5.8	2.20	50	6	2	●	1
MS2XL6D0230N115	2.3	3.5	11.5	2.20	60	6	2	●	1
MS2XL6D0240N060	2.4	3.6	6	2.30	50	6	2	●	1
MS2XL6D0240N120	2.4	3.6	12	2.30	60	6	2	●	1
MS2XL6D0250N063	2.5	3.8	6.3	2.40	50	6	2	●	1
MS2XL6D0250N125	2.5	3.8	12.5	2.40	60	6	2	●	1

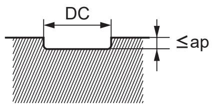
MS2XL6

End mill, Short cut length, 2 flute, 6mm shank

RECOMMENDED CUTTING CONDITIONS

Workpiece 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

Depth of cut

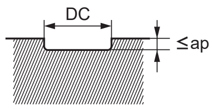


DC:Dia.

Note 1) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 2) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

Workpiece 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)
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

Depth of cut



DC:Dia.

Note 1) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 2) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

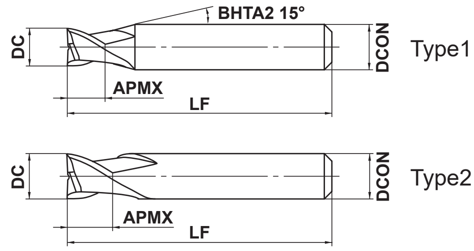
CARBIDE

MP2ES NEW

End mill, For small automatic lathes, 2 flute

UWC MS+ 30° DC<6 DC≥6

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	○		○	○	○	



3≤DC≤10				
- 0.010 - 0.030				
4≤DCON≤6	7≤DCON≤10			
0 - 0.008	0 - 0.009			

●2 flute end mill.

(mm)

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
MP2ESD0300S04	3	4.5	50	4	2	●	1
MP2ESD0400S04	4	6	50	4	2	●	2
MP2ESD0500S06	5	7.5	50	6	2	●	1
MP2ESD0600S06	6	9	50	6	2	●	2
MP2ESD0700S07	7	10.5	50	7	2	●	2
MP2ESD0800S08	8	12	50	8	2	●	2
MP2ESD1000S10	10	15	50	10	2	●	2

● : Inventory maintained in Japan.

SQUARE BALL RADIUS TAPER BARREL ROUGHING CHAMFER J SOLID END MILLS

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ISO13399

➤ J002

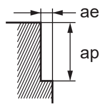
RECOMMENDED CUTTING CONDITIONS

■Side Milling

(mm)

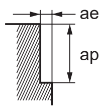
Workpiece Material	Carbon steel, Cast iron, Alloy steel (−30HRC) AISI 1050, AISI No 35 B, AISI P20				Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21				Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V			
Dia. **DC**	Revolution (min^{-1})	Feed rate (mm/min)	Depth of Cut **ap**	Width of Cut **ae**	Revolution (min^{-1})	Feed rate (mm/min)	Depth of Cut **ap**	Width of Cut **ae**	Revolution (min^{-1})	Feed rate (mm/min)	Depth of Cut **ap**	Width of Cut **ae**
3	10000	600	3	0.6	7000	400	3	0.6	6000	300	3	0.6
4	7500	600	4	0.6	5200	400	4	0.6	4500	300	4	0.6
5	6000	600	5	0.6	4200	400	5	0.6	3600	300	5	0.6
6	5000	600	6	0.6	3500	400	6	0.6	3000	300	6	0.6
7	4500	560	7	0.6	3200	360	7	0.6	2700	280	7	0.6
8	4000	520	8	0.6	2800	350	8	0.6	2400	260	8	0.6
10	3200	450	10	0.6	2200	300	10	0.6	1900	230	10	0.6

Depth of cut



Workpiece Material	Hardened steel (45−55HRC) AISI H13				Copper, Copper Alloy			
Dia. **DC**	Revolution (min^{-1})	Feed rate (mm/min)	Depth of Cut **ap**	Width of Cut **ae**	Revolution (min^{-1})	Feed rate (mm/min)	Depth of Cut **ap**	Width of Cut **ae**
3	5000	120	3	0.2	13000	780	3	0.6
4	4000	120	4	0.2	9500	760	4	0.6
5	3200	120	5	0.2	7600	760	5	0.6
6	2700	120	6	0.2	6400	770	6	0.6
7	2300	110	7	0.2	5500	680	7	0.6
8	2000	110	8	0.2	4800	620	8	0.6
10	1600	100	10	0.2	3800	530	10	0.6

Depth of cut



Note 1) When cutting austenitic stainless steels, the use of water-soluble cutting fluid is effective.
Note 2) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 3) When drilling, please set the feed rate at 1/3 or below the values above.
Note 4) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

MP2ES

End mill, For small automatic lathes, 2 flute

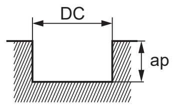
RECOMMENDED CUTTING CONDITIONS

■Slotting

(mm)

Workpiece 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**	Revolution (min^{-1})	Feed rate (mm/min)	Depth of Cut **ap**	Revolution (min^{-1})	Feed rate (mm/min)	Depth of Cut **ap**	Revolution (min^{-1})	Feed rate (mm/min)	Depth of Cut **ap**
3	10000	600	0.6	7000	400	0.6	6000	300	0.6
4	7500	600	0.6	5200	400	0.6	4500	300	0.6
5	6000	600	0.6	4200	400	0.6	3600	300	0.6
6	5000	600	0.6	3500	400	0.6	3000	300	0.6
7	4500	560	0.6	3200	360	0.6	2700	280	0.6
8	4000	520	0.6	2800	350	0.6	2400	260	0.6
10	3200	450	0.6	2200	300	0.6	1900	230	0.6

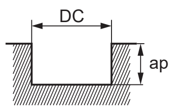
Depth of cut



DC:Dia.

Workpiece Material	Hardened steel (45−55HRC) AISI H13			Copper, Copper Alloy		
Dia. **DC**	Revolution (min^{-1})	Feed rate (mm/min)	Depth of Cut **ap**	Revolution (min^{-1})	Feed rate (mm/min)	Depth of Cut **ap**
3	5000	120	0.2	13000	780	0.6
4	4000	120	0.2	9500	760	0.6
5	3200	120	0.2	7600	760	0.6
6	2700	120	0.2	6400	770	0.6
7	2300	110	0.2	5500	680	0.6
8	2000	110	0.2	4800	620	0.6
10	1600	100	0.2	3800	530	0.6

Depth of cut



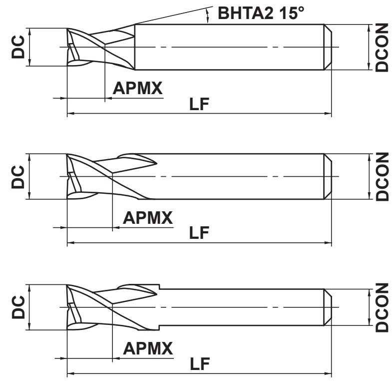
DC:Dia.

Note 1) When cutting austenitic stainless steels, the use of water-soluble cutting fluid is effective.
Note 2) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 3) When drilling, please set the feed rate at 1/3 or below the values above.
Note 4) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

MS2ES

End mill, 2 flute, For small automatic lathes

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	○		○	○	○	



Type1
Type2
Type3

3≤DC≤12	
0 - 0.020	
4≤DCON≤6	7≤DCON≤10
0 - 0.008	0 - 0.009

●2 flute end mill.

Overall length 35mm (mm)

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
MS2ESD0300L35S04	3	3	35	4	2	●	1
MS2ESD0350L35S04	3.5	3.5	35	4	2	●	1
MS2ESD0400L35S04	4	4	35	4	2	●	2
MS2ESD0500L35S05	5	5	35	5	2	●	2
MS2ESD0500L35S06	5	5	35	6	2	●	1
MS2ESD0600L35S05	6	6	35	5	2	●	3
MS2ESD0600L35S06	6	6	35	6	2	●	2
MS2ESD0700L35S07	7	6	35	7	2	●	2
MS2ESD0800L35S07	8	6	35	7	2	●	3
MS2ESD0800L35S08	8	6	35	8	2	●	2
MS2ESD1000L35S07	10	6	35	7	2	●	3
MS2ESD1000L35S10	10	6	35	10	2	●	2
MS2ESD1200L35S10	12	6	35	10	2	●	3

Overall length 45mm (mm)

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
MS2ESD0300L45S04	3	3	45	4	2	●	1
MS2ESD0350L45S04	3.5	3.5	45	4	2	●	1
MS2ESD0400L45S04	4	4	45	4	2	●	2
MS2ESD0500L45S06	5	5	45	6	2	●	1
MS2ESD0600L45S06	6	6	45	6	2	●	2
MS2ESD0700L45S07	7	7	45	7	2	●	2
MS2ESD0800L45S07	8	8	45	7	2	●	3
MS2ESD0800L45S08	8	8	45	8	2	●	2
MS2ESD1000L45S07	10	10	45	7	2	●	3
MS2ESD1000L45S10	10	10	45	10	2	●	2
MS2ESD1200L45S10	12	12	45	10	2	●	3

●: Inventory maintained in Japan.

SQUARE
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BARREL
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CHAMFER
J
SOLID END MILLS

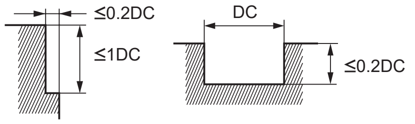
MS2ES

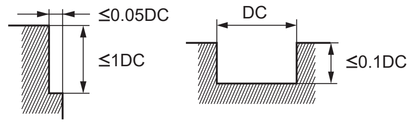
End mill, 2 flute, For small automatic lathes

RECOMMENDED CUTTING CONDITIONS

Workpiece 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

Depth of cut





DC:Dia.

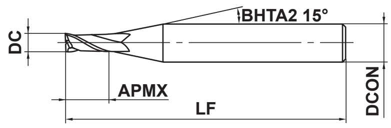
Note 1) When cutting austenitic stainless steels, the use of water-soluble cutting fluid is effective.
Note 2) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 3) When drilling, please set the feed rate at 1/3 or below the values above.
Note 4) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

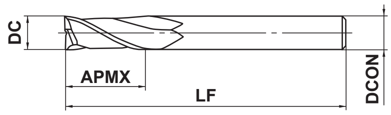
VF2MD

End mill, Medium cut length, 2 flute, For hardened materials

DC<3 DC≥3

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
	○	◎	◎				





0.5≤DC≤6			
0 / - 0.020			
4≤DCON≤6			
0 / - 0.008			

●2 flute end mill suitable for high-speed machining of hardened steel.

(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

● : Inventory maintained in Japan.

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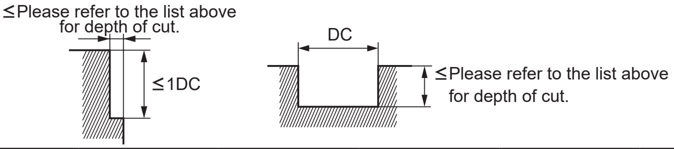
VF2MD

End mill, Medium cut length, 2 flute, For hardened materials

RECOMMENDED CUTTING CONDITIONS

Workpiece 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 (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (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

Depth of cut



DC:Dia.

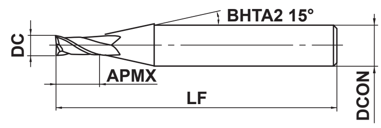
Note 1) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 2) When drilling, please set the feed rate at 1/3 or below the values above.
Note 3) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

VF2MV

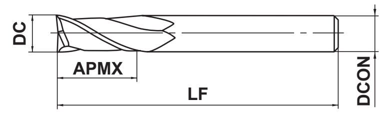
End mill, Medium cut length, 2 flute, Irregular helix flutes

32.5°
37.5°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
	○	◎	◎				



Type1



Type2

0.5≤DC≤6			
0 - 0.020			
4≤DCON≤6			
0 - 0.008			

●An irregular helix 2 flute square end mill suitable for high-speed machining of hardened steel.

(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

● : Inventory maintained in Japan.

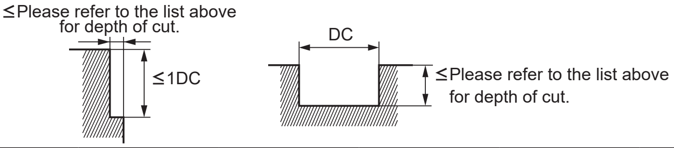
VF2MV

End mill, Medium cut length, 2 flute, Irregular helix flutes

RECOMMENDED CUTTING CONDITIONS

Workpiece 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 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)
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

Depth of cut



DC:Dia.

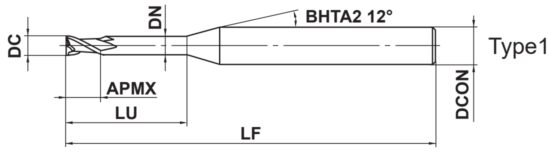
Note 1) When slotting, reduce the revolutions by 50—70% and the feed rate by 40—60%.
Note 2) For austenitic stainless steels, titanium and heat-resistant alloys, the VFMHV is recommended.
Note 3) Vibration damping end mills are more effective in suppressing chatter and vibration compared to general end mills, but these may still occur if the rigidity of the machine or the workpiece material is low. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

VF2XL

End mill, 2 flute, Long neck

DC<3 DC=3

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	◎	◎	◎				



0.2≤DC≤3			
0 - 0.020			
4≤DCON≤6			
0 - 0.008			

●2 flute long neck end mill for high-speed machining of hardened steels.

(mm)

Order Number	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	Type
VF2XLD0020N006	0.2	0.3	0.6	0.17	45	4	2	●	1
VF2XLD0030N010	0.3	0.5	1	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
VF2XLD0050N020	0.5	0.8	2	0.46	45	4	2	●	1
VF2XLD0050N040	0.5	0.8	4	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
VF2XLD0080N040	0.8	1.2	4	0.76	45	4	2	●	1
VF2XLD0080N060	0.8	1.2	6	0.76	45	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
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
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
VF2XLD0200N200	2	3	20	1.9	60	4	2	●	1
VF2XLD0300N120	3	4.5	12	2.9	50	6	2	●	1
VF2XLD0300N200	3	4.5	20	2.9	60	6	2	●	1

● : Inventory maintained in Japan.

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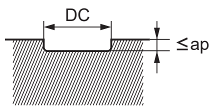
VF2XL

End mill, 2 flute, Long neck

RECOMMENDED CUTTING CONDITIONS

Workpiece 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)
0.2	**0.6**	40000	400	0.004	40000	360	0.004
0.3	**1**	40000	500	0.006	40000	450	0.004
0.4	**1**	40000	800	0.008	36000	500	0.006
	2	40000	500	0.007	30000	350	0.005
0.5	**2**	40000	800	0.01	30000	600	0.009
	4	36000	600	0.008	27000	450	0.007
0.6	**2**	40000	1000	0.015	30000	700	0.012
	4	36000	800	0.01	27000	500	0.01
0.8	**4**	36000	1200	0.03	27000	900	0.02
	6	30000	900	0.02	22000	650	0.015
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
	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
	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
	20	11000	500	0.1	8200	350	0.1

Depth of cut



DC:Dia.

Note 1) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 2) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

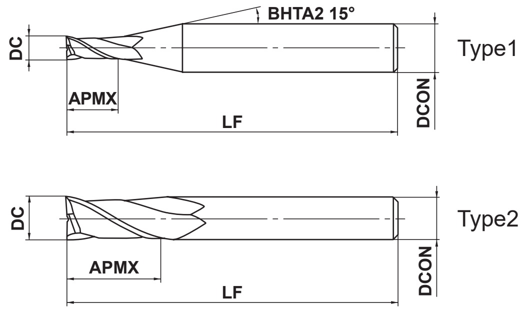
CRN2MS

End mill, Medium cut length, 2 flute, For copper electrodes

30°

DC<3 DC≥3

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
						◎	○



0.2≤DC≤12				
0 - 0.02				
4≤DCON≤6	8≤DCON≤10	DCON=12		
0 - 0.008	0 - 0.009	0 - 0.011		

●2 flute end mill with CRN coating for copper electrode machining.

(mm)

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
CRN2MSD0020S04	0.2	0.4	40	4	2	●	1
CRN2MSD0030S04	0.3	0.6	40	4	2	●	1
CRN2MSD0040S04	0.4	0.8	40	4	2	●	1
CRN2MSD0050S04	0.5	1	40	4	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
CRN2MSD0100S04	1	2.5	40	4	2	●	1
CRN2MSD0100S06	1	2.5	45	6	2	●	1
CRN2MSD0150S04	1.5	4	40	4	2	●	1
CRN2MSD0150S06	1.5	4	45	6	2	●	1
CRN2MSD0170S04	1.7	4	40	4	2	●	1
CRN2MSD0200S06	2	6	45	6	2	●	1
CRN2MSD0250S06	2.5	8	45	6	2	●	1
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

● : Inventory maintained in Japan.

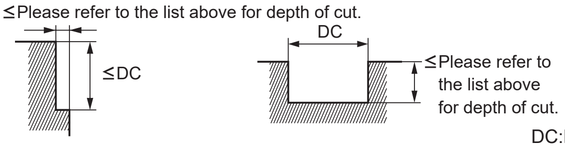
CRN2MS

End mill, Medium cut length, 2 flute, For copper electrodes

RECOMMENDED CUTTING CONDITIONS

Workpiece 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
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

Depth of cut



DC:Dia.

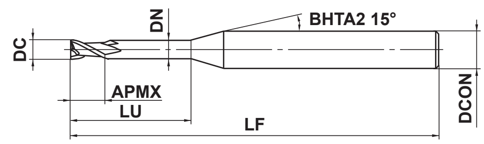
Note 1) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 2) Water-soluble cutting fluid is recommended.
Note 3) When drilling, please set the feed rate at 1/3 or below of the table value.
Note 4) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

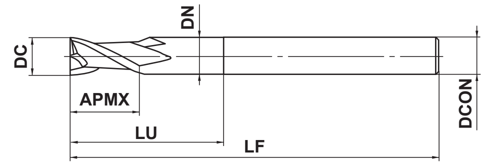
CRN2XL

End mill, Medium cut length, 2 flute, Long neck, For copper electrodes

UWC CRN 30° DC<3 DC≥3

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
						◎	○





0.3≤DC≤6			
0 - 0.02			
4≤DCON≤6			
h6 0 - 0.008			

●2 flute long neck end mill with CRN coating for copper electrode machining.

(mm)

Order Number	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	Type
CRN2XLD0030N010S04	0.3	0.5	1	0.27	50	4	2	●	1
CRN2XLD0030N030S04	0.3	0.5	3	0.27	50	4	2	●	1
CRN2XLD0040N020S04	0.4	0.6	2	0.36	50	4	2	●	1
CRN2XLD0050N020S04	0.5	0.8	2	0.46	50	4	2	●	1
CRN2XLD0050N040S04	0.5	0.8	4	0.46	50	4	2	●	1
CRN2XLD0050N060S04	0.5	0.8	6	0.46	50	4	2	●	1
CRN2XLD0080N040S04	0.8	1.2	4	0.76	50	4	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
CRN2XLD0100N100S04	1	1.5	10	0.94	50	4	2	●	1
CRN2XLD0100N120S04	1	1.5	12	0.94	50	4	2	●	1
CRN2XLD0150N060S04	1.5	2.3	6	1.44	50	4	2	●	1
CRN2XLD0150N080S04	1.5	2.3	8	1.44	50	4	2	●	1
CRN2XLD0150N100S04	1.5	2.3	10	1.44	50	4	2	●	1
CRN2XLD0150N120S04	1.5	2.3	12	1.44	50	4	2	●	1
CRN2XLD0200N060S06	2	3.0	6	1.90	50	6	2	●	1
CRN2XLD0200N080S06	2	3.0	8	1.90	50	6	2	●	1
CRN2XLD0200N100S06	2	3.0	10	1.90	50	6	2	●	1
CRN2XLD0200N120S06	2	3.0	12	1.90	50	6	2	●	1
CRN2XLD0200N200S06	2	3.0	20	1.90	60	6	2	●	1
CRN2XLD0250N200S06	2.5	3.8	20	2.40	65	6	2	●	1
CRN2XLD0300N200S06	3	4.5	20	2.90	65	6	2	●	1
CRN2XLD0400N200S06	4	6.0	20	3.90	65	6	2	●	1
CRN2XLD0500N250S06	5	7.5	25	4.90	70	6	2	●	1
CRN2XLD0600N300S06	6	9.0	30	5.85	70	6	2	●	2

● : Inventory maintained in Japan.

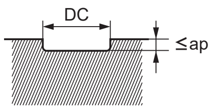
CRN2XL

End mill, Medium cut length, 2 flute, Long neck, For copper electrodes

RECOMMENDED CUTTING CONDITIONS

Workpiece Material		Copper, Copper alloys		
Dia. **DC** (mm)	Neck length **LU** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)
0.3	**1**	40000	800	0.007
	3	40000	600	0.002
0.4	**2**	40000	950	0.007
0.5	**2**	40000	950	0.01
	4	40000	800	0.005
	6	40000	700	0.002
0.8	**4**	40000	1200	0.02
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
2	**6**	40000	2400	0.18
	8	40000	2200	0.15
	10	40000	2000	0.12
	12	30000	1500	0.10
	20	15000	600	0.03
2.5	**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

Depth of cut



DC:Dia.

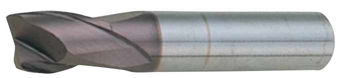
Note 1) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 2) Water-soluble cutting fluid is recommended.
Note 3) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

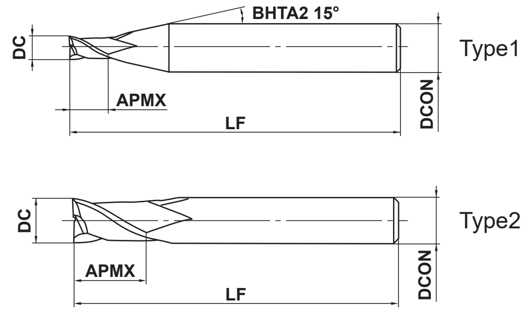
SED2KMG

End mill, Medium cut length, 2 flute, - Tolerance

30° DC≤10 DC>10 DC<3 3≤DC≤10 DC≥11

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎			○			





2≤DC≤16				
0 - 0.02				
4≤DCON≤6	8≤DCON≤10	12≤DCON≤16		
0 - 0.008	0 - 0.009	0 - 0.011		

●2 flute end mill for key way slotting with minus tolerance cutting diameter.

(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

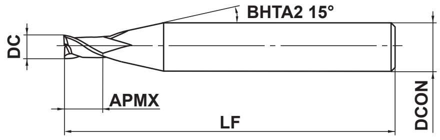
● : Inventory maintained in Japan.

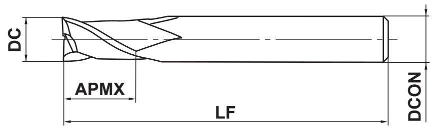
SED2KPG

End mill, Medium cut length, 2 flute, + Tolerance

UWC MS 30° DC≤10 DC>10 DC<3 3≤DC≤10 DC≥11

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎			○			





2≤DC≤16				
0 + 0.02				
4≤DCON≤6	8≤DCON≤10	12≤DCON≤16		
0 - 0.008	0 - 0.009	0 - 0.011		

h6

● 2 flute end mill for key way slotting with plus tolerance cutting diameter.

(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

● : Inventory maintained in Japan.

ISO13399 ➤ J002

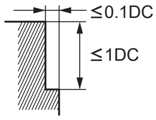
SED2KMG
End mill, Short cut length, 2 flute, For key ways

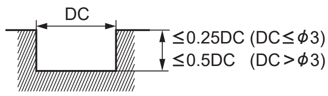
SED2KPG
End mill, Short cut length, 2 flute, For key ways

RECOMMENDED CUTTING CONDITIONS

Workpiece 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)		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)

Depth of cut





DC:Dia.

( ) : Indicates standard feed rate for slotting.

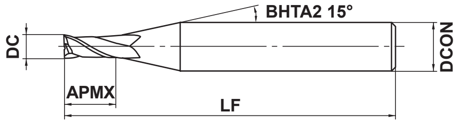
Note 1) The cutting conditions above are a guide only to milling within the standard depth of cut.
Note 2) Ductile cast iron milling has the same cutting conditions as carbon steel and alloy steel. (180−280HB)
Note 3) When drilling, please set the feed rate at 1/3 or below of the values above.
Note 4) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

C2MA

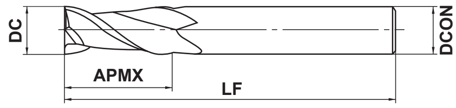
End mill, Medium cut length, 2 flute, For aluminium alloy

UWC | 30° DC<3 | 37.5° DC≥3 | DC<3 | DC≥3

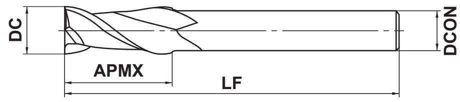
Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
							◎



Type1



Type2



Type3

	DC≤12	DC>12			
DC tolerance	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	

●2 flute uncoated end mill designed especially for aluminium alloys.

(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

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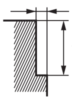
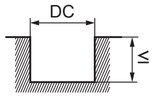
ISO13399 ➤J002

RECOMMENDED CUTTING CONDITIONS

Side milling

Workpiece Material	Aluminium alloy		Aluminium alloy casting	
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
Depth of cut	≤0.2DC (DC < ϕ3) ≤0.5DC (DC ≥ ϕ3)  ≤1DC DC:Dia.			

Slotting

Workpiece Material	Aluminium alloy		Aluminium alloy casting	
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
Depth of cut	DC  ≤1DC (MAX. 12mm) DC:Dia.			

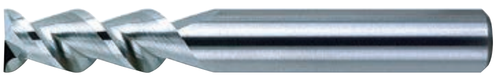
Note 1) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 2) Water-soluble cutting fluid is recommended.
Note 3) Climb cutting is recommended for side milling.
Note 4) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

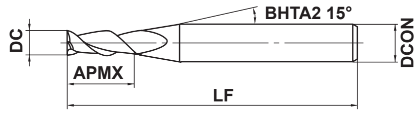
C2MHA

End mill, Medium cut length, 2 flute, For aluminium alloy

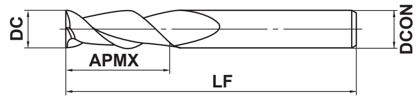
UWC γ 55°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
							◎

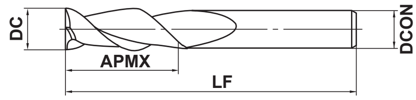




Type1



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	

●High efficiency machining for aluminium alloys.

(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

● : Inventory maintained in Japan.

ISO13399

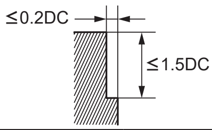
➢ J002

RECOMMENDED CUTTING CONDITIONS

■Side milling

Workpiece Material	Aluminium alloy	
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

Depth of cut

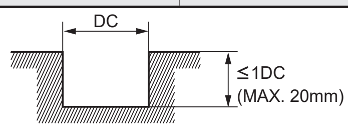


DC:Dia.

■Slotting

Workpiece Material	Aluminium alloy	
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

Depth of cut



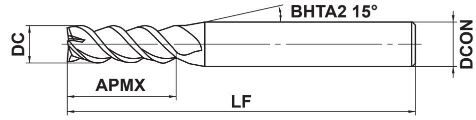
DC:Dia.

Note 1) Water-soluble cutting fluid is recommended.
Note 2) Climb cutting is recommended for side milling.
Note 3) If tool clamping is poor, the tool can be pulled out of the holder. Ensure that the tool is sufficiently clamped.
Note 4) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

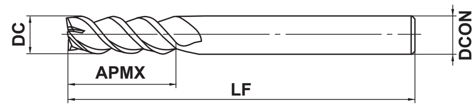
MSMHZD

Slotting, Medium cut length, 3 flute

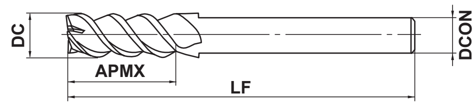
Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	○		○	○	○	



Type1



Type2



Type3

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	

●A single end mill for both plunging and slotting.

(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

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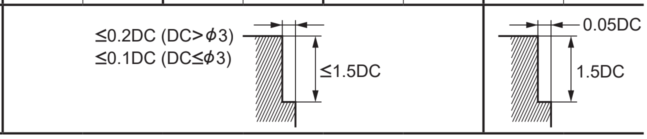
RECOMMENDED CUTTING CONDITIONS

■Side milling

Workpiece 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)
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

Depth of cut

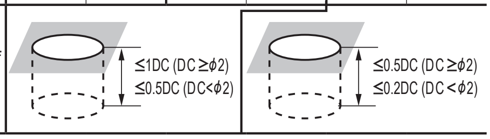


DC:Dia.

■Plunging

Workpiece 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)
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

Depth of cut

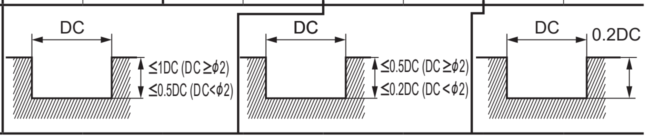


DC:Dia.

■Slotting

Workpiece 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)
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

Depth of cut



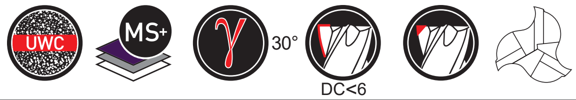
DC:Dia.

Note 1) When cutting austenitic stainless steels, the use of water-soluble cutting fluid is effective.
Note 2) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 3) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

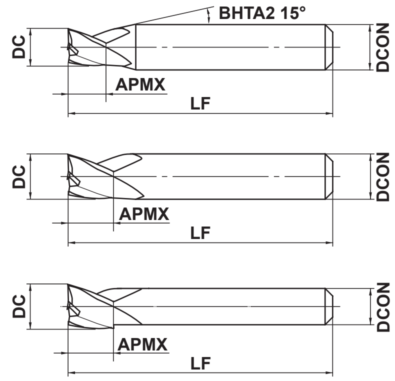
CARBIDE

MP3ES NEW

End mill, For small automatic lathes, 3 flute



Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	○		○	○	○	



3≤DC≤12				
- 0.010 - 0.030				
4≤DCON≤6	7≤DCON≤10	DCON=12		
0 - 0.008	0 - 0.009	0 - 0.011		

h6

●3 flute end mill.

(mm)

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
MP3ESD0300S04	3	4.5	50	4	3	●	1
MP3ESD0400S04	4	6	50	4	3	●	2
MP3ESD0500S06	5	7.5	50	6	3	●	1
MP3ESD0600S06	6	9	50	6	3	●	2
MP3ESD0700S07	7	10.5	50	7	3	●	2
MP3ESD0800S08	8	12	50	8	3	●	2
MP3ESD0900S10	9	13.5	50	10	3	●	1
MP3ESD1000S10	10	15	50	10	3	●	2
MP3ESD1200S10	12	15	50	10	3	●	3
MP3ESD1200S12	12	15	50	12	3	●	2

SQUARE
BALL
RADIUS
TAPER
BARREL
ROUGHING
CHAMFER
J
SOLID END MILLS

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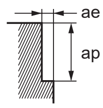
ISO13399

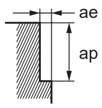
➤ J002

RECOMMENDED CUTTING CONDITIONS

■Side Milling

(mm)

Workpiece 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**	Revolution (min^{-1})	Feed rate (mm/min)	Depth of Cut **ap**	Width of Cut **ae**	Revolution (min^{-1})	Feed rate (mm/min)	Depth of Cut **ap**	Width of Cut **ae**	Revolution (min^{-1})	Feed rate (mm/min)	Depth of Cut **ap**	Width of Cut **ae**
3	10000	720	3	0.6	7000	480	3	0.6	6000	360	3	0.6
4	7500	720	4	0.6	5200	480	4	0.6	4500	360	4	0.6
5	6000	720	5	0.6	4200	480	5	0.6	3600	360	5	0.6
6	5000	720	6	0.6	3500	480	6	0.6	3000	360	6	0.6
7	4500	670	7	0.6	3200	440	7	0.6	2700	340	7	0.6
8	4000	620	8	0.6	2800	420	8	0.6	2400	310	8	0.6
9	3500	580	9	0.6	2500	380	9	0.6	2100	290	9	0.6
10	3200	540	10	0.6	2200	360	10	0.6	1900	280	10	0.6
12	2700	490	12	0.6	1900	320	12	0.6	1600	250	12	0.6
Depth of cut												

Workpiece Material	Hardened steel (45−55HRC) AISI H13				Copper, Copper Alloy			
Dia. **DC**	Revolution (min^{-1})	Feed rate (mm/min)	Depth of Cut **ap**	Width of Cut **ae**	Revolution (min^{-1})	Feed rate (mm/min)	Depth of Cut **ap**	Width of Cut **ae**
3	5000	140	3	0.2	13000	940	3	0.6
4	4000	140	4	0.2	9500	910	4	0.6
5	3200	140	5	0.2	7600	910	5	0.6
6	2700	140	6	0.2	6400	920	6	0.6
7	2300	130	7	0.2	5500	820	7	0.6
8	2000	130	8	0.2	4800	740	8	0.6
9	1800	130	9	0.2	4200	700	9	0.6
10	1600	120	10	0.2	3800	640	10	0.6
12	1300	120	12	0.2	3200	580	12	0.6
Depth of cut								

Note 1) When cutting austenitic stainless steels, the use of water-soluble cutting fluid is effective.
Note 2) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 3) When drilling, please set the feed rate at 1/3 or below the values above.
Note 4) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

MP3ES

End mill, For small automatic lathes, 3 flute

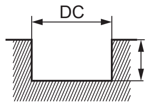
RECOMMENDED CUTTING CONDITIONS

■Slotting

(mm)

Workpiece 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	Revolution (min^{-1})	Feed rate (mm/min)	Depth of Cut **ap**	Revolution (min^{-1})	Feed rate (mm/min)	Depth of Cut **ap**	Revolution (min^{-1})	Feed rate (mm/min)	Depth of Cut **ap**
3	10000	720	0.6	7000	480	0.6	6000	360	0.6
4	7500	720	0.6	5200	480	0.6	4500	360	0.6
5	6000	720	0.6	4200	480	0.6	3600	360	0.6
6	5000	720	0.6	3500	480	0.6	3000	360	0.6
7	4500	670	0.6	3200	440	0.6	2700	340	0.6
8	4000	620	0.6	2800	420	0.6	2400	310	0.6
9	3500	580	0.6	2500	380	0.6	2100	290	0.6
10	3200	540	0.6	2200	360	0.6	1900	280	0.6
12	2700	490	0.6	1900	320	0.6	1600	250	0.6

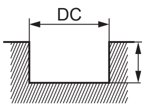
Depth of cut



DC:Dia.

Workpiece Material	Hardened steel (45−55HRC) AISI H13			Copper, Copper Alloy		
Dia. DC	Revolution (min^{-1})	Feed rate (mm/min)	Depth of Cut **ap**	Revolution (min^{-1})	Feed rate (mm/min)	Depth of Cut **ap**
3	5000	140	0.2	13000	940	0.6
4	4000	140	0.2	9500	910	0.6
5	3200	140	0.2	7600	910	0.6
6	2700	140	0.2	6400	920	0.6
7	2300	130	0.2	5500	820	0.6
8	2000	130	0.2	4800	740	0.6
9	1800	130	0.2	4200	700	0.6
10	1600	120	0.2	3800	640	0.6
12	1300	120	0.2	3200	580	0.6

Depth of cut



DC:Dia.

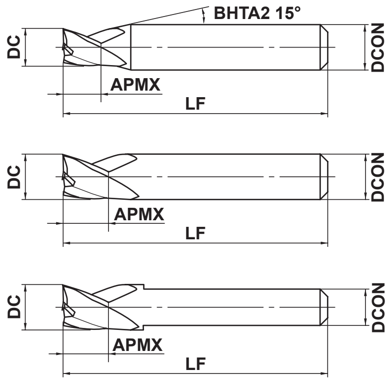
Note 1) When cutting austenitic stainless steels, the use of water-soluble cutting fluid is effective.
Note 2) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 3) When drilling, please set the feed rate at 1/3 or below the values above.
Note 4) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

MS3ES

End mill, 3 flute, For small automatic lathes

UWC MS 30°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	○		○	○	○	



3≤DC≤12				
0 - 0.020				
4≤DCON≤6	7≤DCON≤10			
0 - 0.008	0 - 0.009			

h6

●3 flute end mill.

Overall length 35mm (mm)

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
MS3ESD0300L35S04	3	3	35	4	3	●	1
MS3ESD0350L35S04	3.5	3.5	35	4	3	●	1
MS3ESD0400L35S04	4	4	35	4	3	●	2
MS3ESD0500L35S05	5	5	35	5	3	●	2
MS3ESD0500L35S06	5	5	35	6	3	●	1
MS3ESD0600L35S05	6	6	35	5	3	●	3
MS3ESD0600L35S06	6	6	35	6	3	●	2
MS3ESD0700L35S07	7	6	35	7	3	●	2
MS3ESD0800L35S07	8	6	35	7	3	●	3
MS3ESD0800L35S08	8	6	35	8	3	●	2
MS3ESD1000L35S07	10	6	35	7	3	●	3
MS3ESD1000L35S10	10	6	35	10	3	●	2
MS3ESD1200L35S10	12	6	35	10	3	●	3

Overall length 45mm (mm)

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
MS3ESD0300L45S04	3	3	45	4	3	●	1
MS3ESD0350L45S04	3.5	3.5	45	4	3	●	1
MS3ESD0400L45S04	4	4	45	4	3	●	2
MS3ESD0500L45S06	5	5	45	6	3	●	1
MS3ESD0600L45S06	6	6	45	6	3	●	2
MS3ESD0700L45S07	7	7	45	7	3	●	2
MS3ESD0800L45S07	8	8	45	7	3	●	3
MS3ESD0800L45S08	8	8	45	8	3	●	2
MS3ESD1000L45S07	10	10	45	7	3	●	3
MS3ESD1000L45S10	10	10	45	10	3	●	2
MS3ESD1200L45S10	12	12	45	10	3	●	3

● : Inventory maintained in Japan.

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ISO13399 ➤ J002

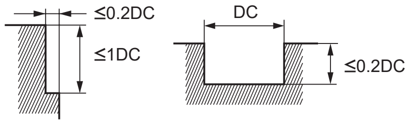
MS3ES

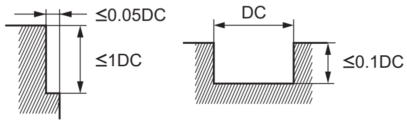
End mill, 3 flute, For small automatic lathes

RECOMMENDED CUTTING CONDITIONS

Workpiece 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

Depth of cut





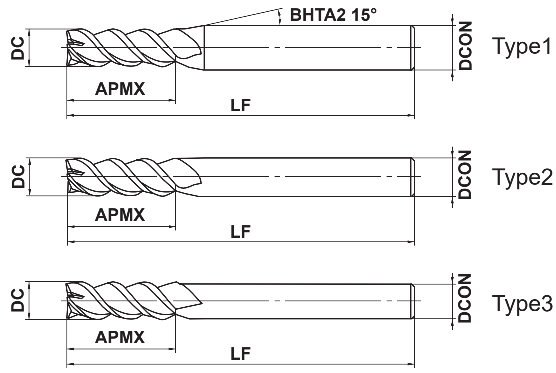
DC:Dia.

Note 1) When cutting austenitic stainless steels, the use of water-soluble cutting fluid is effective.
Note 2) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 3) When drilling, please set the feed rate at 1/3 or below the values above.
Note 4) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

VQMHZV

End mill, Medium cutting length, 3 flute for drilling and slotting

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎			◎	◎	○	



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	

- A single end mill for both plunging and slotting.
- Irregular helical geometry controls the vibration.

(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
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

Note 1) 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.

● : Inventory maintained in Japan.

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CARBIDE

VQMHZV

End mill, Medium cutting length, 3 flute for drilling and slotting

(mm)

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
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

Note 1) 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.

SQUARE
BALL
RADIUS
TAPER
BARREL
ROUGHING
CHAMFER
J
SOLID END MILLS

ISO13399 ➤ J002

RECOMMENDED CUTTING CONDITIONS

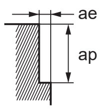
■Side milling

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

Workpiece Material	Carbon steel, Alloy steel, Mild steel					Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel					Austenitic, Ferritic and Martensitic stainless steels, Titanium alloys					Hardened stainless steels, Cobaly chromium alloy				
	AISI 1045, AISI 4140, ASTM A36, AISI 1010					AISI P21, AISI P20, AISI 4340, SKD, SKT					AISI 304, AISI 316, Ti-6Al-4V					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)	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	50	16000	340	1.5	0.1
1.5	130	28000	1300	2.25	0.3	100	21000	630	2.25	0.3	85	18000	540	2.25	0.3	65	14000	420	2.25	0.15
2	150	24000	1800	3	0.6	120	19000	860	3	0.6	100	16000	620	3	0.6	75	12000	540	3	0.4
3	150	16000	1900	4.5	0.9	120	13000	940	4.5	0.9	100	11000	660	4.5	0.9	75	8000	580	4.5	0.6
4	150	12000	2000	6	1.2	120	9500	940	6	1.2	100	8000	670	6	1.2	75	6000	590	6	0.8
5	150	9500	1900	7.5	1.5	120	7600	960	7.5	1.5	100	6400	670	7.5	1.5	75	4800	600	7.5	1
6	150	8000	1900	9	1.8	120	6400	960	9	1.8	100	5300	830	9	1.8	75	4000	600	9	1.2
8	150	6000	1900	12	2.4	120	4800	1000	12	2.4	100	4000	900	12	2.4	75	3000	630	12	1.6
10	150	4800	1700	15	3	120	3800	910	15	3	100	3200	960	15	3	75	2400	580	15	2
12	150	4000	1400	18	3.6	120	3200	860	18	3.6	100	2700	890	18	3.6	75	2000	540	18	2.4
16	150	3000	1200	24	4.8	120	2400	720	24	4.8	100	2000	720	24	4.8	75	1500	450	24	3.2
20	150	2400	970	30	6	120	1900	570	30	6	100	1600	580	30	6	75	1200	360	30	4

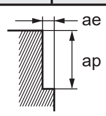
Depth of cut



General-purpose conditions

Workpiece Material	Carbon steel, Alloy steel, Mild steel					Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel					Austenitic, Ferritic and Martensitic stainless steels, Titanium alloys					Hardened stainless steels, Cobaly chromium alloy				
	AISI 1045, AISI 4140, ASTM A36, AISI 1010					AISI P21, AISI P20, AISI 4340, SKD, SKT					AISI 304, AISI 316, Ti-6Al-4V					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)	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	50	16000	220	1.5	0.1
1.5	120	25000	740	2.25	0.3	100	21000	420	2.25	0.3	80	17000	340	2.25	0.3	65	14000	280	2.25	0.15
2	120	19000	940	3	0.6	100	16000	480	3	0.6	80	13000	340	3	0.6	70	11000	330	3	0.4
3	120	13000	1000	4.5	0.9	100	11000	520	4.5	0.9	80	8500	340	4.5	0.9	70	7400	350	4.5	0.6
4	120	9500	1000	6	1.2	100	8000	520	6	1.2	80	6400	350	6	1.2	70	5600	370	6	0.8
5	120	7600	980	7.5	1.5	100	6400	530	7.5	1.5	80	5100	350	7.5	1.5	70	4500	370	7.5	1
6	120	6400	1000	9	1.8	100	5300	540	9	1.8	80	4200	400	9	1.8	70	3700	370	9	1.2
8	120	4800	1000	12	2.4	100	4000	550	12	2.4	80	3200	430	12	2.4	70	2800	390	12	1.6
10	120	3800	900	15	3	100	3200	510	15	3	80	2500	450	15	3	70	2200	350	15	2
12	120	3200	760	18	3.6	100	2700	480	18	3.6	80	2100	420	18	3.6	70	1900	340	18	2.4
16	120	2400	640	24	4.8	100	2000	400	24	4.8	80	1600	340	24	4.8	70	1400	280	24	3.2
20	120	1900	510	30	6	100	1600	320	30	6	80	1300	270	30	6	70	1100	220	30	4

Depth of cut



Note 1) 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.
Note 2) Effective cutting of stainless steel, titanium alloys and heat-resistant alloys etc. can be achieved with the use of emulsion.
Note 3) Vibration damping end mills are more effective in suppressing chatter and vibration compared to general end mills, but these may still occur if the rigidity of the machine or the workpiece material is low. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.
Note 4) When the depth of cut is smaller than shown the feed rate can be increased.

VQMHZV

End mill, Medium cutting length, 3 flute for drilling and slotting

RECOMMENDED CUTTING CONDITIONS

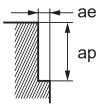
■Side milling

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 cutting conditions

Workpiece Material	Copper, Copper alloy					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)
1	120	38000	860	1.5	0.2	40	13000	160	1.5	0.05
1.5	150	32000	1400	2.25	0.3	40	8500	170	2.25	0.08
2	180	29000	2200	3	0.6	40	6400	170	3	0.2
3	180	19000	2300	4.5	0.9	40	4200	180	4.5	0.3
4	180	14000	2300	6	1.2	40	3200	180	6	0.4
5	180	11000	2300	7.5	1.5	40	2500	180	7.5	0.5
6	180	9500	2300	9	1.8	40	2100	190	9	0.6
8	180	7200	2300	12	2.4	40	1600	190	12	0.8
10	180	5700	2100	15	3	40	1300	220	15	1
12	180	4800	1700	18	3.6	40	1100	210	18	1.2
16	180	3600	1500	24	4.8	40	800	150	24	1.6
20	180	2900	1200	30	6	40	640	120	30	2

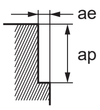
Depth of cut



General-purpose conditions

Workpiece Material	Copper, Copper alloy					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)
1	120	38000	560	1.5	0.2	30	9500	75	1.5	0.05
1.5	140	30000	890	2.25	0.3	30	6400	82	2.25	0.07
2	140	22000	1100	3	0.6	30	4800	86	3	0.2
3	140	15000	1200	4.5	0.9	30	3200	89	4.5	0.3
4	140	11000	1200	6	1.2	30	2400	90	6	0.4
5	140	8900	1200	7.5	1.5	30	1900	90	7.5	0.5
6	140	7400	1200	9	1.8	30	1600	95	9	0.6
8	140	5600	1200	12	2.4	30	1200	95	12	0.8
10	140	4500	1100	15	3	30	950	110	15	1
12	140	3700	880	18	3.6	30	800	100	18	1.2
16	140	2800	750	24	4.8	30	600	76	24	1.6
20	140	2200	590	30	6	30	480	61	30	2

Depth of cut



Note 1) 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.
Note 2) Effective cutting of stainless steel, titanium alloys and heat-resistant alloys etc. can be achieved with the use of emulsion.
Note 3) Vibration damping end mills are more effective in suppressing chatter and vibration compared to general end mills, but these may still occur if the rigidity of the machine or the workpiece material is low. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.
Note 4) When the depth of cut is smaller than shown the revolution and feed rate can be increased.

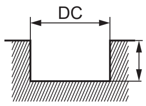
■Slotting

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

Workpiece Material	Carbon steel, Alloy steel, Mild steel				Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel				Austenitic, Ferritic and Martensitic stainless steels, Titanium alloys				Hardened stainless steels, Cobaly chromium alloy				Copper, Copper alloy				Heat resistant alloys			
	AISI 1045, AISI 4140, ASTM A36, AISI 1010				AISI P21, AISI P20, AISI 4340, SKD, SKT				AISI 304, AISI 316, Ti-6Al-4V				AISI 630, AISI 631 15-5PH, 17-4PH								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)	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	45	14000	80	0.3	120	38000	460	0.5	30	9500	60	0.2
1.5	130	28000	590	0.75	100	21000	250	0.75	85	18000	220	0.75	60	12000	140	0.4	150	32000	670	0.75	30	6400	80	0.3
2	150	24000	940	2	120	19000	460	2	100	16000	480	2	60	9500	230	1	180	29000	1100	2	30	4800	100	0.6
3	150	16000	1100	3	120	13000	550	3	100	11000	500	3	60	6400	270	1.5	180	19000	1300	3	30	3200	120	0.9
4	150	12000	1400	4	120	9500	680	4	100	8000	530	4	60	4800	350	2	180	14000	1700	4	30	2400	130	1.2
5	150	9500	1400	5	120	7600	680	5	100	6400	540	5	60	3800	350	2.5	180	11000	1700	5	30	1900	130	1.5
6	150	8000	1400	6	120	6400	770	6	100	5300	560	6	60	3200	380	3	180	9500	1700	6	30	1600	130	1.8
8	150	6000	1300	8	120	4800	720	8	100	4000	600	8	60	2400	360	4	180	7200	1500	8	30	1200	140	2.4
10	150	4800	1200	10	120	3800	630	10	100	3200	670	10	60	1900	310	5	180	5700	1400	10	30	950	160	3
12	150	4000	960	12	120	3200	580	12	100	2700	650	12	60	1600	290	6	180	4800	1200	12	30	800	150	3.6
16	150	3000	810	12	120	2400	500	12	100	2000	480	12	60	1200	250	8	180	3600	970	12	30	600	120	4.8
20	150	2400	650	12	120	1900	400	12	100	1600	380	12	60	950	200	10	180	2900	780	12	30	480	90	6

Depth of cut

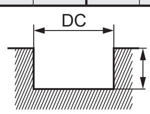


DC:Dia.

General-purpose conditions

Workpiece Material	Carbon steel, Alloy steel, Mild steel				Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel				Austenitic, Ferritic and Martensitic stainless steels, Titanium alloys				Hardened stainless steels, Cobaly chromium alloy				Copper, Copper alloy				Heat resistant alloys			
	AISI 1045, AISI 4140, ASTM A36, AISI 1010				AISI P21, AISI P20, AISI 4340, SKD, SKT				AISI 304, AISI 316, Ti-6Al-4V				AISI 630, AISI 631 15-5PH, 17-4PH								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)	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	45	14000	60	0.3	120	38000	300	0.5	25	8000	30	0.2
1.5	100	21000	290	0.75	80	17000	130	0.75	60	13000	100	0.75	50	11000	87	0.4	120	25000	350	0.75	25	5300	40	0.3
2	100	16000	410	2	80	13000	210	2	60	9500	190	2	50	8000	130	1	120	19000	490	2	25	4000	55	0.6
3	100	11000	500	3	80	8500	240	3	60	6400	190	3	50	5300	150	1.5	120	13000	590	3	25	2700	64	0.9
4	100	8000	630	4	80	6400	300	4	60	4800	210	4	50	4000	190	2	120	9500	750	4	25	2000	70	1.2
5	100	6400	630	5	80	5100	300	5	60	3800	210	5	50	3200	190	2.5	120	7600	750	5	25	1600	71	1.5
6	100	5300	630	6	80	4200	330	6	60	3200	220	6	50	2700	210	3	120	6400	760	6	25	1300	72	1.8
8	100	4000	550	8	80	3200	320	8	60	2400	240	8	50	2000	200	4	120	4800	670	8	25	990	78	2.4
10	100	3200	510	10	80	2500	270	10	60	1900	260	10	50	1600	170	5	120	3800	600	10	25	800	89	3
12	100	2700	430	12	80	2100	250	12	60	1600	250	12	50	1300	150	6	120	3200	510	12	25	660	84	3.6
16	100	2000	360	12	80	1600	220	12	60	1200	190	12	50	990	140	8	120	2400	430	12	25	500	63	4.8
20	100	1600	290	12	80	1300	180	12	60	950	150	12	50	800	110	10	120	1900	340	12	25	400	50	6

Depth of cut



DC:Dia.

Note 1) 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.
Note 2) Effective cutting of stainless steel, titanium alloys and heat-resistant alloys etc. can be achieved with the use of emulsion.
Note 3) Vibration damping end mills are more effective in suppressing chatter and vibration compared to general end mills, but these may still occur if the rigidity of the machine or the workpiece material is low. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.
Note 4) When the depth of cut is smaller than shown the feed rate can be increased.

VQMHZV

End mill, Medium cutting length, 3 flute for drilling and slotting

RECOMMENDED CUTTING CONDITIONS

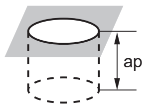
■Plunging

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

Workpiece Material	Carbon steel, Alloy steel, Mild steel AISI 1045, AISI 4140, ASTM A36, AISI 1010					Pre-hardened steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT					Austenitic, Ferritic and Martensitic stainless steels, Titanium alloys AISI 304, AISI 316, Ti-6Al-4V					Hardened stainless steels, Cobaly chromium alloy AISI 630, AISI 631 15-5PH, 17-4PH					Copper, Copper alloy				
Dia. DC (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Hole Depth ap (mm)	Step (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Hole Depth ap (mm)	Step (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Hole Depth ap (mm)	Step (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Hole Depth ap (mm)	Step (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Hole Depth 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	30	9500	30	0.5	0.05	75	24000	190	0.5	0.1
1.5	85	18000	270	0.75	0.3	60	13000	120	0.75	0.3	60	13000	80	0.75	0.1	35	7400	40	0.75	0.1	100	21000	320	0.75	0.3
2	100	16000	480	2	0.5	70	11000	200	2	0.4	60	9500	90	1	0.15	40	6400	60	1	0.1	120	19000	570	2	0.5
3	100	11000	660	3	1	70	7400	270	3	0.6	60	6400	100	1.5	0.2	40	4200	60	1.5	0.2	120	13000	780	3	1.0
4	100	8000	800	4	2	70	5600	340	4	0.8	60	4800	100	2	0.4	40	3200	60	2	0.4	120	9500	950	4	2
5	100	6400	960	5	2.5	70	4500	410	5	1	60	3800	100	2.5	0.5	40	2500	60	2.5	0.5	120	7600	1100	5	2.5
6	100	5300	950	6	3	70	3700	440	6	1.2	60	3200	100	3	0.6	40	2100	60	3	0.6	120	6400	1200	6	3
8	100	4000	720	8	4	70	2800	340	8	1.6	60	2400	70	4	0.6	40	1600	50	4	0.6	120	4800	860	8	4
10	100	3200	580	10	5	70	2200	260	10	2.5	60	1900	60	5	0.6	40	1300	40	5	0.6	120	3800	680	10	5
12	100	2700	490	12	5	70	1900	230	12	3	60	1600	50	6	0.6	40	1100	30	6	0.6	120	3200	580	12	5
16	100	2000	360	16	5	70	1400	170	16	4	60	1200	40	8	0.6	40	800	20	8	0.6	120	2400	430	16	5
20	100	1600	290	20	5	70	1100	130	20	5	60	950	30	10	0.6	40	640	20	10	0.6	120	1900	340	20	5

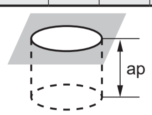
Depth of cut



General-purpose conditions

Workpiece 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, Ferritic and Martensitic stainless steels, Titanium alloys AISI 304, AISI 316, Ti-6Al-4V					Hardened stainless steels, Cobaly chromium alloy AISI 630, AISI 631 15-5PH, 17-4PH					Copper, Copper alloy				
Dia. DC (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Hole Depth ap (mm)	Step (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Hole Depth ap (mm)	Step (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Hole Depth ap (mm)	Step (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Hole Depth ap (mm)	Step (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Hole Depth 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	30	9500	30	0.5	0.05	75	24000	190	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	35	7400	40	0.75	0.05	100	21000	320	0.75	0.15
2	100	16000	480	2	0.25	70	11000	200	2	0.2	60	9500	90	1	0.05	40	6400	60	1	0.05	120	19000	570	2	0.25
3	100	11000	660	3	0.3	70	7400	270	3	0.3	60	6400	100	1.5	0.1	40	4200	60	1.5	0.1	120	13000	780	3	0.3
4	100	8000	800	4	0.4	70	5600	340	4	0.4	60	4800	100	2	0.2	40	3200	60	2	0.2	120	9500	950	4	0.4
5	100	6400	960	5	0.5	70	4500	410	5	0.5	60	3800	100	2.5	0.25	40	2500	60	2.5	0.25	120	7600	1100	5	0.5
6	100	5300	950	6	0.6	70	3700	440	6	0.6	60	3200	100	3	0.3	40	2100	60	3	0.3	120	6400	1200	6	0.6
8	100	4000	720	8	0.7	70	2800	340	8	0.7	60	2400	70	4	0.3	40	1600	50	4	0.3	120	4800	860	8	0.7
10	100	3200	580	10	0.75	70	2200	260	10	0.75	60	1900	60	5	0.3	40	1300	40	5	0.3	120	3800	680	10	0.75
12	100	2700	490	12	0.75	70	1900	230	12	0.75	60	1600	50	6	0.3	40	1100	30	6	0.3	120	3200	580	12	0.75
16	100	2000	360	16	0.75	70	1400	170	16	0.75	60	1200	40	8	0.3	40	800	20	8	0.3	120	2400	430	16	0.75
20	100	1600	290	20	0.75	70	1100	130	20	0.75	60	950	30	10	0.3	40	640	20	10	0.3	120	1900	340	20	0.75

Depth of cut



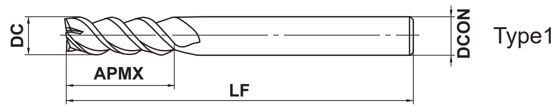
Note 1) SMART MIRACLE Coating is not energized because of its nature. Therefore, an external contact (voltaic type) tool setter cannot be used. An internal contact (non-voltaic) type or laser type tool setter is recommended to measure the length of the tool.
Note 2) Effective cutting of stainless steel, titanium alloys and heat-resistant alloys etc. can be achieved with the use of emulsion.
Note 3) Vibration damping end mills are more effective in suppressing chatter and vibration compared to general end mills, but these may still occur if the rigidity of the machine or the workpiece material is low. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

VQMHZVOH

End mill, Medium cutting length, 3 flute for drilling and slotting with internal through coolant holes

42°
43.5°
45°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎			◎	◎	○	



DC≤12	DC=16			
0 - 0.02	0 - 0.03			
DCON=6	8≤DCON≤10	12≤DCON≤16		
0 - 0.008	0 - 0.009	0 - 0.011		

h6

- ●A single end mill for both plunging and slotting.
- ●Excellent peformance in slotting and pocketing with oil supply from the end cutting edge.

(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

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● : Inventory maintained in Japan.

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VQMHZVOH

End mill, Medium cutting length, 3 flute for drilling and slotting with internal through coolant holes

RECOMMENDED CUTTING CONDITIONS

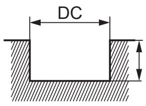
■Slotting

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

Workpiece Material	Carbon steel, Alloy steel, Mild steel				Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel				Austenitic, Ferritic and Martensitic stainless steels, Titanium alloys				Hardened stainless steels, Cobaly chromium alloy				Copper, Copper alloy				Heat resistant alloys			
	AISI 1045, AISI 4140, ASTM A36, AISI 1010				AISI P21, AISI P20, AISI 4340, SKD, SKT				AISI 304, AISI 316, Ti-6Al-4V				AISI 630, AISI 631 15-5PH, 17-4PH								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)	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	60	3200	380	3	180	9500	1700	6	30	1600	130	1.8
8	150	6000	1300	8	120	4800	720	8	100	4000	600	8	60	2400	360	4	180	7200	1500	8	30	1200	140	2.4
10	150	4800	1200	10	120	3800	630	10	100	3200	670	10	60	1900	310	5	180	5700	1400	10	30	950	160	3
12	150	4000	960	12	120	3200	580	12	100	2700	650	12	60	1600	290	6	180	4800	1200	12	30	800	150	3.6
16	150	3000	810	12	120	2400	500	12	100	2000	480	12	60	1200	250	8	180	3600	970	12	30	600	120	4.8

Depth of cut



DC:Dia.

General-purpose conditions

Workpiece Material	Carbon steel, Alloy steel, Mild steel				Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel				Austenitic, Ferritic and Martensitic stainless steels, Titanium alloys				Hardened stainless steels, Cobaly chromium alloy				Copper, Copper alloy				Heat resistant alloys			
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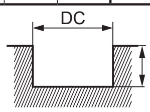
Dia. DC (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Cutting speed (m/min)	Revolution (min^{-1})	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	50	2700	210	3	120	6400	760	6	25	1300	72	1.8
8	100	4000	550	8	80	3200	320	8	60	2400	240	8	50	2000	200	4	120	4800	670	8	25	990	78	2.4
10	100	3200	510	10	80	2500	270	10	60	1900	260	10	50	1600	170	5	120	3800	600	10	25	800	89	3
12	100	2700	430	12	80	2100	250	12	60	1600	250	12	50	1300	150	6	120	3200	510	12	25	660	84	3.6
16	100	2000	360	12	80	1600	220	12	60	1200	190	12	50	990	140	8	120	2400	430	12	25	500	63	4.8

Depth of cut



DC:Dia.

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Note 4) When the depth of cut is smaller than shown the feed rate can be increased.

■Plunging

The rigidity of the machine or workpiece and chip discharge are sufficient at high efficiency conditions.
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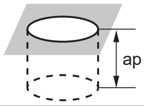
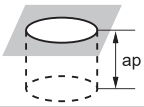
High efficiency conditions

Workpiece 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, Ferritic and Martensitic stainless steels, Titanium alloys AISI 304, AISI 316, Ti-6Al-4V					Hardened stainless steels, Cobaly chromium alloy AISI 630, AISI 631 15-5PH, 17-4PH				
Dia. DC (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Hole Depth ap (mm)	Step (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Hole Depth ap (mm)	Step (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Hole Depth ap (mm)	Step (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Hole Depth ap (mm)	Step (mm)
6	100	5300	950	9	3	70	3700	440	9	1.2	60	3200	100	6	0.6	40	2100	60	6	0.6
8	100	4000	720	12	4	70	2800	340	12	1.6	60	2400	70	8	0.6	40	1600	50	8	0.6
10	100	3200	580	15	5	70	2200	260	15	2.5	60	1900	60	10	0.6	40	1300	40	10	0.6
12	100	2700	490	18	5	70	1900	230	18	3	60	1600	50	12	0.6	40	1100	30	12	0.6
16	100	2000	360	24	5	70	1400	170	24	4	60	1200	40	16	0.6	40	800	20	16	0.6
Depth of cut	 ap																			

Workpiece Material	Copper, Copper alloy				
Dia. DC (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Hole Depth ap (mm)	Step (mm)
6	120	6400	1200	9	3
8	120	4800	860	12	4
10	120	3800	680	15	5
12	120	3200	580	18	5
16	120	2400	430	24	5
Depth of cut	 ap				

Note 1) 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.
Note 2) Effective cutting of stainless steel, titanium alloys and heat-resistant alloys etc. can be achieved with the use of emulsion.
Note 3) Vibration damping end mills are more effective in suppressing chatter and vibration compared to general end mills, but these may still occur if the rigidity of the machine or the workpiece material is low. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

VQMHZVOH

End mill, Medium cutting length, 3 flute for drilling and slotting with internal through coolant holes

RECOMMENDED CUTTING CONDITIONS

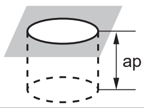
Plunging

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.

General-purpose conditions

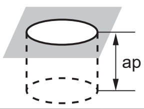
Workpiece Material	Carbon steel, Alloy steel, Mild steel AISI 1045, AISI 4140, ASTM A36, AISI 1010					Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT					Austenitic, Ferritic and Martensitic stainless steels, Titanium alloys AISI 304, AISI 316, Ti-6Al-4V					Hardened stainless steels, Cobaly chromium alloy AISI 630, AISI 631 15-5PH, 17-4PH				
Dia. DC (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Hole Depth ap (mm)	Step (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Hole Depth ap (mm)	Step (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Hole Depth ap (mm)	Step (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Hole Depth ap (mm)	Step (mm)
6	100	5300	950	9	0.6	70	3700	440	9	0.6	60	3200	100	6	0.3	40	2100	60	6	0.3
8	100	4000	720	12	0.7	70	2800	340	12	0.7	60	2400	70	8	0.3	40	1600	50	8	0.3
10	100	3200	580	15	0.75	70	2200	260	15	0.75	60	1900	60	10	0.3	40	1300	40	10	0.3
12	100	2700	490	18	0.75	70	1900	230	18	0.75	60	1600	50	12	0.3	40	1100	30	12	0.3
16	100	2000	360	24	0.75	70	1400	170	24	0.75	60	1200	40	16	0.3	40	800	20	16	0.3

Depth of cut



Workpiece Material	Copper, Copper alloy				
Dia. DC (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Hole Depth ap (mm)	Step (mm)
6	120	6400	1200	9	0.6
8	120	4800	860	12	0.7
10	120	3800	680	15	0.75
12	120	3200	580	18	0.75
16	120	2400	430	24	0.75

Depth of cut



Note 1) 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.
Note 2) Effective cutting of stainless steel, titanium alloys and heat-resistant alloys etc. can be achieved with the use of emulsion.
Note 3) Vibration damping end mills are more effective in suppressing chatter and vibration compared to general end mills, but these may still occur if the rigidity of the machine or the workpiece material is low. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

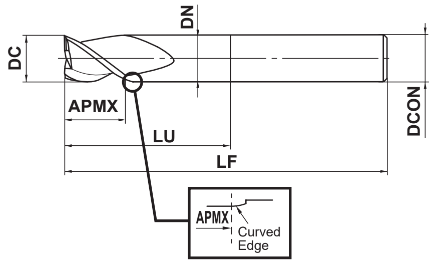
A3SA NEW

End mill, Short cut length, 3 flute, with multiple internal through coolant holes

UWC 37.5°

CARBIDE

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
							◎



	DC=12	DC>12			
	0 - 0.020	0 - 0.030			
h6	12≤DCON≤16	20≤DCON≤25			
	0 - 0.011	0 - 0.013			

●Stability and reliability even when slotting, ramping and plunging.
●The cross sectional geometry of the flutes is perfect for efficient chip discharge.

(mm)

Order Number	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock
A3SA120N36C	12	18	36	11.4	80	12	3	●
A3SA160N48C	16	24	48	15.4	90	16	3	●
A3SA200N55C	20	30	55	18	100	20	3	●
A3SA250N55C	25	37.5	55	23	100	25	3	●

SQUARE BALL RADIUS TAPER BARREL ROUGHING CHAMFER

J

SOLID END MILLS

● : Inventory maintained in Japan.

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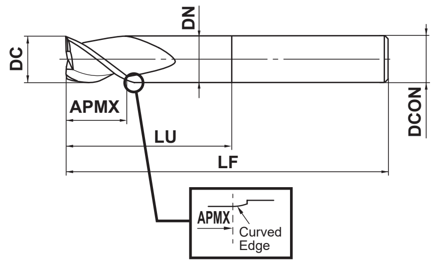
DLC3SA NEW

End mill, Short cut length, 3 flute, with multiple internal through coolant holes

UWC DLC 37.5°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
							◎



	DC=12	DC>12			
	0 - 0.020	0 - 0.030			
h6	12≤DCON≤16	20≤DCON≤25			
	0 - 0.011	0 - 0.013			

- Stability and reliability even when slotting, ramping and plunging.
- The cross sectional geometry of the flutes is perfect for efficient chip discharge.

(mm)

Order Number	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock
DLC3SA120N36C	12	18	36	11.4	80	12	3	●
DLC3SA160N48C	16	24	48	15.4	90	16	3	●
DLC3SA200N55C	20	30	55	18	100	20	3	●
DLC3SA250N55C	25	37.5	55	23	100	25	3	●

● : Inventory maintained in Japan.

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A3SA NEW

End mill, Short cut length, 3 flute, with multiple internal through coolant holes

DLC3SA NEW

End mill, Short cut length, 3 flute, with multiple internal through coolant holes

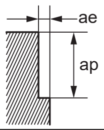
RECOMMENDED CUTTING CONDITIONS

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

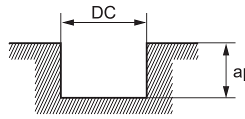
■Side Milling

(mm)

Workpiece Material	Aluminium Alloys				
Dia. DC	Cutting Speed (m/min)	Revolution (min^{-1})	Feed Rate (mm/min)	Depth of cut ae(mm)	Depth of Cut ap(mm)
12	1240	33000	15000	6	12
16	1660	33000	20000	8	16
20	2070	33000	26000	10	20
25	2590	33000	32000	12.5	25
Depth of Cut					

■Slot Milling

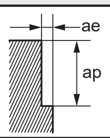
(mm)

Workpiece Material	Aluminium Alloys				
Dia. DC	Cutting Speed (m/min)	Revolution (min^{-1})	Feed Rate (mm/min)	Depth of Cut ap(mm)	
12	1240	33000	15000	6	
16	1660	33000	20000	8	
20	2070	33000	26000	10	
25	2590	33000	32000	12.5	
Depth of Cut	 DC:Cutting Dia.				

General-purpose conditions

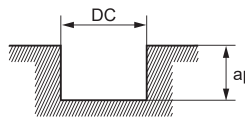
■Side Milling

(mm)

Workpiece Material	Aluminium Alloys				
Dia. DC	Cutting Speed (m/min)	Revolution (min^{-1})	Feed Rate (mm/min)	Depth of cut ae(mm)	Depth of Cut ap(mm)
12	600	16000	7200	6	12
16	600	12000	7200	8	16
20	600	9500	7400	10	20
25	600	7600	7300	12.5	25
Depth of Cut					

■Slot Milling

(mm)

Workpiece Material	Aluminium Alloys				
Dia. DC	Cutting Speed (m/min)	Revolution (min^{-1})	Feed Rate (mm/min)	Depth of Cut ap(mm)	
12	600	16000	7200	6	
16	600	12000	7200	8	
20	600	9500	7400	10	
25	600	7600	7300	12.5	
Depth of Cut	 DC:Cutting Dia.				

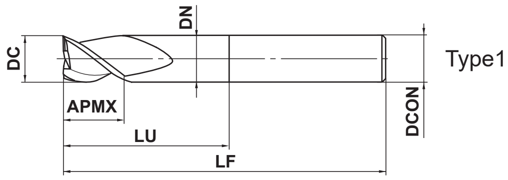
Note 1) It is recommended to use a water-soluble coolant. It is also possible to use an air blower (external/internal) for DLC coating.
Note 2) Down cut is recommended for side cutting.
Note 3) This table shows the cutting conditions with an overhang length of less than 4D. If more than 4D, spindle speed, feed rate and depth of cut should be reduced.
Note 4) When ramping, consider the chip discharge and use a feed rate 50% lower than the slotting conditions above and also use a ramping angle of 5º or less.
Note 5) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

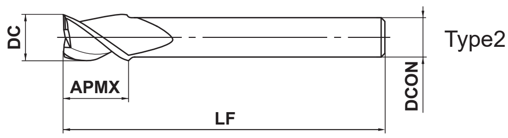
C3SA

End mill, Short cut length, 3 flute, For aluminium alloy

UWC 37.5° Non-center Cutting Center Cutting

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
							◎





DC≤12	DC>12			
0 - 0.020	0 - 0.030			
8≤DCON≤10	12≤DCON≤16	20≤DCON≤25		
0 - 0.009	0 - 0.011	0 - 0.013		

h6

●High efficiency machining for aluminium alloys.

(mm)

Order Number	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	Type	Center cutting edge
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	○

▲ : Product scheduled to be discontinued at the end of March 2023
A3SA (J113) is alternative product.

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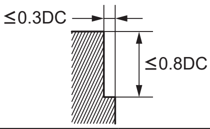
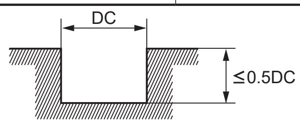
ISO13399 ➤ J002

RECOMMENDED CUTTING CONDITIONS

■Side milling

Workpiece Material	Aluminium alloy	
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
Depth of cut		DC:Dia.

■Slotting

Workpiece Material	Aluminium alloy	
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
Depth of cut		DC:Dia.

Note 1) Water-soluble cutting fluid is recommended.
Note 2) Climb cutting is recommended for side milling.
Note 3) This table shows the cutting condition with less than 4D overhang length. If more than 4D, spindle speed, feed rate and depth of cut should be reduced.
Note 4) These end mills do not have a centre cutting edge, therefore when entering a workpiece use a ramping process rather than vertical feed.
Note 5) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

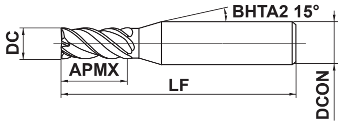
CARBIDE

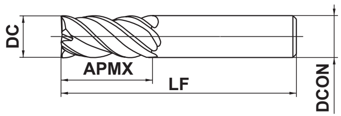
MPMHV

End mill, Medium cut length, 4 flute, Irregular helix flutes

UWC MS+ 37° 40°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	○		◎	○	○	



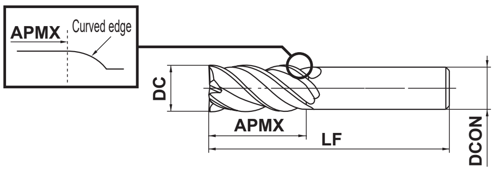


	DC≤12	DC>12			
	0 - 0.02	0 - 0.03			
h5	DCON=4	DCON=6	DCON=8		
	0 - 0.005	0 - 0.005	0 - 0.006		
h6	DCON=6(DC=8)	DCON=8(DC=10)	DCON=10	12≤DCON≤16	DCON=20
	0 - 0.008	0 - 0.009	0 - 0.009	0 - 0.011	0 - 0.013

● flute irregular helix end mill for reduced vibration when machining stainless steels and carbon steels.

(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
MPMHVD1000	10	25	80	10	4	●	2
MPMHVD1200	12	30	100	12	4	●	2
MPMHVD1600	16	40	110	16	4	●	2
MPMHVD2000	20	50	125	20	4	●	2



Slim Shank

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
MPMHVD0700S06	7	17.5	80	6	4	●	3
MPMHVD0800S06	8	20	90	6	4	●	3
MPMHVD0900S08	9	22.5	90	8	4	●	3
MPMHVD1000S08	10	25	100	8	4	●	3
MPMHVD1100S10	11	28	100	10	4	●	3
MPMHVD1200S10	12	30	110	10	4	●	3
MPMHVD1300S12	13	32	110	12	4	●	3
MPMHVD1400S12	14	35	130	12	4	●	3
MPMHVD1800S16	18	45	150	16	4	●	3
MPMHVD2200S20	22	55	160	20	4	●	3

● : Inventory maintained in Japan.

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ISO13399 ➤ J002

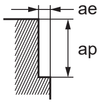
RECOMMENDED CUTTING CONDITIONS

■Side milling

*Please refer to page J120 for cutting conditions of slim shank.

Workpiece 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 (45−55HRC) 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
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
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

Depth of cut



Note 1) Wet cutting mode is recommended for cutting stainless steels and titanium alloys, and air blow is recommended for carbon steels.

Note 2) Vibration damping end mills are more effective in suppressing chatter and vibration compared to general end mills, but these may still occur if the rigidity of the machine or the workpiece material is low. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

MPMHV

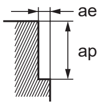
End mill, Medium cut length, 4 flute, Irregular helix flutes

RECOMMENDED CUTTING CONDITIONS

■Side milling (Slim Shank)

Workpiece 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 (45−55HRC) 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)
7	4100	1200	12	0.7	3300	860	12	0.7	2700	700	12	0.7	1900	270	12	0.35
8	3600	1200	13.5	0.8	2900	870	13.5	0.8	2400	720	13.5	0.8	1700	270	13.5	0.4
9	3200	1200	15	0.9	2500	900	15	0.9	2100	660	15	0.9	1500	270	15	0.45
10	2900	1300	17	1	2300	920	17	1	1900	670	17	1	1300	260	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	2400	1200	20.5	1.2	1900	840	20.5	1.2	1600	650	20.5	1.2	1100	220	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
14	2000	960	24	1.4	1600	700	24	1.4	1400	460	24	1.4	950	150	24	0.7
18	1600	770	31	1.8	1300	570	31	1.8	1100	360	31	1.8	740	120	31	0.9
22	1300	620	37.5	2.2	1000	440	37.5	2.2	870	280	37.5	2.2	610	98	37.5	1.2

Depth of cut



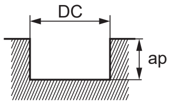
Note 1) Wet cutting mode is recommended for cutting stainless steels and titanium alloys, and air blow is recommended for carbon steels.

Note 2) Vibration damping end mills are more effective in suppressing chatter and vibration compared to general end mills, but these may still occur if the rigidity of the machine or the workpiece material is low. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

■Slotting

Workpiece 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 (45−55HRC) 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
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

Depth of cut



DC:Dia.

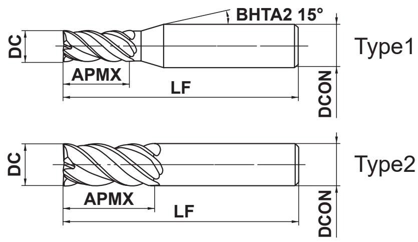
Note 3) Slim shank type is not recommended for grooving.

MPJHV

End mill, Semi long cut length, 4 flute, Irregular helix flutes

UWC MS+ 37.5° 40° APMX=DCx3.3 38° 40° APMX=DCx4

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	○		◎	○	○	



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=10	DCON=12	DCON=16	DCON=20	
0 - 0.009	0 - 0.011	0 - 0.011	0 - 0.013	

- Irregular helix flutes end mill for reduced vibration when machining stainless steels and carbon steels.
- Semi long flute length suitable for vertical wall finishing.

(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

● : Inventory maintained in Japan.

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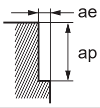
ISO13399 ➤J002

RECOMMENDED CUTTING CONDITIONS

■Side milling

Workpiece 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 (45−55HRC) 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
	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
	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
	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
	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
	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
	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
	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
	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
	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
	80	1800	580	60	0.6	1400	400	60	0.6	1200	310	60	0.6	900	180	60	0.4

Depth of cut



Note 1) Wet cutting mode is recommended for cutting stainless steels and titanium alloys, and air blow is recommended for carbon steels.

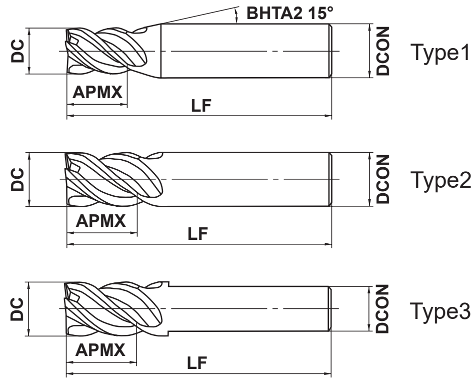
Note 2) Vibration damping end mills are more effective in suppressing chatter and vibration compared to general end mills, but these may still occur if the rigidity of the machine or the workpiece material is low. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

MSSHD

High power, Short cut length, 4 flute

UWC MS 45°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	○		○	○	○	



DC≤12	DC>12			
0 - 0.020	0 - 0.030			
DCON=6	8≤DCON≤10	12≤DCON≤16	DCON=20	
h6 0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013	

●4 flute high power end mill.

(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

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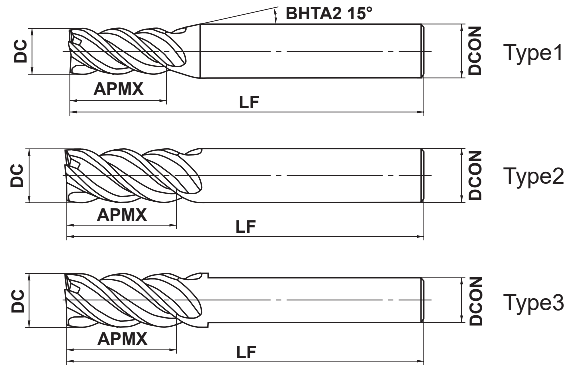
ISO13399 ➤ J002

MSMHD

High power, Medium cut length, 4 flute

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	○		○	○	○	



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	

●4 flute high power end mill.

(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
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

CARBIDE

MSMHD

High power, Medium cut length, 4 flute

(mm)

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
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
MSMHDD1200S10	12	26	75	10	4	●	3
MSMHDD1200	12	26	75	12	4	●	2
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

● : Inventory maintained in Japan.

ISO13399 ➤J002

MSSHD
High power, Short cut length, 4 flute

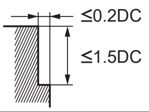
MSMHD
High power, Medium cut length, 4 flute

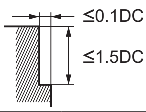
RECOMMENDED CUTTING CONDITIONS

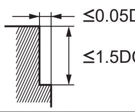
■Side milling

Workpiece 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		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)	Revolution (min^{-1})	Feed rate (mm/min)
2	15000	550	10000	340	10000	320	6400	160	4800	100
3	11000	800	7400	500	7400	480	4800	250	4000	170
4	8000	900	5600	540	5600	520	3600	270	3200	240
5	6400	1000	4500	600	4500	580	2900	300	2600	240
6	5800	1100	3700	640	3700	600	2400	320	2100	230
8	4400	1100	2800	660	2800	600	1800	330	1600	220
10	3500	1000	2200	640	2200	560	1400	320	1300	200
12	2900	1000	1900	640	1900	530	1200	320	1100	170
16	2200	800	1400	500	1400	450	900	250	800	130
20	1800	750	1100	460	1100	440	720	230	640	100
25	1400	600	900	400	900	380	570	200	510	80

Depth of cut





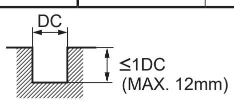


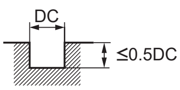
DC:Dia.

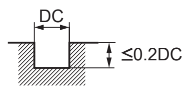
■Slotting

Workpiece 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		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)	Revolution (min^{-1})	Feed rate (mm/min)
2	12000	400	7000	200	7000	100	4200	80	2300	40
3	9000	600	5300	300	5300	150	3200	130	1900	70
4	7200	720	4000	360	4000	180	2400	140	1400	95
5	5800	720	3200	360	3200	180	1900	150	1100	95
6	5000	800	2700	400	2700	200	1600	160	950	95
8	3700	800	2000	400	2000	200	1200	170	720	90
10	3000	720	1600	360	1600	180	960	160	570	80
12	2500	720	1300	360	1300	180	800	160	480	70
16	2000	600	1000	280	1000	150	600	130	360	50
20	1600	540	800	250	800	130	480	120	290	40
25	1300	480	640	220	640	120	380	100	230	35

Depth of cut







DC:Dia.

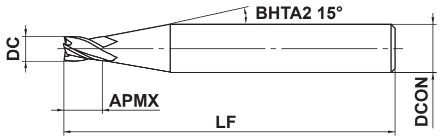
Note 1) When cutting austenitic stainless steels, the use of water-soluble cutting fluid is effective.
Note 2) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 3) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

MS4SC

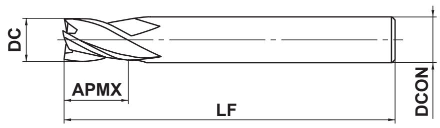
End mill, Short cut length, 4 flute

30°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	○		○	○	○	



Type1



Type2

1≤DC≤12				
0 - 0.020				
4≤DCON≤6	8≤DCON≤10	DCON=12		
0 - 0.008	0 - 0.009	0 - 0.011		

●4 flute end mill for general use.

(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

● : Inventory maintained in Japan.

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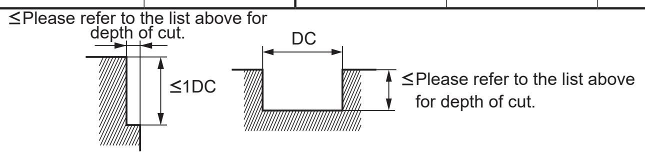
RECOMMENDED CUTTING CONDITIONS

Workpiece 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 (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (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

Depth of cut



DC:Dia.

Note 1) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 2) When slotting with end mills with ϕ3 or larger, reduce the revolution to 50−70% and the feed rate to 40−60%.
Note 3) When drilling, please set the feed rate at 1/3 or below the values above.
Note 4) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

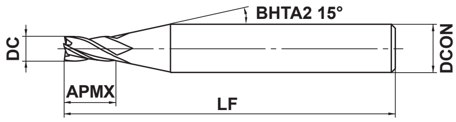
CARBIDE
SQUARE
BALL
RADIUS
TAPER
BARREL
ROUGHING
CHAMFER
J
SOLID END MILLS

MS4MC

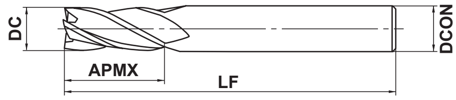
End mill, Medium cut length, 4 flute

UWC MS 30°

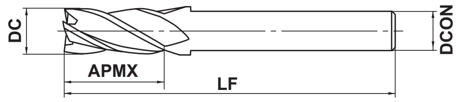
Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	○		○	○	○	



Type1



Type2



Type3

DC≤12	DC>12			
0 - 0.020	0 - 0.030			
4≤DCON≤6	8≤DCON≤10	12≤DCON≤16	DCON=20	
h6 0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013	

●4 flute end mill for general use.

(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

● : Inventory maintained in Japan.

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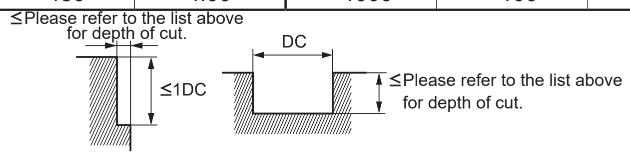
ISO13399 ➤ J002

RECOMMENDED CUTTING CONDITIONS

Workpiece 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 (mm)**	**Revolution (min^{-1})**	**Feed rate (mm/min)**	**Depth of cut (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

Depth of cut



DC:Dia.

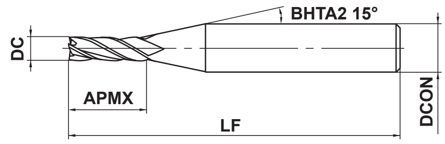
Note 1) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 2) When slotting with end mills with ϕ3 or larger, reduce the revolution to 50−70% and the feed rate to 40−60%.
Note 3) When drilling, please set the feed rate at 1/3 or below the values above.
Note 4) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

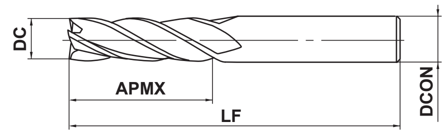
MS4JC

End mill, Semi long cut length, 4 flute

UWC MS 30° DC<3 DC≥3 DC<3 DC≥3

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	○		○	○	○	





1≤DC≤12				
0 - 0.020				

h6 4≤DCON≤6	8≤DCON≤10	DCON=12		
0 - 0.008	0 - 0.009	0 - 0.011		

●4 flute end mill for general use.

(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

● : Inventory maintained in Japan.

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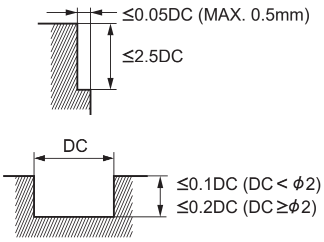
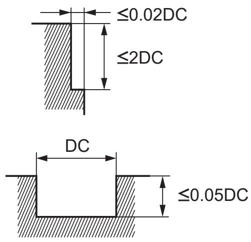
➢ J002

RECOMMENDED CUTTING CONDITIONS

Workpiece 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

Depth of cut





DC:Dia.

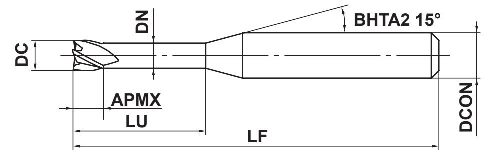
Note 1) When cutting austenitic stainless steels, the use of water-soluble cutting fluid is effective.
Note 2) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 3) When drilling, please set the feed rate at 1/3 or below the values above.
Note 4) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

MS4XL

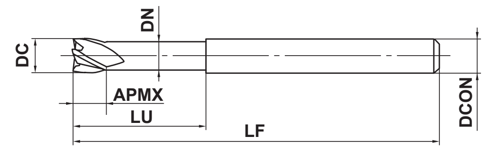
End mill, Short cut length, 4 flute, Long neck

UWC MS 30°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	○		○	○	○	



Type1



Type2

	1≦DC≦10			
	0 - 0.020			
h6	4≦DCON≦6	8≦DCON≦10		
	0 - 0.008	0 - 0.009		

●4 flute long neck end mill.

(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
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

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ISO13399 ➤J002

(mm)

Order Number	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	Type
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
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

MS4XL

End mill, Short cut length, 4 flute, Long neck

(mm)

Order Number	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	Type
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

● : Inventory maintained in Japan.

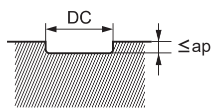
ISO13399 ➤ J002

RECOMMENDED CUTTING CONDITIONS

Workpiece 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

Workpiece 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)
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	0.5
	35	6400	1200	0.2
	50	3200	600	0.05
6	**20**	11000	2200	1.2
	30	8000	1600	0.6
	40	5400	1100	0.25
	50	3200	640	0.15
8	**30**	8000	1600	1.6
	50	4000	800	0.5
	70	2000	400	0.2
10	**40**	6400	1300	2
	60	3200	640	0.6
	80	1600	320	0.3

Depth of cut



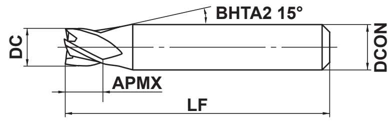
DC:Dia.
ap:Depth of Cut in the Axial Direction

Note 1) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 2) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

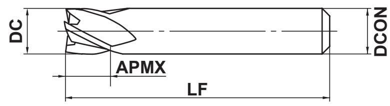
MP4EC NEW

End mill, For small automatic lathes, 4 flute

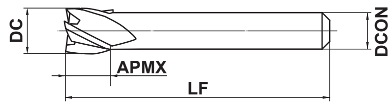
Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	○		○	○	○	



Type1



Type2



Type3

3≤DC≤12	DC=14			
-0.010 -0.030	-0.010 -0.040			
4≤DCON≤6	7≤DCON≤10	DCON=12		
0 -0.008	0 -0.009	0 -0.011		

● 4 flute end mill.

(mm)

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
MP4ECD0300S04	3	4.5	50	4	4	●	1
MP4ECD0350S04	3.5	5	50	4	4	●	1
MP4ECD0400S04	4	6	50	4	4	●	2
MP4ECD0500S06	5	7.5	50	6	4	●	1
MP4ECD0600S06	6	9	50	6	4	●	2
MP4ECD0700S07	7	10.5	50	7	4	●	2
MP4ECD0800S07	8	12	50	7	4	●	3
MP4ECD0800S08	8	12	50	8	4	●	2
MP4ECD0900S10	9	13.5	50	10	4	●	1
MP4ECD1000S07	10	15	50	7	4	●	3
MP4ECD1000S10	10	15	50	10	4	●	2
MP4ECD1200S10	12	15	50	10	4	●	3
MP4ECD1200S12	12	15	50	12	4	●	2
MP4ECD1400S10	14	15	50	10	4	●	3

SQUARE
BALL
RADIUS
TAPER
BARREL
ROUGHING
CHAMFER
J
SOLID END MILLS

● : Inventory maintained in Japan.

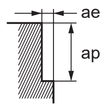
RECOMMENDED CUTTING CONDITIONS

■Side Milling

(mm)

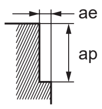
Workpiece Material	Carbon steel, Cast iron, Alloy steel (−30HRC) AISI 1050, AISI No 35 B, AISI P20				Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21				Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V			
Dia. **DC**	Revolution (min^{-1})	Feed rate (mm/min)	Depth of Cut **ap**	Width of Cut **ae**	Revolution (min^{-1})	Feed rate (mm/min)	Depth of Cut **ap**	Width of Cut **ae**	Revolution (min^{-1})	Feed rate (mm/min)	Depth of Cut **ap**	Width of Cut **ae**
3	10000	900	3	0.6	7000	600	3	0.6	6000	450	3	0.6
3.5	8500	900	3.5	0.6	6000	600	3.5	0.6	5100	450	3.5	0.6
4	7500	900	4	0.6	5200	600	4	0.6	4500	450	4	0.6
5	6000	900	5	0.6	4200	600	5	0.6	3600	450	5	0.6
6	5000	900	6	0.6	3500	600	6	0.6	3000	450	6	0.6
7	4500	840	7	0.6	3200	540	7	0.6	2700	420	7	0.6
8	4000	780	8	0.6	2800	520	8	0.6	2400	390	8	0.6
9	3500	720	9	0.6	2500	480	9	0.6	2100	360	9	0.6
10	3200	680	10	0.6	2200	450	10	0.6	1900	340	10	0.6
12	2700	620	12	0.6	1900	410	12	0.6	1600	310	12	0.6
14	2300	550	14	0.6	1600	350	14	0.6	1400	280	14	0.6

Depth of cut



Workpiece Material	Hardened steel (45−55HRC) AISI H13				Copper, Copper Alloy			
Dia. **DC**	Revolution (min^{-1})	Feed rate (mm/min)	Depth of Cut **ap**	Width of Cut **ae**	Revolution (min^{-1})	Feed rate (mm/min)	Depth of Cut **ap**	Width of Cut **ae**
3	5000	180	3	0.2	13000	1200	3	0.6
3.5	4500	180	3.5	0.2	11000	1200	3.5	0.6
4	4000	180	4	0.2	9500	1100	4	0.6
5	3200	180	5	0.2	7600	1100	5	0.6
6	2700	180	6	0.2	6400	1100	6	0.6
7	2300	160	7	0.2	5500	1000	7	0.6
8	2000	160	8	0.2	4800	940	8	0.6
9	1800	150	9	0.2	4200	860	9	0.6
10	1600	140	10	0.2	3800	810	10	0.6
12	1300	120	12	0.2	3200	730	12	0.6
14	1200	120	14	0.2	2700	650	14	0.6

Depth of cut



Note 1) When cutting austenitic stainless steels, the use of water-soluble cutting fluid is effective.
Note 2) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 3) When drilling, please set the feed rate at 1/3 or below the values above.
Note 4) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

MP4EC

End mill, For small automatic lathes, 4 flute

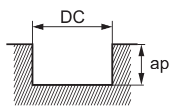
RECOMMENDED CUTTING CONDITIONS

■Slotting

(mm)

Workpiece 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**	Revolution (min^{-1})	Feed rate (mm/min)	Depth of Cut **ap**	Revolution (min^{-1})	Feed rate (mm/min)	Depth of Cut **ap**	Revolution (min^{-1})	Feed rate (mm/min)	Depth of Cut **ap**
3	10000	900	0.6	7000	600	0.6	6000	450	0.6
3.5	8500	900	0.6	6000	600	0.6	5100	450	0.6
4	7500	900	0.6	5200	600	0.6	4500	450	0.6
5	6000	900	0.6	4200	600	0.6	3600	450	0.6
6	5000	900	0.6	3500	600	0.6	3000	450	0.6
7	4500	840	0.6	3200	540	0.6	2700	420	0.6
8	4000	780	0.6	2800	520	0.6	2400	390	0.6
9	3500	720	0.6	2500	480	0.6	2100	360	0.6
10	3200	680	0.6	2200	450	0.6	1900	340	0.6
12	2700	620	0.6	1900	410	0.6	1600	310	0.6
14	2300	550	0.6	1600	350	0.6	1400	280	0.6

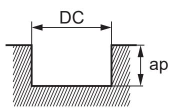
Depth of cut



DC:Dia.

Workpiece Material	Hardened steel (45−55HRC) AISI H13			Copper, Copper Alloy		
Dia. **DC**	Revolution (min^{-1})	Feed rate (mm/min)	Depth of Cut **ap**	Revolution (min^{-1})	Feed rate (mm/min)	Depth of Cut **ap**
3	5000	180	0.2	13000	1200	0.6
3.5	4500	180	0.2	11000	1200	0.6
4	4000	180	0.2	9500	1100	0.6
5	3200	180	0.2	7600	1100	0.6
6	2700	180	0.2	6400	1100	0.6
7	2300	160	0.2	5500	1000	0.6
8	2000	160	0.2	4800	940	0.6
9	1800	150	0.2	4200	860	0.6
10	1600	140	0.2	3800	810	0.6
12	1300	120	0.2	3200	730	0.6
14	1200	120	0.2	2700	650	0.6

Depth of cut



DC:Dia.

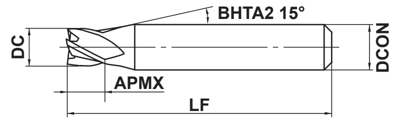
Note 1) When cutting austenitic stainless steels, the use of water-soluble cutting fluid is effective.
Note 2) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 3) When drilling, please set the feed rate at 1/3 or below the values above.
Note 4) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

MS4EC

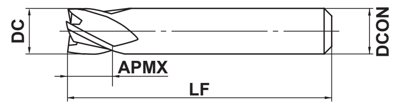
End mill, 4 flute, For small automatic lathes

30°

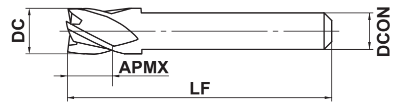
Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	○		○	○	○	



Type1



Type2



Type3

DC≤12	DC>12			
0 - 0.020	0 - 0.030			
4≤DCON≤6	7≤DCON≤10			
0 - 0.008	0 - 0.009			

h6

●4 flute end mill.

Overall length 35mm (mm)

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
MS4ECD0300L35S04	3	3	35	4	4	●	1
MS4ECD0350L35S04	3.5	3.5	35	4	4	●	1
MS4ECD0400L35S04	4	4	35	4	4	●	2
MS4ECD0500L35S05	5	5	35	5	4	●	2
MS4ECD0500L35S06	5	5	35	6	4	●	1
MS4ECD0600L35S05	6	6	35	5	4	●	3
MS4ECD0600L35S06	6	6	35	6	4	●	2
MS4ECD0700L35S07	7	6	35	7	4	●	2
MS4ECD0800L35S07	8	6	35	7	4	●	3
MS4ECD0800L35S08	8	6	35	8	4	●	2
MS4ECD1000L35S07	10	6	35	7	4	●	3
MS4ECD1000L35S10	10	6	35	10	4	●	2
MS4ECD1200L35S10	12	6	35	10	4	●	3

Overall length 45mm (mm)

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
MS4ECD0300L45S04	3	3	45	4	4	●	1
MS4ECD0350L45S04	3.5	3.5	45	4	4	●	1
MS4ECD0400L45S04	4	4	45	4	4	●	2
MS4ECD0500L45S06	5	5	45	6	4	●	1
MS4ECD0600L45S06	6	6	45	6	4	●	2
MS4ECD0700L45S07	7	7	45	7	4	●	2
MS4ECD0800L45S07	8	8	45	7	4	●	3
MS4ECD0800L45S08	8	8	45	8	4	●	2
MS4ECD1000L45S07	10	10	45	7	4	●	3
MS4ECD1000L45S10	10	10	45	10	4	●	2
MS4ECD1200L45S10	12	12	45	10	4	●	3
MS4ECD1400L45S10	14	14	45	10	4	●	3

● : Inventory maintained in Japan.

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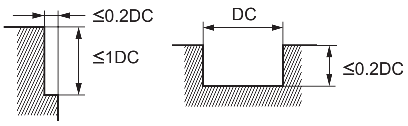
MS4EC

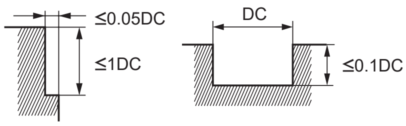
End mill, 4 flute, For small automatic lathes

RECOMMENDED CUTTING CONDITIONS

Workpiece 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

Depth of cut





DC:Dia.

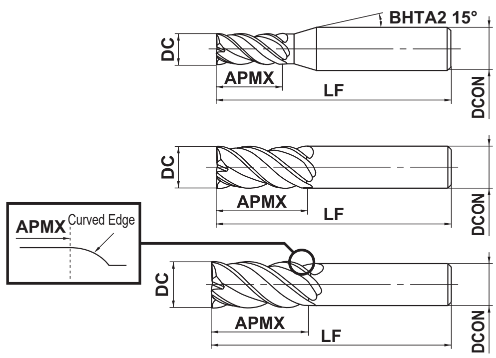
Note 1) When cutting austenitic stainless steels, the use of water-soluble cutting fluid is effective.
Note 2) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 3) When drilling, please set the feed rate at 1/3 or below the values above.
Note 4) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

VQMHV

End mill, Medium cutting length, 4 flute, Irregular helix flutes

37° 40°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎			◎	◎	○	



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	

● Smart Miracle vibration control end mill achieving stable machining of difficult-to-cut materials and for long overhang applications.

(mm)

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
VQMHVD0100	1	2	45	4	4	●	1
VQMHVD0150	1.5	3	45	4	4	●	1
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
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

Note 1) 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.

● : Inventory maintained in Japan.

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CARBIDE

VQMHV

End mill, Medium length of cut, 4 flute, Irregular helix flutes

SQUARE BALL RADIUS TAPER BARREL ROUGHING CHAMFER J SOLID END MILLS

RECOMMENDED CUTTING CONDITIONS

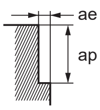
■Side milling

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

Workpiece 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, Ferritic and Martensitic stainless steels, Titanium alloys AISI 304, AISI 316, Ti-6Al-4V					Hardened stainless steels, Cobaly 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)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)
1	130	40000	1800	1.5	0.3	120	38000	910	1.5	0.3	80	25000	500	1.5	0.2	75	24000	580	1.5	0.2
2	150	24000	2400	3	0.6	120	19000	1100	3	0.6	100	16000	830	3	0.6	75	12000	720	3	0.4
3	150	16000	2600	4.5	0.9	120	13000	1200	4.5	0.9	100	11000	880	4.5	0.9	75	8000	770	4.5	0.6
4	150	12000	2600	6	1.2	120	9500	1300	6	1.2	100	8000	900	6	1.2	75	6000	790	6	0.8
5	150	9500	2600	7.5	1.5	120	7600	1300	7.5	1.5	100	6400	900	7.5	1.5	75	4800	810	7.5	1
6	150	8000	2600	9	1.8	120	6400	1300	9	1.8	100	5300	1100	9	1.8	75	4000	810	9	1.2
8	150	6000	2500	12	2.4	120	4800	1300	12	2.4	100	4000	1200	12	2.4	75	3000	840	12	1.6
10	150	4800	2300	15	3	120	3800	1200	15	3	100	3200	1300	15	3	75	2400	770	15	2
12	150	4000	1900	18	3.6	120	3200	1200	18	3.6	100	2700	1200	18	3.6	75	2000	720	18	2.4
16	150	3000	1600	24	4.8	120	2400	960	24	4.8	100	2000	960	24	4.8	75	1500	600	24	3.2
20	150	2400	1300	30	6	120	1900	760	30	6	100	1600	770	30	6	75	1200	480	30	4
25	150	1900	1100	37.5	7.5	120	1500	600	37.5	7.5	100	1300	620	37.5	7.5	75	950	380	37.5	5

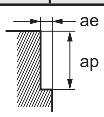
Depth of cut



General-purpose conditions

Workpiece 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, Ferritic and Martensitic stainless steels, Titanium alloys AISI 304, AISI 316, Ti-6Al-4V					Hardened stainless steels, Cobaly 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)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)
1	120	38000	1000	1.5	0.3	100	32000	560	1.5	0.3	80	25000	400	0.75	0.1	70	22000	390	1.5	0.2
2	120	19000	1300	3	0.6	100	16000	630	3	0.6	80	13000	450	1.5	0.2	70	11000	440	3	0.4
3	120	13000	1400	4.5	0.9	100	11000	700	4.5	0.9	80	8500	450	2.2	0.3	70	7400	470	4.5	0.6
4	120	9500	1400	6	1.2	100	8000	700	6	1.2	80	6400	470	3	0.6	70	5600	490	6	0.8
5	120	7600	1400	7.5	1.5	100	6400	710	7.5	1.5	80	5100	470	4.5	0.9	70	4500	500	7.5	1
6	120	6400	1400	9	1.8	100	5300	710	9	1.8	80	4200	580	6	1.2	70	3700	500	9	1.2
8	120	4800	1300	12	2.4	100	4000	740	12	2.4	80	3200	630	7.5	1.5	70	2800	520	12	1.6
10	120	3800	1200	15	3	100	3200	680	15	3	80	2500	660	9	1.8	70	2200	460	15	2
12	120	3200	1000	18	3.6	100	2700	640	18	3.6	80	2100	610	12	2.4	70	1900	450	18	2.4
16	120	2400	860	24	4.8	100	2000	530	24	4.8	80	1600	510	15	3	70	1400	370	24	3.2
20	120	1900	680	30	6	100	1600	420	30	6	80	1300	410	18	3.6	70	1100	290	30	4
25	120	1500	390	37.5	7.5	100	1300	340	37.5	7.5	80	1000	210	24	4.8	70	890	230	37.5	5

Depth of cut



Note 1) 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.
Note 2) Effective cutting of stainless steel, titanium alloys and heat-resistant alloys etc. can be achieved with the use of emulsion.
Note 3) Vibration damping end mills are more effective in suppressing chatter and vibration compared to general end mills, but these may still occur if the rigidity of the machine or the workpiece material is low. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.
Note 4) When the depth of cut is smaller than shown the revolution and feed rate can be increased.

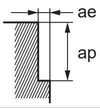
■Side milling

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

Workpiece Material	Copper, Copper alloy					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)
1	130	40000	1800	1.5	0.3	40	13000	210	1.5	0.1
2	180	29000	2900	3	0.6	40	6400	230	3	0.2
3	180	19000	3000	4.5	0.9	40	4200	240	4.5	0.3
4	180	14000	3000	6	1.2	40	3200	240	6	0.4
5	180	11000	3000	7.5	1.5	40	2500	240	7.5	0.5
6	180	9500	3000	9	1.8	40	2100	250	9	0.6
8	180	7200	3000	12	2.4	40	1600	260	12	0.8
10	180	5700	2700	15	3	40	1300	290	15	1
12	180	4800	2300	18	3.6	40	1100	280	18	1.2
16	180	3600	1900	24	4.8	40	800	200	24	1.6
20	180	2900	1600	30	6	40	640	160	30	2
25	180	2300	1300	37.5	7.5	40	510	130	37.5	2.5

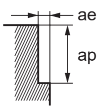
Depth of cut



General-purpose conditions

Workpiece Material	Copper, Copper alloy					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)
1	130	40000	1300	1.5	0.3	30	9600	92	1.5	0.1
2	140	22000	1500	3	0.6	30	4800	110	3	0.2
3	140	15000	1600	4.5	0.9	30	3200	120	4.5	0.3
4	140	11000	1600	6	1.2	30	2400	120	6	0.4
5	140	8900	1600	7.5	1.5	30	1900	120	7.5	0.5
6	140	7400	1600	9	1.8	30	1600	130	9	0.6
8	140	5600	1600	12	2.4	30	1200	130	12	0.8
10	140	4500	1400	15	3	30	950	140	15	1
12	140	3700	1200	18	3.6	30	800	140	18	1.2
16	140	2800	1000	24	4.8	30	600	100	24	1.6
20	140	2200	780	30	6	30	480	81	30	2
25	140	1800	670	37.5	7.5	30	380	64	37.5	2.5

Depth of cut



Note 1) 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.
Note 2) Effective cutting of stainless steel, titanium alloys and heat-resistant alloys etc. can be achieved with the use of emulsion.
Note 3) Vibration damping end mills are more effective in suppressing chatter and vibration compared to general end mills, but these may still occur if the rigidity of the machine or the workpiece material is low. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.
Note 4) When the depth of cut is smaller than shown the revolution and feed rate can be increased.

VQMHV

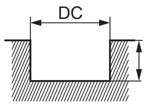
End mill, Medium length of cut, 4 flute, Irregular helix flutes

RECOMMENDED CUTTING CONDITIONS

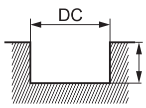
■Slotting

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

Workpiece 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, Ferritic and Martensitic stainless steels, Titanium alloys AISI 304, AISI 316, Ti-6Al-4V				Hardened stainless steels, Cobaly chromium alloy AISI 630, AISI 631 15-5PH, 17-4PH				Copper, Copper alloy				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)	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	60	9500	300	1	180	29000	1500	2	30	4800	130	0.6
3	150	16000	1500	3	120	13000	730	3	100	11000	660	3	60	6400	360	1.5	180	19000	1700	3	30	3200	150	0.9
4	150	12000	1900	4	120	9500	910	4	100	8000	700	4	60	4800	460	2	180	14000	2200	4	30	2400	170	1.2
5	150	9500	1900	5	120	7600	910	5	100	6400	720	5	60	3800	460	2.5	180	11000	2200	5	30	1900	170	1.5
6	150	8000	1900	6	120	6400	1000	6	100	5300	740	6	60	3200	510	3	180	9500	2300	6	30	1600	180	1.8
8	150	6000	1700	8	120	4800	960	8	100	4000	800	8	60	2400	480	4	180	7200	2000	8	30	1200	190	2.4
10	150	4800	1500	10	120	3800	840	10	100	3200	900	10	60	1900	420	5	180	5700	1800	10	30	950	210	3
12	150	4000	1300	12	120	3200	770	12	100	2700	860	12	60	1600	380	6	180	4800	1500	12	30	800	200	3.6
16	150	3000	1100	12	120	2400	670	12	100	2000	640	12	60	1200	340	8	180	3600	1300	12	30	600	150	4.8
20	150	2400	860	12	120	1900	530	12	100	1600	510	12	60	950	270	10	180	2900	1000	12	30	480	120	6
25	150	1900	760	12	120	1500	420	12	100	1300	420	12	60	760	210	12	180	2300	920	12	30	380	100	7.5
Depth of cut	 DC:Dia.																							

General-purpose conditions

Workpiece 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, Ferritic and Martensitic stainless steels, Titanium alloys AISI 304, AISI 316, Ti-6Al-4V				Hardened stainless steels, Cobaly chromium alloy AISI 630, AISI 631 15-5PH, 17-4PH				Copper, Copper alloy				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)	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	500	1	80	25000	250	1	80	25000	300	1	50	16000	150	0.5	120	38000	590	1	25	8000	67	0.3
2	100	16000	550	2	80	13000	270	2	60	9500	250	2	50	8000	170	1	120	19000	650	2	25	4000	74	0.6
3	100	11000	670	3	80	8500	310	3	60	6400	250	3	50	5300	200	1.5	120	13000	790	3	25	2700	86	0.9
4	100	8000	840	4	80	6400	410	4	60	4800	280	4	50	4000	250	2	120	9500	1000	4	25	2000	93	1.2
5	100	6400	840	5	80	5100	410	5	60	3800	280	5	50	3200	250	2.5	120	7600	1000	5	25	1600	95	1.5
6	100	5300	840	6	80	4200	440	6	60	3200	300	6	50	2700	290	3	120	6400	1000	6	25	1300	96	1.8
8	100	4000	740	8	80	3200	420	8	60	2400	320	8	50	2000	260	4	120	4800	890	8	25	990	100	2.4
10	100	3200	680	10	80	2500	360	10	60	1900	350	10	50	1600	230	5	120	3800	800	10	25	800	120	3
12	100	2700	570	12	80	2100	330	12	60	1600	340	12	50	1300	210	6	120	3200	680	12	25	660	110	3.6
16	100	2000	480	12	80	1600	300	12	60	1200	250	12	50	990	180	8	120	2400	570	12	25	500	84	4.8
20	100	1600	380	12	80	1300	240	12	60	950	200	12	50	800	150	10	120	1900	450	12	25	400	68	6
25	100	1300	340	12	80	1000	180	12	60	760	160	12	50	640	120	12	120	1500	400	12	25	320	50	7.5
Depth of cut	 DC:Dia.																							

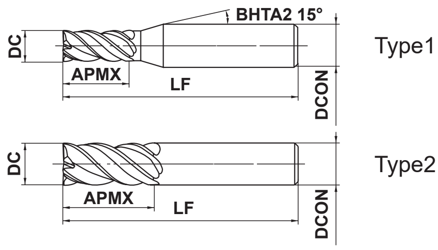
Note 1) SMART MIRACLE Coating is not energized because of its nature. Therefore, an external contact (voltaic type) tool setter cannot be used. An internal contact (non-voltaic) type or laser type tool setter is recommended to measure the length of the tool.
Note 2) Effective cutting of stainless steel, titanium alloys and heat-resistant alloys etc. can be achieved with the use of emulsion.
Note 3) Vibration damping end mills are more effective in suppressing chatter and vibration compared to general end mills, but these may still occur if the rigidity of the machine or the workpiece material is low. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.
Note 4) When the depth of cut is smaller than shown the revolution and feed rate can be increased.

VQJHV

End mill, Semi long cut length, 4 flute, Irregular helix flutes

UWC VQ 38° 40° DC≤6 37.5° 40° DC>6

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎			◎	◎	○	



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	

h6

● Smart Miracle vibration control end mill achieving stable machining of difficult-to-cut materials and for long overhang applications.

(mm)

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
VQJHVD0100	1	4	45	4	4	●	1
VQJHVD0150	1.5	6	45	4	4	●	1
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

Note 1) 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.

● : Inventory maintained in Japan.

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VQJHV

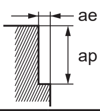
End mill, Medium cut length, 4 flute, Irregular helix flutes

RECOMMENDED CUTTING CONDITIONS

■Side milling

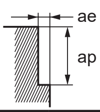
Workpiece Material	Carbon steel, Alloy steel, Mild steel AISI 1045, AISI 4140, ASTM A36, AISI 1010					Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340					Austenitic, Ferritic and Martensitic stainless steels, Titanium alloys AISI 304, AISI 306, Ti-6Al-4V					Hardened stainless steels, Cobaly chromium alloy SUS630, SUS631, 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)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)
1	130	40000	530	2.5	0.1	100	32000	410	2.5	0.1	80	25000	300	2.5	0.05	75	24000	290	2.5	0.05
2	130	21000	700	5	0.2	100	16000	510	5	0.2	80	13000	390	5	0.1	75	12000	360	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	75	8000	460	7.5	0.15
4	130	10000	1000	10	0.4	100	8000	690	10	0.4	80	6400	540	10	0.2	75	6000	510	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	75	4800	540	12.5	0.25
6	130	6900	1200	15	0.6	100	5300	810	15	0.6	80	4200	630	15	0.3	75	4000	600	15	0.3
8	130	5200	1200	20	0.8	100	4000	840	20	0.8	80	3200	640	20	0.4	75	3000	600	20	0.4
10	130	4100	1100	25	1	100	3200	810	25	1	80	2500	590	25	0.5	75	2400	570	25	0.5
12	130	3400	1100	30	1.2	100	2700	780	30	1.2	80	2100	550	30	0.6	75	2000	520	30	0.6
16	130	2600	920	40	1.6	100	2000	640	40	1.6	80	1600	450	40	0.8	75	1500	420	40	0.8
20	130	2100	820	50	2	100	1600	570	50	2	80	1300	420	50	1	75	1200	390	50	1

Depth of cut



Workpiece Material	Copper, Copper alloy					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)
1	130	40000	530	2.5	0.1	40	13000	73	2.5	0.02
2	160	25000	830	5	0.2	40	6400	90	5	0.04
3	160	17000	1200	7.5	0.3	40	4200	130	7.5	0.06
4	160	13000	1300	10	0.4	40	3200	190	10	0.08
5	160	10000	1300	12.5	0.5	40	2500	180	12.5	0.1
6	160	8500	1500	15	0.6	40	2100	180	15	0.12
8	160	6400	1500	20	0.8	40	1600	170	20	0.16
10	160	5100	1300	25	1	40	1300	170	25	0.2
12	160	4200	1300	30	1.2	40	1100	140	30	0.24
16	160	3200	1100	40	1.6	40	800	110	40	0.32
20	160	2500	970	50	2	40	640	80	50	0.4

Depth of cut



Note 1) 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.
Note 2) Effective cutting of stainless steel, titanium alloys and heat-resistant alloys etc. can be achieved with the use of emulsion.
Note 3) Vibration damping end mills are more effective in suppressing chatter and vibration compared to general end mills, but these may still occur if the rigidity of the machine or the workpiece material is low. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.
Note 4) When the depth of cut is smaller than shown the revolution and feed rate can be increased.

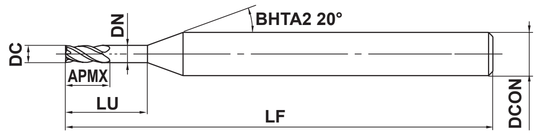
VQXL

End mill, Short cut length, 3—4 flute, Long neck

35°

DC≤0.3 DC≥0.4

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎			◎	◎	○	



Type1

DC≤1				
0 - 0.010				
DCON=4				
0 - 0.005				

h6

- The use of SMART MIRACLE Coating improves chip discharge dramatically.
- Multi-cutters at a small diameter of ϕ1 is realized.

(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

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Torque chart

Order Number	ISO 10664 Torque type
VQXLD0020N006	T4
VQXLD0030N009	T6
VQXLD0030N015	
VQXLD0040N010	T8
VQXLD0040N018	
VQXLD0050N015	T15
VQXLD0050N025	
VQXLD0050N030	
VQXLD0080N024	TS25
VQXLD0080N040	
VQXLD0100N050	T40

● **: Inventory maintained in Japan.**

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ISO13399 ➤J002

VQXL

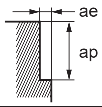
End mill, Short cut length, 3—4 flute, Long neck

RECOMMENDED CUTTING CONDITIONS

■Side milling

Workpiece Material		Carbon steel, Alloy steel, Austenitic stainless steels, Titanium alloys 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				
Dia. **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

Depth of cut

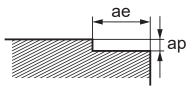


Note 1) SMART MIRACLE Coating is not energized because of its nature. Therefore, an external contact (voltaic type) tool setter cannot be used. An internal contact (non-voltaic) type or laser type tool setter is recommended to measure the length of the tool.
Note 2) Effective cutting of stainless steel, titanium alloys and heat-resistant alloys etc. can be achieved with the use of emulsion.
Note 3) When the depth of cut is smaller than shown the revolution and feed rate can be increased.

■Bottom face milling

Workpiece Material		Carbon steel, Alloy steel, Austenitic stainless steels, Titanium alloys 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				
Dia. 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

Depth of cut



Note 1) 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.
Note 2) Effective cutting of stainless steel, titanium alloys and heat-resistant alloys etc. can be achieved with the use of emulsion.
Note 3) When the depth of cut is smaller than shown the revolution and feed rate can be increased.

VQXL

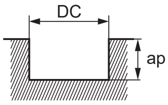
End mill, Short cut length, 3—4 flute, Long neck

RECOMMENDED CUTTING CONDITIONS

■Slotting

Workpiece Material		Carbon steel, Alloy steel, Austenitic stainless steels, Titanium alloys Cobaly chromium alloy, Copper, Copper alloy AISI 1045, AISI 4140, AISI 4340, AISI 304, AISI 306, 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			
Dia. 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

Depth of cut



DC:Dia.

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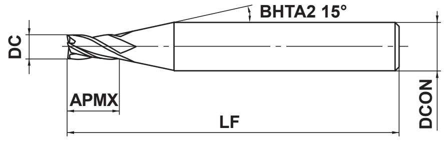
Note 2) Effective cutting of stainless steel, titanium alloys and heat-resistant alloys etc. can be achieved with the use of emulsion.
Note 3) When the depth of cut is small, the feed rate can be increased.

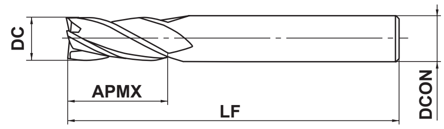
VF4MD

End mill, Medium cut length, 4 flute, For hardened materials

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
	○	◎	◎				



Type1



Type2

DC≤12	DC>12			
0 - 0.020	0 - 0.030			
4≤DCON≤6	8≤DCON≤10	12≤DCON≤16	DCON=20	
h6 0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013	

●4 flute end mill suitable for high-speed machining of hardened steel.

(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

● : Inventory maintained in Japan.

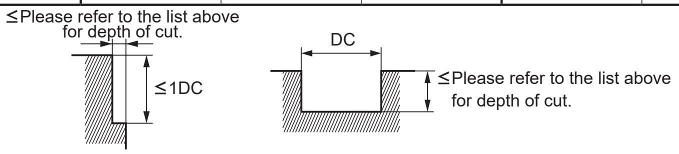
VF4MD

End mill, Medium cut length, 4 flute, For hardened materials

RECOMMENDED CUTTING CONDITIONS

Workpiece 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 (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (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

Depth of cut



DC:Dia.

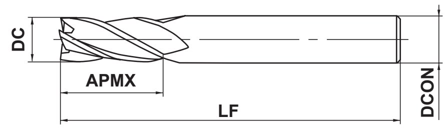
Note 1) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 2) When drilling, please set the feed rate at 1/3 or below the values above.
Note 3) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

VF4MV

End mill, Medium cut length, 4 flute, For hardened materials

UWC VF 35° 38°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
	○	◎	◎				



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	

h6

●An irregular helix 4 flute square end mill suitable for high-speed machining of hardened steel.

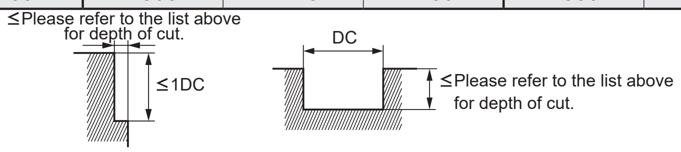
(mm)

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

RECOMMENDED CUTTING CONDITIONS

Workpiece 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 (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (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

Depth of cut



DC:Dia.

Note 1) When slotting, reduce the revolutions by 50−70% and the feed rate by 40−60%.
Note 2) For austenitic stainless steels, titanium and heat-resistant alloys, the VFMHV is recommended.
Note 3) Vibration damping end mills are more effective in suppressing chatter and vibration compared to general end mills, but these may still occur if the rigidity of the machine or the workpiece material is low. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

● : **Inventory maintained in Japan.**

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CARBIDE

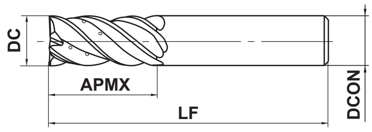
VFMHVCH

End mill, Medium cut length, 4 flute, Irregular helix flutes, with multiple internal through coolant holes

UWC VF 42° 45°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	○			◎	◎		

CoolStar
END MILLS



Type1

16≤DC≤20			
0 - 0.03			
DCON=16	DCON=20		
0 - 0.011	0 - 0.013		

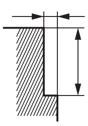
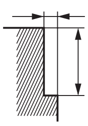
●Vibration control end mill with multiple internal through coolant holes ensures stable machining on difficult-to-cut materials and applications requiring long overhangs.

(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

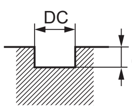
RECOMMENDED CUTTING CONDITIONS

■Side milling

Workpiece Material	Alloy steel, Tool steel, Pre-hardened steel (−45HRC) 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)
16	3000	1140	2000	560	800	110
20	2400	860	1600	510	600	100
Depth of cut	 ≤0.1DC, 0.5DC−1.5DC				 ≤0.05DC, 0.5DC−1.5DC	

DC:Dia.

■Slotting

Workpiece Material	Carbon steel, Cast iron, Alloy steel (−30HRC) AISI 1050, AISI No 35 B, AISI P20		Alloy steel, Tool steel, Pre-hardened steel (−45HRC) 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)
16	2400	670	1400	380	1400	170
20	1900	610	1100	350	1100	130
Depth of cut			 DC, 0.5DC−1.5DC			

DC:Dia.

Note 1) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 2) Vibration damping end mills are more effective in suppressing chatter and vibration compared to general end mills, but these may still occur if the rigidity of the machine or the workpiece material is low.
In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

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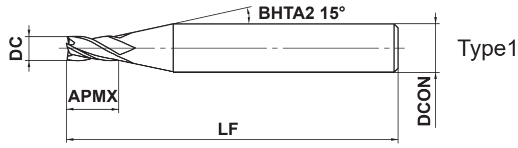
VCMDSC

End mill, Medium cut length, 4−6 flute

UWC VC 30° DC<3 DC=3

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
	○	◎	◎				



0.5≤DC≤3			
0 - 0.020			
DCON=6			
0 - 0.008			

●Recommended for shape nose cutting hardened steels.

(mm)

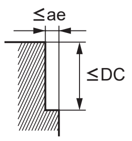
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
VCMDSCD0050	0.5	1	45	6	4	●	1
VCMDSCD0100	1	2.5	45	6	4	●	1
VCMDSCD0150	1.5	4	45	6	4	●	1
VCMDSCD0200	2	6	45	6	4	●	1
VCMDSCD0250	2.5	8	45	6	4	●	1
VCMDSCD0300	3	8	45	6	6	●	1

VCMDSC

End mill, Medium cut length, 4–6 flute

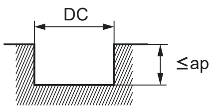
RECOMMENDED CUTTING CONDITIONS

■Side milling

Workpiece 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
Depth of cut	 DC:Dia.					

Note 1) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 2) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

■Slotting

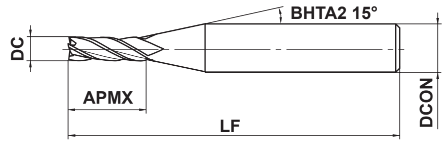
Workpiece Material	Hardened steel (45–55HRC) AISI H13			Hardened steel (55–62HRC) AISI D2		
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)
0.5	20000	200	0.05	15000	90	0.03
1	15000	300	0.1	11000	110	0.05
1.5	10000	280	0.15	7500	150	0.07
2	8000	320	0.2	6000	190	0.1
3	5000	200	0.3	3800	120	0.15
Depth of cut	 DC:Dia.					

Note 1) Air blow or oil mist is recommended for good chip evacuation.

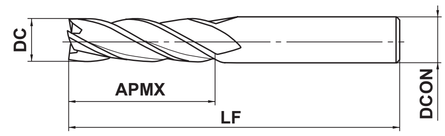
CRN4JC

End mill, Semi long cut length, 4 flute, For copper electrodes

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
						◎	○



Type1



Type2

3≤DC≤12				
0 - 0.02				
DCON=6	8≤DCON≤10	DCON=12		
0 - 0.008	0 - 0.009	0 - 0.011		

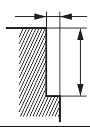
●4 flute end mill with CRN coating for copper electrode machining.

(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
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

RECOMMENDED CUTTING CONDITIONS

Workpiece Material	Copper, Copper alloys	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)
3	10600	280
4	8000	330
6	5300	420
8	4000	460
10	3200	460
12	2700	460
Depth of cut	≤0.05DC (MAX. 0.5mm) ≤2.5DC DC:Dia.	



Note 1) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 2) Water-soluble cutting fluid is recommended.
Note 3) When drilling, please set the feed rate at 1/3 or below of the table value.
Note 4) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

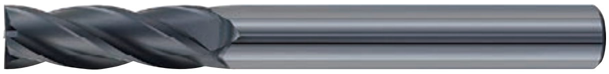
● : **Inventory maintained in Japan.**

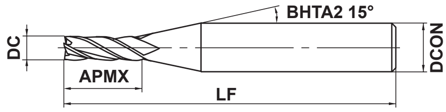
DF4JC

End mill, Semi long cut length, 4 flute, For graphite

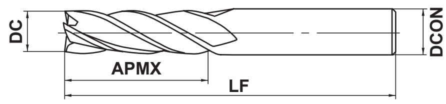
30°

Aluminium Alloy	Copper Alloy	Graphite	GFRP CFRP	Machineable Ceramics
○	◎	◎	○	○





Type1



Type2

3≤DC≤12				
0 - 0.02				
DCON=6	8≤DCON≤10	DCON=12		
0 - 0.008	0 - 0.009	0 - 0.011		

●4 flute end mill with original diamond coating for graphite machining.

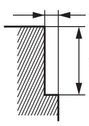
(mm)

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

RECOMMENDED CUTTING CONDITIONS

Workpiece Material	Graphite				Copper, Copper alloys			
Dia. DC (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of Cut ap (mm)	Cutting Width ae (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of Cut ap (mm)	Cutting Width ae (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

Depth of cut



DC:Dia.

Note 1) When high machining accuracy is needed, or the workpiece becomes chipped, we recommend lowering the feed rate.
Note 2) Use a milling machine dedicated for graphite.
Note 3) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

● : Inventory maintained in Japan.

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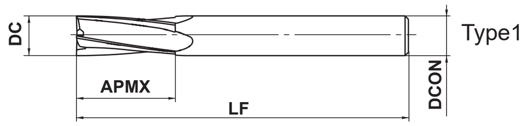
DFC4JC

End mill, Semi long cut length, 4 flute

10°

CFRP
◎



6≤DC≤12				
0 - 0.03				
DCON=6	8≤DCON≤10	DCON=12		
0 - 0.008	0 - 0.009	0 - 0.011		

●4 flute end mill with original CVD diamond coating for CFRP machining.

(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

Note 1) Please contact Mitsubishi Materials for geometries and through coolant types that are non-standard.

RECOMMENDED CUTTING CONDITIONS

Workpiece Material	CFRP	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)
6	11000	950
8	8000	780
10	6400	700
12	5300	650

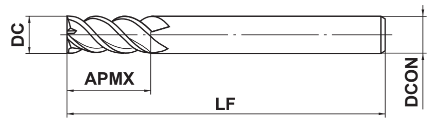
Note 1) Cutting conditions may differ considerably due to the kind of CFRP, the rigidity of the machine, or the clamping and geometry of the workpiece. Please use the above table as a guideline.
Note 2) When high machining accuracy is needed or if large burrs or delamination occur, we recommend reducing the feed rate.
Note 3) When the depth of cut is greater than 0.8DC, we recommend reducing the feed rate.
Note 4) Please take precautions against dust.

SEG4SA

End mill, Medium cut length, 4 flute, Irregular spiral helix angle, For aluminium alloy

UWC 38° 41°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
						○	◎



	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	

●4 flute end mill with irregular helix angle for aluminium alloy.

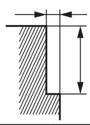
(mm)

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

RECOMMENDED CUTTING CONDITIONS

■Side milling

Workpiece 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
Depth of cut	≤0.1DC, ≤1.5DC			DC:Dia.



Note 1) The cutting conditions above are a guide only to milling within the standard depth of cut.
Note 2) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

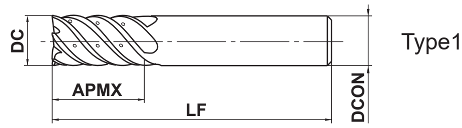
● : Inventory maintained in Japan.

VQ6MHVCH

End mill, Medium cut length, 6 flute, Irregular helix flutes, With multiple internal through coolant

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	○			◎	◎	○	

CoolStar
END MILLS



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	

● Vibration control end mill with multiple internal through coolant holes ensures stable machining on difficult-to-cut materials and applications requiring long overhangs.

(mm)

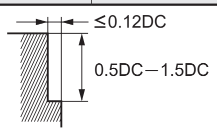
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
VQ6MHVCHD1000	10	22	70	10	6	●	1
VQ6MHVCHD1200	12	26	75	12	6	●	1
VQ6MHVCHD1600	16	32	90	16	6	●	1
VQ6MHVCHD2000	20	38	100	20	6	●	1

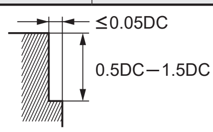
RECOMMENDED CUTTING CONDITIONS

■Shoulder Milling

Workpiece Material	Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Austenitic Stainless Steel (≤200HB), Titanium Alloy AISI 304, AISI 316, Ti-6Al-4V		Copper, Copper alloy		Heat Resistant Alloys Inconel 718	
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	—	—	4800	2000	—	—	1300	260
12	—	—	4000	2000	—	—	1100	230
16	4000	2200	3000	1600	2400	1400	800	180
20	3200	1900	2400	1400	1900	1100	640	150

Depth of Cut



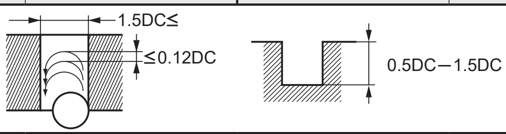


DC:Dia.

■Trochoid Milling

Workpiece Material	Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Austenitic Stainless Steel (≤200HB), 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)
10	—	—	4800	1400
12	—	—	4000	1200
16	4000	1600	3000	1100
20	3200	1400	2400	900

Depth of Cut



DC:Dia.

Note 1) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 2) Vibration damping end mills are more effective in suppressing chatter and vibration compared to general end mills, but these may still occur if the rigidity of the machine or the workpiece material is low.
In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

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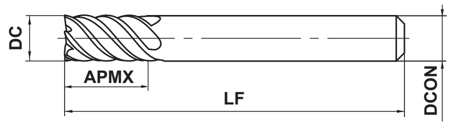
VF6MHV

End mill, Medium cut length, 6 flute, Irregular helix flutes

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	○			◎	◎		



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	

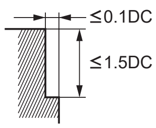
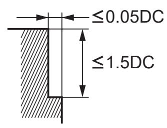
●Newly developed irregular helix 6 flute geometry reduces vibrations and achieves high efficiency machining.
Suitable for machining of difficult-to-cut materials such as stainless steel, titanium alloy and inconel.

(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

RECOMMENDED CUTTING CONDITIONS

■Side milling

Workpiece 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
Depth of cut	 ≤0.1DC, ≤1.5DC				 ≤0.05DC, ≤1.5DC	

DC:Dia.

Note 1) When cutting austenitic stainless steels, the use of water-soluble cutting fluid is effective.
Note 2) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 3) Vibration damping end mills are more effective in suppressing chatter and vibration compared to general end mills, but these may still occur if the rigidity of the machine or the workpiece material is low. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

● : Inventory maintained in Japan.

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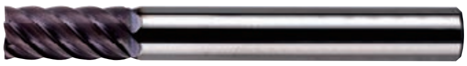
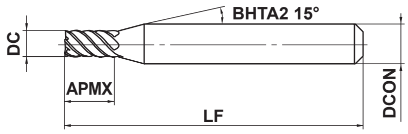
VFSD

End mill, Short cut length, For hardened materials

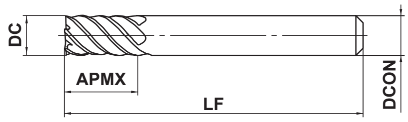
30° DC<3 | 45° DC≥3 | DC<3 | DC≥3

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
	○	◎	◎				





Type1



Type2

1≤DC≤12				
0 - 0.02				
DCON=6	8≤DCON≤10	DCON=12		
0 - 0.008	0 - 0.009	0 - 0.011		

●End mill with Impact Miracle coating for high hardened materials.

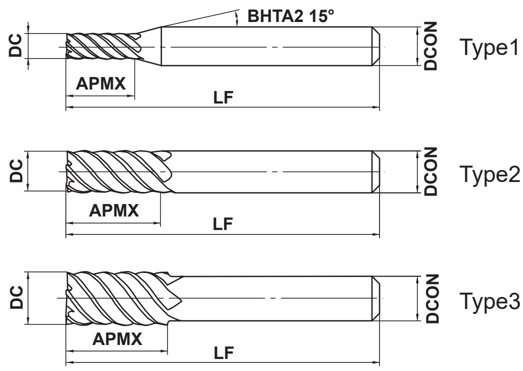
(mm)

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

VFMD

End mill, Medium cut length, For hardened materials

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
	○	◎	◎				



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

●End mill with Impact Miracle coating for high hardened materials.

(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

● : Inventory maintained in Japan.

SQUARE
BALL
RADIUS
TAPER
BARREL
ROUGHING
CHAMFER
J
SOLID END MILLS

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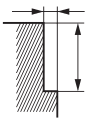
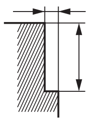
ISO13399 ➤J002

VFSD
End mill, Short cut length, For hardened materials

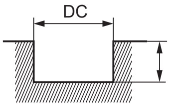
VFMD
End mill, Medium cut length, For hardened materials

RECOMMENDED CUTTING CONDITIONS

Workpiece 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 (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (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
Depth of cut	 ≤Please refer to the list above for depth of cut. ≤1.5DC						 ≤Please refer to the list above for depth of cut. ≤1.0DC		

DC:Dia.

■Slot milling with small diameter tools

Workpiece 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 (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (mm)
1	15000	300	0.1	9500	110	0.05
2	8000	320	0.2	4800	190	0.1
Depth of cut	 DC ≤Please refer to the list above for depth of cut.					

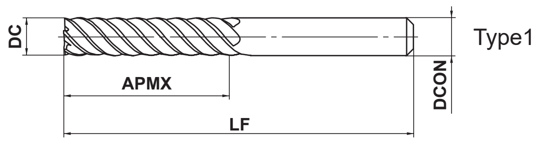
DC:Dia.

Note 1) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 2) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

VCLD

End mill, Long cut length, 6 flute

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
	○	◎	◎				



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	

h6

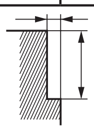
●Ideal for tool steel and hardened materials machining

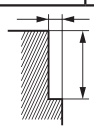
(mm)

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

RECOMMENDED CUTTING CONDITIONS

Workpiece 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
Depth of cut	≤0.01DC 3DC−4DC				≤0.005DC 3DC−4DC			





DC:Dia.

Note 1) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 2) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

● : Inventory maintained in Japan.
▲ : Inventory maintained in Japan. To be replaced by new products.

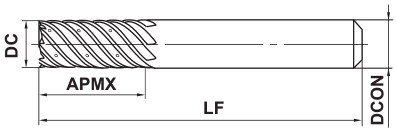
VF8MHVCH

End mill, Medium cut length, Irregular helix flutes, with multiple internal through coolant holes

44° 45°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	○			◎	◎		

CoolStar
END MILLS



Type1

16≤DC≤20			
0 - 0.03			
DCON=16	DCON=20		
0 - 0.011	0 - 0.013		

●Vibration control end mill with multiple internal through coolant holes ensures stable machining on difficult-to-cut materials and applications requiring long overhangs.

(mm)

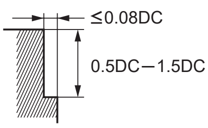
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
VF8MHVCHD1600	16	32	90	16	8	▲	1
VF8MHVCHD2000	20	38	100	20	8	▲	1

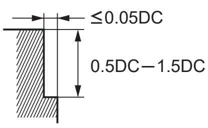
RECOMMENDED CUTTING CONDITIONS

■Side milling

Workpiece 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)
16	4000	2400	3000	2100	800	240
20	3200	1900	2400	1900	640	200

Depth of cut



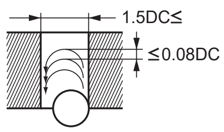


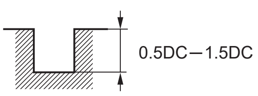
DC:Dia.

■Trochoidal slotting

Workpiece 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	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
16	4000	1900	3000	1400
20	3200	1500	2400	1200

Depth of cut





DC:Dia.

Note 1) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 2) Vibration damping end mills are more effective in suppressing chatter and vibration compared to general end mills, but these may still occur if the rigidity of the machine or the workpiece material is low.
In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

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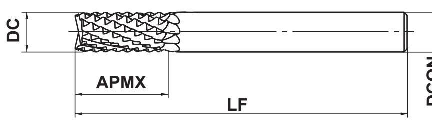
CARBIDE

DFCJRT

Diamond coating endmill with cross-nick

UWC DFC

CFRP
◎



h6

DCON=6	8≤DCON≤10	DCON=12		
0 - 0.008	0 - 0.009	0 - 0.011		

● Cross-nick type end mill with original CVD diamond coating for CFRP machining.

(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

Note 1) Please contact Mitsubishi Materials for geometries and through coolant types that are non-standard.

RECOMMENDED CUTTING CONDITIONS

Workpiece Material	CFRP	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)
6	11000	1200
8	8000	1000
10	6400	900
12	5300	850

Note 1) 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.
Note 2) When high machining accuracy is needed or if large burrs or delamination occur, we recommend reducing the feed rate.
Note 3) When the depth of cut is greater than 0.8DC, we recommend reducing the feed rate.
Note 4) Please take precautions against dust.

● : Inventory maintained in Japan.

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SQUARE BALL RADIUS TAPER BARREL ROUGHING CHAMFER J SOLID END MILLS

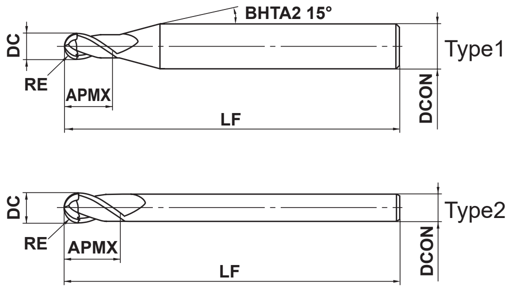
ISO13399 ➢J002

MP2SSB

Ball nose, Short cut length, 2 flute, Short shank

UWC MS+ 30°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	◎		○	○	○	



0.1≤RE≤6			
±0.005			
4≤DCON≤6	8≤DCON≤10	DCON=12	
0 - 0.005	0 - 0.006	0 - 0.008	

●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.

(mm)

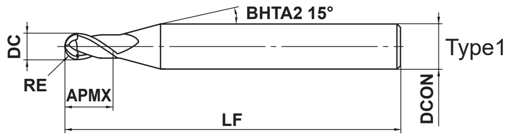
Order Number	RE	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
MP2SSBR0010	0.1	0.2	0.2	40	4	2	●	1
MP2SSBR0020	0.2	0.4	0.4	40	4	2	●	1
MP2SSBR0030	0.3	0.6	0.6	40	4	2	●	1
MP2SSBR0040	0.4	0.8	0.8	40	4	2	●	1
MP2SSBR0050	0.5	1	1	40	4	2	●	1
MP2SSBR0050S06	0.5	1	1	40	6	2	●	1
MP2SSBR0075	0.75	1.5	1.5	40	4	2	●	1
MP2SSBR0075S06	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

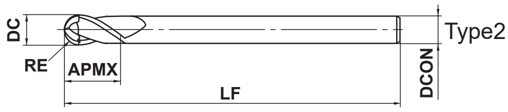
MP2SB

Ball nose, Short cut length, 2 flute

UWC MS+ 30°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	◎		○	○	○	





0.1≤RE≤6				
±0.005				
4≤DCON≤6	8≤DCON≤10	DCON=12		
0 / -0.005	0 / -0.006	0 / -0.008		

h5

●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.

(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

● : Inventory maintained in Japan.

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ISO13399

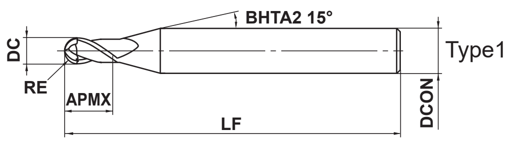
➤J002

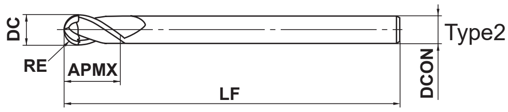
MP2MB

Ball nose, Medium cutting length, 2 flute

UWC MS+ 30°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	◎		○	○	○	





0.25≤RE≤6			
±0.005			
4≤DCON≤6	8≤DCON≤10	DCON=12	
0 - 0.005	0 - 0.006	0 - 0.008	

h5

● 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.

(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

Ball nose, Short cut length, 2 flute, Short shank **MP2SSB**

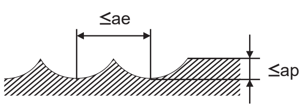
Ball nose, Short cut length, 2 flute **MP2SB** Ball nose, Medium cutting length, 2 flute **MP2MB**

RECOMMENDED CUTTING CONDITIONS

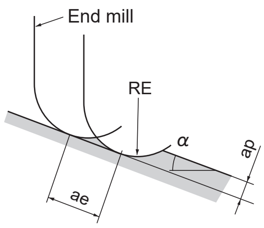
Workpiece Material	Mild Steel,Carbon steel, Alloy steel, Pre-hardened steel, Hardened steel (−45HRC) AISI 1050, AISI P21, AISI H13						Austenitic Stainless Steel (≤200HB), Titanium Alloy AISI 304, AISI 316, Ti-6Al-4V					
R **RE** (mm)	α≤15°		α>15°		Depth of cut	Depth of cut	α≤15°		α>15°		Depth of cut	Depth of cut
	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	ap (mm)	ae (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	ap (mm)	ae (mm)
R0.1	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
R0.2	40000	1600	40000	1200	0.02	0.04	40000	1300	40000	1000	0.015	0.04
R0.25	40000	2400	40000	1400	0.025	0.05	40000	1900	40000	1200	0.02	0.05
R0.3	40000	3200	40000	1600	0.03	0.06	40000	2400	40000	1400	0.025	0.06
R0.4	40000	4800	40000	2400	0.05	0.08	40000	2400	40000	1900	0.04	0.08
R0.5	40000	5600	40000	3200	0.06	0.1	40000	3200	38000	2400	0.05	0.1
R0.75	40000	6500	40000	4000	0.09	0.15	40000	3200	25000	1600	0.08	0.15
R1	40000	6500	39000	4700	0.11	0.2	32000	3200	19000	1500	0.11	0.2
R1.25	40000	7000	33000	4500	0.12	0.25	25000	2500	15000	1200	0.12	0.25
R1.5	40000	7500	27000	4300	0.13	0.3	21000	2100	13000	1100	0.13	0.3
R2	32000	7500	20000	3600	0.15	0.4	16000	1900	9500	900	0.15	0.4
R2.5	25000	6000	16000	2900	0.2	0.5	13000	1600	7600	750	0.2	0.5
R3	21000	5800	13000	2600	0.25	0.6	11000	1500	6400	700	0.25	0.6
R4	16000	4500	10000	2000	0.3	0.8	8000	1400	4800	670	0.3	0.8
R5	13000	3600	8000	1700	0.5	1.0	6400	1300	3800	620	0.5	1.0
R6	9000	2500	6000	1300	0.5	1.2	5300	1300	3200	620	0.5	1.2

Workpiece Material	Hardened steel (45−55HRC) AISI 420, AISI H13						Copper, Copper alloys					
R **RE** (mm)	α≤15°		α>15°		Depth of cut	Depth of cut	α≤15°		α>15°		Depth of cut	Depth of cut
	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	ap (mm)	ae (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	ap (mm)	ae (mm)
R0.1	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
R0.2	40000	1300	40000	950	0.015	0.04	40000	1300	40000	950	0.015	0.04
R0.25	40000	1900	40000	1100	0.02	0.05	40000	1900	40000	1100	0.02	0.05
R0.3	40000	2500	40000	1300	0.025	0.06	40000	2500	40000	1300	0.025	0.06
R0.4	40000	4000	40000	1900	0.04	0.08	40000	4000	40000	1900	0.04	0.08
R0.5	40000	5600	40000	3000	0.05	0.1	40000	5600	40000	3000	0.05	0.1
R0.75	40000	6500	32000	3200	0.08	0.15	40000	6500	32000	3200	0.08	0.15
R1	40000	6500	31000	3500	0.11	0.2	40000	6500	31000	3500	0.11	0.2
R1.25	36000	6500	26000	3500	0.12	0.25	36000	6500	26000	3500	0.12	0.25
R1.5	32000	6000	22000	3400	0.13	0.3	32000	6000	22000	3400	0.13	0.3
R2	25000	6000	16000	2700	0.15	0.4	25000	6000	16000	2700	0.15	0.6
R2.5	20000	5400	13000	2300	0.2	0.5	20000	5400	13000	2300	0.2	0.75
R3	17000	4700	10000	2000	0.25	0.6	17000	4700	10000	2000	0.25	0.9
R4	13000	3600	8000	1500	0.3	0.8	13000	3600	8000	1500	0.3	1.6
R5	10000	2900	6400	1200	0.5	1.0	10000	2900	6400	1200	0.5	2.0
R6	7200	2000	4800	1000	0.5	1.2	8500	2300	5300	1100	0.5	2.4

Depth of cut



Note 1) α is the inclination angle of the machined surface.
Note 2) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 3) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.
Note 4) Standard cutting conditions of austenitic stainless steel and titanium alloy, please reduce to 60% revolution and 45% feedrate. (Hardened steel (45−55HRC) table above)

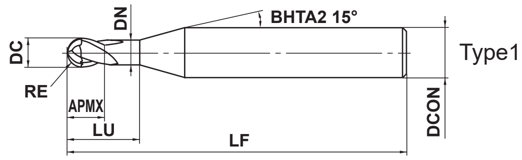


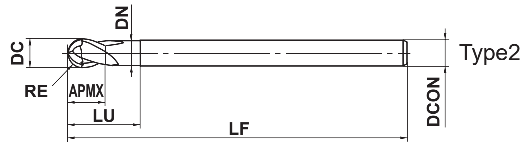
MP2SDB

Ball nose, Short cut length, 2 flute, High strength

30°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	◎	◎					





0.5≤RE≤6				
±0.01				
4≤DCON≤6	DCON=8			
0 - 0.005	0 - 0.006			
DCON=10	DCON=12			
0 - 0.009	0 - 0.011			

● Excellent chipping resistance with a strong S curve cutting edge.
Ideal for semi-finish machining of forging dies.

(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	1.90	50	4	2	●	1
MP2SDBR0100S06	1	2	2	4	1.90	60	6	2	●	1
MP2SDBR0150	1.5	3	3	6	2.90	70	6	2	●	1
MP2SDBR0200	2	4	4	8	3.90	60	4	2	●	2
MP2SDBR0200S06	2	4	4	8	3.90	70	6	2	●	1
MP2SDBR0250	2.5	5	5	10	4.90	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	9.70	100	10	2	●	2
MP2SDBR0500A140	5	10	18	30	9.70	140	10	2	●	2
MP2SDBR0600	6	12	22	36	11.70	110	12	2	●	2
MP2SDBR0600A140	6	12	22	36	11.70	140	12	2	●	2

Note 1) MS plus end mills series MP2SB and MP2MB are recommended for finish surface processing.

● : **Inventory maintained in Japan.**

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MP2SDB

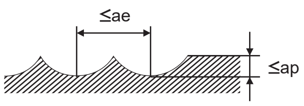
Ball nose, Short cut length, 2 flute, High strength

RECOMMENDED CUTTING CONDITIONS

■Overhang below 5D (D:Dia.)

Workpiece Material	Carbon steel, Alloy steel, Tool steel, Alloy tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21						Hardened steel (45−55HRC) AISI H13, AISI L6					
R **RE** (mm)	$\alpha \le 15°$		$\alpha > 15°$		Depth of cut ap (mm)	Depth of cut ae (mm)	$\alpha \le 15°$		$\alpha > 15°$		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)		
R 0.5	40000	3900	36000	2100	0.1	0.25	40000	4300	36000	2200	0.1	0.25
R 0.75	40000	4200	36000	2600	0.15	0.35	40000	4700	36000	2700	0.15	0.35
R 1	40000	4500	36000	3100	0.2	0.5	40000	5000	36000	3300	0.2	0.5
R 1.5	37000	5300	24000	2700	0.3	0.75	37000	5800	24000	2800	0.3	0.75
R 2X4	24000	3200	15000	2000	0.25	0.7	19000	2800	13000	1600	0.25	0.7
R 2	30000	4900	19000	2500	0.4	1	28000	5000	19000	2400	0.4	1
R 2.5	25000	4500	16000	2300	0.5	1.3	22000	4200	16000	2200	0.5	1.25
R 3	22000	4300	14000	2200	0.6	1.8	18000	3800	12000	1800	0.6	1.5
R 4	19000	3900	12000	2000	0.8	2.4	15000	3200	9500	1600	0.8	2
R 5	15000	3300	9500	1800	1	3	11000	2500	7000	1400	1	2.5
R 6	12000	2550	8000	1600	1.2	3.6	9000	2000	6000	1300	1.2	3

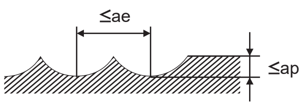
Depth of cut



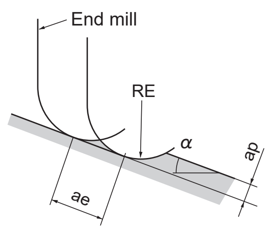
■Overhang below 7D (D:Dia.)

Workpiece Material	Carbon steel, Alloy steel, Tool steel, Alloy tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21						Hardened steel (45−55HRC) AISI H13, AISI L6					
R **RE** (mm)	$\alpha \le 15°$		$\alpha > 15°$		Depth of cut ap (mm)	Depth of cut ae (mm)	$\alpha \le 15°$		$\alpha > 15°$		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)		
R 3	10000	1500	6900	1000	0.2	1	8000	1400	5300	770	0.2	0.8
R 4	8000	1400	5600	900	0.3	1.5	6400	1300	4000	650	0.3	1.2
R 5	6000	1200	4100	740	0.4	2	4800	1100	3200	580	0.4	1.6
R 6	5000	1000	3400	600	0.45	2.4	4000	900	2700	490	0.45	2

Depth of cut



Note 1) α is the inclination angle of the machined surface.
Note 2) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 3) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.



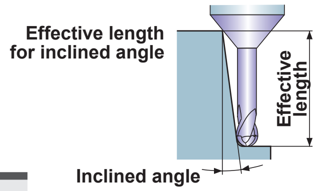
ae:Pick feed

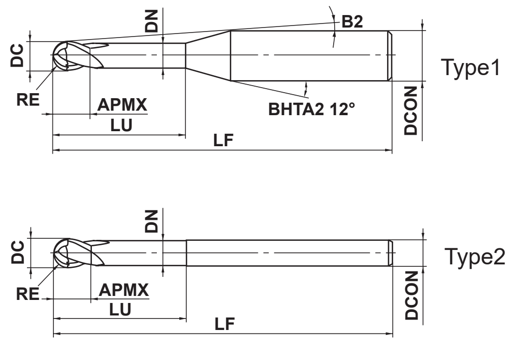
MP2XLB

Ball nose, Short cut length, 2 flute, Long neck

30°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	◎		○	○	○	





0.05≤RE≤3			
±0.005			
4≤DCON≤6			
h5 0 - 0.005			

● 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.

(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	1.0
MP2XLBR0010N010	0.1	0.2	0.15	1	0.18	10.9°	50	4	2	●	1	1.0	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	2.0
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	3.0	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	1.0
MP2XLBR0015N010	0.15	0.3	0.24	1	0.28	10.9°	50	4	2	●	1	1.0	1.1	1.2	1.3
MP2XLBR0015N010S06	0.15	0.3	0.24	1	0.28	11.3°	50	6	2	●	1	1.0	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	2.0
MP2XLBR0015N015S06	0.15	0.3	0.24	1.5	0.28	10.9°	50	6	2	●	1	1.6	1.6	1.8	2.0
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	3.0	3.3
MP2XLBR0015N030	0.15	0.3	0.24	3	0.28	9.1°	50	4	2	●	1	3.1	3.3	3.6	4.0
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
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	1.0	1.1	1.2	1.3
MP2XLBR0020N010S06	0.2	0.4	0.3	1	0.37	11.3°	50	6	2	●	1	1.0	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

● : Inventory maintained in Japan.

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MP2XLB

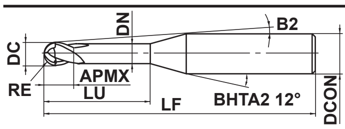
Ball nose, Short cut length, 2 flute, Long neck

(mm)

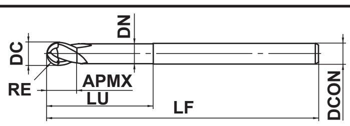
Order Number	RE	DC	APMX	LU	DN	B2	LF	DCON	No. of Flutes	Stock	Type	Effective length for inclined angle			
												0.5°	1°	2°	3°
MP2XLBR0020N030	0.2	0.4	0.3	3	0.37	9.1°	50	4	2	●	1	3.1	3.2	3.5	3.9
MP2XLBR0020N035	0.2	0.4	0.3	3.5	0.37	8.7°	50	4	2	●	1	3.6	3.8	4.1	4.6
MP2XLBR0020N040	0.2	0.4	0.3	4	0.37	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	6.0	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	1.0	1.0	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	6.0	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	2.0
MP2XLBR0030N015S06	0.3	0.6	0.45	1.5	0.57	11°	50	6	2	●	1	1.5	1.6	1.8	2.0
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	3.0	3.3
MP2XLBR0030N030	0.3	0.6	0.45	3	0.57	9°	50	4	2	●	1	3.1	3.3	3.6	4.0
MP2XLBR0030N030S06	0.3	0.6	0.45	3	0.57	9.9°	50	6	2	●	1	3.1	3.3	3.6	4.0
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	6.0	6.6
MP2XLBR0030N050S06	0.3	0.6	0.45	5	0.57	8.8°	50	6	2	●	1	5.2	5.5	6.0	6.6
MP2XLBR0030N055	0.3	0.6	0.45	5.5	0.57	7.3°	50	4	2	●	1	5.8	6.0	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
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	12.0	13.2

● : Inventory maintained in Japan.

ISO13399 ➤J002



Type1



Type2

(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°
MP2XLBR0030N110	0.3	0.6	0.45	11	0.57	5.2°	50	4	2	●	1	11.5	12.0	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	6.0	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	10.0	10.9	12.0
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	16.0
MP2XLBR0050N120S06	0.5	1	0.75	12	0.96	6.1°	60	6	2	●	1	12.7	13.2	14.5	16.0
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	24.0
MP2XLBR0050N200	0.5	1	0.75	20	0.96	3.3°	55	4	2	●	1	21.0	22.0	24.1	26.6
MP2XLBR0050N200S06	0.5	1	0.75	20	0.96	4.6°	65	6	2	●	1	21.0	22.0	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	8.0
MP2XLBR0060N060S06	0.6	1.2	0.9	6	1.16	8.1°	55	6	2	●	1	6.4	6.7	7.3	8.0
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	11.0	12.1	13.3
MP2XLBR0060N100S06	0.6	1.2	0.9	10	1.16	6.6°	55	6	2	●	1	10.6	11.0	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	16.0
MP2XLBR0060N120S06	0.6	1.2	0.9	12	1.16	6°	65	6	2	●	1	12.7	13.2	14.5	16.0
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	24.0

MP2XLB

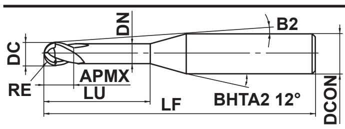
Ball nose, Short cut length, 2 flute, Long neck

(mm)

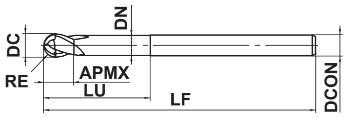
Order Number	RE	DC	APMX	LU	DN	B2	LF	DCON	No. of Flutes	Stock	Type	Effective length for inclined angle			
												0.5°	1°	2°	3°
MP2XLBR0060N200	0.6	1.2	0.9	20	1.16	3.1°	60	4	2	●	1	21.0	21.9	24.0	26.6
MP2XLBR0060N240	0.6	1.2	0.9	24	1.16	2.7°	60	4	2	●	1	25.2	26.3	28.8	*
MP2XLBR0070N080	0.7	1.4	1.05	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	11.0	12.0	13.2
MP2XLBR0075N100S06	0.75	1.5	1.1	10	1.44	6.5°	60	6	2	●	1	10.5	11.0	12.0	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	21.0	21.9	23.9	*
MP2XLBR0075N220	0.75	1.5	1.1	22	1.44	2.7°	60	4	2	●	1	23.0	24.0	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	21.0	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	23.0	24.0	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

* No interference

● : Inventory maintained in Japan.



Type1



Type2

(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°
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	*
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	●	2	*	*	*	*
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	13.0	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	38.0	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	26.0	27.1	29.6	*
MP2XLBR0175N350	1.75	3.5	2.6	35	3.4	1.9°	90	6	2	●	1	36.5	38.0	*	*
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	●	2	*	*	*	*
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	14.0	15.4
MP2XLBR0200N140	2	4	3	14	3.9	3.4°	65	6	2	●	1	14.6	15.1	16.4	18.0
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	26.0	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	38.0	*	*
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	26.0	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	*	*	*	*

* No interference

MP2XLB

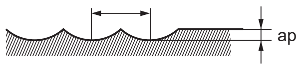
Ball nose, Short cut length, 2 flute, Long neck

RECOMMENDED CUTTING CONDITIONS

Workpiece Material		Carbon steel,Alloy steel,Alloy Tool Steel, Pre-hardened steel, Precipitation hardeningstainless steel AISI 1055, AISI P21, ASTM 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

Depth ofcut

≤0.1RE (RE≤1)
≤0.2RE (RE>1)

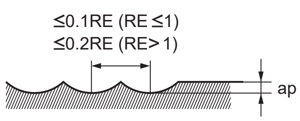


RE:Radius

Note 1) 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.
Note 2) The use of oil mist is recommended when machining with small diameter.
Note 3) The revolution and feed rate can increase for the small depth of cut.
Note 4) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.
Note 5) For hardened steel over 55HRC, use VF2XLB.
Note 6) 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)

Workpiece Material		Carbon steel,Alloy steel,Alloy Tool Steel, Pre-hardened steel, Precipitation hardeningstainless steel AISI 1055, AISI P21, ASTM 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)
R0.4	**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
	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

Depth ofcut



RE:Radius

Note 1) 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.
Note 2) The use of oil mist is recommended when machining with small diameter.
Note 3) The revolution and feed rate can increase for the small depth of cut.
Note 4) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.
Note 5) For hardened steel over 55HRC, use VF2XLB.
Note 6) 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)

MP2XLB

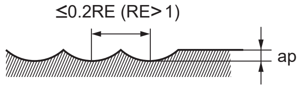
Ball nose, Short cut length, 2 flute, Long neck

RECOMMENDED CUTTING CONDITIONS

Workpiece Material		Carbon steel,Alloy steel,Alloy Tool Steel, Pre-hardened steel, Precipitation hardeningstainless steel AISI 1055, AISI P21, ASTM 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)
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
	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

Depth ofcut

≦0.1RE (RE≦1)
≦0.2RE (RE>1)



RE:Radius

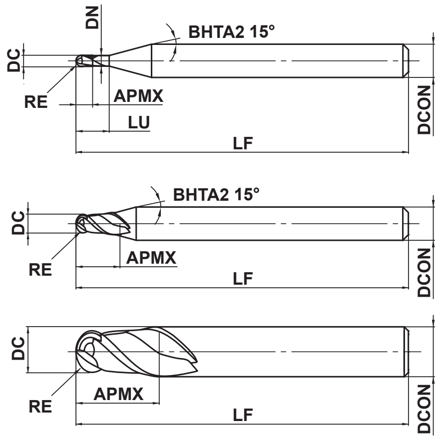
Note 1) When the inclination angle of machined surface is large, or machining with large cutting load such as corner area, reduce the revolution and feed rate.
Note 2) The use of oil mist is recommended when machining with small diameter.
Note 3) The revolution and feed rate can increase for the small depth of cut.
Note 4) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.
Note 5) For hardened steel over 55HRC, use VF2XLB.
Note 6) 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)

VQN2MB NEW

Ball nose, Medium cut length, 2 flute

UWC VQN 30° RE≤1.5 45° RE>1.5

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
					◎		



RE≤6		
±0.010		
DCON=6	8≤DCON≤10	DCON=12
0 - 0.005	0 - 0.006	0 - 0.008

h5

●(Al, Ti, Si) N-based coating exhibits excellent wear and chipping resistance when machining heat resistant super alloys.
●The R cutting edge rake angle and ball nose geometry have been optimised to improve strength.

(mm)

Order Number	RE	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	Type
VQN2MBR0050	0.5	1	1	4	0.94	60	6	2	●	1
VQN2MBR0100	1.0	2	2	6	1.9	60	6	2	●	1
VQN2MBR0150	1.5	3	3	8	2.9	60	6	2	●	1
VQN2MBR0200	2.0	4	8	–	–	60	6	2	●	2
VQN2MBR0250	2.5	5	12	–	–	60	6	2	●	2
VQN2MBR0300	3.0	6	12	–	–	60	6	2	●	3
VQN2MBR0400	4.0	8	14	–	–	70	8	2	●	3
VQN2MBR0500	5.0	10	18	–	–	80	10	2	●	3
VQN2MBR0600	6.0	12	22	–	–	80	12	2	●	3

● : Inventory maintained in Japan.

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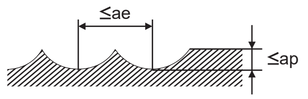
VQN2MB

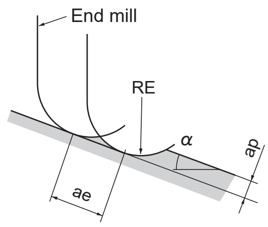
Ball nose, Medium cut length, 2 flute

RECOMMENDED CUTTING CONDITIONS

(mm)

Workpiece Material	Nickel-Based Heat Resistant Super Alloy Inconel718, Inconel713C, WASPALOY etc.					
R **RE**	$\alpha \leq 15°$		$\alpha > 15°$		Depth of cut ap	Depth of cut ae
	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)		
0.5	12700	640	12700	760	0.1	0.25
1.0	6300	320	6300	380	0.2	0.50
1.5	4200	250	4200	250	0.3	0.75
2.0	3100	190	3100	220	0.4	1.00
2.5	2500	180	2500	200	0.5	1.25
3.0	2100	170	2100	210	0.6	1.50
4.0	1500	130	1500	160	0.8	2.00
5.0	1200	130	1200	140	1.0	2.50
6.0	1000	110	1000	120	1.2	3.00
Depth of cut						

Note 1) The use of water-soluble coolant is effective for heat resistant super alloys.
Note 2) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 3) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.
Note 4) α is the inclination angle of the machined surface.



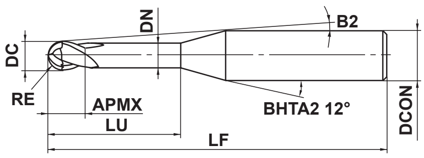
ae:Pick Feed

VQ2XLB NEW

Ball nose, Short cut length, 2 flute, Long neck

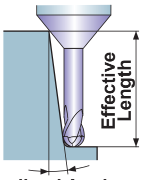
UWC VQ 30°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Precipitation Hardening Stainless Steel	Austenitic Stainless Steel	Cobalt Chrome Alloy, Heat Resistant Alloy	Titanium Alloy	Aluminium Alloy
					◎	◎	



Type1

Effective Length for Inclined Angle



Inclined Angle

0.05≤RE≤1.5			
±0.005			
4≤DCON≤6			
h5 0 - 0.005			

- Fracture resistance is improved by adopting a new S-shape, reinforced cutting edge geometry.
- SMART MIRACLE coating provides better wear resistance when machining difficult-to-cut materials.

(mm)

Order Number	RE	DC	APMX	LU	DN	B2	LF	DCON	No. of Flutes	Stock	Type
VQ2XLBR0050N080	0.5	1	0.75	8	0.94	6.4°	50	4	2	●	1
VQ2XLBR0050N100	0.5	1	0.75	10	0.94	5.6°	50	4	2	●	1
VQ2XLBR0050N080S06	0.5	1	0.75	8	0.94	8.3°	50	6	2	●	1
VQ2XLBR0050N100S06	0.5	1	0.75	10	0.94	7.5°	55	6	2	●	1
VQ2XLBR0050N120S06	0.5	1	0.75	12	0.94	6.8°	55	6	2	●	1
VQ2XLBR0075N100S06	0.75	1.5	1.1	10	1.44	7.2°	55	6	2	●	1
VQ2XLBR0075N120S06	0.75	1.5	1.1	12	1.44	6.5°	55	6	2	●	1
VQ2XLBR0100N100	1.0	2	1.5	10	1.9	4.5°	50	4	2	●	1
VQ2XLBR0100N100S06	1.0	2	1.5	10	1.9	6.9°	55	6	2	●	1
VQ2XLBR0100N120	1.0	2	1.5	12	1.9	3.9°	50	4	2	●	1
VQ2XLBR0100N120S06	1.0	2	1.5	12	1.9	6.1°	55	6	2	●	1
VQ2XLBR0150N120	1.5	3	2.3	12	2.9	5.3°	55	6	2	●	1
VQ2XLBR0150N140	1.5	3	2.3	14	2.9	4.7°	60	6	2	●	1
VQ2XLBR0150N160	1.5	3	2.3	16	2.9	4.3°	60	6	2	●	1

● : Inventory maintained in Japan.

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VQ2XLB

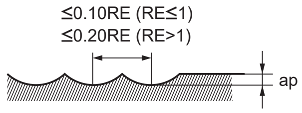
Ball nose, Short cut length, 2 flute, Long neck

RECOMMENDED CUTTING CONDITIONS

(mm)

Workpiece Material		Titanium Alloys Ti-6Al-4V ELI, ASTM F136, etc.					Cobalt Chromium Alloys ASTM F75:Casting, F1537:Wrought Bar, F799:Forgings, etc.				
RE	LU	Revolution n (min-1)	Cutting Speed vc (m/min)	Feed Rate vf (mm/min)	Depth of cut ap	Width of cut ae	Revolution n (min-1)	Cutting Speed vc (m/min)	Feed Rate vf (mm/min)	Depth of cut ap	Width of cut ae
0.5	**8**	32000	100	2500	0.05	0.1	25000	80	2000	0.05	0.1
0.5	**10**	24000	75	1500	0.05	0.1	19000	60	1500	0.05	0.1
0.5	**12**	24000	75	1500	0.03	0.1	19000	60	1500	0.03	0.1
0.75	**10**	21000	100	2100	0.13	0.3	17000	80	1700	0.08	0.1
0.75	**12**	16000	75	1500	0.13	0.3	13000	60	1200	0.08	0.1
1	**10**	16000	100	1800	0.20	0.5	13000	80	1500	0.2	0.5
1	**12**	16000	100	1800	0.20	0.5	13000	80	1500	0.2	0.5
1.5	**12**	10000	100	1600	0.30	0.8	8500	80	1300	0.3	0.8
1.5	**14**	10000	100	1600	0.30	0.8	8500	80	1300	0.3	0.8
1.5	**16**	10000	100	1600	0.30	0.8	8500	80	1300	0.3	0.8

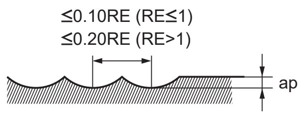
Depth of Cut



RE : Radius

Workpiece Material		Pure Titanium Ti etc.				
RE	LU	Revolution n (min-1)	Cutting Speed vc (m/min)	Feed Rate vf (mm/min)	Depth of cut ap	Width of cut ae
0.5	**8**	27000	80	1600	0.08	0.1
0.5	**10**	19000	60	1200	0.08	0.1
0.5	**12**	19000	60	1200	0.04	0.1
0.75	**10**	25000	120	2000	0.13	0.2
0.75	**12**	21000	100	1600	0.13	0.2
1	**10**	32000	200	2500	0.32	0.8
1	**12**	29000	180	1700	0.32	0.8
1.5	**12**	21000	200	1600	0.48	1.2
1.5	**14**	21000	200	1600	0.48	1.2
1.5	**16**	21000	200	1600	0.48	1.2

Depth of Cut



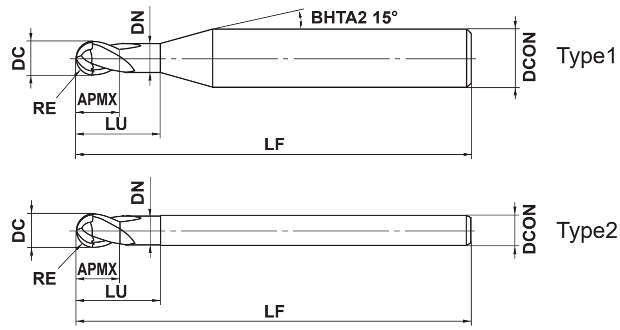
RE : Radius

Note 1) The SMART MIRACLE coating has very low electrical conductivity; therefore, an external contact type of tool setter (electrically transmitted) may not work.
When measuring the tool length, please use an internal contact type (non-electrical type) or a laser tool setter.
Note 2) When cutting titanium alloys, the use of water-soluble cutting fluid is effective.
Note 3) If the depth of cut is shallow, the revolution and the feed rate can be increased.

VFR2SSB

Ball nose, Short cut length, 2 flute, Short shank

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
	○	◎	◎				



RE≤6				
±0.005				
4≤DCON≤6	8≤DCON≤10	DCON=12		
0 - 0.005	0 - 0.006	0 - 0.008		

● Optimization of the cutting edge curve, helix angle, and rake angle have improved the edge strength at all areas of the ball blades.

(mm)

Order Number	RE	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	Type
VFR2SSBR0050S04	0.5	1	1	2	0.94	40	4	2	●	1
VFR2SSBR0050	0.5	1	1	2	0.94	40	6	2	●	1
VFR2SSBR0075S04	0.75	1.5	1.5	3	1.44	40	4	2	●	1
VFR2SSBR0075	0.75	1.5	1.5	3	1.44	40	6	2	●	1
VFR2SSBR0100	1	2	2	4	1.9	45	6	2	●	1
VFR2SSBR0150	1.5	3	3	6	2.9	45	6	2	●	1
VFR2SSBR0200	2	4	4	8	3.9	45	6	2	●	1
VFR2SSBR0250	2.5	5	5	10	4.9	50	6	2	●	1
VFR2SSBR0300	3	6	6	12	5.85	50	6	2	●	2
VFR2SSBR0400	4	8	8	14	7.85	60	8	2	●	2
VFR2SSBR0500	5	10	10	18	9.7	70	10	2	●	2
VFR2SSBR0600	6	12	12	22	11.7	75	12	2	●	2

● : Inventory maintained in Japan.

CARBIDE
SQUARE
BALL
RADIUS
TAPER
BARREL
ROUGHING
CHAMFER
J
SOLID END MILLS

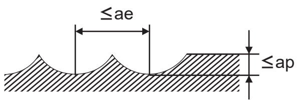
VFR2SSB

Ball nose, Short cut length, 2 flute, Short shank

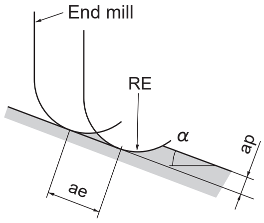
RECOMMENDED CUTTING CONDITIONS

Workpiece Material	Hardened steel (45−55HRC) AISI H13						Hardened steel (55−62HRC) AISI D2						Hardened steel (62−70HRC) AISI W1, AISI M2					
	α≤15°		α>15°		Depth of cut	Depth of cut	α≤15°		α>15°		Depth of cut	Depth of cut	α≤15°		α>15°		Depth of cut	Depth of cut
R RE (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	ap (mm)	ae (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	ap (mm)	ae (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	ap (mm)	ae (mm)
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

Depth of cut



Note 1) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.
Note 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.
Note 3) α is the inclination angle of the machined surface.



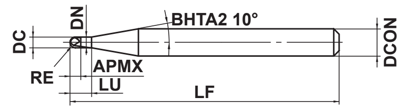
ae:Pick Feed

VFR2SB

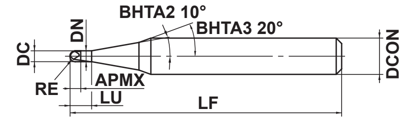
Ball nose, Short cut length, 2 flute

UWC VFR 0° RE<0.3 20° RE≥0.3

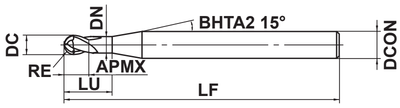
Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
	○	◎	◎				



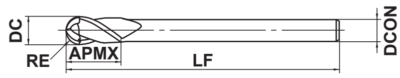
Type1



Type2



Type3



Type4

RE≤6	RE>6			
±0.005	±0.010			
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

h5

● Optimization of the cutting edge curve, helix angle, and rake angle have improved the edge strength at all areas of the ball blades.

(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
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

● : Inventory maintained in Japan.

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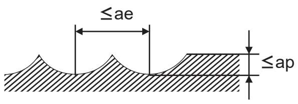
VFR2SB

Ball nose, Short cut length, 2 flute

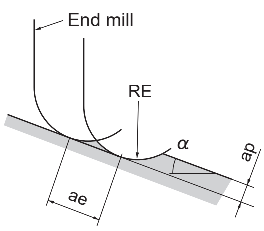
RECOMMENDED CUTTING CONDITIONS

Workpiece Material	Hardened steel (45−55HRC) AISI H13						Hardened steel (55−62HRC) AISI D2						Hardened steel (62−70HRC) AISI W1, AISI M2					
R	$\alpha \leq 15^\circ$		$\alpha > 15^\circ$		Depth of cut	Depth of cut	$\alpha \leq 15^\circ$		$\alpha > 15^\circ$		Depth of cut	Depth of cut	$\alpha \leq 15^\circ$		$\alpha > 15^\circ$		Depth of cut	Depth of cut
RE (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	ap (mm)	ae (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	ap (mm)	ae (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	ap (mm)	ae (mm)
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



Note 1) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.
Note 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.
Note 3) α is the inclination angle of the machined surface.



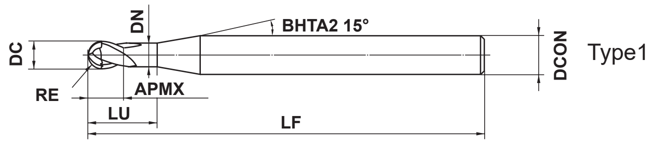
ae:Pick Feed

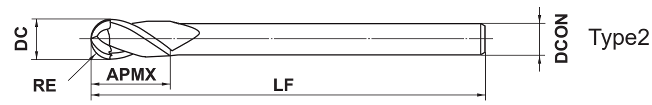
VFR2SBF

Ball nose, Short cut length, 2 flute, For Mirror finish cutting

30°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
	○	◎	◎				





RE≤3				
±0.010				
4≤DCON≤6				
0 - 0.005				

● New ball geometry for mirror finish cutting.

(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	12	—	—	80	6	2	●	2

● : Inventory maintained in Japan.

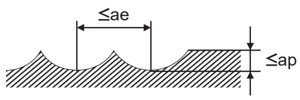
VFR2SBF

Ball nose, Short cut length, 2 flute, For Mirror finish cutting

RECOMMENDED CUTTING CONDITIONS

Workpiece Material	Carbon Steel, Alloy Steel (180—280HB) Alloy steel (≦350HB), Pre-hardened steel (35— 45HRC) Hardened steel (45— 52HRC), Hardened steel (55— 62HRC) AISI 1045, AISI 4140, SKD, SKT, AISI P21, AISI P20, AISI H13, L6, AISI D2						Hardened steel (62—70HRC) AISI W1, AISI M2					
R **RE** (mm)	$\alpha \leq 15°$		$\alpha > 15°$		Depth of cut ap (mm)	Depth of cut ae (mm)	$\alpha \leq 15°$		$\alpha > 15°$		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)		
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

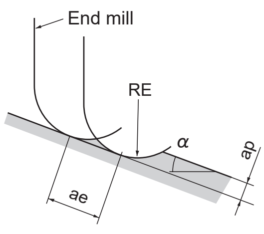
Depth of cut



Note 1) The tools are recommended for use only in finish machining.
Note 2) Air blowing or oil mist is recommended as coolants.
Note 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.

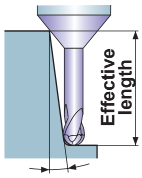
Note 4) α is the inclination angle of the machined surface.

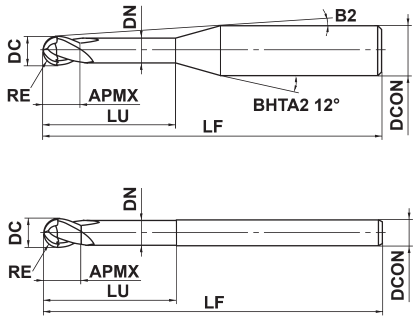


VFR2XLB NEW

Ball nose, Long neck, 2 flute

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
	○	◎	◎				





RE<0.3	0.3≤RE≤3			
±0.005	±0.005			
4≤DCON≤6				
h5: 0 / -0.005				

●Precise machining of vertical walls is possible due to a back taper and a strong, seamless ball nose cutting edge geometry.

(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°
VFR2XLBR0010N005	0.1	0.2	0.15	0.5	0.18	11.5°	50	4	2	●	1	0.5	0.5	0.6	0.7
VFR2XLBR0010N010	0.1	0.2	0.15	1	0.18	10.9°	50	4	2	●	1	1	1.1	1.2	1.3
VFR2XLBR0015N010	0.15	0.3	0.24	1	0.28	10.9°	50	4	2	●	1	1	1.1	1.2	1.3
VFR2XLBR0015N015	0.15	0.3	0.24	1.5	0.28	10.4°	50	4	2	●	1	1.6	1.6	1.8	2
VFR2XLBR0015N020	0.15	0.3	0.24	2	0.28	9.9°	50	4	2	●	1	2.1	2.2	2.4	2.6
VFR2XLBR0020N010	0.2	0.4	0.3	1	0.37	11°	50	4	2	●	1	1	1.1	1.2	1.3
VFR2XLBR0020N015	0.2	0.4	0.3	1.5	0.37	10.4°	50	4	2	●	1	1.5	1.6	1.7	1.9
VFR2XLBR0020N020	0.2	0.4	0.3	2	0.37	9.9°	50	4	2	●	1	2.1	2.2	2.3	2.6
VFR2XLBR0020N025	0.2	0.4	0.3	2.5	0.37	9.5°	50	4	2	●	1	2.6	2.7	2.9	3.3
VFR2XLBR0020N030	0.2	0.4	0.3	3	0.37	9.1°	50	4	2	●	1	3.1	3.2	3.5	3.9
VFR2XLBR0020N040	0.2	0.4	0.3	4	0.37	8.4°	50	4	2	●	1	4.2	4.3	4.7	5.2
VFR2XLBR0025N015	0.25	0.5	0.37	1.5	0.47	10.4°	50	4	2	●	1	1.5	1.6	1.7	1.9
VFR2XLBR0025N020	0.25	0.5	0.37	2	0.47	9.9°	50	4	2	●	1	2.1	2.1	2.3	2.6
VFR2XLBR0025N025	0.25	0.5	0.37	2.5	0.47	9.5°	50	4	2	●	1	2.6	2.7	2.9	3.2
VFR2XLBR0025N030	0.25	0.5	0.37	3	0.47	9.1°	50	4	2	●	1	3.1	3.2	3.5	3.9
VFR2XLBR0025N040	0.25	0.5	0.37	4	0.47	8.3°	50	4	2	●	1	4.1	4.3	4.7	5.2
VFR2XLBR0030N020	0.3	0.6	0.45	2	0.57	9.9°	50	4	2	●	1	2.1	2.2	2.4	2.6
VFR2XLBR0030N020S06	0.3	0.6	0.45	2	0.57	10.6°	50	6	2	●	1	2.1	2.2	2.4	2.6
VFR2XLBR0030N030	0.3	0.6	0.45	3	0.57	9°	50	4	2	●	1	3.1	3.3	3.6	4
VFR2XLBR0030N030S06	0.3	0.6	0.45	3	0.57	9.9°	50	6	2	●	1	3.1	3.3	3.6	4
VFR2XLBR0030N040	0.3	0.6	0.45	4	0.57	8.2°	50	4	2	●	1	4.2	4.4	4.8	5.3
VFR2XLBR0030N050	0.3	0.6	0.45	5	0.57	7.6°	50	4	2	●	1	5.2	5.5	6	6.6
VFR2XLBR0030N060	0.3	0.6	0.45	6	0.57	7.1°	50	4	2	●	1	6.3	6.6	7.2	7.9
VFR2XLBR0040N030	0.4	0.8	0.6	3	0.77	8.9°	50	4	2	●	1	3.1	3.3	3.6	3.9
VFR2XLBR0040N040	0.4	0.8	0.6	4	0.77	8.2°	50	4	2	●	1	4.2	4.4	4.8	5.2
VFR2XLBR0040N060	0.4	0.8	0.6	6	0.77	6.9°	50	4	2	●	1	6.3	6.5	7.2	7.9
VFR2XLBR0040N080	0.4	0.8	0.6	8	0.77	6°	50	4	2	●	1	8.4	8.7	9.5	10.6
VFR2XLBR0050N030	0.5	1	0.75	3	0.96	8.7°	50	4	2	●	1	3.2	3.4	3.7	4.1
VFR2XLBR0050N030S06	0.5	1	0.75	3	0.96	9.8°	50	6	2	●	1	3.2	3.4	3.7	4.1
VFR2XLBR0050N040	0.5	1	0.75	4	0.96	7.9°	50	4	2	●	1	4.3	4.5	4.9	5.4
VFR2XLBR0050N040S06	0.5	1	0.75	4	0.96	9.2°	50	6	2	●	1	4.3	4.5	4.9	5.4
VFR2XLBR0050N060	0.5	1	0.75	6	0.96	6.7°	50	4	2	●	1	6.3	6.5	7.2	7.9

● : Inventory maintained in Japan.

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VFR2XLB

Ball nose, Long neck, 2 flute

(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°
VFR2XLBR0050N060S06	0.5	1	0.75	6	0.96	8.2°	50	6	2	●	1	6.3	6.5	7.2	7.9
VFR2XLBR0050N080	0.5	1	0.75	8	0.96	5.8°	50	4	2	●	1	8.5	8.9	9.7	10.7
VFR2XLBR0050N100	0.5	1	0.75	10	0.96	5.1°	50	4	2	●	1	10.6	11.1	12.1	13.4
VFR2XLBR0050N120	0.5	1	0.75	12	0.96	4.6°	50	4	2	●	1	12.7	13.2	14.5	16
VFR2XLBR0075N060	0.75	1.5	1.1	6	1.44	6.3°	50	4	2	●	1	6.3	6.6	7.2	7.9
VFR2XLBR0075N060S06	0.75	1.5	1.1	6	1.44	8°	50	6	2	●	1	6.3	6.6	7.2	7.9
VFR2XLBR0075N080	0.75	1.5	1.1	8	1.44	5.4°	50	4	2	●	1	8.4	8.8	9.6	10.6
VFR2XLBR0075N080S06	0.75	1.5	1.1	8	1.44	7.2°	50	6	2	●	1	8.4	8.8	9.6	10.6
VFR2XLBR0075N100	0.75	1.5	1.1	10	1.44	4.7°	50	4	2	●	1	10.5	11	12	13.2
VFR2XLBR0075N120	0.75	1.5	1.1	12	1.44	4.2°	50	4	2	●	1	12.6	13.1	14.4	15.9
VFR2XLBR0075N140	0.75	1.5	1.1	14	1.44	3.8°	50	4	2	●	1	14.7	15.3	16.8	18.5
VFR2XLBR0075N160	0.75	1.5	1.1	16	1.44	3.4°	60	4	2	●	1	16.8	17.5	19.2	21.2
VFR2XLBR0100N060	1	2	1.5	6	1.94	5.8°	50	4	2	●	1	6.3	6.6	7.1	7.8
VFR2XLBR0100N060S06	1	2	1.5	6	1.94	7.8°	50	6	2	●	1	6.3	6.6	7.1	7.8
VFR2XLBR0100N080	1	2	1.5	8	1.94	4.8°	50	4	2	●	1	8.4	8.8	9.5	10.5
VFR2XLBR0100N080S06	1	2	1.5	8	1.94	6.9°	50	6	2	●	1	8.4	8.8	9.5	10.5
VFR2XLBR0100N100	1	2	1.5	10	1.94	4.2°	50	4	2	●	1	10.5	10.9	11.9	13.1
VFR2XLBR0100N100S06	1	2	1.5	10	1.94	6.2°	50	6	2	●	1	10.5	10.9	11.9	13.1
VFR2XLBR0100N120	1	2	1.5	12	1.94	3.6°	50	4	2	●	1	12.6	13.1	14.3	15.8
VFR2XLBR0100N120S06	1	2	1.5	12	1.94	5.6°	50	6	2	●	1	12.6	13.1	14.3	15.8
VFR2XLBR0100N160	1	2	1.5	16	1.94	2.9°	60	4	2	●	1	16.8	17.5	19.1	*
VFR2XLBR0100N160S06	1	2	1.5	16	1.94	4.7°	60	6	2	●	1	16.8	17.5	19.1	21.1
VFR2XLBR0100N200	1	2	1.5	20	1.94	2.4°	60	4	2	●	1	20.9	21.8	23.9	*
VFR2XLBR0100N200S06	1	2	1.5	20	1.94	4°	60	6	2	●	1	20.9	21.8	23.9	26.4
VFR2XLBR0125N100	1.25	2.5	1.9	10	2.4	3.5°	60	4	2	●	1	10.4	10.8	11.8	12.9
VFR2XLBR0125N150	1.25	2.5	1.9	15	2.4	2.5°	60	4	2	●	1	15.6	16.3	17.8	*
VFR2XLBR0150N100	1.5	3	2.3	10	2.9	5.5°	60	6	2	●	1	10.4	10.8	11.7	12.9
VFR2XLBR0150N120	1.5	3	2.3	12	2.9	4.9°	60	6	2	●	1	12.5	13	14.1	15.5
VFR2XLBR0150N160	1.5	3	2.3	16	2.9	4°	70	6	2	●	1	16.7	17.3	18.9	20.8
VFR2XLBR0150N200	1.5	3	2.3	20	2.9	3.4°	70	6	2	●	1	20.8	21.7	23.7	26.1
VFR2XLBR0150N250	1.5	3	2.3	25	2.9	2.8°	70	6	2	●	1	26.1	27.2	29.7	*
VFR2XLBR0150N300	1.5	3	2.3	30	2.9	2.5°	70	6	2	●	1	31.3	32.6	35.7	*
VFR2XLBR0200N100	2	4	3	10	3.9	4.5°	70	6	2	●	1	10.4	10.8	11.6	12.7
VFR2XLBR0200N120	2	4	3	12	3.9	3.9°	70	6	2	●	1	12.5	12.9	14	15.4
VFR2XLBR0200N160	2	4	3	16	3.9	3.1°	70	6	2	●	1	16.6	17.3	18.8	20.7
VFR2XLBR0200N200	2	4	3	20	3.9	2.6°	70	6	2	●	1	20.8	21.7	23.6	*
VFR2XLBR0200N250	2	4	3	25	3.9	2.1°	70	6	2	●	1	26	27.1	29.6	*
VFR2XLBR0200N300	2	4	3	30	3.9	1.8°	70	6	2	●	1	31.2	32.6	*	*
VFR2XLBR0250N200	2.5	5	3.8	20	4.9	1.5°	70	6	2	●	1	20.8	21.6	*	*
VFR2XLBR0250N250	2.5	5	3.8	25	4.9	1.2°	70	6	2	●	1	26	27.1	*	*
VFR2XLBR0300N180	3	6	6	18	5.85	—	80	6	2	●	2	*	*	*	*
VFR2XLBR0300N300	3	6	6	30	5.85	—	80	6	2	●	2	*	*	*	*

* No interference

● : Inventory maintained in Japan.

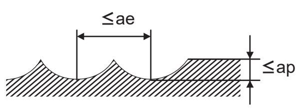
ISO13399 ➤J002

RECOMMENDED CUTTING CONDITIONS

(mm)

Workpiece Material		Hardened Steels (45—55HRC)				Hardened Steels (55—70HRC)			
R **RE**	Neck length **LU**	Revolution (min^{-1})	Feed Rate (mm/min)	Depth of Cut **ap**	Width of Cut **ae**	Revolution (min^{-1})	Feed Rate (mm/min)	Depth of Cut **ap**	Width of Cut **ae**
0.1	**0.5**	40000	300	0.003	0.01	40000	300	0.002	0.01
0.1	**1**	40000	300	0.002	0.01	40000	300	0.002	0.01
0.15	**1**	40000	500	0.007	0.015	40000	500	0.005	0.015
0.15	**1.5**	40000	500	0.005	0.015	40000	500	0.003	0.015
0.15	**2**	40000	500	0.003	0.015	40000	500	0.002	0.015
0.2	**1**	40000	1400	0.015	0.02	40000	1400	0.01	0.02
0.2	**1.5**	40000	1000	0.01	0.02	40000	1000	0.006	0.02
0.2	**2**	40000	1000	0.01	0.02	40000	1000	0.006	0.02
0.2	**2.5**	40000	700	0.005	0.02	40000	700	0.003	0.02
0.2	**3**	40000	700	0.005	0.02	40000	700	0.003	0.02
0.2	**4**	40000	600	0.004	0.02	40000	500	0.003	0.02
0.25	**1.5**	40000	2000	0.02	0.025	40000	2000	0.015	0.025
0.25	**2**	40000	2000	0.02	0.025	40000	2000	0.015	0.025
0.25	**2.5**	40000	1500	0.015	0.025	40000	1500	0.01	0.025
0.25	**3**	40000	1200	0.015	0.025	40000	1200	0.01	0.025
0.25	**4**	36000	900	0.1	0.025	36000	900	0.007	0.025
0.3	**2**	40000	2800	0.03	0.03	40000	2800	0.02	0.03
0.3	**3**	40000	2800	0.03	0.03	40000	2800	0.02	0.03
0.3	**4**	35000	2000	0.02	0.03	35000	2000	0.015	0.03
0.3	**5**	30000	1000	0.01	0.03	30000	1000	0.007	0.03
0.3	**6**	30000	800	0.008	0.03	30000	800	0.005	0.03
0.4	**3**	40000	3000	0.04	0.04	40000	3000	0.03	0.04
0.4	**4**	40000	3000	0.02	0.04	40000	3000	0.015	0.04
0.4	**6**	30000	1600	0.02	0.04	30000	1600	0.01	0.04
0.4	**8**	25000	1000	0.01	0.04	25000	1000	0.007	0.04
0.5	**3**	40000	4000	0.05	0.05	40000	4000	0.04	0.05
0.5	**4**	40000	4000	0.05	0.05	40000	4000	0.04	0.05
0.5	**6**	35000	2000	0.03	0.05	35000	2000	0.02	0.05
0.5	**8**	30000	1600	0.02	0.05	30000	1600	0.01	0.05
0.5	**10**	20000	1000	0.01	0.05	20000	1000	0.01	0.05
0.5	**12**	20000	1000	0.01	0.05	20000	800	0.008	0.05
0.75	**6**	40000	5000	0.07	0.075	40000	4000	0.06	0.075
0.75	**8**	40000	5000	0.07	0.075	40000	3500	0.06	0.075
0.75	**10**	40000	4500	0.06	0.075	40000	2400	0.06	0.075
0.75	**12**	32000	3400	0.04	0.075	32000	2000	0.04	0.075
0.75	**14**	16000	1500	0.04	0.075	16000	1200	0.03	0.075
0.75	**16**	13000	1200	0.03	0.075	13000	1200	0.02	0.075
1	**6**	40000	6000	0.1	0.1	40000	3400	0.1	0.1
1	**8**	40000	5000	0.1	0.1	40000	3000	0.1	0.1
1	**10**	40000	5000	0.08	0.1	40000	3000	0.07	0.1
1	**12**	40000	5000	0.08	0.1	40000	2600	0.05	0.1
1	**16**	32000	3500	0.05	0.1	32000	1700	0.03	0.1
1	**20**	10000	1000	0.04	0.1	10000	1000	0.03	0.1
1.25	**10**	36000	5000	0.12	0.25	36000	2600	0.11	0.25
1.25	**15**	36000	4600	0.08	0.25	36000	2000	0.075	0.25

Depth of Cut



Note 1) When the inclination angle of a machined surface is large, or when machining with a large cutting load such as the corner area, reduce the revolution and feed rate.

Note 2) If the depth of cut is shallow, the revolution and feed rate can be increased.

Note 3) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

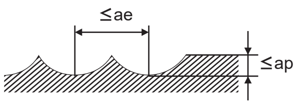
VFR2XLB

Ball nose, Long neck, 2 flute

RECOMMENDED CUTTING CONDITIONS

Workpiece Material		Hardened Steels (45−55HRC)				Hardened Steels (55−70HRC)			
R **RE**	Neck length **LU**	Revolution (min^{-1})	Feed Rate (mm/min)	Depth of Cut **ap**	Width of Cut **ae**	Revolution (min^{-1})	Feed Rate (mm/min)	Depth of Cut **ap**	Width of Cut **ae**
1.5	**10**	32000	5100	0.15	0.3	32000	2200	0.15	0.3
1.5	**12**	32000	5100	0.13	0.3	32000	2200	0.13	0.3
1.5	**16**	32000	4500	0.1	0.3	32000	1800	0.1	0.3
1.5	**20**	27000	3800	0.1	0.3	27000	1600	0.06	0.3
1.5	**25**	21000	2700	0.08	0.3	21000	1200	0.06	0.3
1.5	**30**	9000	1000	0.08	0.3	9000	700	0.05	0.3
2	**10**	24000	4800	0.2	0.4	24000	2200	0.2	0.4
2	**12**	24000	4800	0.2	0.4	24000	2200	0.2	0.4
2	**16**	24000	3800	0.15	0.4	24000	1500	0.15	0.4
2	**20**	24000	3800	0.15	0.4	24000	1500	0.15	0.4
2	**25**	24000	3800	0.15	0.4	24000	1100	0.1	0.4
2	**30**	24000	3000	0.1	0.4	24000	1100	0.08	0.4
2.5	**20**	19000	3400	0.2	0.5	19000	1400	0.2	0.5
2.5	**25**	19000	3400	0.2	0.5	19000	1400	0.2	0.5
3	**18**	16000	3500	0.25	0.6	16000	1000	0.2	0.6
3	**30**	16000	3500	0.2	0.6	16000	1000	0.2	0.6

Depth of Cut

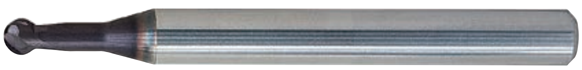


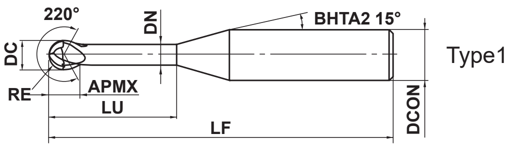
Note 1) When the inclination angle of a machined surface is large, or when machining with a large cutting load such as the corner area, reduce the revolution and feed rate.
Note 2) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 3) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

VF2WB

Wide ball nose, Medium cut length, 2 flute

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	○	○		◎	◎		





1≤RE≤3				
±0.01				
DCON=6				
0 - 0.008				

● Ball nose end mill suitable for machining of undercut geometries and complex geometries using a 5-axis machine.

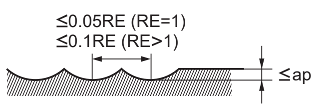
(mm)

Order Number	RE	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	Type
VF2WBR0100N060	1	2	1.3	6	1.6	60	6	2	●	1
VF2WBR0150N080	1.5	3	2	8	2.4	60	6	2	●	1
VF2WBR0200N100	2	4	2.6	10	3.2	60	6	2	●	1
VF2WBR0300N120	3	6	4	12	4.8	80	6	2	●	1

RECOMMENDED CUTTING CONDITIONS

Workpiece 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

Depth of cut



RE:Radius

Note 1) When cutting austenitic stainless steels, the use of water-soluble cutting fluid is effective.
Note 2) If the depth of cut is shallow, the revolution and feed rate can be increased.

● : **Inventory maintained in Japan.**

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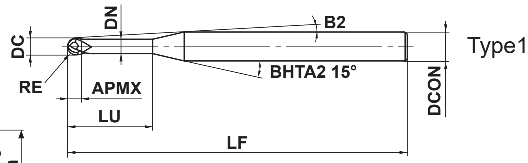
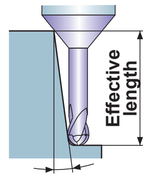
VF2XLBS

IMPACT MIRACLE, Ball nose, 2 flute, Long neck, Short shank

UWC VF 30°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	◎	◎	◎				





0.2≤RE≤1				
±0.007				
0.4≤DC≤2				
0 - 0.02				
DCON=4				
0 - 0.008				

h6

- 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.

(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	8.0°	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

▲ : Inventory maintained in Japan. To be replaced by new products.
VFR2XLB (J195) is alternative product.

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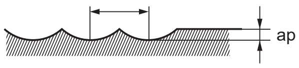
ISO13399 ➤ J002

RECOMMENDED CUTTING CONDITIONS

Workpiece 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)
R 0.2	**1**	40000	1400	0.015	40000	1400	0.01
	2	40000	1000	0.01	40000	1000	0.006
	3	40000	700	0.005	40000	700	0.003
	4	40000	600	0.004	40000	500	0.003
R 0.25	**4**	36000	900	0.01	36000	900	0.007
	6	36000	600	0.006	36000	500	0.004
R 0.3	**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
	6	30000	800	0.008	30000	800	0.005
R 0.4	**4**	40000	3000	0.02	40000	3000	0.015
	6	30000	1600	0.02	30000	1600	0.01
R 0.5	**3**	40000	4000	0.05	40000	4000	0.04
	4	40000	4000	0.05	40000	4000	0.04
	6	35000	2000	0.03	35000	2000	0.02
	8	30000	1600	0.02	30000	1600	0.01
R 1	**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

Depth of cut

≦0.1RE (RE≦1)
≦0.2RE (RE>1)



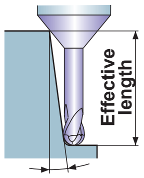
RE:Radius

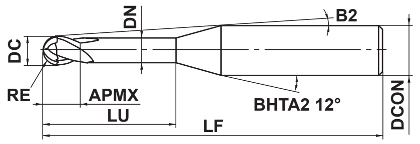
Note 1) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 2) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

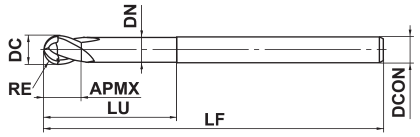
VF2XLB

IMPACT MIRACLE, Ball nose, 2 flute, Long neck

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	◎	◎	◎				







RE≤1	RE>1			
±0.007	±0.010			
0.2≤DC≤6				
0 - 0.02				
4≤DCON≤6				
h6: 0 - 0.008				

●2 flute long neck ball nose end mill with Impact Miracle coating for high hardened materials.

(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	1.0
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	3.0	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	3.0	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
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

▲ : Inventory maintained in Japan. To be replaced by new products.
VFR2XLB (J195) is alternative product.

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ISO13399

➤ J002

(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°
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	3.0	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
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

VF2XLB

IMPACT MIRACLE, Ball nose, 2 flute, Long neck

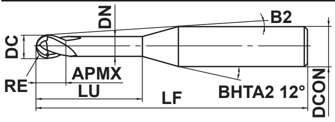
(mm)

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°
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	12.0
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	24.0	26.6
VF2XLBR0050N200S06	0.5	1	0.8	20	0.94	4.6°	70	6	2	▲	1	21.0	21.9	24.0	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
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

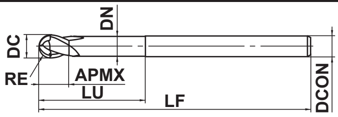
* No interference

▲ : Inventory maintained in Japan. To be replaced by new products.
VFR2XLB (J195) is alternative product.

ISO13399 ➤ J002



Type1



Type2

(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°
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
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	*	*

* No interference

CARBIDE

VF2XLB

IMPACT MIRACLE, Ball nose, 2 flute, Long neck

(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°
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	*	*	*	*

* No interference

SQUARE
BALL
RADIUS
TAPER
BARREL
ROUGHING
CHAMFER
J
SOLID END MILLS

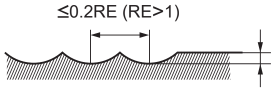
▲ : Inventory maintained in Japan. To be replaced by new products.
VFR2XLB (J195) is alternative product.

RECOMMENDED CUTTING CONDITIONS

Workpiece 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)
R 0.1	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
R 0.15	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
R 0.2	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
R 0.25	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
R 0.3	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
R 0.4	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
R 0.5	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
R 0.6	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
R 0.7	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
R 0.75	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
R 0.8	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
R 0.9	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
R 1	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
R 1.25	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
R 1.5	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
R 1.75	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
R 2	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
	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
R 2.5	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
R 3	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

Depth of cut

≤0.1RE (RE≤1)
≤0.2RE (RE>1)



RE:Radius

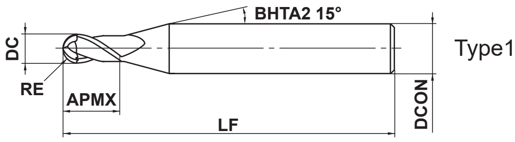
Note 1) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 2) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

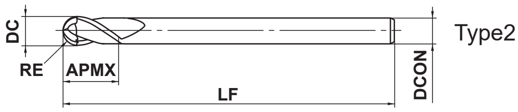
CRN2MB

Ball nose, Medium cut length, 2 flute, For copper electrodes

UWC CRN 30°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
						◎	○





0.2≦RE≦5				
±0.01				
0.4≦DC≦10				
0 - 0.02				
4≦DCON≦6	8≦DCON≦10			
h6: 0 - 0.008	0 - 0.009			

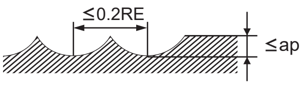
●2 flute ball nose end mill with CRN coating for copper electrode machining.

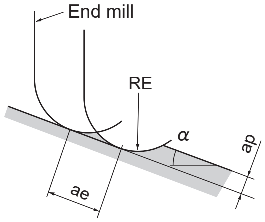
(mm)

Order Number	RE	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
CRN2MBR0020S04	0.2	0.4	0.8	45	4	2	●	1
CRN2MBR0030S04	0.3	0.6	1.2	45	4	2	●	1
CRN2MBR0040S04	0.4	0.8	1.6	45	4	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
CRN2MBR0100S06	1	2	6	50	6	2	●	1
CRN2MBR0150S06	1.5	3	8	70	6	2	●	1
CRN2MBR0200S06	2	4	8	70	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

● : Inventory maintained in Japan.

RECOMMENDED CUTTING CONDITIONS

Workpiece Material	Copper, Copper alloys				
R **RE** (mm)	$\alpha \leq 15°$		$\alpha > 15°$		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
Depth of cut					RE:Radius



ae:Pick Feed

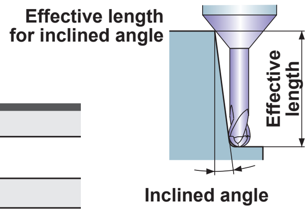
Note 1) α is the inclination angle of the machined surface.
Note 2) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 3) Water-soluble cutting fluid is recommended.
Note 4) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

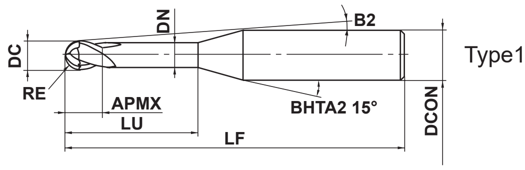
CRN2XLB

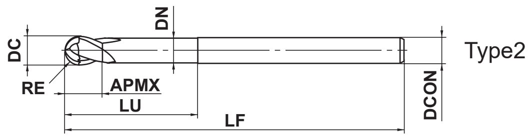
Ball nose, Medium cut length, 2 flute, Long neck, For copper electrodes

UWC CRN 30°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
						◎	○







0.15≤RE≤3			
±0.01			
0.3≤DC≤6			
0 - 0.02			
h6 4≤DCON≤6			
0 - 0.008			

● 2 flute long neck ball nose end mill with CRN coating for copper electrode machining.

(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°
CRN2XLBR0015N010S04	0.15	0.3	0.3	1	0.27	13.3°	50	4	2	●	1	1.0	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
CRN2XLBR0015N020S04	0.15	0.3	0.3	2	0.27	11.9°	50	4	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	1.0	1.0	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
CRN2XLBR0020N020S04	0.2	0.4	0.4	2	0.36	11.9°	50	4	2	●	1	2.0	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
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
CRN2XLBR0025N020S04	0.25	0.5	0.5	2	0.46	11.9°	50	4	2	●	1	2.0	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
CRN2XLBR0025N060S04	0.25	0.5	0.5	6	0.46	8.1°	50	4	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
CRN2XLBR0030N020S04	0.3	0.6	0.6	2	0.56	11.8°	50	4	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	5.0
CRN2XLBR0030N060S04	0.3	0.6	0.6	6	0.56	8°	50	4	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	10.0
CRN2XLBR0030N100S04	0.3	0.6	0.6	10	0.56	6°	50	4	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
CRN2XLBR0040N040S04	0.4	0.8	0.8	4	0.76	9.4°	50	4	2	●	1	4.2	4.3	4.6	5.0
CRN2XLBR0040N060S04	0.4	0.8	0.8	6	0.76	7.8°	50	4	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	10.0
CRN2XLBR0040N100S04	0.4	0.8	0.8	10	0.76	5.9°	50	4	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
CRN2XLBR0050N040S04	0.5	1	1	4	0.94	9.1°	50	4	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	6.0	6.4
CRN2XLBR0050N050S06	0.5	1	1	5	0.94	10.1°	50	6	2	●	1	5.3	5.5	6.0	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
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
CRN2XLBR0050N120S04	0.5	1	1	12	0.94	5°	50	4	2	●	1	12.6	13.1	14.0	15.1

● : Inventory maintained in Japan.

ISO13399 ➤J002

(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°
CRN2XLBR0050N160S04	0.5	1	1	16	0.94	4.1°	55	4	2	●	1	16.8	17.4	18.6	20.1
CRN2XLBR0050N200S04	0.5	1	1	20	0.94	3.4°	55	4	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
CRN2XLBR0075N160S04	0.75	1.5	1.5	16	1.44	3.6°	55	4	2	●	1	16.8	17.3	18.6	20.0
CRN2XLBR0100N080S04	1	2	2	8	1.90	5.3°	50	4	2	●	1	8.3	8.7	9.2	9.9
CRN2XLBR0100N100S04	1	2	2	10	1.90	4.5°	50	4	2	●	1	10.4	10.8	11.5	12.4
CRN2XLBR0100N100S06	1	2	2	10	1.90	6.9°	50	6	2	●	1	10.4	10.8	11.5	12.4
CRN2XLBR0100N120S04	1	2	2	12	1.90	3.9°	50	4	2	●	1	12.5	12.9	13.8	14.9
CRN2XLBR0100N120S06	1	2	2	12	1.90	6.1°	50	6	2	●	1	12.5	12.9	13.8	14.9
CRN2XLBR0100N140S06	1	2	2	14	1.90	5.6°	55	6	2	●	1	14.6	15.1	16.1	17.4
CRN2XLBR0100N160S04	1	2	2	16	1.90	3.1°	55	4	2	●	1	16.7	17.2	18.4	19.9
CRN2XLBR0100N200S04	1	2	2	20	1.90	2.5°	60	4	2	●	1	20.8	21.5	23.0	*
CRN2XLBR0100N250S06	1	2	2	25	1.90	3.7°	65	6	2	●	1	26.0	26.8	28.8	31.0
CRN2XLBR0100N300S06	1	2	2	30	1.90	3.2°	70	6	2	●	1	31.1	32.2	34.5	37.3
CRN2XLBR0150N160S06	1.5	3	3	16	2.90	4.3°	60	6	2	●	1	16.6	17.2	18.4	19.7
CRN2XLBR0150N250S06	1.5	3	3	25	2.90	3°	70	6	2	●	1	26.0	26.8	28.7	*
CRN2XLBR0150N350S06	1.5	3	3	35	2.90	2.2°	80	6	2	●	1	36.3	37.5	40.2	*
CRN2XLBR0200N160S06	2	4	4	16	3.90	3.2°	70	6	2	●	1	16.6	17.1	18.3	19.6
CRN2XLBR0200N200S06	2	4	4	20	3.90	2.7°	70	6	2	●	1	20.8	21.4	22.9	*
CRN2XLBR0200N300S06	2	4	4	30	3.90	1.8°	70	6	2	●	1	31.1	32.1	*	*
CRN2XLBR0200N400S06	2	4	4	40	3.90	1.4°	90	6	2	●	1	41.4	42.8	*	*
CRN2XLBR0250N200S06	2.5	5	5	20	4.90	1.5°	70	6	2	●	1	20.7	21.4	*	*
CRN2XLBR0300N300S06	3	6	6	30	5.85	—	80	6	2	●	2	*	*	*	*
CRN2XLBR0300N500S06	3	6	6	50	5.85	—	100	6	2	●	2	*	*	*	*

* No interference

CRN2XLB

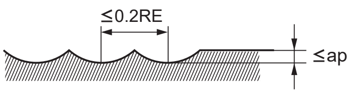
Ball nose, Medium cut length, 2 flute, Long neck, For copper electrodes

RECOMMENDED CUTTING CONDITIONS

Workpiece Material		Copper, Copper alloys		
R RE (mm)	Neck length LU (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)
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

Workpiece Material		Copper, Copper alloys		
R RE (mm)	Neck length LU (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)
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

Depth of cut



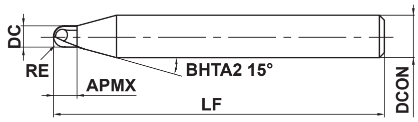
RE:Radius

Note 1) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 2) Water-soluble cutting fluid is recommended.
Note 3) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

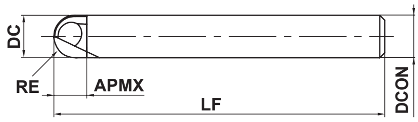
DC2SB

Ball nose, Short cut length, 2 flute, For hard brittle materials

Cemented carbide	Alumina Zirconia	Silicon carbide Silicon nitride	Quartz glass
◎	○	○	○



Type1



Type2

0.1≦RE≦3			
±0.01			
4≦DCON≦6			
0 - 0.008			

●Suitable DC ball end mill for cemented carbide and other hard brittle materials processing.

(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

● : Inventory maintained in Japan.

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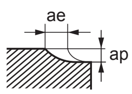
DC2SB

Ball nose, Short cut length, 2 flute, For hard brittle materials

RECOMMENDED CUTTING CONDITIONS

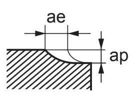
Workpiece Material		Cemented carbide				Alumina Zirconia			
Dia. **DC** (mm)	R **RE** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)
0.2	**0.1**	30000	100	0.01	0.01	30000	100	0.01	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

Depth of cut



Workpiece 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

Depth of cut

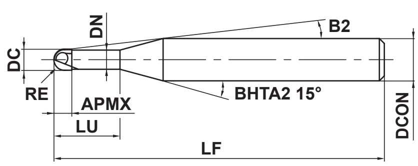


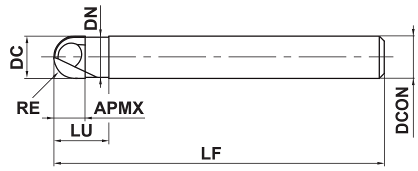
Note 1) The cemented carbide in the above mentioned cutting conditions table is based on CIS standard VM-40(90HRA).
Note 2) Air blow or dry machining is recommended with cemented carbide machining.
*Note: Using coolants or oil mists may decrease tool longevity.
Note 3) The use of a water soluble cutting 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.
Note 4) Cutting conditions may need adjustments depending on the type of workpiece material.
Note 5) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.
Note 6) Implementation of special counter measures is recommended since fine chip discharge may enter gaps in the processing machinery.

DC2XLB

Ball nose, Short cut length, 2 flute, For hard brittle materials

Cemented carbide	Alumina Zirconia	Silicon carbide Silicon nitride	Quartz glass
◎	○	○	○





0.1≤RE≤3				
±0.01				
4≤DCON≤6				
0 - 0.008				

●Suitable DC long neck ball end mill for cemented carbide and other hard brittle materials processing.

(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

● : Inventory maintained in Japan.

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SQUARE BALL RADIUS TAPER BARREL ROUGHING CHAMFER J SOLID END MILLS

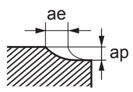
DC2XLB

Ball nose, Short cut length, 2 flute, For hard brittle materials

RECOMMENDED CUTTING CONDITIONS

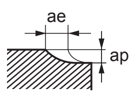
Workpiece Material			Cemented carbide				Alumina Zirconia			
Dia. **DC** (mm)	R **RE** (mm)	Neck length **LU** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)
0.2	**0.1**	**0.5**	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

Depth of cut



Workpiece Material			Silicon carbide Silicon nitride				Quartz glass			
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)
0.2	**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

Depth of cut



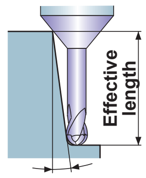
Note 1) The cemented carbide in the above mentioned cutting conditions table is based on CIS standard VM-40(90HRA).
Note 2) Air blow or dry machining is recommended with cemented carbide machining.
*Note: Using coolants or oil mists may decrease tool longevity.
Note 3) The use of a water soluble cutting 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.
Note 4) Cutting conditions may need adjustments depending on the type of workpiece material.
Note 5) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.
Note 6) Implementation of special counter measures is recommended since fine chip discharge may enter gaps in the processing machinery.

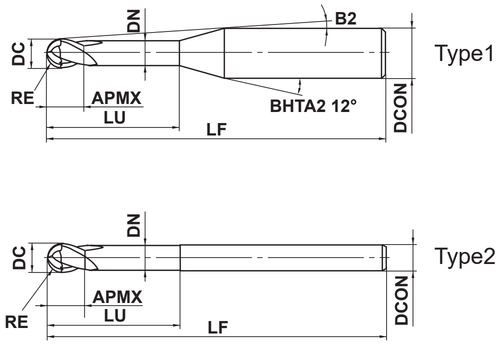
DF2XLB

Ball nose, Medium cut length, 2 flute, Long neck, For graphite

30°

Aluminium Alloy	Copper Alloy	Graphite	GFRP CFRP	Machineable Ceramics
○	◎	◎	○	○





0.15≤RE≤2	
±0.01	
DCON=4	
0 - 0.008	

●2 flute long neck ball nose end mill with Mitsubishi's unique diamond coating for graphite machining.

(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°
DF2XLBR0015N020	0.15	0.3	0.3	2	0.27	9.9°	50	4	2	●	1	2.1	2.2	2.4	2.6
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
DF2XLBR0025N040	0.25	0.5	0.6	4	0.46	8.3°	60	4	2	●	1	4.1	4.3	4.7	5.2
DF2XLBR0025N080	0.25	0.5	0.6	8	0.46	6.3°	60	4	2	●	1	8.3	8.7	9.5	10.5
DF2XLBR0030N060	0.3	0.6	0.9	6	0.56	7.1°	60	4	2	●	1	6.3	6.5	7.1	7.9
DF2XLBR0030N100	0.3	0.6	0.9	10	0.56	5.5°	60	4	2	●	1	10.4	10.9	11.9	13.2
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
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
DF2XLBR0050N160	0.5	1	1.5	16	0.94	3.8°	80	4	2	●	1	16.8	17.5	19.2	21.3
DF2XLBR0050N200	0.5	1	1.5	20	0.94	3.3°	80	4	2	●	1	21.0	21.9	24.0	26.6
DF2XLBR0050N300	0.5	1	1.5	30	0.94	2.4°	80	4	2	●	1	31.4	32.8	36.0	*
DF2XLBR0075N160	0.75	1.5	2.3	16	1.44	3.4°	80	4	2	●	1	16.8	17.5	19.2	21.2
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	*	*
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	*	*
DF2XLBR0200N300	2	4	6	30	3.9	—	80	4	2	●	2	*	*	*	*
DF2XLBR0200N600	2	4	6	60	3.9	—	100	4	2	●	2	*	*	*	*

* No interference

● : Inventory maintained in Japan.

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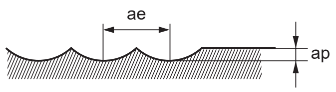
DF2XLB

Ball nose, Medium cut length, 2 flute, Long neck, For graphite

RECOMMENDED CUTTING CONDITIONS

Workpiece 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)
R0.15	**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	—	—	—	—

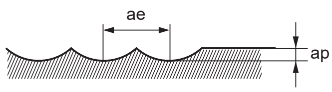
Depth of cut



Note 1) When high machining accuracy is needed, or the workpiece becomes chipped, we recommend lowering the feed rate.
Note 2) Use a milling machine dedicated for graphite.
Note 3) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

Workpiece 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)
R0.75	**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	0.3	20000	900	0.03	0.15
	30	27000	1000	0.1	0.3	—	—	—	—
	40	21000	700	0.08	0.25	—	—	—	—
R1	**8**	40000	3000	0.23	0.7	40000	3000	0.1	0.2
	10	40000	3000	0.2	0.6	40000	2800	0.08	0.2
	12	35000	2500	0.2	0.6	35000	2300	0.08	0.2
	16	30000	2000	0.2	0.5	30000	1800	0.05	0.2
	20	30000	2000	0.2	0.5	20000	1200	0.04	0.2
	25	25000	1500	0.18	0.45	20000	1000	0.03	0.2
	40	20000	1000	0.15	0.4	—	—	—	—
	60	15000	500	0.1	0.3	—	—	—	—
R1.5	**16**	28000	3000	0.3	0.9	28000	3000	0.3	0.3
	25	20000	2000	0.25	0.75	20000	2000	0.25	0.3
	40	16000	1500	0.2	0.6	16000	1500	0.2	0.3
	60	14000	1000	0.17	0.45	—	—	—	—
R2	**8**	24000	3800	0.5	1.5	24000	3800	0.5	0.4
	20	21000	3300	0.5	1.5	21000	3300	0.4	0.4
	30	15000	2000	0.4	1.2	15000	2000	0.3	0.4
	40	13000	1600	0.35	1.0	13000	1600	0.25	0.4
	60	12000	1400	0.3	0.9	12000	1400	0.2	0.4

Depth of cut



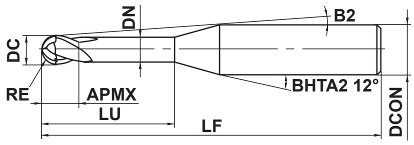
Note 1) When high machining accuracy is needed, or the workpiece becomes chipped, we recommend lowering the feed rate.
Note 2) Use a milling machine dedicated for graphite.
Note 3) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

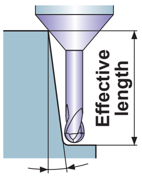
DF2XLBF (For Finishing)

Ball nose, Medium cut length, 2 flute, Long neck, For graphite

UWC DF 30°

Aluminium Alloy	Copper Alloy	Graphite	Zirconia (Before Sintering)	Rigid Composite Resin (Composite Resin)	Machineable Ceramics
○	◎	◎	◎	◎	○





0.3≤RE≤1	1.5≤RE			
±0.005	±0.01			
DCON=4				
0 - 0.008				

● DF long-neck ball end mills are ideal for finished surfaces of non-ferrous metals.

(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°
DF2XLBFR0030N100	0.3	0.6	0.45	10	0.57	5.5°	50	4	2	●	1	10.4	10.9	11.9	13.2
DF2XLBFR0050N120	0.5	1	1.5	12	0.86	4.6°	50	4	2	●	1	12.6	13.2	14.4	15.9
DF2XLBFR0050N160	0.5	1	1.5	16	0.86	3.8°	50	4	2	●	1	16.8	17.5	19.2	21.3
DF2XLBFR0050N200	0.5	1	1.5	20	0.86	3.2°	50	4	2	●	1	21	21.9	24	26.6
DF2XLBFR0100N160	1	2	3	16	1.86	2.9°	50	4	2	●	1	16.7	17.4	19	*
DF2XLBFR0100N200	1	2	3	20	1.86	2.4°	50	4	2	●	1	20.9	21.8	23.9	*
DF2XLBFR0150N160	1.5	3	4.5	16	2.86	1.7°	50	4	2	●	1	16.7	17.3	18.9	20.8
DF2XLBFR0150N200	1.5	3	4.5	20	2.86	1.4°	50	4	2	●	1	20.8	21.7	23.7	26.1

* No interference

SQUARE BALL RADIUS TAPER BARREL ROUGHING CHAMFER J SOLID END MILLS

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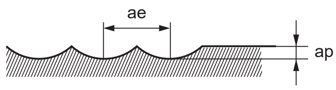
RECOMMENDED CUTTING CONDITIONS

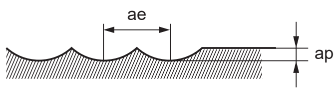
Workpiece Material			Graphite				Zirconia (Before Sintering)			
Dia. **DC** (mm)	R **RE** (mm)	Neck length **LU** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)
0.6	**R0.3**	**10**	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

Depth of cut



Workpiece 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

Depth of cut

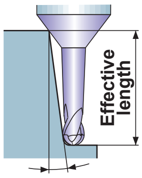


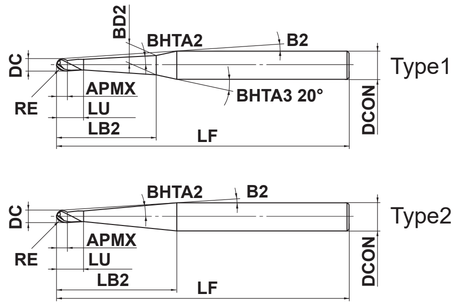
Note 1) When high machining accuracy is needed, or the workpiece becomes chipped, we recommend lowering the feed rate and depth of cut.
Note 2) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.
Note 3) When work on dry machining material that contain resin, be careful of tool breakage and mechanical problems (as there is a possibility of blockage caused by cutting chips).
Note 4) Use a milling machine dedicated for graphite.

MP3XB

Ball nose, 3 flute, Taper neck

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	◎		○	○	○	





RE≤3	RE≥4			
±0.005	±0.010			
DCON=6	DCON=8			
h5: 0 - 0.005	0 - 0.006			
DCON=10	DCON≥12			
h6: 0 - 0.009	0 - 0.011			

- 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.

(mm)

Order Number	RE	DC	BHTA2	APMX	LU	LB2	B2	BD2	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	2.3	8	9.3°	1.04	60	6	3	●	1	8.5	8.8	9.3	9.8
MP3XBR0050N012T05	0.5	1	0.5°	0.8	2.3	12	7.5°	1.1	60	6	3	●	1	12.6	13	13.6	14.4
MP3XBR0050N016T05	0.5	1	0.5°	0.8	2.3	16	6.3°	1.18	60	6	3	●	1	16.6	17.1	18	18.9
MP3XBR0050N020T05	0.5	1	0.5°	0.8	2.3	20	5.4°	1.24	60	6	3	●	1	20.6	21.2	22.3	23.5
MP3XBR0050N025T05	0.5	1	0.5°	0.8	2.3	25	4.6°	1.34	70	6	3	●	1	25.7	26.3	27.7	29.3
MP3XBR0050N030T05	0.5	1	0.5°	0.8	2.3	30	4°	1.42	70	6	3	●	1	30.7	31.5	33.1	35
MP3XBR0050N050T05	0.5	1	0.5°	0.8	2.3	50	2.6°	1.78	90	6	3	●	1	50.8	52.1	54.8	*
MP3XBR0050N010T10	0.5	1	1°	0.8	2.3	10	8.4°	1.2	60	6	3	●	1	—	10.6	11.2	11.8
MP3XBR0050N016T10	0.5	1	1°	0.8	2.3	16	6.4°	1.42	60	6	3	●	1	—	16.7	17.6	18.5
MP3XBR0050N020T10	0.5	1	1°	0.8	2.3	20	5.5°	1.56	60	6	3	●	1	—	20.7	21.8	23
MP3XBR0050N025T10	0.5	1	1°	0.8	2.3	25	4.7°	1.74	70	6	3	●	1	—	25.7	27.1	28.6
MP3XBR0050N030T10	0.5	1	1°	0.8	2.3	30	4.1°	1.9	70	6	3	●	1	—	30.8	32.4	34.2
MP3XBR0050N035T10	0.5	1	1°	0.8	2.3	35	3.6°	2.08	90	6	3	●	1	—	35.8	37.7	39.8
MP3XBR0050N050T10	0.5	1	1°	0.8	2.3	50	2.7°	2.6	90	6	3	●	1	—	50.9	53.6	*
MP3XBR0050N010T15	0.5	1	1.5°	0.8	2.3	10	8.5°	1.34	60	6	3	●	1	—	—	11	11.6
MP3XBR0050N016T15	0.5	1	1.5°	0.8	2.3	16	6.5°	1.66	60	6	3	●	1	—	—	17.2	18.1
MP3XBR0050N020T15	0.5	1	1.5°	0.8	2.3	20	5.6°	1.86	60	6	3	●	1	—	—	21.3	22.5
MP3XBR0050N023T15	0.5	1	1.5°	0.8	2.3	23	5°	2.02	70	6	3	●	1	—	—	24.4	25.7
MP3XBR0050N025T15	0.5	1	1.5°	0.8	2.3	25	4.7°	2.12	70	6	3	●	1	—	—	26.5	27.9
MP3XBR0050N010T30	0.5	1	3°	0.8	2.3	10	8.8°	1.74	60	6	3	●	1	—	—	—	10.8
MP3XBR0050N020T30	0.5	1	3°	0.8	2.3	20	5.9°	2.8	60	6	3	●	1	—	—	—	20.9
MP3XBR0050N030T30	0.5	1	3°	0.8	2.3	30	4.4°	3.84	70	6	3	●	1	—	—	—	31
MP3XBR0050N042T30	0.5	1	3°	0.8	2.3	42	3.4°	5.1	90	6	3	●	1	—	—	—	43
MP3XBR0050N025T50	0.5	1	5°	0.8	2.3	25	5.4°	4.92	60	6	3	●	1	—	—	—	—
MP3XBR0075N010T05	0.75	1.5	0.5°	1.2	2.7	10	7.8°	1.56	60	6	3	●	1	10.6	10.9	11.4	12
MP3XBR0075N016T05	0.75	1.5	0.5°	1.2	2.7	16	5.8°	1.68	60	6	3	●	1	16.6	17.1	17.9	18.9
MP3XBR0075N020T05	0.75	1.5	0.5°	1.2	2.7	20	5°	1.74	60	6	3	●	1	20.6	21.2	22.3	23.5
MP3XBR0075N030T05	0.75	1.5	0.5°	1.2	2.7	30	3.7°	1.92	80	6	3	●	1	30.7	31.5	33.1	35
MP3XBR0075N010T10	0.75	1.5	1°	1.2	2.7	10	7.9°	1.7	60	6	3	●	1	—	10.6	11.2	11.8
MP3XBR0075N016T10	0.75	1.5	1°	1.2	2.7	16	5.9°	1.9	60	6	3	●	1	—	16.7	17.6	18.5
MP3XBR0075N020T10	0.75	1.5	1°	1.2	2.7	20	5.1°	2.04	60	6	3	●	1	—	20.7	21.8	23
MP3XBR0075N030T10	0.75	1.5	1°	1.2	2.7	30	3.7°	2.4	80	6	3	●	1	—	30.8	32.4	34.2

* No interference

● : Inventory maintained in Japan.

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(mm)

Order Number	RE	DC	BHTA2	APMX	LU	LB2	B2	BD2	LF	DCON	No. of Flutes	Stock	Type	Effective length for inclined angle			
														0.5°	1°	2°	3°
MP3XBR0075N010T15	0.75	1.5	1.5°	1.2	2.7	10	8°	1.82	60	6	3	●	1	—	—	11	11.6
MP3XBR0075N016T15	0.75	1.5	1.5°	1.2	2.7	16	6°	2.14	60	6	3	●	1	—	—	17.2	18.1
MP3XBR0075N020T15	0.75	1.5	1.5°	1.2	2.7	20	5.1°	2.34	60	6	3	●	1	—	—	21.3	22.5
MP3XBR0075N025T15	0.75	1.5	1.5°	1.2	2.7	25	4.4°	2.6	80	6	3	●	1	—	—	26.5	27.9
MP3XBR0075N030T15	0.75	1.5	1.5°	1.2	2.7	30	3.8°	2.86	80	6	3	●	1	—	—	31.6	33.4
MP3XBR0075N046T30	0.75	1.5	3°	1.2	2.7	46	2.9°	—	80	6	3	●	2	—	—	—	*
MP3XBR0100N016T05	1	2	0.5°	1.6	3.6	16	5.2°	2.12	60	6	3	●	1	17	17.6	18.6	19.5
MP3XBR0100N020T05	1	2	0.5°	1.6	3.6	20	4.5°	2.18	60	6	3	●	1	21.1	21.8	22.9	24.1
MP3XBR0100N030T05	1	2	0.5°	1.6	3.6	30	3.3°	2.36	70	6	3	●	1	31.1	32.1	33.7	35.6
MP3XBR0100N035T05	1	2	0.5°	1.6	3.6	35	2.9°	2.44	80	6	3	●	1	36.2	37.2	39.2	*
MP3XBR0100N040T05	1	2	0.5°	1.6	3.6	40	2.6°	2.54	80	6	3	●	1	41.2	42.4	44.6	*
MP3XBR0100N016T10	1	2	1°	1.6	3.6	16	5.3°	2.34	60	6	3	●	1	—	17.1	18.2	19.1
MP3XBR0100N020T10	1	2	1°	1.6	3.6	20	4.5°	2.48	60	6	3	●	1	—	21.2	22.4	23.6
MP3XBR0100N025T10	1	2	1°	1.6	3.6	25	3.8°	2.64	70	6	3	●	1	—	26.2	27.7	29.2
MP3XBR0100N030T10	1	2	1°	1.6	3.6	30	3.3°	2.82	70	6	3	●	1	—	31.3	33	34.8
MP3XBR0100N035T10	1	2	1°	1.6	3.6	35	3°	3	80	6	3	●	1	—	36.3	38.3	40.4
MP3XBR0100N040T10	1	2	1°	1.6	3.6	40	2.7°	3.18	80	6	3	●	1	—	41.3	43.6	*
MP3XBR0100N050T10	1	2	1°	1.6	3.6	50	2.2°	3.52	110	6	3	●	1	—	51.4	54.2	*
MP3XBR0100N070T10	1	2	1°	1.6	3.6	70	1.7°	4.22	110	6	3	●	1	—	71.5	*	*
MP3XBR0100N016T15	1	2	1.5°	1.6	3.6	16	5.4°	2.54	60	6	3	●	1	—	—	22.8	18.7
MP3XBR0100N020T15	1	2	1.5°	1.6	3.6	20	4.6°	2.76	60	6	3	●	1	—	—	21.9	23.1
MP3XBR0100N025T15	1	2	1.5°	1.6	3.6	25	3.9°	3.02	70	6	3	●	1	—	—	27.1	28.5
MP3XBR0100N030T15	1	2	1.5°	1.6	3.6	30	3.4°	3.28	70	6	3	●	1	—	—	32.2	34
MP3XBR0100N035T15	1	2	1.5°	1.6	3.6	35	3°	3.54	80	6	3	●	1	—	—	37.4	39.4
MP3XBR0100N040T15	1	2	1.5°	1.6	3.6	40	2.7°	3.8	80	6	3	●	1	—	—	42.6	*
MP3XBR0100N020T30	1	2	3°	1.6	3.6	20	4.8°	3.62	60	6	3	●	1	—	—	—	20.5
MP3XBR0100N030T30	1	2	3°	1.6	3.6	30	3.6°	4.66	70	6	3	●	1	—	—	—	30.6
MP3XBR0100N042T30	1	2	3°	1.6	3.6	42	2.8°	—	80	6	3	●	2	—	—	—	*
MP3XBR0100N027T50	1	2	5°	1.6	3.6	27	4.3°	—	60	6	3	●	2	—	—	—	—
MP3XBR0150N010T05	1.5	3	0.5°	2.4	5.4	10	5.7°	2.98	60	6	3	●	1	11	11.4	12	12.6
MP3XBR0150N020T05	1.5	3	0.5°	2.4	5.4	20	3.5°	3.16	60	6	3	●	1	21.1	21.8	22.9	24.1
MP3XBR0150N030T05	1.5	3	0.5°	2.4	5.4	30	2.6°	3.32	70	6	3	●	1	31.2	32.1	33.7	*
MP3XBR0150N040T05	1.5	3	0.5°	2.4	5.4	40	2°	3.5	80	6	3	●	1	41.3	42.4	44.6	*
MP3XBR0150N050T05	1.5	3	0.5°	2.4	5.4	50	1.7°	3.68	90	6	3	●	1	51.3	52.7	*	*
MP3XBR0150N020T10	1.5	3	1°	2.4	5.4	20	3.6°	3.4	60	6	3	●	1	—	21.3	22.4	23.6
MP3XBR0150N030T10	1.5	3	1°	2.4	5.4	30	2.6°	3.76	70	6	3	●	1	—	31.3	33	*
MP3XBR0150N035T10	1.5	3	1°	2.4	5.4	35	2.3°	3.94	80	6	3	●	1	—	36.4	38.3	*
MP3XBR0150N040T10	1.5	3	1°	2.4	5.4	40	2.1°	4.1	80	6	3	●	1	—	41.4	43.6	*
MP3XBR0150N050T10	1.5	3	1°	2.4	5.4	50	1.7°	4.46	90	6	3	●	1	—	51.5	*	*
MP3XBR0150N060T10	1.5	3	1°	2.4	5.4	60	1.5°	4.8	110	6	3	●	1	—	61.5	*	*
MP3XBR0150N070T10	1.5	3	1°	2.4	5.4	70	1.3°	5.16	110	6	3	●	1	—	71.6	*	*
MP3XBR0150N020T15	1.5	3	1.5°	2.4	5.4	20	3.7°	3.66	60	6	3	●	1	—	—	22	23.2
MP3XBR0150N030T15	1.5	3	1.5°	2.4	5.4	30	2.7°	4.18	70	6	3	●	1	—	—	32.3	*
MP3XBR0150N035T15	1.5	3	1.5°	2.4	5.4	35	2.4°	4.46	70	6	3	●	1	—	—	37.5	*
MP3XBR0150N040T15	1.5	3	1.5°	2.4	5.4	40	2.1°	4.72	80	6	3	●	1	—	—	42.6	*
MP3XBR0150N045T15	1.5	3	1.5°	2.4	5.4	45	1.9°	4.98	80	6	3	●	1	—	—	*	*
MP3XBR0150N052T15	1.5	3	1.5°	2.4	5.4	52	1.7°	5.34	90	6	3	●	1	—	—	*	*
MP3XBR0150N064T15	1.5	3	1.5°	2.4	5.4	64	1.4°	—	110	6	3	●	2	—	—	*	*
MP3XBR0150N025T30	1.5	3	3°	2.4	5.4	25	3.3°	4.96	60	6	3	●	1	—	—	—	26.8
MP3XBR0150N034T30	1.5	3	3°	2.4	5.4	34	2.6°	—	70	6	3	●	2	—	—	—	*

* No interference

MP3XB

Ball nose, 3 flute, Taper neck

(mm)

Order Number	RE	DC	BHTA2	APMX	LU	LB2	B2	BD2	LF	DCON	No. of Flutes	Stock	Type	Effective length for inclined angle			
														0.5°	1°	2°	3°
MP3XBR0150N040T30	1.5	3	3°	2.4	5.4	40	3.4°	6.52	90	8	3	●	1	–	–	–	41.9
MP3XBR0150N054T30	1.5	3	3°	2.4	5.4	54	2.7°	–	90	8	3	●	2	–	–	–	*
MP3XBR0200N030T05	2	4	0.5°	3.2	6.2	30	1.8°	4.32	70	6	3	●	1	31.2	32.1	*	*
MP3XBR0200N040T05	2	4	0.5°	3.2	6.2	40	1.4°	4.48	80	6	3	●	1	41.3	42.4	*	*
MP3XBR0200N060T05	2	4	0.5°	3.2	6.2	60	1°	4.84	100	6	3	●	1	61.4	63	*	*
MP3XBR0200N020T10	2	4	1°	3.2	6.2	20	2.6°	4.38	70	6	3	●	1	–	21.3	22.4	*
MP3XBR0200N030T10	2	4	1°	3.2	6.2	30	1.8°	4.74	70	6	3	●	1	–	31.4	*	*
MP3XBR0200N035T10	2	4	1°	3.2	6.2	35	1.6°	4.9	70	6	3	●	1	–	36.4	*	*
MP3XBR0200N040T10	2	4	1°	3.2	6.2	40	1.5°	5.08	80	6	3	●	1	–	41.4	*	*
MP3XBR0200N045T10	2	4	1°	3.2	6.2	45	1.3°	5.26	80	6	3	●	1	–	46.5	*	*
MP3XBR0200N066T10	2	4	1°	3.2	6.2	66	1°	–	100	6	3	●	2	–	*	*	*
MP3XBR0200N050T15	2	4	1.5°	3.2	6.2	50	2.2°	6.2	90	8	3	●	1	–	–	53	*
MP3XBR0200N084T15	2	4	1.5°	3.2	6.2	84	1.5°	–	120	8	3	●	2	–	–	*	*
MP3XBR0200N030T30	2	4	3°	3.2	6.2	30	3.6°	6.4	90	8	3	●	1	–	–	–	31.9
MP3XBR0200N045T30	2	4	3°	3.2	6.2	45	2.6°	–	90	8	3	●	2	–	–	–	*
MP3XBR0250N038T10	2.5	5	1°	4	7	38	0.8°	–	80	6	3	●	2	–	*	*	*
MP3XBR0250N050T10	2.5	5	1°	4	7	50	1.7°	6.4	90	8	3	●	1	–	51.5	*	*
MP3XBR0250N065T10	2.5	5	1°	4	7	65	1.4°	6.92	110	8	3	●	1	–	66.6	*	*
MP3XBR0250N066T15	2.5	5	1.5°	4	7	66	1.4°	–	110	8	3	●	2	–	–	*	*
MP3XBR0250N036T30	2.5	5	3°	4	7	36	2.4°	–	90	8	3	●	2	–	–	–	*
MP3XBR0300N040T10	3	6	1°	9	12	40	1.4°	6.82	80	8	3	●	1	–	41.8	*	*
MP3XBR0300N050T10	3	6	1°	9	12	50	1.2°	7.18	90	8	3	●	1	–	51.8	*	*
MP3XBR0300N073T10	3	6	1°	9	12	73	0.9°	–	110	8	3	●	2	–	*	*	*
MP3XBR0300N090T10	3	6	1°	9	12	90	1.3°	8.58	140	10	3	●	1	–	92	*	*
MP3XBR0300N053T15	3	6	1.5°	9	12	53	1.2°	–	90	8	3	●	2	–	–	*	*
MP3XBR0300N032T30	3	6	3°	9	12	32	1.9°	–	80	8	3	●	2	–	–	–	*
MP3XBR0400N050T10	4	8	1°	12	15	50	1.2°	9.08	110	10	3	●	1	–	51.9	*	*
MP3XBR0400N065T10	4	8	1°	12	15	65	1°	9.6	130	10	3	●	1	–	67	*	*
MP3XBR0400N076T10	4	8	1°	12	15	76	0.8°	–	130	10	3	●	2	–	*	*	*
MP3XBR0400N090T10	4	8	1°	12	15	90	1.3°	10.46	150	12	3	●	1	–	92.1	*	*
MP3XBR0400N040T15	4	8	1.5°	12	15	40	1.5°	9.16	90	10	3	●	1	–	–	*	*
MP3XBR0400N056T15	4	8	1.5°	12	15	56	1.1°	–	110	10	3	●	2	–	–	*	*
MP3XBR0400N035T30	4	8	3°	12	15	35	1.7°	–	90	10	3	●	2	–	–	–	*
MP3XBR0500N060T10	5	10	1°	15	25	60	1°	10.92	120	12	3	●	1	–	62.6	*	*
MP3XBR0500N070T10	5	10	1°	15	25	70	0.9°	11.28	120	12	3	●	1	–	*	*	*
MP3XBR0500N100T10	5	10	1°	15	25	100	1.7°	12.32	160	16	3	●	1	–	102.8	*	*
MP3XBR0500N050T15	5	10	1.5°	15	25	50	1.2°	11	100	12	3	●	1	–	–	*	*
MP3XBR0500N068T15	5	10	1.5°	15	25	68	0.9°	–	120	12	3	●	2	–	–	*	*
MP3XBR0500N046T30	5	10	3°	15	25	46	1.3°	–	100	12	3	●	2	–	–	–	*
MP3XBR0600N070T10	6	12	1°	18	28	70	1.6°	13.16	130	16	3	●	1	–	72.7	*	*
MP3XBR0600N100T10	6	12	1°	18	28	100	1.2°	14.22	160	16	3	●	1	–	102.9	*	*
MP3XBR0600N080T15	6	12	1.5°	18	28	80	1.5°	14.42	130	16	3	●	1	–	–	*	*
MP3XBR0600N069T30	6	12	3°	18	28	69	1.8°	–	130	16	3	●	2	–	–	–	*

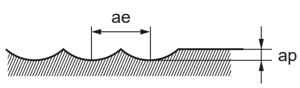
* No interference

● : Inventory maintained in Japan.

RECOMMENDED CUTTING CONDITIONS

Workpiece Material			Carbon steel, Alloy steel (180−280HB) Alloy Tool Steel (≤350HB) Pre-hardened steel (35−45HRC) AISI 1045, AISI 4140, SKD, SKT, AISI 4140, AISI P21				Hardened steel (45−52HRC) AISI H13, AISI L6				Copper, Copper alloys			
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)	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

Depth of cut



Note 1) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 2) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

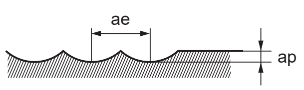
MP3XB

Ball nose, 3 flute, Taper neck

RECOMMENDED CUTTING CONDITIONS

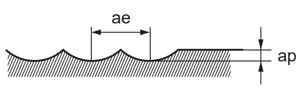
Workpiece Material			Carbon steel, Alloy steel (180−280HB) Alloy Tool Steel (≤350HB) Pre-hardened steel (35−45HRC) AISI 1045, AISI 4140, SKD, SKT, AISI 4140, AISI P21				Hardened steel (45−52HRC) AISI H13, AISI L6				Copper, Copper alloys			
R RE (mm)	Taper angle one side BHTA2	Neck length LB2 (mm)	Revolution (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)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)
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
		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

Depth of cut



Workpiece Material			Carbon steel, Alloy steel (180−280HB) Alloy Tool Steel (≤350HB) Pre-hardened steel (35−45HRC) AISI 1045, AISI 4140, SKD, SKT, AISI 4140, AISI P21				Hardened steel (45−52HRC) AISI H13, AISI L6				Copper, Copper alloys			
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)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)
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
		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

Depth of cut



Note 1) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 2) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

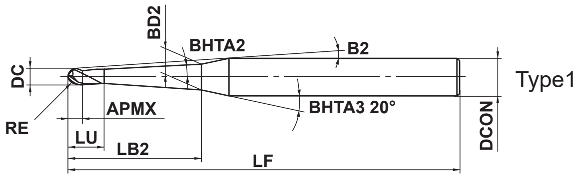
CARBIDE

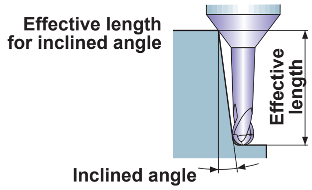
VF3XB

Ball nose, Medium cut length, 3 flute, Taper neck

UWC VF 30°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	◎	◎	◎				





0.4≤RE≤2.5			
±0.01			
0.8≤DC≤5			
0 - 0.02			
4≤DCON≤6	DCON=8		
0 - 0.008	0 - 0.009		

h6

● 3 flute ball end mill, high rigidity taper neck type.

(mm)

Order Number	RE	DC	BHTA2	APMX	LB2	LU	B2	BD2	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	—	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	—	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	—	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	13.0	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	18.0	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	4.0°	1.33	80	6	3	▲	1	30.7	31.5	33.1	35.0
VF3XBR0050T0024L035	0.5	1	0.4°	0.8	35	2.3	3.5°	1.40	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	—	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	—	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	—	16.7	17.6	18.5
VF3XBR0050T0054L020	0.5	1	0.9°	0.8	20	2.3	5.5°	1.50	70	6	3	▲	1	—	20.7	21.8	23.0
VF3XBR0050T0054L025	0.5	1	0.9°	0.8	25	2.3	4.7°	1.65	70	6	3	▲	1	—	25.7	27.1	28.6
VF3XBR0050T0054L030	0.5	1	0.9°	0.8	30	2.3	4.0°	1.81	80	6	3	▲	1	—	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	—	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	—	40.8	43.0	45.4
VF3XBR0050T0054L050	0.5	1	0.9°	0.8	50	2.3	2.7°	2.44	110	6	3	▲	1	—	50.9	53.6	*
VF3XBR0050T0054L060	0.5	1	0.9°	0.8	60	2.3	2.3°	2.75	110	6	3	▲	1	—	60.9	64.1	*
VF3XBR0050T0054L070	0.5	1	0.9°	0.8	70	2.3	2.0°	3.07	110	6	3	▲	1	—	71.0	74.7	*
VF3XBR0050T0130L012	0.5	1	1.5°	0.8	12	2.3	7.9°	1.45	60	6	3	▲	1	—	—	13.0	13.7
VF3XBR0050T0130L016	0.5	1	1.5°	0.8	16	2.3	6.5°	1.66	70	6	3	▲	1	—	—	17.1	18.0
VF3XBR0050T0130L020	0.5	1	1.5°	0.8	20	2.3	5.6°	1.87	70	6	3	▲	1	—	—	21.2	22.4
VF3XBR0050T0130L025	0.5	1	1.5°	0.8	25	2.3	4.8°	2.13	70	6	3	▲	1	—	—	26.3	27.8
VF3XBR0050T0130L030	0.5	1	1.5°	0.8	30	2.3	4.1°	2.39	80	6	3	▲	1	—	—	31.5	33.2
VF3XBR0050T0130L035	0.5	1	1.5°	0.8	35	2.3	3.7°	2.65	80	6	3	▲	1	—	—	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	12.0
VF3XBR0075T0024L015	0.75	1.5	0.4°	1.3	15	2.8	6.2°	1.61	60	6	3	▲	1	15.6	16.0	16.9	17.8
VF3XBR0075T0024L020	0.75	1.5	0.4°	1.3	20	2.8	5.0°	1.68	70	6	3	▲	1	20.6	21.2	22.3	23.5

* No interference

▲ : Inventory maintained in Japan. To be replaced by new products.
MP3XB (J222) is alternative product.

Click here for product NEWS ▶

ISO13399 ➤ J002

(mm)

Order Number	RE	DC	BHTA2	APMX	LB2	LU	B2	BD2	LF	DCON	No. of Flutes	Stock	Type	Effective length for inclined angle 0.5°	1°	2°	3°
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	35.0
VF3XBR0075T0054L015	0.75	1.5	0.9°	1.3	15	2.8	6.3°	1.82	60	6	3	▲	1	—	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	—	20.7	21.8	23.0
VF3XBR0075T0054L030	0.75	1.5	0.9°	1.3	30	2.8	3.7°	2.29	80	6	3	▲	1	—	30.8	32.4	34.2
VF3XBR0075T0054L040	0.75	1.5	0.9°	1.3	40	2.8	3.0°	2.61	80	6	3	▲	1	—	40.8	43.0	45.3
VF3XBR0075T0130L015	0.75	1.5	1.5°	1.3	15	2.8	6.4°	2.08	60	6	3	▲	1	—	—	16.1	17.0
VF3XBR0075T0130L020	0.75	1.5	1.5°	1.3	20	2.8	5.2°	2.34	70	6	3	▲	1	—	—	21.2	22.4
VF3XBR0075T0130L030	0.75	1.5	1.5°	1.3	30	2.8	3.8°	2.86	80	6	3	▲	1	—	—	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	18.0	19.0
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°	2.20	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	35.0
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	44.0	*
VF3XBR0100T0054L020	1	2	0.9°	1.6	20	3.6	4.7°	2.42	70	6	3	▲	1	—	20.8	21.9	23.0
VF3XBR0100T0054L025	1	2	0.9°	1.6	25	3.6	4.0°	2.57	70	6	3	▲	1	—	25.8	27.2	28.6
VF3XBR0100T0054L030	1	2	0.9°	1.6	30	3.6	3.4°	2.73	80	6	3	▲	1	—	30.9	32.5	34.2
VF3XBR0100T0054L035	1	2	0.9°	1.6	35	3.6	3.0°	2.89	80	6	3	▲	1	—	35.9	37.7	39.8
VF3XBR0100T0054L040	1	2	0.9°	1.6	40	3.6	2.7°	3.04	80	6	3	▲	1	—	40.9	43.0	*
VF3XBR0100T0054L050	1	2	0.9°	1.6	50	3.6	2.2°	3.36	110	6	3	▲	1	—	51.0	53.6	*
VF3XBR0100T0054L060	1	2	0.9°	1.6	60	3.6	1.9°	3.67	110	6	3	▲	1	—	61.0	*	*
VF3XBR0100T0054L070	1	2	0.9°	1.6	70	3.6	1.6°	3.99	110	6	3	▲	1	—	71.1	*	*
VF3XBR0100T0130L025	1	2	1.5°	1.6	25	3.6	4.1°	3.02	70	6	3	▲	1	—	—	26.4	27.9
VF3XBR0100T0130L030	1	2	1.5°	1.6	30	3.6	3.5°	3.28	80	6	3	▲	1	—	—	31.6	33.3
VF3XBR0100T0130L035	1	2	1.5°	1.6	35	3.6	3.1°	3.54	80	6	3	▲	1	—	—	36.7	38.7
VF3XBR0100T0130L040	1	2	1.5°	1.6	40	3.6	2.7°	3.81	80	6	3	▲	1	—	—	41.8	*
VF3XBR0125T0054L020	1.25	2.5	0.9°	2	20	4.5	4.3°	2.89	60	6	3	▲	1	—	20.8	21.9	23.1
VF3XBR0125T0054L030	1.25	2.5	0.9°	2	30	4.5	3.1°	3.20	80	6	3	▲	1	—	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	—	40.9	43.1	*
VF3XBR0125T0130L020	1.25	2.5	1.5°	2	20	4.5	4.4°	3.21	60	6	3	▲	1	—	—	21.4	22.5
VF3XBR0125T0130L030	1.25	2.5	1.5°	2	30	4.5	3.1°	3.74	80	6	3	▲	1	—	—	31.6	33.3
VF3XBR0125T0130L040	1.25	2.5	1.5°	2	40	4.5	2.5°	4.26	80	6	3	▲	1	—	—	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	44.0	*
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	—	20.9	21.9	23.0
VF3XBR0150T0054L030	1.5	3	0.9°	2	30	5	2.7°	3.69	80	6	3	▲	1	—	30.9	32.5	*
VF3XBR0150T0054L040	1.5	3	0.9°	2	40	5	2.1°	4.00	80	6	3	▲	1	—	41.0	43.1	*
VF3XBR0150T0054L050	1.5	3	0.9°	2	50	5	1.7°	4.31	100	6	3	▲	1	—	51.0	*	*
VF3XBR0150T0054L060	1.5	3	0.9°	2	60	5	2.3°	4.63	110	8	3	▲	1	—	61.1	64.2	*
VF3XBR0150T0054L070	1.5	3	0.9°	2	70	5	2.0°	4.94	120	8	3	▲	1	—	71.1	74.8	*
VF3XBR0150T0130L040	1.5	3	1.5°	2	40	5	2.2°	4.73	80	6	3	▲	1	—	—	41.9	*
VF3XBR0150T0130L050	1.5	3	1.5°	2	50	5	2.8°	5.26	110	8	3	▲	1	—	—	52.2	*
VF3XBR0150T0130L060	1.5	3	1.5°	2	60	5	2.4°	5.78	110	8	3	▲	1	—	—	62.4	*
VF3XBR0150T0130L070	1.5	3	1.5°	2	70	5	2.1°	6.30	120	8	3	▲	1	—	—	72.7	*
VF3XBR0200T0054L030	2	4	0.9°	3	30	6	3.5°	4.65	90	8	3	▲	1	—	30.9	32.5	34.2
VF3XBR0200T0054L040	2	4	0.9°	3	40	6	2.7°	4.97	90	8	3	▲	1	—	41.0	43.0	*
VF3XBR0200T0054L050	2	4	0.9°	3	50	6	2.2°	5.28	110	8	3	▲	1	—	51.0	53.6	*
VF3XBR0200T0054L060	2	4	0.9°	3	60	6	1.9°	5.60	110	8	3	▲	1	—	61.1	*	*
VF3XBR0250T0054L035	2.5	5	0.9°	3.5	35	6.5	2.4°	5.80	90	8	3	▲	1	—	35.9	37.7	*

* No interference

VF3XB

Ball nose, Medium cut length, 3 flute, Taper neck

(mm)

Order Number	RE	DC	BHTA2	APMX	LB2	LU	B2	BD2	LF	DCON	No. of Flutes	Stock	Type	Effective length for inclined angle 0.5°	1°	2°	3°
VF3XBR0250T0054L040	2.5	5	0.9°	3.5	40	6.5	2.2°	5.95	90	8	3	▲	1	—	41.0	43.0	*
VF3XBR0250T0054L050	2.5	5	0.9°	3.5	50	6.5	1.8°	6.27	110	8	3	▲	1	—	51.0	*	*
VF3XBR0250T0054L060	2.5	5	0.9°	3.5	60	6.5	1.5°	6.58	110	8	3	▲	1	—	61.1	*	*

* No interference

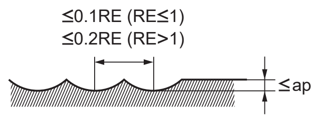
▲ : Inventory maintained in Japan. To be replaced by new products.
MP3XB (J222) is alternative product.

ISO13399 ➢ J002

RECOMMENDED CUTTING CONDITIONS

Workpiece 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

Depth of cut



RE:Radius

Note 1) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 2) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

VF3XB

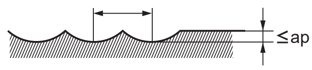
Ball nose, Medium cut length, 3 flute, Taper neck

RECOMMENDED CUTTING CONDITIONS

Workpiece 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)
R0.75	**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
		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

Depth of cut

≤0.1RE (RE≤1)
≤0.2RE (RE>1)

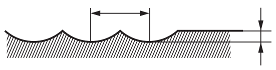


RE:Radius

Note 1) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 2) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

Workpiece 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)
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

Depth of cut



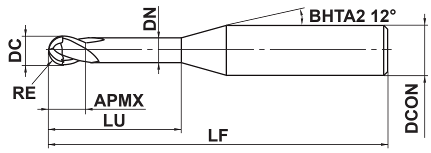
RE:Radius

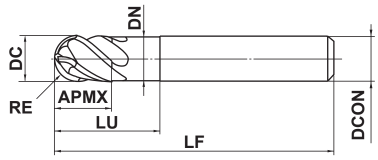
Note 1) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 2) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

VQ4SVB

Ball nose, Short cut length, 4 flute

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎			◎	◎	○	





1≤RE≤6				
±0.01				
DC≤12				
0 - 0.02				
DCON=6	8≤DCON≤10	DCON=12		
0 - 0.008	0 - 0.009	0 - 0.011		

● 4 flute ball nose end mill
● With the special substrate, suitable for finishing of heat resistance alloy, etc.

(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

Note 1) 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.

● : Inventory maintained in Japan.

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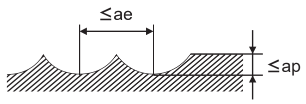
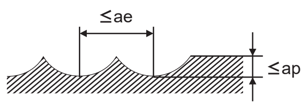
ISO13399 ➢ J002

RECOMMENDED CUTTING CONDITIONS

■Shoulder milling(Slotting)

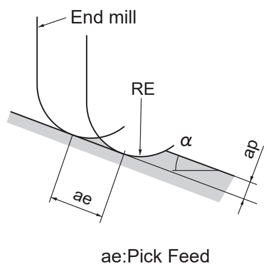
Workpiece Material	Carbon steel, Alloy steel, Mild steel, Pre-hardened steel AISI 1045, AISI 4140, ASTM A36, AISI 1010, AISI P21, AISI P20, AISI 4340								Austenitic stainless steel, Titanium alloy, Precipitation hardeningstainless steel, Cobalt chromium alloy, Ferritic, Precipitation hardeningstainless steel AISI 304, AISI 316, Ti-6Al-4V, AISI 630, AISI 631, 15-5PH, 17-4PH, AISI 431, AISI 420							
R **RE** (mm)	$\alpha\leq 15°$			$\alpha>15°$			Depth of cut ap (mm)	Depth of cut ae (mm)	$\alpha\leq 15°$			$\alpha>15°$			Depth of cut ap (mm)	Depth of cut ae (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)		
R 1	250	40000	8000	200	32000	3800	0.17	0.5	230	36000	6500	150	24000	2900	0.17	0.5
R 1.5	300	32000	7700	200	21000	3200	0.25	0.75	230	24000	4800	150	16000	1900	0.25	0.75
R 2	300	24000	5800	200	16000	2800	0.33	1	230	18000	4000	150	12000	1700	0.33	1
R 2.5	300	19000	5300	200	12700	2600	0.42	1.25	230	14400	3500	150	9600	1500	0.42	1.25
R 3	300	16000	4800	200	10600	2100	0.5	1.5	230	12000	3200	150	8000	1400	0.5	1.5
R 4	300	12000	4300	200	8000	1900	0.8	2	230	9000	3200	150	6000	1400	0.8	2
R 5	300	9600	4100	200	6400	1800	1	2.5	230	7200	3000	150	4800	1300	1	2.5
R 6	300	8000	4000	200	5300	1800	1.2	3	230	6000	3000	150	4000	1300	1.2	3
Depth of cut																

RE:Radius

Workpiece Material	Copper, Copper alloy								Heat Resistant Alloy Inconel718							
R **RE** (mm)	$\alpha\leq 15°$			$\alpha>15°$			Depth of cut ap (mm)	Depth of cut ae (mm)	$\alpha\leq 15°$			$\alpha>15°$			Depth of cut ap (mm)	Depth of cut ae (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)		
R 1	250	40000	8000	240	38000	4500	0.17	0.5	60	9600	960	40	6400	510	0.08	0.2
R 1.5	360	38000	9100	240	25000	3800	0.25	0.7	60	6400	640	40	4200	340	0.13	0.3
R 2	360	29000	7000	240	19000	3300	0.33	1	60	4800	580	40	3200	260	0.17	0.4
R 2.5	360	23000	6400	240	15000	3100	0.42	1.2	60	3800	530	39	2500	250	0.21	0.5
R 3	360	19000	5700	240	13000	2600	0.5	1.5	60	3200	500	40	2100	210	0.25	0.6
R 4	360	14000	5000	240	9600	2300	0.8	2	60	2400	430	40	1600	190	0.4	0.8
R 5	360	12000	5100	240	7700	2200	1	2.5	63	2000	420	41	1300	180	0.5	1
R 6	360	9600	4800	240	6400	2200	1.2	3	64	1700	350	41	1100	150	0.6	1.2
Depth of cut																

RE:Radius

Note 1) 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.
Note 2) For stainless steel, titanium alloy and heat resistant alloy, the use of water-soluble coolant is effective.
Note 3) Vibration damping end mills are more effective in suppressing chatter and vibration compared to general end mills, but these may still occur if the rigidity of the machine or the workpiece material is low. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.
Note 4) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 5) α is the inclination angle of the machined surface.

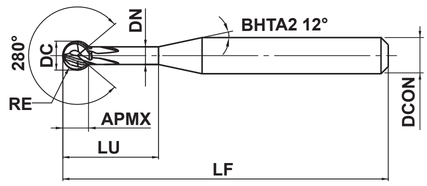


ae:Pick Feed

VQ4WB NEW

Multi-functional lollipop, Short cut length, 4 flute

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎			◎	◎	○	



0.5≤RE≤3				
±0.01				
4≤DCON≤6				
0 - 0.008				

●Multi-functional ball end mill with a lollipop shape for 5-axis machining. Optimal for back deburring undercutting, and inner curved surface machining.

(mm)

Order Number	RE	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock
VQ4WBR0050N06E280	0.5	1.0	0.88	6	0.61	50	4	4	●
VQ4WBR0065N08E280	0.65	1.3	1.14	8	0.80	50	4	4	●
VQ4WBR0090N06E280	0.9	1.8	1.58	6	1.11	50	4	4	●
VQ4WBR0100N06E280	1.0	2.0	1.76	6	1.24	60	6	4	●
VQ4WBR0140N16E280	1.4	2.8	2.47	16	1.74	60	6	4	●
VQ4WBR0150N08E280	1.5	3.0	2.64	8	1.87	60	6	4	●
VQ4WBR0190N12E280	1.9	3.8	3.35	12	2.37	60	6	4	●
VQ4WBR0200N12E280	2.0	4.0	3.53	12	2.50	60	6	4	●
VQ4WBR0240N16E280	2.4	4.8	4.23	16	3.00	70	6	4	●
VQ4WBR0250N12E280	2.5	5.0	4.41	12	3.13	80	6	4	●
VQ4WBR0300N12E280	3.0	6.0	5.29	12	3.76	80	6	4	●

Note 1) SMART MIRACLE coating has very low electrical conductivity; therefore, an external contact type of tool setter (electrically transmitted) may not work.

<Special Orders>
For non standard products not shown above, please contact our sales department.

● : Inventory maintained in Japan.

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ISO13399 ➤ J002

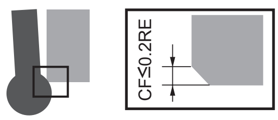
RECOMMENDED CUTTING CONDITIONS

Chamfering (Debarring)

(mm)

Workpiece Material		Mild Steels, Carbon Steels, Alloy steel Pre-hardened Steels, Alloy tool steel (–45HRC), Copper Alloys SS400, S10C, S45C, SCM440, SNCM439 NAK, SKD etc.			Austenitic, Ferritic and Martensitic Stainless Steels, Precipitation Hardening Stainless Steels, Cobalt Chromium Alloys, Titanium Alloys SUS304, SUS316L, SUS420J, SUS630, SU631, Ti-6Al-4V, CCM etc.		
DC	RE	Revolution **n** (min^{-1})	Feed Rate **vf** (mm/min)	Depth of Cut **Max. CF**	Revolution **n** (min^{-1})	Feed Rate **vf** (mm/min)	Depth of Cut **Max. CF**
1.0	**0.5**	19000	300	0.10	14000	220	0.10
1.3	**0.65**	15000	420	0.13	11000	310	0.13
1.8	**0.9**	11000	570	0.18	8000	420	0.18
2.0	**1.0**	9500	610	0.20	7200	460	0.20
2.8	**1.4**	6800	760	0.28	5100	570	0.28
3.0	**1.5**	6400	770	0.30	4800	580	0.30
3.8	**1.9**	5000	840	0.38	3800	640	0.38
4.0	**2.0**	4800	880	0.40	3600	660	0.40
4.8	**2.4**	4000	960	0.48	3000	720	0.48
5.0	**2.5**	3800	970	0.50	2900	740	0.50
6.0	**3.0**	3200	1000	0.60	2400	770	0.60

Depth of Cut



RE : Radius

Internal Profile / Undercut

(mm)

Workpiece Material		Mild Steels, Carbon Steels, Alloy steel Pre-hardened Steels, Alloy tool steel (–45HRC), Copper Alloys SS400, S10C, S45C, SCM440, SNCM439 NAK, SKD etc.			Austenitic, Ferritic and Martensitic Stainless Steels, Precipitation Hardening Stainless Steels, Cobalt Chromium Alloys, Titanium Alloys SUS304, SUS316L, SUS420J, SUS630, SU631, Ti-6Al-4V, CCM etc.		
DC	RE	Revolution **n** (min^{-1})	Feed Rate **vf** (mm/min)	Depth of Cut **ae**	Revolution **n** (min^{-1})	Feed Rate **vf** (mm/min)	Depth of Cut **ae**
2.0	**1.0**	9500	460	0.03	7200	290	0.03
3.0	**1.5**	6400	560	0.10	4800	350	0.10
4.0	**2.0**	4800	650	0.14	3600	390	0.14
5.0	**2.5**	3800	730	0.18	2900	440	0.18
6.0	**3.0**	3200	770	0.22	2400	460	0.22

Depth of Cut

RE : Radius

Note 1) SMART MIRACLE coating has very low electrical conductivity; therefore, an external contact type of tool setter (electrically transmitted) may not work. When measuring the tool length, please use an internal contact type (non-electrical type) or a laser tool setter.
Note 2) If the depth of cut is smaller than this table, feed rate can be increased.
Note 3) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.
Note 4) For sizes RE 0.5, 0.65, 0.9, 1.4, 1.9 and RE 2.4, which have long neck lengths, internal profile milling and round shape slotting are not recommended.

CARBIDE

VQ4WB

Multi-functional lollipop, Short cut length, 4 flute

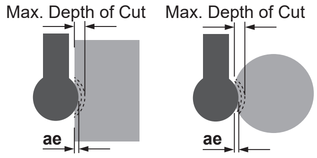
RECOMMENDED CUTTING CONDITIONS

■ Radiused Shape Slotting

(mm)

Workpiece Material		Mild Steels, Carbon Steels, Alloy steel Pre-hardened Steels, Alloy tool steel (–45HRC), Copper Alloys SS400, S10C, S45C, SCM440, SNCM439 NAK, SKD etc.				Austenitic, Ferritic and Martensitic Stainless Steels, Precipitation Hardening Stainless Steels, Cobalt Chromium Alloys, Titanium Alloys SUS304, SUS316L, SUS420J, SUS630, SU631, Ti-6Al-4V, CCM etc.			
DC	RE	Revolution n (min^{-1})	Feed Rate vf (mm/min)	Depth of Cut ae	Depth of Cut Max. ae	Revolution n (min^{-1})	Feed Rate vf (mm/min)	Depth of Cut ae	Depth of Cut Max. ae
2.0	**1.0**	9500	300	0.03	0.06	7200	140	0.03	0.06
3.0	**1.5**	6400	380	0.10	0.20	4800	190	0.10	0.20
4.0	**2.0**	4800	440	0.14	0.28	3600	230	0.14	0.28
5.0	**2.5**	3800	490	0.18	0.54	2900	260	0.18	0.54
6.0	**3.0**	3200	510	0.22	0.88	2400	270	0.22	0.88

Depth of Cut

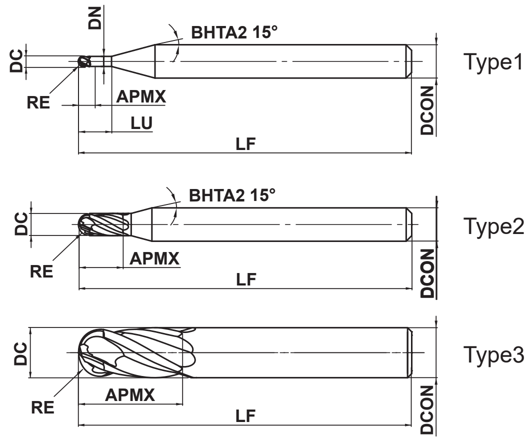


Note 1) SMART MIRACLE coating has very low electrical conductivity; therefore, an external contact type of tool setter (electrically transmitted) may not work. When measuring the tool length, please use an internal contact type (non-electrical type) or a laser tool setter.
Note 2) If the depth of cut is smaller than this table, feed rate can be increased.
Note 3) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.
Note 4) For sizes RE 0.5, 0.65, 0.9, 1.4, 1.9 and RE 2.4, which have long neck lengths, internal profile milling and round shape slotting are not recommended.
Note 5) The maximum allowed depth of cut (Max. ae) avoids interference between the workpiece and tool shank. It is recommended to machine up to the Max. ae in 2-4 passes.

VQN4MB NEW

Ball nose, Medium cut length, 4 flute

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
					◎		



RE≤6		
±0.010		
DCON=6	8≤DCON≤10	DCON=12
0 - 0.005	0 - 0.006	0 - 0.008

●(Al, Ti, Si) N-based coating exhibits excellent wear and chipping resistance when machining heat resistant super alloys.
●The 2-flute end cutting edge provides excellent chip evacuation and is ideal for rough machining.

(mm)

Order Number	RE	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	Type
VQN4MBR0100	1.0	2	2	6	1.9	60	6	4	●	1
VQN4MBR0150	1.5	3	3	8	2.9	60	6	4	●	1
VQN4MBR0200	2.0	4	8	–	–	60	6	4	●	2
VQN4MBR0250	2.5	5	12	–	–	60	6	4	●	2
VQN4MBR0300	3.0	6	12	–	–	60	6	4	●	3
VQN4MBR0400	4.0	8	14	–	–	70	8	4	●	3
VQN4MBR0500	5.0	10	18	–	–	80	10	4	●	3
VQN4MBR0600	6.0	12	22	–	–	80	12	4	●	3

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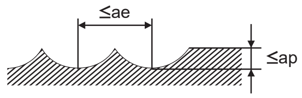
VQN4MB

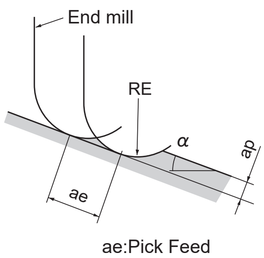
Ball nose, Medium cut length, 4 flute

RECOMMENDED CUTTING CONDITIONS

(mm)

Workpiece Material	Nickel-Based Heat Resistant Super Alloy Inconel718, Inconel713C, WASPALOY etc.					
R **RE**	$\alpha \leq 15°$		$\alpha > 15°$		Depth of cut ap	Depth of cut ae
	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)		
1.0	6300	380	6300	510	0.2	0.50
1.5	4200	340	4200	420	0.3	0.75
2.0	3100	320	3100	380	0.4	1.00
2.5	2500	250	2500	310	0.5	1.25
3.0	2100	210	2100	250	0.6	1.50
4.0	1500	160	1500	190	0.8	2.00
5.0	1200	150	1200	200	1.0	2.50
6.0	1000	150	1000	170	1.2	3.00
Depth of cut						

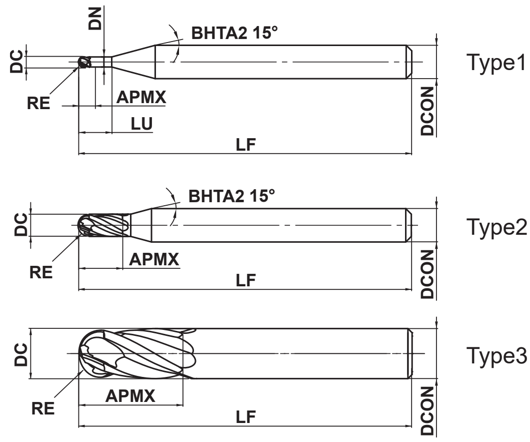
Note 1) The use of water-soluble coolant is effective for heat resistant super alloys.
Note 2) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 3) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.
Note 4) α is the inclination angle of the machined surface.



VQN4MBF NEW

Ball nose, Medium cut length, 4 flute

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
					◎		



RE≤6		
±0.010		
DCON=6	8≤DCON≤10	DCON=12
0 - 0.005	0 - 0.006	0 - 0.008

● (Al, Ti, Si) N-based coating exhibits excellent wear and chipping resistance when machining heat resistant super alloys.
● The 4-flute end cutting edge is also ideal for 5-axis machining.

(mm)

Order Number	RE	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	Type
VQN4MBFR0100	1.0	2	2	6	1.9	60	6	4	●	1
VQN4MBFR0150	1.5	3	3	8	2.9	60	6	4	●	1
VQN4MBFR0200	2.0	4	8	–	–	60	6	4	●	2
VQN4MBFR0250	2.5	5	12	–	–	60	6	4	●	2
VQN4MBFR0300	3.0	6	12	–	–	60	6	4	●	3
VQN4MBFR0400	4.0	8	14	–	–	70	8	4	●	3
VQN4MBFR0500	5.0	10	18	–	–	80	10	4	●	3
VQN4MBFR0600	6.0	12	22	–	–	80	12	4	●	3

● : Inventory maintained in Japan.

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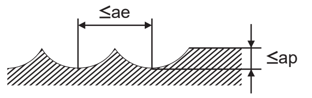
VQN4MBF

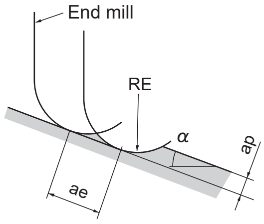
Ball nose, Medium cut length, 4 flute

RECOMMENDED CUTTING CONDITIONS

(mm)

Workpiece Material	Nickel-Based Heat Resistant Super Alloy Inconel718, Inconel713C, WASPALOY etc.						
R **RE**	$\alpha \leq 15°$			$\alpha > 15°$			Depth of cut ap
	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ae	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ae	
1.0	6300	180	0.40	6300	310	0.50	0.2
1.5	4200	170	0.60	4200	340	0.75	0.3
2.0	3100	190	0.80	3100	320	1.00	0.4
2.5	2500	150	1.00	2500	250	1.25	0.5
3.0	2100	170	1.20	2100	250	1.50	0.6
4.0	1500	130	1.60	1500	190	2.00	0.8
5.0	1200	100	2.00	1200	200	2.50	1.0
6.0	1000	130	2.40	1000	170	3.00	1.2
Depth of cut							

Note 1) The use of water-soluble coolant is effective for heat resistant super alloys.
Note 2) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 3) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.
Note 4) α is the inclination angle of the machined surface.

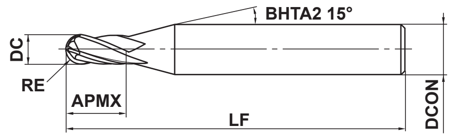


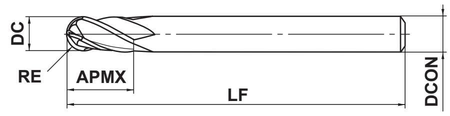
ae:Pick Feed

VF4MB

Ball nose, Medium cut length, 4 flute

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
	○	◎	◎				





0.5≤RE≤6				
±0.01				
1≤DC≤12				
0 / - 0.020				
DCON=6	8≤DCON≤10	DCON=12		
0 / - 0.008	0 / - 0.009	0 / - 0.011		

●4 flute ball nose end mill for high-speed machining of hardened steel.

(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

● : Inventory maintained in Japan.

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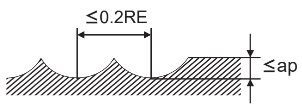
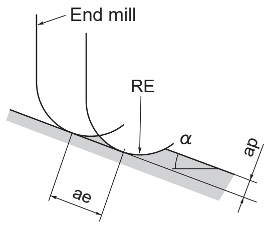
VF4MB

Ball nose, Medium cut length, 4 flute

RECOMMENDED CUTTING CONDITIONS

Workpiece 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
Depth of cut	 RE:Radius														

Note 1) α is the inclination angle of the machined surface.
Note 2) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 3) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.



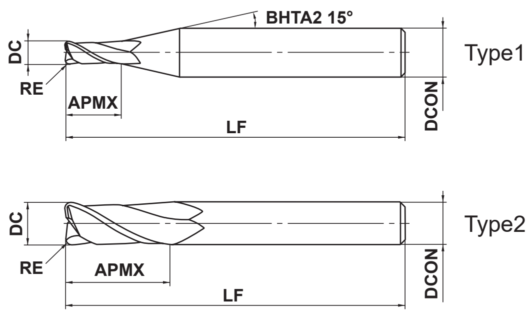
ae:Pick Feed

MS2MRB

Corner radius end mill, Medium cut length, 2 flute

UWC MS 30° DC<3 DC≥3

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	○		○	○	○	



1≤DC≤12				
0 - 0.020				
4≤DCON≤6	8≤DCON≤10	DCON=12		
0 - 0.008	0 - 0.009	0 - 0.011		

●2 flute corner radius end mill for general use.

(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
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

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MS2MRB

Corner radius end mill, Medium cut length, 2 flute

(mm)

Order Number	DC	RE	APMX	LF	DCON	No. of Flutes	Stock	Type
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

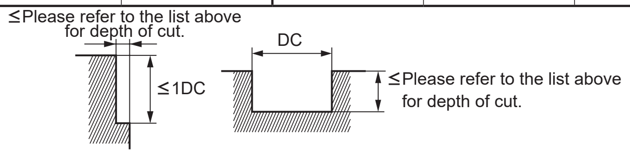
● : Inventory maintained in Japan.

ISO13399 ➤J002

RECOMMENDED CUTTING CONDITIONS

Workpiece 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 (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (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

Depth of cut



DC:Dia.

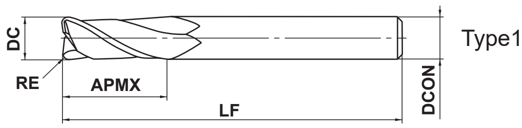
Note 1) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 2) When slotting with end mills with ϕ3 or larger, reduce the revolution to 50−70% and the feed rate to 40−60%.
Note 3) When drilling, please set the feed rate at 1/3 or below the values above.
Note 4) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

CRN2MRB

Corner radius, Medium cut length, 2 flute, For copper electrodes

UWC CRN 30°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
						◎	○



6≤DC≤12			
0 - 0.02			
DCON=6	8≤DCON≤10	DCON=12	
0 - 0.008	0 - 0.009	0 - 0.011	

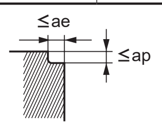
h6

●2 flute corner radius end mill with CRN coating for copper electrode machining.

(mm)

Order Number	DC	RE	APMX	LF	DCON	No. of Flutes	Stock	Type
CRN2MRBD0600R020	6	0.2	13	50	6	2	●	1
CRN2MRBD0600R050	6	0.5	13	50	6	2	●	1
CRN2MRBD0800R050	8	0.5	19	60	8	2	●	1
CRN2MRBD0800R100	8	1	19	60	8	2	●	1
CRN2MRBD1000R050	10	0.5	22	70	10	2	●	1
CRN2MRBD1000R100	10	1	22	70	10	2	●	1
CRN2MRBD1200R050	12	0.5	26	75	12	2	●	1
CRN2MRBD1200R100	12	1	26	75	12	2	●	1

RECOMMENDED CUTTING CONDITIONS

Workpiece Material		Copper, Copper alloys			
Dia. **DC** (mm)	Corner radius **RE** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)
6	**R0.2, R0.5**	10000	1400	6	0.6
8	**R0.5**	8000	1000	8	0.8
	R1	8000	1200	8	0.8
10	**R0.5**	6400	900	10	1.0
	R1	6400	1100	10	1.0
12	**R0.5**	5400	800	12	1.0
	R1	5400	1000	12	1.0
Depth of cut		 DC:Dia.			

Note 1) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 2) Water-soluble cutting fluid is recommended.
Note 3) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

● : Inventory maintained in Japan.

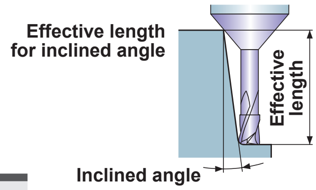
ISO13399 ➤J002

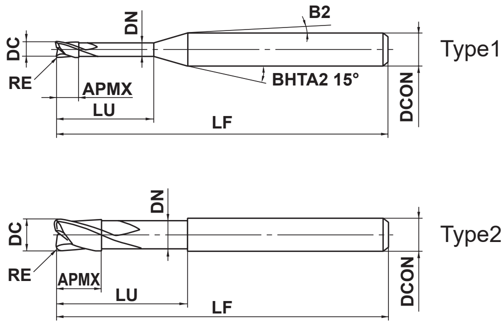
CRN2XLRB

Corner radius, Medium cut length, 2 flute, For copper electrodes

UWC CRN 30° DC<3 DC≥3

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
						◎	○





0.5≤DC≤6			
0 - 0.02			
4≤DCON≤6			
0 - 0.008			

h6

● 2 flute long neck corner radius end mill with CRN coating for copper electrode machining.

(mm)

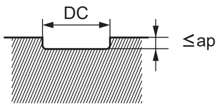
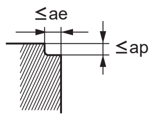
Order Number	DC	RE	APMX	LU	DN	B2	LF	DCON	No. of Flutes	Stock	Type	Effective length for inclined angle 0.5°	1°	2°	3°
CRN2XLRBD0050R005N04	0.5	0.05	0.5	4	0.46	9.5°	50	4	2	●	1	4.1	4.3	4.6	5
CRN2XLRBD0050R010N04	0.5	0.1	0.5	4	0.46	9.5°	50	4	2	●	1	4.1	4.3	4.6	5
CRN2XLRBD0100R010N08	1	0.1	1	8	0.94	6.3°	50	4	2	●	1	8.5	8.8	9.5	10.2
CRN2XLRBD0100R030N08	1	0.3	1	8	0.94	6.3°	50	4	2	●	1	8.5	8.8	9.5	10.2
CRN2XLRBD0100R030N12	1	0.3	1	12	0.94	4.9°	55	4	2	●	1	12.6	13.1	14.1	15.2
CRN2XLRBD0150R020N12	1.5	0.2	1.5	12	1.44	4.3°	55	4	2	●	1	12.6	13.1	14.1	15.2
CRN2XLRBD0150R030N12	1.5	0.3	1.5	12	1.44	4.3°	55	4	2	●	1	12.6	13.1	14.1	15.2
CRN2XLRBD0200R010N12	2	0.1	2	12	1.9	3.7°	55	4	2	●	1	12.5	13	14	15.1
CRN2XLRBD0200R020N12	2	0.2	2	12	1.9	3.7°	55	4	2	●	1	12.5	13	14	15.1
CRN2XLRBD0200R030N12	2	0.3	2	12	1.9	3.7°	55	4	2	●	1	12.5	13	13.9	15
CRN2XLRBD0200R050N12	2	0.5	2	12	1.9	3.8°	55	4	2	●	1	12.5	13	13.9	15
CRN2XLRBD0200R020N16	2	0.2	2	16	1.9	2.9°	55	4	2	●	1	16.7	17.3	18.6	*
CRN2XLRBD0200R030N16	2	0.3	2	16	1.9	3°	55	4	2	●	1	16.7	17.3	18.5	*
CRN2XLRBD0200R020N20	2	0.2	2	20	1.9	2.5°	60	4	2	●	1	20.8	21.5	23.2	*
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	*
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	*	*	*	*

* No interference

CRN2XLRB

Corner radius, Medium cut length, 2 flute, For copper electrodes

RECOMMENDED CUTTING CONDITIONS

			■Slotting			■Contour Cutting			
Workpiece Material			Copper, Copper alloys			Copper, Copper alloys			
								Depth of cut	
Dia. DC (mm)	Corner radius RE (mm)	Neck length (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Revolution (min^{-1})	Feed rate (mm/min)	ap (mm)	ae (mm)
0.5	**R0.05, R0.1**	**4**	40000	800	0.005	40000	1500	0.01	0.1
1	**R0.1, R0.3**	**8**	40000	2000	0.03	40000	3000	0.03	0.2
		12	30000	1200	0.02	30000	1800	0.02	0.2
1.5	**R0.2, R0.3**	**12**	30000	1500	0.05	40000	4500	0.04	0.3
2	**R0.1, R0.2 R0.3, R0.5**	**12**	30000	1500	0.1	40000	4500	0.08	0.4
		16	30000	1000	0.06	30000	3000	0.05	0.4
		20	20000	600	0.04	20000	2000	0.04	0.4
3	**R0.2, R0.3**	**20**	20000	2000	0.12	35000	6000	0.1	0.6
	R0.5	**20**	20000	2200	0.12	35000	8000	0.1	0.6
4	**R0.2, R0.3**	**20**	15000	2000	0.25	32000	5000	0.15	0.8
	R0.5	**20**	15000	2200	0.25	32000	7000	0.15	0.8
6	**R0.2, R0.3, R0.5**	**30**	10000	1200	0.4	20000	5000	0.25	1.2
	R1	**30**	10000	1500	0.4	20000	7000	0.25	1.2
Depth of cut			 DC:Dia.			 DC:Dia.			

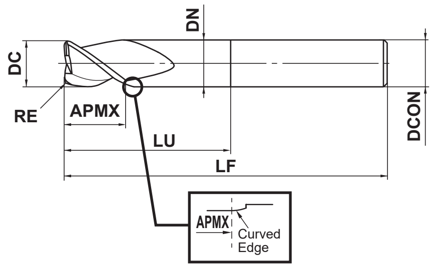
Note 1) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 2) Water-soluble cutting fluid is recommended.
Note 3) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

A3SARB NEW

Corner radius end mill, Short cut length, 3 flute, with multiple internal through coolant holes

UWC 37.5°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
							◎



DC=12	DC>12			
0 - 0.020	0 - 0.030			
12≤DCON≤16	20≤DCON≤25			
0 - 0.011	0 - 0.013			

h6

- ●Stability and reliability even when slotting, ramping and plunging.
- ●The cross sectional geometry of the flutes is perfect for efficient chip discharge.

(mm)

Order Number	DC	RE	APMX	LU	DN	LF	DCON	No. of Flutes	Stock
A3SARB120R100N36C	12	1	18	36	11.4	80	12	3	●
A3SARB120R200N36C	12	2	18	36	11.4	80	12	3	●
A3SARB120R300N36C	12	3	18	36	11.4	80	12	3	●
A3SARB160R200N48C	16	2	24	48	15.4	90	16	3	●
A3SARB160R300N48C	16	3	24	48	15.4	90	16	3	●
A3SARB160R400N48C	16	4	24	48	15.4	90	16	3	●
A3SARB200R200N55C	20	2	30	55	18	100	20	3	●
A3SARB200R300N55C	20	3	30	55	18	100	20	3	●
A3SARB200R400N55C	20	4	30	55	18	100	20	3	●
A3SARB250R200N55C	25	2	37.5	55	23	100	25	3	●
A3SARB250R300N55C	25	3	37.5	55	23	100	25	3	●
A3SARB250R400N55C	25	4	37.5	55	23	100	25	3	●
A3SARB250R500N55C	25	5	37.5	55	23	100	25	3	●

● : Inventory maintained in Japan.

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A3SARB

Corner radius end mill, Short cut length, 3 flute, with multiple internal through coolant holes

RECOMMENDED CUTTING CONDITIONS

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.

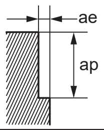
High efficiency conditions

■Side Milling

(mm)

Workpiece Material	Aluminium Alloys				
Dia. **DC**	Cutting Speed (m/min)	Revolution (min^{-1})	Feed Rate (mm/min)	Depth of cut ae(mm)	Depth of Cut ap(mm)
12	1240	33000	15000	6	12
16	1660	33000	20000	8	16
20	2070	33000	26000	10	20
25	2590	33000	32000	12.5	25

Depth of Cut

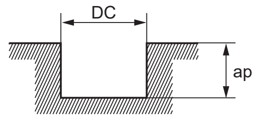


■Slot Milling

(mm)

Workpiece Material	Aluminium Alloys			
Dia. **DC**	Cutting Speed (m/min)	Revolution (min^{-1})	Feed Rate (mm/min)	Depth of Cut ap(mm)
12	1240	33000	15000	6
16	1660	33000	20000	8
20	2070	33000	26000	10
25	2590	33000	32000	12.5

Depth of Cut



DC:Cutting Dia.

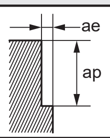
General-purpose conditions

■Side Milling

(mm)

Workpiece Material	Aluminium Alloys				
Dia. **DC**	Cutting Speed (m/min)	Revolution (min^{-1})	Feed Rate (mm/min)	Depth of cut ae(mm)	Depth of Cut ap(mm)
12	600	16000	7200	6	12
16	600	12000	7200	8	16
20	600	9500	7400	10	20
25	600	7600	7300	12.5	25

Depth of Cut

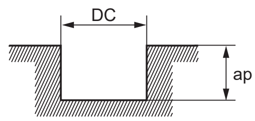


■Slot Milling

(mm)

Workpiece Material	Aluminium Alloys			
Dia. **DC**	Cutting Speed (m/min)	Revolution (min^{-1})	Feed Rate (mm/min)	Depth of Cut ap(mm)
12	600	16000	7200	6
16	600	12000	7200	8
20	600	9500	7400	10
25	600	7600	7300	12.5

Depth of Cut



DC:Cutting Dia.

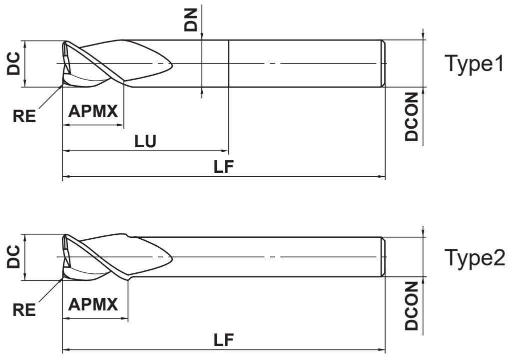
Note 1) It is recommended to use a water-soluble coolant. It is also possible to use an air blower (external/internal) for DLC coating.
Note 2) Down cut is recommended for side cutting.
Note 3) This table shows the cutting conditions with an overhang length of less than 4D. If more than 4D, spindle speed, feed rate and depth of cut should be reduced.
Note 4) When ramping, consider the chip discharge and use a feed rate 50% lower than the slotting conditions above and also use a ramping angle of 5º or less.
Note 5) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

C3SARB

Corner radius, Short cut length, 3 flute, For aluminium alloy

UWC 37.5°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
							◎



DC≤12	DC>12			
0 - 0.020	0 - 0.030			
12≤DCON≤16	20≤DCON≤25			
0 - 0.011	0 - 0.013			

h6

●High efficiency machining for aluminium alloys.

(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	18.0	125	20	3	▲	1
C3SARBD2000N0600R320	20	3.2	20	60	18.0	125	20	3	▲	1
C3SARBD2000N0600R400	20	4	20	60	18.0	125	20	3	▲	1
C3SARBD2000N0850R100	20	1	20	85	18.0	150	20	3	▲	1
C3SARBD2000N0850R320	20	3.2	20	85	18.0	150	20	3	▲	1
C3SARBD2000N0850R400	20	4	20	85	18.0	150	20	3	▲	1
C3SARBD2500N0650R320	25	3.2	20	65	23.0	125	25	3	▲	1
C3SARBD2500N0650R400	25	4	20	65	23.0	125	25	3	▲	1
C3SARBD2500N0650R500	25	5	20	65	23.0	125	25	3	▲	1
C3SARBD2500N0900R320	25	3.2	20	90	23.0	150	25	3	▲	1
C3SARBD2500N0900R400	25	4	20	90	23.0	150	25	3	▲	1
C3SARBD2500N0900R500	25	5	20	90	23.0	150	25	3	▲	1

▲ : Product scheduled to be discontinued at the end of March 2023
A3SARB (J251) is alternative product.

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C3SARB

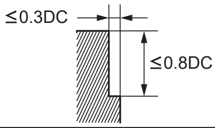
Corner radius, Short cut length, 3 flute, For aluminium alloy

RECOMMENDED CUTTING CONDITIONS

■Side milling

Workpiece Material	Aluminium alloy	
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

Depth of cut

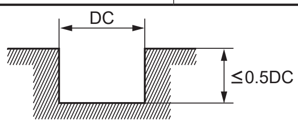


DC:Dia.

■Slotting

Workpiece Material	Aluminium alloy	
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

Depth of cut



DC:Dia.

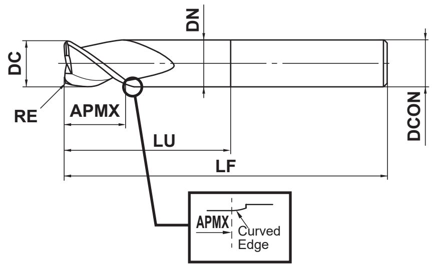
Note 1) Water-soluble cutting fluid is recommended.
Note 2) Climb cutting is recommended for side milling.
Note 3) This table shows the cutting condition with less than 4D overhang length. If more than 4D, spindle speed, feed rate and depth of cut should be reduced.
Note 4) These end mills do not have a centre cutting edge, therefore when entering a workpiece use a ramping process rather than vertical feed.
Note 5) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

DLC3SARB NEW

Corner radius end mill, Short cut length, 3 flute, with multiple internal through coolant holes

UWC DLC 37.5°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
							◎



	DC=12	DC>12			
	0 - 0.020	0 - 0.030			
h6	12≤DCON≤16	20≤DCON≤25			
	0 - 0.011	0 - 0.013			

●Stability and reliability even when slotting, ramping and plunging.
●The cross sectional geometry of the flutes is perfect for efficient chip discharge.

(mm)

Order Number	DC	RE	APMX	LU	DN	LF	DCON	No. of Flutes	Stock
DLC3SARB120R100N36C	12	1	18	36	11.4	80	12	3	●
DLC3SARB120R200N36C	12	2	18	36	11.4	80	12	3	●
DLC3SARB120R300N36C	12	3	18	36	11.4	80	12	3	●
DLC3SARB160R200N48C	16	2	24	48	15.4	90	16	3	●
DLC3SARB160R300N48C	16	3	24	48	15.4	90	16	3	●
DLC3SARB160R400N48C	16	4	24	48	15.4	90	16	3	●
DLC3SARB200R200N55C	20	2	30	55	18	100	20	3	●
DLC3SARB200R300N55C	20	3	30	55	18	100	20	3	●
DLC3SARB200R400N55C	20	4	30	55	18	100	20	3	●
DLC3SARB250R200N55C	25	2	37.5	55	23	100	25	3	●
DLC3SARB250R300N55C	25	3	37.5	55	23	100	25	3	●
DLC3SARB250R400N55C	25	4	37.5	55	23	100	25	3	●
DLC3SARB250R500N55C	25	5	37.5	55	23	100	25	3	●

● : Inventory maintained in Japan.

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DLC3SARB

Corner radius end mill, Short cut length, 3 flute, with multiple internal through coolant holes

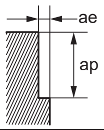
RECOMMENDED CUTTING CONDITIONS

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

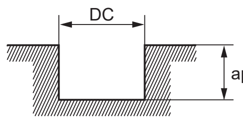
■Side Milling

(mm)

Workpiece Material	Aluminium Alloys				
Dia. **DC**	Cutting Speed (m/min)	Revolution (min^{-1})	Feed Rate (mm/min)	Depth of cut ap(mm)	Depth of Cut ae(mm)
12	1240	33000	15000	6	12
16	1660	33000	20000	8	16
20	2070	33000	26000	10	20
25	2590	33000	32000	12.5	25
Depth of Cut					

■Slot Milling

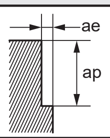
(mm)

Workpiece Material	Aluminium Alloys			
Dia. **DC**	Cutting Speed (m/min)	Revolution (min^{-1})	Feed Rate (mm/min)	Depth of Cut ap(mm)
12	1240	33000	15000	6
16	1660	33000	20000	8
20	2070	33000	26000	10
25	2590	33000	32000	12.5
Depth of Cut				DC:Cutting Dia.

General-purpose conditions

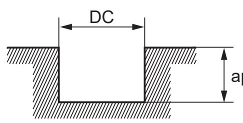
■Side Milling

(mm)

Workpiece Material	Aluminium Alloys				
Dia. **DC**	Cutting Speed (m/min)	Revolution (min^{-1})	Feed Rate (mm/min)	Depth of cut ap(mm)	Depth of Cut ae(mm)
12	600	16000	7200	6	12
16	600	12000	7200	8	16
20	600	9500	7400	10	20
25	600	7600	7300	12.5	25
Depth of Cut					

■Slot Milling

(mm)

Workpiece Material	Aluminium Alloys			
Dia. **DC**	Cutting Speed (m/min)	Revolution (min^{-1})	Feed Rate (mm/min)	Depth of Cut ap(mm)
12	600	16000	7200	6
16	600	12000	7200	8
20	600	9500	7400	10
25	600	7600	7300	12.5
Depth of Cut				DC:Cutting Dia.

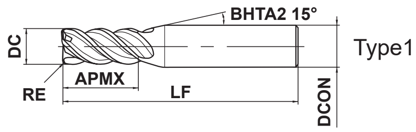
Note 1) It is recommended to use a water-soluble coolant. It is also possible to use an air blower (external/internal) for DLC coating.
Note 2) Down cut is recommended for side cutting.
Note 3) This table shows the cutting conditions with an overhang length of less than 4D. If more than 4D, spindle speed, feed rate and depth of cut should be reduced.
Note 4) When ramping, consider the chip discharge and use a feed rate 50% lower than the slotting conditions above and also use a ramping angle of 5º or less.
Note 5) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

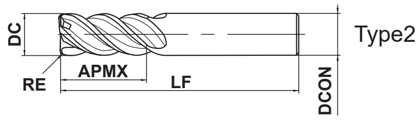
MPMHVRB

End mill, Medium cut length, 4 flute, Irregular helix flutes

UWC MS+ 37° 40°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	○		◎	○	○	





RE	0.1≤RE≤5				
	±0.015				
DC	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

●Irregular helix flutes end mill for reduced vibration when machining stainless steels and carbon steels.

(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
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

● : Inventory maintained in Japan.

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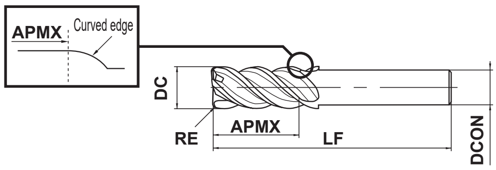
MPMHVRB

End mill, Medium cut length, 4 flute, Irregular helix flutes

(mm)

Order Number	DC	RE	APMX	LF	DCON	No. of Flutes	Stock	Type
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
MPMHVRBD1000R050	10	0.5	25	80	10	4	●	2
MPMHVRBD1000R100	10	1	25	80	10	4	●	2
MPMHVRBD1000R150	10	1.5	25	80	10	4	●	2
MPMHVRBD1000R200	10	2	25	80	10	4	●	2
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
MPMHVRBD1200R050	12	0.5	30	100	12	4	●	2
MPMHVRBD1200R100	12	1	30	100	12	4	●	2
MPMHVRBD1200R150	12	1.5	30	100	12	4	●	2
MPMHVRBD1200R200	12	2	30	100	12	4	●	2
MPMHVRBD1200R300	12	3	30	100	12	4	●	2
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



Type3

Slim Shank

Order Number	DC	RE	APMX	LF	DCON	No. of Flutes	Stock	Type
MPMHVRBD1000R030S08	10	0.3	25	100	8	4	●	3
MPMHVRBD1000R050S08	10	0.5	25	100	8	4	●	3
MPMHVRBD1000R100S08	10	1	25	100	8	4	●	3
MPMHVRBD1000R200S08	10	2	25	100	8	4	●	3
MPMHVRBD1200R030S10	12	0.3	30	110	10	4	●	3
MPMHVRBD1200R050S10	12	0.5	30	110	10	4	●	3
MPMHVRBD1200R100S10	12	1	30	110	10	4	●	3
MPMHVRBD1200R200S10	12	2	30	110	10	4	●	3
MPMHVRBD1200R300S10	12	3	30	110	10	4	●	3

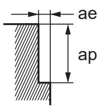
ISO13399 ➤ J002

RECOMMENDED CUTTING CONDITIONS

■Side milling

Workpiece 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 (45－55HRC) AISI H13, AISI L6			
Dia. DC	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

Depth of cut



Note 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 cut ae by 50% from the above conditions.
Note 2) Wet cutting mode is recommended for cutting stainless steels and titanium alloys, and air blow is recommended for carbon steels.
Note 3) Vibration damping end mills are more effective in suppressing chatter and vibration compared to general end mills, but these may still occur if the rigidity of the machine or the workpiece material is low. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

MPMHVRB

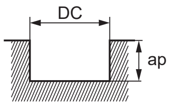
End mill, Medium cut length, 4 flute, Irregular helix flutes

RECOMMENDED CUTTING CONDITIONS

■Slotting

Workpiece 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 (45−55HRC) AISI H13, AISI L6		
Dia. DC	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

Depth of cut



DC:Dia.

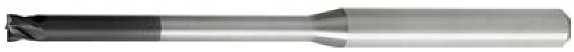
Note 4) Slim shank type is not recommended for slotting.

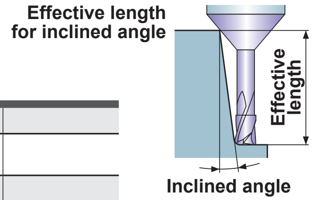
MPXLRB

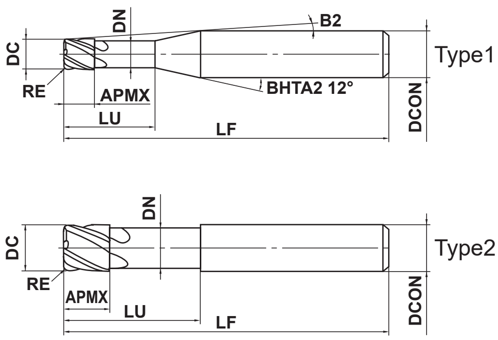
Corner radius, short cut length, long neck

UWC MS+ 30° DC≤0.3 DC≥0.4

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	◎		○	○	○	







0.05≤RE≤0.5	
±0.005	
0.2≤DC≤6	
0 - 0.01	
4≤DCON≤6	
h5 0 - 0.005	

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

(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	1.0	1.1	1.2	1.3
MPXLRBD0030R005N010	0.3	0.05	0.3	1	0.28	10.8°	50	4	2	●	1	1.0	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	4.0
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	4.0
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	6.0	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	5.0	5.6
MPXLRBD0100R005N050	1	0.05	1	5	0.96	7.0°	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
MPXLRBD0100R005N100	1	0.05	1	10	0.96	5.0°	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	5.0	5.5
MPXLRBD0100R010N050	1	0.1	1	5	0.96	7.0°	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	5.0°	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	6.0°	50	4	4	●	1	6.4	6.7	7.3	8.1
MPXLRBD0150R010N120	1.5	0.1	1.5	12	1.44	4.0°	50	4	4	●	1	12.6	13.2	14.5	16.1

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MPXLRB

Corner radius, short cut length, long neck

(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°
MPXLRBD0150R010N180	1.5	0.1	1.5	18	1.44	3.0°	60	4	4	●	1	18.9	19.7	21.7	24.0
MPXLRBD0150R020N060	1.5	0.2	1.5	6	1.44	6.0°	50	4	4	●	1	6.4	6.7	7.3	8.1
MPXLRBD0150R020N120	1.5	0.2	1.5	12	1.44	4.0°	50	4	4	●	1	12.6	13.2	14.5	16.0
MPXLRBD0150R020N180	1.5	0.2	1.5	18	1.44	3.0°	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	8.0
MPXLRBD0150R030N120	1.5	0.3	1.5	12	1.44	4.0°	50	4	4	●	1	12.6	13.2	14.5	16.0
MPXLRBD0150R030N180	1.5	0.3	1.5	18	1.44	3.0°	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	21.0	21.9	24.1	*
MPXLRBD0200R010N240	2	0.1	2	24	1.94	2.0°	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	21.0	21.9	24.0	*
MPXLRBD0200R020N240	2	0.2	2	24	1.94	2.0°	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	16.0
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	21.0	21.9	24.0	*
MPXLRBD0200R030N240	2	0.3	2	24	1.94	2.0°	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	16.0
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	2.0°	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	2.0°	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	2.0°	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	*
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	2.0°	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	2.0°	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	2.0°	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	*

* No interference

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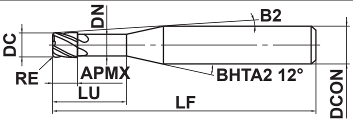
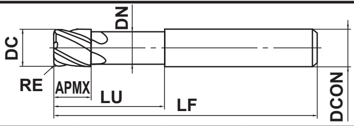


Type1



Type2

(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°
MPXLRBD0400R030N240	4	0.3	4	24	3.9	2.0°	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	2.0°	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	*	*	*	*

* No interference

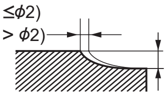
MPXLRB

Corner radius, short cut length, long neck

RECOMMENDED CUTTING CONDITIONS

Workpiece Material		Carbon steel, Alloy steel (180−280HB) Pre-hardened steel, Alloy Tool Steel, Precipitation hardeningstainless steel (<450HB) AISI 1045, AISI 4140, AISI P21, AISI P20, SKD, SKT, AISI 431, AISI 420				Hardened steel (45−52HRC) AISI H13, AISI L6			
Dia. **DC** (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	**0.5**	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.

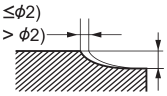
Note 1) The cutting conditions above are a guide only to machining with cutting edges with a corner radius. When machining with peripheral cutting edges, use the minimum feed rate as a guide.
Note 2) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 3) For profile machining 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.
Note 4) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

Workpiece Material		Austenitic stainless steel (≤200HB) Titanium alloy (<450HB) AISI 304, AISI 306, Ti-6Al-4V			
Dia. DC (mm)	**Neck length LU** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)
0.2	**0.5**	33000	170	0.003	0.04
	1	30000	110	0.003	0.04
0.3	**1**	30000	200	0.003	0.08
	2	30000	110	0.003	0.08
0.4	**2**	31000	930	0.005	0.10
	3	31000	750	0.004	0.10
	4	31000	510	0.003	0.10
0.5	**2**	31000	1400	0.006	0.12
	3	31000	1200	0.005	0.12
	4	31000	930	0.004	0.12
	5	25000	750	0.004	0.12
0.6	**2**	31000	2000	0.020	0.13
	4	25000	1200	0.015	0.13
	6	20000	750	0.008	0.13
0.8	**4**	25000	3100	0.025	0.20
	6	20000	2000	0.020	0.20
1	**3**	23000	2300	0.045	0.30
	4	23000	1800	0.040	0.30
	5	23000	1700	0.035	0.25
	6	19000	1300	0.030	0.25
	8	19000	1000	0.020	0.20
	10	14000	770	0.015	0.10
	12	14000	350	0.010	0.01
1.2	**10**	17000	1400	0.030	0.25
1.5	**6**	19000	2300	0.050	0.40
	12	14000	1300	0.040	0.30
	18	11000	640	0.010	0.15
2	**8**	14000	2500	0.050	0.50
	12	14000	2000	0.045	0.50
	16	13000	1800	0.040	0.35
	20	13000	1100	0.015	0.25
	24	8900	890	0.010	0.20
3	**8**	11000	3200	0.100	0.80
	12	11000	2900	0.080	0.80
	18	11000	2900	0.070	0.70
	24	10000	2500	0.060	0.50
	30	8600	1200	0.030	0.40
	36	5900	870	0.010	0.30
4	**16**	8600	3100	0.100	1.00
	24	7500	2400	0.085	0.80
	32	6600	1600	0.040	0.70
	48	4600	710	0.010	0.35
6	**24**	5200	2600	0.120	1.50
	48	3600	1100	0.050	1.20

Depth of cut

DC:Dia.

≤0.2RE (DC ≤ϕ2)
≤0.4RE (DC > ϕ2)



≤0.1mm (DC ≤ϕ1.5)
≤0.2mm (DC ≤ϕ4)
≤0.5mm (DC ≤ϕ6)

MPXLRB

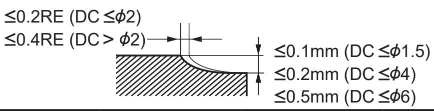
Corner radius, short cut length, long neck

RECOMMENDED CUTTING CONDITIONS

Workpiece Material		Copper, Copper alloys			
Dia. **DC** (mm)	Neck length **LU** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)
0.2	**0.5**	30000	150	0.003	0.08
	1	30000	100	0.003	0.08
0.3	**1**	30000	180	0.003	0.16
	2	30000	100	0.003	0.16
0.4	**2**	31000	810	0.005	0.20
	3	31000	660	0.004	0.20
	4	31000	450	0.003	0.20
0.5	**2**	31000	1300	0.006	0.24
	3	31000	1100	0.005	0.24
	4	31000	810	0.004	0.24
	5	25000	660	0.004	0.24
0.6	**2**	31000	1800	0.020	0.26
	4	25000	1100	0.015	0.26
	6	20000	660	0.008	0.26
0.8	**4**	25000	2700	0.025	0.40
	6	20000	1800	0.020	0.40
1	**3**	20000	2000	0.045	0.60
	4	20000	1600	0.040	0.60
	5	20000	1500	0.035	0.50
	6	17000	1200	0.030	0.50
	8	17000	880	0.020	0.40
	10	13000	670	0.015	0.20
	12	13000	310	0.010	0.02
1.2	**10**	15000	1300	0.030	0.50
1.5	**6**	14700	1700	0.050	0.80
	12	11000	1000	0.040	0.60
	18	8600	480	0.010	0.30
2	**8**	11000	1900	0.050	1.00
	12	11000	1500	0.045	1.00
	16	10000	1300	0.040	0.70
	20	10000	830	0.015	0.50
	24	6700	670	0.010	0.40
3	**8**	8600	2400	0.100	1.60
	12	8600	2200	0.080	1.60
	18	8300	2200	0.070	1.40
	24	8000	1900	0.060	1.00
	30	6500	950	0.030	0.80
	36	4500	660	0.010	0.60
4	**16**	6500	2300	0.100	2.00
	24	5700	1800	0.085	1.60
	32	5000	1200	0.040	1.40
	48	3400	530	0.010	0.70
6	**24**	4000	1900	0.120	3.00
	48	2700	870	0.050	2.40

Depth of cut

DC:Dia.

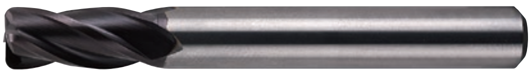


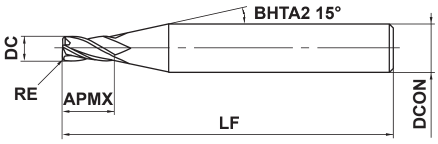
MS4MRB

Corner radius end mill, Medium cut length, 4 flute

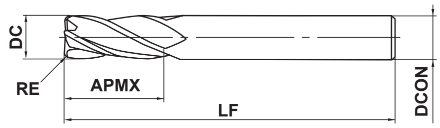
30°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	○		○	○	○	





Type1



Type2

	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

●4 flute corner radius end mill for general use.

(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
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

● : Inventory maintained in Japan.

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MS4MRB

Corner radius end mill, Medium cut length, 4 flute

(mm)

Order Number	DC	RE	APMX	LF	DCON	No. of Flutes	Stock	Type
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

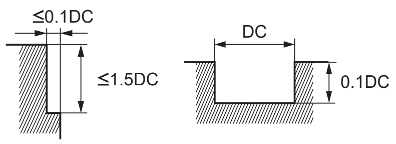
● : Inventory maintained in Japan.

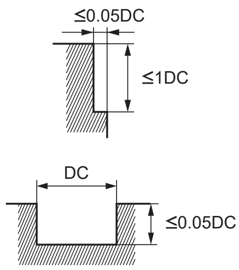
ISO13399 ➢J002

RECOMMENDED CUTTING CONDITIONS

Workpiece 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

Depth of cut





DC:Dia.

Note 1) When cutting austenitic stainless steels, the use of water-soluble cutting fluid is effective.
Note 2) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 3) When drilling, please set the feed rate at 1/3 or below the values above.
Note 4) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

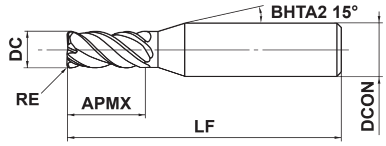
CARBIDE

VQMHVRB

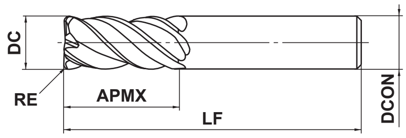
Corner radius end mill, Medium cutting length, 4 flute, Irregular helix flutes

37°
40°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎			◎	◎	○	



Type1



Type2

0.2≤RE≤6.35			
±0.015			
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

h6

● Smart Miracle vibration control end mill achieving stable machining of difficult-to-cut materials and for long overhang applications.

(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
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

Note 1) 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.

● : Inventory maintained in Japan.

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(mm)

Order Number	DC	RE	APMX	LF	DCON	No. of Flutes	Stock	Type
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

Note 1) 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.

VQMHVRB

Corner radius end mill, Medium cutting length, 4 flute, Irregular helix flutes

RECOMMENDED CUTTING CONDITIONS

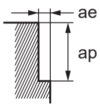
■Side milling

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

Workpiece 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, Ferritic and Martensitic stainless steels, Titanium alloys AISI 304, AISI 316, Ti-6Al-4V					Hardened stainless steels, Cobaly 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)	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	75	12000	720	3	0.4
3	150	16000	2600	4.5	0.9	120	13000	1200	4.5	0.9	100	11000	880	4.5	0.9	75	8000	770	4.5	0.6
4	150	12000	2600	6	1.2	120	9500	1300	6	1.2	100	8000	900	6	1.2	75	6000	790	6	0.8
5	150	9500	2600	7.5	1.5	120	7600	1300	7.5	1.5	100	6400	900	7.5	1.5	75	4800	810	7.5	1
6	150	8000	2600	9	1.8	120	6400	1300	9	1.8	100	5300	1100	9	1.8	75	4000	810	9	1.2
8	150	6000	2500	12	2.4	120	4800	1300	12	2.4	100	4000	1200	12	2.4	75	3000	840	12	1.6
10	150	4800	2300	15	3	120	3800	1200	15	3	100	3200	1300	15	3	75	2400	770	15	2
12	150	4000	1900	18	3.6	120	3200	1200	18	3.6	100	2700	1200	18	3.6	75	2000	720	18	2.4
16	150	3000	1600	24	4.8	120	2400	960	24	4.8	100	2000	960	24	4.8	75	1500	600	24	3.2
20	150	2400	1300	30	6	120	1900	760	30	6	100	1600	770	30	6	75	1200	480	30	4

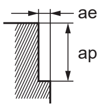
Depth of cut



General-purpose conditions

Workpiece 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, Ferritic and Martensitic stainless steels, Titanium alloys AISI 304, AISI 316, Ti-6Al-4V					Hardened stainless steels, Cobaly 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)	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	70	11000	440	3	0.4
3	120	13000	1400	4.5	0.9	100	11000	700	4.5	0.9	80	8500	450	2.2	0.3	70	7400	470	4.5	0.6
4	120	9500	1400	6	1.2	100	8000	700	6	1.2	80	6400	470	3	0.6	70	5600	490	6	0.8
5	120	7600	1400	7.5	1.5	100	6400	710	7.5	1.5	80	5100	470	4.5	0.9	70	4500	500	7.5	1
6	120	6400	1400	9	1.8	100	5300	710	9	1.8	80	4200	580	6	1.2	70	3700	500	9	1.2
8	120	4800	1300	12	2.4	100	4000	740	12	2.4	80	3200	630	7.5	1.5	70	2800	520	12	1.6
10	120	3800	1200	15	3	100	3200	680	15	3	80	2500	660	9	1.8	70	2200	460	15	2
12	120	3200	1000	18	3.6	100	2700	640	18	3.6	80	2100	610	12	2.4	70	1900	450	18	2.4
16	120	2400	860	24	4.8	100	2000	530	24	4.8	80	1600	510	15	3	70	1400	370	24	3.2
20	120	1900	680	30	6	100	1600	420	30	6	80	1300	410	18	3.6	70	1100	290	30	4

Depth of cut



Note 1) 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.
Note 2) Effective cutting of stainless steel, titanium alloys and heat-resistant alloys etc. can be achieved with the use of emulsion.
Note 3) Vibration damping end mills are more effective in suppressing chatter and vibration compared to general end mills, but these may still occur if the rigidity of the machine or the workpiece material is low. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.
Note 4) When the depth of cut is smaller than shown the revolution and feed rate can be increased.

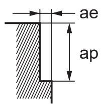
■Side milling

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

Workpiece Material	Copper, Copper alloy					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)
2	180	29000	2900	3	0.6	40	6400	230	3	0.2
3	180	19000	3000	4.5	0.9	40	4200	240	4.5	0.3
4	180	14000	3000	6	1.2	40	3200	240	6	0.4
5	180	11000	3000	7.5	1.5	40	2500	240	7.5	0.5
6	180	9500	3000	9	1.8	40	2100	250	9	0.6
8	180	7200	3000	12	2.4	40	1600	260	12	0.8
10	180	5700	2700	15	3	40	1300	290	15	1
12	180	4800	2300	18	3.6	40	1100	280	18	1.2
16	180	3600	1900	24	4.8	40	800	200	24	1.6
20	180	2900	1600	30	6	40	640	160	30	2

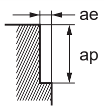
Depth of cut



General-purpose conditions

Workpiece Material	Copper, Copper alloy					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)
2	140	22000	1500	3	0.6	30	4800	110	3	0.2
3	140	15000	1600	4.5	0.9	30	3200	120	4.5	0.3
4	140	11000	1600	6	1.2	30	2400	120	6	0.4
5	140	8900	1600	7.5	1.5	30	1900	120	7.5	0.5
6	140	7400	1600	9	1.8	30	1600	130	9	0.6
8	140	5600	1600	12	2.4	30	1200	130	12	0.8
10	140	4500	1400	15	3	30	950	140	15	1
12	140	3700	1200	18	3.6	30	800	140	18	1.2
16	140	2800	1000	24	4.8	30	600	100	24	1.6
20	140	2200	780	30	6	30	480	81	30	2

Depth of cut



Note 1) 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.
Note 2) Effective cutting of stainless steel, titanium alloys and heat-resistant alloys etc. can be achieved with the use of emulsion.
Note 3) Vibration damping end mills are more effective in suppressing chatter and vibration compared to general end mills, but these may still occur if the rigidity of the machine or the workpiece material is low. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.
Note 4) When the depth of cut is smaller than shown the revolution and feed rate can be increased.

VQMHVRB

Corner radius end mill, Medium cutting length, 4 flute, Irregular helix flutes

RECOMMENDED CUTTING CONDITIONS

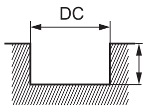
■Slotting

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

Workpiece 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, Ferritic and Martensitic stainless steels, Titanium alloys AISI 304, AISI 316, Ti-6Al-4V				Hardened stainless steels, Cobaly chromium alloy AISI 630, AISI 631 15-5PH, 17-4PH				Copper, Copper alloy				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)	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	60	9500	300	1	180	29000	1500	2	30	4800	130	0.6
3	150	16000	1500	3	120	13000	730	3	100	11000	660	3	60	6400	360	1.5	180	19000	1700	3	30	3200	150	0.9
4	150	12000	1900	4	120	9500	910	4	100	8000	700	4	60	4800	460	2	180	14000	2200	4	30	2400	170	1.2
5	150	9500	1900	5	120	7600	910	5	100	6400	720	5	60	3800	460	2.5	180	11000	2200	5	30	1900	170	1.5
6	150	8000	1900	6	120	6400	1000	6	100	5300	740	6	60	3200	510	3	180	9500	2300	6	30	1600	180	1.8
8	150	6000	1700	8	120	4800	960	8	100	4000	800	8	60	2400	480	4	180	7200	2000	8	30	1200	190	2.4
10	150	4800	1500	10	120	3800	840	10	100	3200	900	10	60	1900	420	5	180	5700	1800	10	30	950	210	3
12	150	4000	1300	12	120	3200	770	12	100	2700	860	12	60	1600	380	6	180	4800	1500	12	30	800	200	3.6
16	150	3000	1100	12	120	2400	670	12	100	2000	640	12	60	1200	340	8	180	3600	1300	12	30	600	150	4.8
20	150	2400	860	12	120	1900	530	12	100	1600	510	12	60	950	270	10	180	2900	1000	12	30	480	120	6

Depth of cut

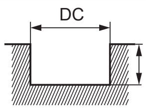


DC:Dia.

General-purpose conditions

Workpiece 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, Ferritic and Martensitic stainless steels, Titanium alloys AISI 304, AISI 316, Ti-6Al-4V				Hardened stainless steels, Cobaly chromium alloy AISI 630, AISI 631 15-5PH, 17-4PH				Copper, Copper alloy				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)	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	50	8000	170	1	120	19000	650	2	25	4000	74	0.6
3	100	11000	670	3	80	8500	310	3	60	6400	250	3	50	5300	200	1.5	120	13000	790	3	25	2700	86	0.9
4	100	8000	840	4	80	6400	410	4	60	4800	280	4	50	4000	250	2	120	9500	1000	4	25	2000	93	1.2
5	100	6400	840	5	80	5100	410	5	60	3800	280	5	50	3200	250	2.5	120	7600	1000	5	25	1600	95	1.5
6	100	5300	840	6	80	4200	440	6	60	3200	300	6	50	2700	290	3	120	6400	1000	6	25	1300	96	1.8
8	100	4000	740	8	80	3200	420	8	60	2400	320	8	50	2000	260	4	120	4800	890	8	25	990	100	2.4
10	100	3200	680	10	80	2500	360	10	60	1900	350	10	50	1600	230	5	120	3800	800	10	25	800	120	3
12	100	2700	570	12	80	2100	330	12	60	1600	340	12	50	1300	210	6	120	3200	680	12	25	660	110	3.6
16	100	2000	480	12	80	1600	300	12	60	1200	250	12	50	990	180	8	120	2400	570	12	25	500	84	4.8
20	100	1600	380	12	80	1300	240	12	60	950	200	12	50	800	150	10	120	1900	450	12	25	400	68	6

Depth of cut



DC:Dia.

Note 1) 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.
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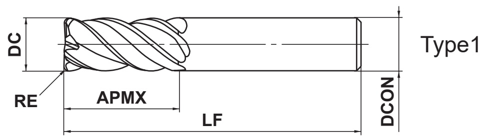
Note 3) Vibration damping end mills are more effective in suppressing chatter and vibration compared to general end mills, but these may still occur if the rigidity of the machine or the workpiece material is low. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.
Note 4) When the depth of cut is smaller than shown the feed rate can be increased.

VQMHVRBF

Corner radius end mill, Medium cutting length, 4 flute, Irregular helix flutes (for finishing)

37°
40°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎			◎	◎	○	



0.3≤RE≤3				
±0.015				
DC≤12	DC>12			
0 / - 0.02	0 / - 0.03			
DCON=6	8≤DCON≤10	12≤DCON≤16		
0 / - 0.008	0 / - 0.009	0 / - 0.011		

- 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.

(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

Note 1) 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.

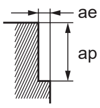
● : Inventory maintained in Japan.

VQMHVRBF

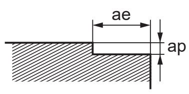
Corner radius end mill, Medium cutting length, 4 flute, Irregular helix flutes (for finishing)

RECOMMENDED CUTTING CONDITIONS

■Side milling

Workpiece 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					Hardened stainless steels, Cobaly chromium alloy AISI 630, AISI 631, 15-5PH, 17-4PH					Copper, Copper alloy					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)	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	180	9500	3000	9	0.3	40	2100	250	9	0.18
8	150	6000	2500	12	0.4	120	4800	1300	12	0.4	75	3000	840	12	0.4	180	7200	3000	12	0.4	40	1600	260	12	0.24
10	150	4800	2300	15	0.5	120	3800	1200	15	0.5	75	2400	770	15	0.5	180	5700	2700	15	0.5	41	1300	290	15	0.3
12	150	4000	1900	18	0.6	120	3200	1200	18	0.6	75	2000	720	18	0.6	180	4800	2300	18	0.6	41	1100	280	18	0.36
16	150	3000	1600	24	0.8	120	2400	960	24	0.8	75	1500	600	24	0.8	180	3600	1900	24	0.8	40	800	200	24	0.48
Depth of cut																									

■Bottom face milling

Workpiece 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					Hardened stainless steels, Cobaly chromium alloy AISI 630, AISI 631, 15-5PH, 17-4PH					Copper, Copper alloy					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)	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	130	6900	1700	0.3	4.8	30	1600	180	0.18	4.8
8	110	4400	1200	0.4	6.4	90	3600	720	0.4	6.4	55	2200	440	0.4	6.4	130	5200	1500	0.4	6.4	30	1200	190	0.24	6.4
10	110	3500	1100	0.5	8	90	2900	640	0.5	8	55	1800	400	0.5	8	130	4100	1300	0.5	8	30	950	210	0.3	8
12	110	2900	930	0.6	9.6	90	2400	580	0.6	9.6	55	1500	360	0.6	9.6	130	3400	1100	0.6	9.6	30	800	200	0.36	9.6
16	110	2200	790	0.8	12.8	90	1800	500	0.8	12.8	55	1100	310	0.8	12.8	130	2600	940	0.8	12.8	30	600	150	0.48	12.8
Depth of cut																									

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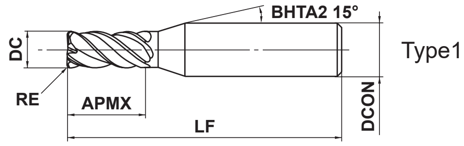
Note 4) When the depth of cut is smaller than shown the feed rate can be increased.

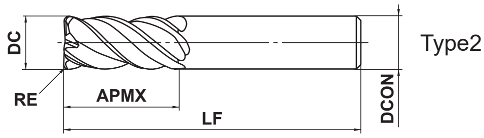
VQN4/6MVRB NEW

Corner Radius, Medium cut length, 4, 6 flute

UWC VQN 33° 37° VQN4 34° 36° VQN6 VQN4 VQN6

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
					◎		





VQN4	VQN6			
±0.015	±0.02			
DC≤12				
0 - 0.02				
DCON=6	DCON=8,12	DCON=12		
0 - 0.008	0 - 0.009	0 - 0.012		

- (Al, Ti, Ai) N-based coating exhibits excellent wear and chipping resistance when machining heat resistant super alloys.
- Optimized number of flutes for efficient and stable machining.

(mm)

Order Number	DC	RE	APMX	LF	DCON	No. of Flutes	Stock	Type
VQN4MVRBD0300R030	3	0.3	7	45	6	4	●	1
VQN4MVRBD0300R050	3	0.5	7	45	6	4	●	1
VQN4MVRBD0400R030	4	0.3	10	45	6	4	●	1
VQN4MVRBD0400R050	4	0.5	10	45	6	4	●	1
VQN4MVRBD0500R050	5	0.5	12	50	6	4	●	1
VQN4MVRBD0600R050	6	0.5	13	50	6	4	●	2
VQN4MVRBD0600R100	6	1	13	50	6	4	●	2
VQN6MVRBD0800R050	8	0.5	19	60	8	6	●	2
VQN6MVRBD0800R100	8	1	19	60	8	6	●	2
VQN6MVRBD1000R050	10	0.5	22	70	10	6	●	2
VQN6MVRBD1000R100	10	1	22	70	10	6	●	2
VQN6MVRBD1200R050	12	0.5	26	75	12	6	●	2
VQN6MVRBD1200R100	12	1	26	75	12	6	●	2

● : Inventory maintained in Japan.

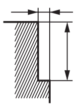
VQN4/6MVRB

Corner Radius, Medium cut length, 4, 6 flute

RECOMMENDED CUTTING CONDITIONS

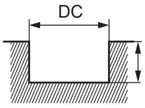
■Side milling

(mm)

Workpiece Material		Nickel-Based Heat Resistant Super Alloy Inconel718, Inconel713C, WASPALOY etc.			
DC	Number of Flutes	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap	Depth of cut ae
3	4	4200	340	4.5	0.3
4	4	3200	260	6	0.4
5	4	2500	300	7.5	0.5
6	4	2100	250	9	0.6
8	6	1600	290	12	0.8
10	6	1300	310	15	1
12	6	1100	260	18	1.2
Depth of cut		 ae ap			

■Slot milling

(mm)

Workpiece Material		Nickel-Based Heat Resistant Super Alloy Inconel718, Inconel713C, WASPALOY etc.		
DC	Number of Flutes	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap
3	4	3200	260	1.5
4	4	2400	190	2
5	4	1900	230	2.5
6	4	1600	190	3
8	6	1200	220	4
10	6	1000	180	5
12	6	800	140	6
Depth of cut		 DC ap		

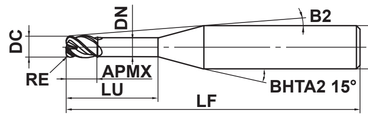
Note 1) The use of water-soluble coolant is effective for heat resistant super alloys.
Note 2) Vibration damping end mills are more effective in suppressing chatter and vibration compared to general end mills, but these may still occur if the rigidity of the machine or the workpiece material is low. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.
Note 3) If the depth of cut is shallow, the revolution and feed rate can be increased.

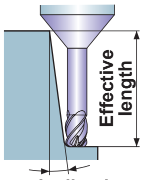
VQHVRB NEW

Corner radius, Short cut length, 4 flute, Irregular helix flutes

UWC VQ 43° 45°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Precipitation Hardening Stainless Steel	Austenitic Stainless Steel	Cobalt Chrome Alloy, Heat Resistant Alloy	Titanium Alloy	Aluminium Alloy
					◎	○	





0.1≤RE≤1			
±0.01			
1≤DC≤4			
0 - 0.02			
DCON=6			
0 - 0.005			

h5

● SMART MIRACLE corner radius end mill for high feed rates and efficient machining.

(mm)

Order Number	DC	RE	APMX	LU	DN	B2	LF	DCON	No. of Flutes	Stock	Type
VQHVRBD0100R01N080	1	0.1	1	8	0.94	8.2°	50	6	4	●	1
VQHVRBD0100R01N120	1	0.1	1	12	0.94	6.7°	55	6	4	●	1
VQHVRBD0200R02N120	2	0.2	2	12	1.9	5.9°	55	6	4	●	1
VQHVRBD0200R02N160	2	0.2	2	16	1.9	4.9°	60	6	4	●	1
VQHVRBD0300R05N100	3	0.5	3	10	2.9	5.6°	55	6	4	●	1
VQHVRBD0300R05N180	3	0.5	3	18	2.9	3.7°	60	6	4	●	1
VQHVRBD0400R10N120	4	1.0	4	12	3.9	3.9°	55	6	4	●	1
VQHVRBD0400R10N200	4	1.0	4	20	3.9	2.5°	60	6	4	●	1

● : Inventory maintained in Japan.

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CARBIDE

VQHVRB

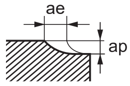
Corner radius, Short cut length, 4 flute, Irregular helix flutes

RECOMMENDED CUTTING CONDITIONS

(mm)

Workpiece Material		Titanium Alloys Ti-6Al-4V ELI etc.					Cobalt Chromium Alloys Precipitation Hardening Stainless Steels Co-Cr-Mo, SUS630, SUS631, 15-5PH, 17-4PH etc.				
DC	LU	Revolution **n** (min^{-1})	Cutting Speed **vc** (m/min)	Feed Rate **vf** (mm/min)	Depth of cut **ap**	Width of cut **ae**	Revolution **n** (min^{-1})	Cutting Speed **vc** (m/min)	Feed Rate **vf** (mm/min)	Depth of cut **ap**	Width of cut **ae**
1	**8**	2500	8	500	0.030	0.1	2500	8	500	0.030	0.1
1	**12**	2500	8	350	0.030	0.1	2500	8	350	0.030	0.1
2	**12**	4800	30	600	0.075	0.3	4800	30	600	0.075	0.3
2	**16**	4800	30	340	0.075	0.3	4800	30	350	0.075	0.3
3	**10**	8500	80	2400	0.190	1.3	6400	60	2200	0.170	1.3
3	**18**	8500	80	2000	0.190	1.3	6400	60	1600	0.170	1.3
4	**12**	6400	80	2000	0.250	1.7	4800	60	1800	0.220	1.7
4	**20**	6400	80	2000	0.250	1.7	4800	60	1800	0.220	1.7

Depth of Cut



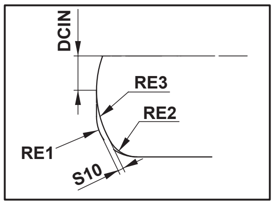
Note 1) The SMART MIRACLE coating has very low electrical conductivity; therefore, an external contact type of tool setter (electrically transmitted) may not work.
When measuring the tool length, please use an internal contact type (non-electrical type) or a laser tool setter.
Note 2) When cutting titanium alloys, the use of water-soluble cutting fluid is effective.
Note 3) Vibration damping end mills are more effective in suppressing chatter and vibration compared to general end mills, but these may still occur if the rigidity of the machine or the workpiece material is low. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.
Note 4) If the depth of cut is shallow, the revolution and the feed rate can be increased.

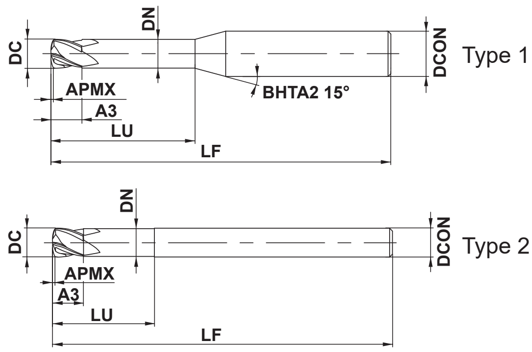
VQFDRB NEW

Duplex corner radius end mill for high-speed cutting

30°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Precipitation Hardening Stainless Steel	Austenitic Stainless Steel	Cobalt Chrome Alloy, Heat Resistant Alloy	Titanium Alloy	Aluminium Alloy
					◎	○	





1≤DC≤4	0 - 0.020
h5 DCON=6	0 - 0.005

- Duplex corner radius type allows a more efficient, higher feed.
- High feed cutting realized through the use of multiple cuts.

(mm)

Order Number	DC	*1 RE1	APMX	*2 A3	LU	DN	LF	DCON	No. F	Multi-task radius part S10	DCIN	RE2	RE3	*3 RMPX	Stock	Type
VQFDRBD0300N080	3	0.64	0.18	3	8	2.8	50	6	4	0.08	0.75	0.5	2	2.1°	●	1
VQFDRBD0300N120	3	0.64	0.18	3	12	2.8	55	6	4	0.08	0.75	0.5	2	2.1°	●	1
VQFDRBD0400N120	4	0.71	0.25	4	12	3.8	55	6	4	0.13	1.0	0.5	3	1.9°	●	1
VQFDRBD0400N160	4	0.71	0.25	4	16	3.8	60	6	4	0.13	1.0	0.5	3	1.9°	●	1
VQFDRBD0600N180	6	0.92	0.36	6	18	5.6	60	6	4	0.21	1.5	0.6	5	1.7°	●	2

*1 RE1 : Approx. R
*2 A3 : Cutting Edge Effective Length
*3 RMPX : Max. Ramping Angle

● : Inventory maintained in Japan.

VQFDRB

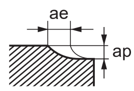
Duplex corner radius end mill for high-speed cutting

RECOMMENDED CUTTING CONDITIONS

(mm)

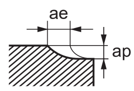
Workpiece Material	Titanium Alloys Ti-6Al-4V ELI etc.					Cobalt Chromium Alloys Precipitation Hardening Stainless Steels Co-Cr-Mo, SUS630, SUS631, 15-5PH, 17-4PH etc.				
DC	Revolution **n** (min^{-1})	Cutting Speed **vc** (m/min)	Feed Rate **vf** (mm/min)	Depth of cut **ap**	Width of cut **ae**	Revolution **n** (min^{-1})	Cutting Speed **vc** (m/min)	Feed Rate **vf** (mm/min)	Depth of cut **ap**	Width of cut **ae**
3	8500	80	2100	0.2	1.3	6400	60	3000	0.2	1.3
4	6400	80	2200	0.2	1.7	4800	60	2700	0.2	1.7
6	4200	80	1400	0.3	2.0	3200	60	2100	0.3	2.6

Depth of Cut



Workpiece Material	Heat Resistant Alloys Inconel 718 etc.				
DC	Revolution **n** (min^{-1})	Cutting Speed **vc** (m/min)	Feed Rate **vf** (mm/min)	Depth of cut **ap**	Width of cut **ae**
3	3200	30	770	0.2	0.6
4	2400	30	770	0.2	0.8
6	1600	30	520	0.3	1.3

Depth of Cut



Note 1) The SMART MIRACLE coating has very low electrical conductivity; therefore, an external contact type of tool setter (electrically transmitted) may not work.
When measuring the tool length, please use an internal contact type (non-electrical type) or a laser tool setter.
Note 2) When cutting titanium alloys, the use of water-soluble cutting fluid is effective.
Note 3) If the depth of cut is shallow, the revolution and the feed rate can be increased.

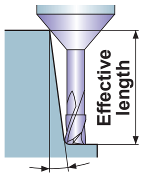
VFRPSRB NEW

Corner radius end mill, Short cut length, High precision, 4 flute

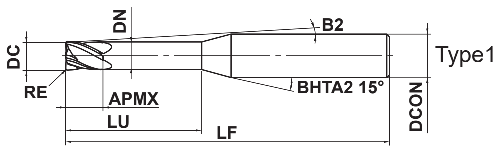
UWC VFR 30° DC≤1.0 DC≥1.5

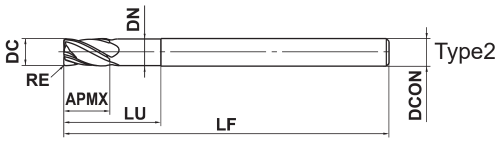
CARBIDE

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
	○	◎	◎				



Effective length for inclined angle





	0.5≤DC≤6	6<DC≤12	
	±0.005	±0.007	
	0.5≤DC≤6	6<DC≤12	
	0 / - 0.01	0 / - 0.15	
h5	DCON=6	8≤DCON≤10	DCON=12
	0 / - 0.005	0 / - 0.006	0 / - 0.008

- Completely seamless curved R edge. DC≥1.5
- The wiper edge and strong back taper achieve high precision machining. 1.5≤DC≤5

(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°
VFRPSRBD0050R005N020	0.5	0.05	0.5	2	0.47	12.6	50	6	4	●	1	2.1	2.2	2.3	2.5
VFRPSRBD0050R010N020	0.5	0.1	0.5	2	0.47	12.7	50	6	4	●	1	2.1	2.2	2.3	2.5
VFRPSRBD0060R005N020	0.6	0.05	0.6	2	0.57	12.5	50	6	4	●	1	2.1	2.2	2.4	2.6
VFRPSRBD0060R010N020	0.6	0.1	0.6	2	0.57	12.5	50	6	4	●	1	2.1	2.2	2.3	2.6
VFRPSRBD0060R010N040	0.6	0.1	0.6	4	0.57	10.8	50	6	4	●	1	4.2	4.4	4.7	5.1
VFRPSRBD0060R020N020	0.6	0.2	0.6	2	0.57	12.6	50	6	4	●	1	2.1	2.2	2.2	2.6
VFRPSRBD0080R005N040	0.8	0.05	0.8	4	0.77	10.7	50	6	4	●	1	4.2	4.4	4.7	5.1
VFRPSRBD0080R010N040	0.8	0.1	0.8	4	0.77	10.7	50	6	4	●	1	4.2	4.4	4.7	5.1
VFRPSRBD0080R020N040	0.8	0.2	0.8	4	0.77	10.8	50	6	4	●	1	4.2	4.4	4.7	5.1
VFRPSRBD0080R030N040	0.8	0.3	0.8	4	0.77	10.8	50	6	4	●	1	4.2	4.4	4.7	5
VFRPSRBD0100R005N040	1	0.05	1	4	0.96	10.4	50	6	4	●	1	4.3	4.5	4.9	5.4
VFRPSRBD0100R010N040	1	0.1	1	4	0.96	10.4	50	6	4	●	1	4.3	4.5	4.9	5.4
VFRPSRBD0100R010N060	1	0.1	1	6	0.96	9.1	50	6	4	●	1	6.4	6.7	7.3	7.9
VFRPSRBD0100R020N040	1	0.2	1	4	0.96	10.5	50	6	4	●	1	4.3	4.5	4.7	5.3
VFRPSRBD0100R020N060	1	0.2	1	6	0.96	9.2	50	6	4	●	1	6.4	6.7	7.3	7.8
VFRPSRBD0100R030N040	1	0.3	1	4	0.96	10.5	50	6	4	●	1	4.3	4.5	4.6	5.3
VFRPSRBD0100R040N040	1	0.4	1	4	0.96	10.6	50	6	4	●	1	4.3	4.5	4.5	5.3
VFRPSRBD0150R010N040	1.5	0.1	1.5	4	1.42	10.2	50	6	4	●	1	4.2	4.4	4.8	5.2
VFRPSRBD0150R010N060	1.5	0.1	1.5	6	1.42	8.8	50	6	4	●	1	6.3	6.6	7.1	7.7
VFRPSRBD0150R010N100	1.5	0.1	1.5	10	1.42	6.9	50	6	4	●	1	10.5	10.9	11.7	12.7
VFRPSRBD0150R020N040	1.5	0.2	1.5	4	1.42	10.2	50	6	4	●	1	4.2	4.4	4.6	5.2
VFRPSRBD0150R020N060	1.5	0.2	1.5	6	1.42	8.8	50	6	4	●	1	6.3	6.6	7.1	7.7
VFRPSRBD0150R020N100	1.5	0.2	1.5	10	1.42	7	50	6	4	●	1	10.5	10.9	11.7	12.6
VFRPSRBD0150R030N040	1.5	0.3	1.5	4	1.42	10.3	50	6	4	●	1	4.2	4.4	4.5	5.2
VFRPSRBD0150R030N060	1.5	0.3	1.5	6	1.42	8.9	50	6	4	●	1	6.3	6.6	7.1	7.6
VFRPSRBD0150R030N100	1.5	0.3	1.5	10	1.42	7	50	6	4	●	1	10.5	10.9	11.7	12.6
VFRPSRBD0150R050N040	1.5	0.5	1.5	4	1.42	10.5	50	6	4	●	1	4.2	4.4	4.3	5.1
VFRPSRBD0150R050N060	1.5	0.5	1.5	6	1.42	9	50	6	4	●	1	6.3	6.6	7.1	7.6
VFRPSRBD0150R050N100	1.5	0.5	1.5	10	1.42	7.1	50	6	4	●	1	10.5	10.9	11.7	12.6
VFRPSRBD0200R010N060	2	0.1	2	6	1.9	8.4	50	6	4	●	1	6.3	6.6	7.1	7.6
VFRPSRBD0200R010N100	2	0.1	2	10	1.9	6.5	50	6	4	●	1	10.5	10.9	11.7	12.6
VFRPSRBD0200R010N150	2	0.1	2	15	1.9	5.1	50	6	4	●	1	15.7	16.2	17.4	18.8
VFRPSRBD0200R020N060	2	0.2	2	6	1.9	8.4	50	6	4	●	1	6.3	6.6	7.1	7.6
VFRPSRBD0200R020N100	2	0.2	2	10	1.9	6.5	50	6	4	●	1	10.5	10.9	11.7	12.6

● : Inventory maintained in Japan.

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VFRPSRB

Corner radius end mill, Short cut length, High precision, 4 flute

(mm)

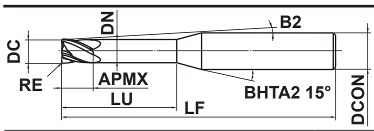
Order Number	DC	RE	APMX	LU	DN	B2	LF	DCON	No. of Flutes	Stock	Type	Effective length for inclined angle 0.5°	1°	2°	3°
VFRPSRBD0200R020N150	2	0.2	2	15	1.9	5.1	50	6	4	●	1	15.7	16.2	17.4	18.8
VFRPSRBD0200R030N060	2	0.3	2	6	1.9	8.5	50	6	4	●	1	6.3	6.6	7	7.6
VFRPSRBD0200R030N100	2	0.3	2	10	1.9	6.6	50	6	4	●	1	10.5	10.8	11.6	12.6
VFRPSRBD0200R030N150	2	0.3	2	15	1.9	5.1	50	6	4	●	1	15.7	16.2	17.4	18.8
VFRPSRBD0200R030N200	2	0.3	2	20	1.9	4.2	60	6	4	●	1	20.8	21.5	23.1	25
VFRPSRBD0200R050N060	2	0.5	2	6	1.9	8.6	50	6	4	●	1	6.3	6.5	7	7.5
VFRPSRBD0200R050N100	2	0.5	2	10	1.9	6.6	50	6	4	●	1	10.5	10.8	11.6	12.5
VFRPSRBD0200R050N150	2	0.5	2	15	1.9	5.2	50	6	4	●	1	15.6	16.2	17.4	18.7
VFRPSRBD0200R050N200	2	0.5	2	20	1.9	4.2	60	6	4	●	1	20.8	21.5	23.1	24.9
VFRPSRBD0250R030N080	2.5	0.3	2.5	8	2.35	6.9	50	6	4	●	1	8.3	8.6	9.2	10
VFRPSRBD0250R030N150	2.5	0.3	2.5	15	2.35	4.7	50	6	4	●	1	15.6	16.1	17.3	18.7
VFRPSRBD0250R050N080	2.5	0.5	2.5	8	2.35	7	50	6	4	●	1	8.3	8.6	9.2	9.9
VFRPSRBD0250R050N150	2.5	0.5	2.5	15	2.35	4.7	50	6	4	●	1	15.6	16.1	17.3	18.6
VFRPSRBD0250R100N080	2.5	1	2.5	8	2.35	7.3	50	6	4	●	1	8.3	8.6	9.1	9.8
VFRPSRBD0300R010N100	3	0.1	3	10	2.85	5.5	60	6	4	●	1	10.4	10.8	11.6	12.5
VFRPSRBD0300R010N150	3	0.1	3	15	2.85	4.2	60	6	4	●	1	15.6	16.1	17.3	18.7
VFRPSRBD0300R020N100	3	0.2	3	10	2.85	5.5	60	6	4	●	1	10.4	10.8	11.6	12.5
VFRPSRBD0300R020N150	3	0.2	3	15	2.85	4.2	60	6	4	●	1	15.6	16.1	17.3	18.7
VFRPSRBD0300R020N200	3	0.2	3	20	2.85	3.4	60	6	4	●	1	20.7	21.5	23.1	24.9
VFRPSRBD0300R030N100	3	0.3	3	10	2.85	5.6	60	6	4	●	1	10.4	10.8	11.5	12.5
VFRPSRBD0300R030N150	3	0.3	3	15	2.85	4.2	60	6	4	●	1	15.6	16.1	17.3	18.7
VFRPSRBD0300R030N200	3	0.3	3	20	2.85	3.4	60	6	4	●	1	20.7	21.5	23	24.9
VFRPSRBD0300R050N100	3	0.5	3	10	2.85	5.6	60	6	4	●	1	10.4	10.7	11.5	12.4
VFRPSRBD0300R050N150	3	0.5	3	15	2.85	4.2	60	6	4	●	1	15.6	16.1	17.3	18.6
VFRPSRBD0300R050N200	3	0.5	3	20	2.85	3.4	60	6	4	●	1	20.7	21.4	23	24.8
VFRPSRBD0300R100N100	3	1	3	10	2.85	5.8	60	6	4	●	1	10.4	10.7	11.4	12.3
VFRPSRBD0300R100N150	3	1	3	15	2.85	4.3	60	6	4	●	1	15.5	16.1	17.2	18.5
VFRPSRBD0300R100N200	3	1	3	20	2.85	3.5	60	6	4	●	1	20.7	21.4	22.9	24.7
VFRPSRBD0400R010N120	4	0.1	4	12	3.85	3.6	60	6	4	●	1	12.5	12.9	13.9	15
VFRPSRBD0400R010N200	4	0.1	4	20	3.85	2.4	60	6	4	●	1	20.7	21.5	23.1	*
VFRPSRBD0400R020N120	4	0.2	4	12	3.85	3.7	60	6	4	●	1	12.5	12.9	13.9	15
VFRPSRBD0400R020N200	4	0.2	4	20	3.85	2.4	60	6	4	●	1	20.7	21.5	23.1	*
VFRPSRBD0400R030N120	4	0.3	4	12	3.85	3.7	60	6	4	●	1	12.5	12.9	13.8	15
VFRPSRBD0400R030N200	4	0.3	4	20	3.85	2.4	60	6	4	●	1	20.7	21.5	23	*
VFRPSRBD0400R030N300	4	0.3	4	30	3.85	1.7	70	6	4	●	1	31.1	32.2	*	*
VFRPSRBD0400R050N120	4	0.5	4	12	3.85	3.7	60	6	4	●	1	12.5	12.9	13.8	14.9
VFRPSRBD0400R050N200	4	0.5	4	20	3.85	2.5	60	6	4	●	1	20.7	21.4	23	*
VFRPSRBD0400R050N300	4	0.5	4	30	3.85	1.7	70	6	4	●	1	31.1	32.1	*	*
VFRPSRBD0400R100N120	4	1	4	12	3.85	3.8	60	6	4	●	1	12.4	12.8	13.7	14.8
VFRPSRBD0400R100N200	4	1	4	20	3.85	2.5	60	6	4	●	1	20.7	21.4	22.9	*
VFRPSRBD0400R100N300	4	1	4	30	3.85	1.7	70	6	4	●	1	31.1	32.1	*	*
VFRPSRBD0500R050N150	5	0.5	5	15	4.85	1.7	60	6	4	●	1	15.6	16.1	*	*
VFRPSRBD0500R100N150	5	1	5	15	4.85	1.8	60	6	4	●	1	15.5	16.1	*	*
VFRPSRBD0600R010N180	6	0.1	9	18	5.85	—	70	6	4	●	2	*	*	*	*
VFRPSRBD0600R020N180	6	0.2	9	18	5.85	—	70	6	4	●	2	*	*	*	*
VFRPSRBD0600R030N180	6	0.3	9	18	5.85	—	70	6	4	●	2	*	*	*	*
VFRPSRBD0600R050N180	6	0.5	9	18	5.85	—	70	6	4	●	2	*	*	*	*
VFRPSRBD0600R100N180	6	1	9	18	5.85	—	70	6	4	●	2	*	*	*	*
VFRPSRBD0600R200N180	6	2	9	18	5.85	—	70	6	4	●	2	*	*	*	*
VFRPSRBD0800R020N240	8	0.2	12	24	7.85	—	90	8	4	●	2	*	*	*	*
VFRPSRBD0800R030N240	8	0.3	12	24	7.85	—	90	8	4	●	2	*	*	*	*
VFRPSRBD0800R050N240	8	0.5	12	24	7.85	—	90	8	4	●	2	*	*	*	*

* No interference

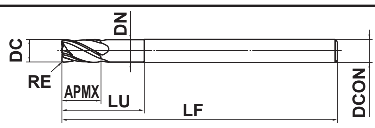
● : Inventory maintained in Japan.

ISO13399

➤ J002



Type1



Type2

(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°
VFRPSRBD0800R100N240	8	1	12	24	7.85	—	90	8	4	●	2	*	*	*	*
VFRPSRBD0800R200N240	8	2	12	24	7.85	—	90	8	4	●	2	*	*	*	*
VFRPSRBD1000R030N300	10	0.3	15	30	9.7	—	100	10	4	●	2	*	*	*	*
VFRPSRBD1000R050N300	10	0.5	15	30	9.7	—	100	10	4	●	2	*	*	*	*
VFRPSRBD1000R100N300	10	1	15	30	9.7	—	100	10	4	●	2	*	*	*	*
VFRPSRBD1000R200N300	10	2	15	30	9.7	—	100	10	4	●	2	*	*	*	*
VFRPSRBD1000R300N300	10	3	15	30	9.7	—	100	10	4	●	2	*	*	*	*
VFRPSRBD1200R050N360	12	0.5	18	36	11.7	—	110	12	4	●	2	*	*	*	*
VFRPSRBD1200R100N360	12	1	18	36	11.7	—	110	12	4	●	2	*	*	*	*
VFRPSRBD1200R200N360	12	2	18	36	11.7	—	110	12	4	●	2	*	*	*	*
VFRPSRBD1200R300N360	12	3	18	36	11.7	—	110	12	4	●	2	*	*	*	*

* No interference

VFRPSRB

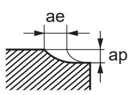
Corner radius end mill, Short cut length, High precision, 4 flute

RECOMMENDED CUTTING CONDITIONS

(mm)

Workpiece Material			Hardened Steels (45−55HRC)				Hardened Steels (55−65HRC)				Hardened Steels (65−70HRC)			
Dia. DC	Corner Radius RE	Usable Length LU	Revolution (min^{-1})	Feed Rate (mm/min)	Depth of Cut ap	Width of Cut ae	Revolution (min^{-1})	Feed rate (mm/min)	Depth of Cut ap	Width of Cut ae	Revolution (min^{-1})	Feed rate (mm/min)	Depth of Cut ap	Width of Cut ae
0.5	**0.05**	**2**	25000	1000	0.005	0.1	19000	760	0.004	0.08	13000	510	0.003	0.08
0.5	**0.1**	**2**	25000	1000	0.008	0.1	19000	760	0.006	0.08	13000	510	0.005	0.08
0.6	**0.05**	**2**	21000	1000	0.005	0.1	16000	760	0.004	0.08	11000	510	0.003	0.08
0.6	**0.1**	**2**	21000	1000	0.008	0.1	16000	760	0.006	0.08	11000	510	0.005	0.08
0.6	**0.1**	**4**	18000	890	0.006	0.1	16000	760	0.005	0.08	11000	510	0.004	0.08
0.6	**0.2**	**2**	24000	1100	0.01	0.1	19000	890	0.008	0.08	16000	760	0.006	0.08
0.8	**0.05**	**4**	16000	760	0.015	0.12	12000	570	0.01	0.1	7900	380	0.01	0.1
0.8	**0.1**	**4**	16000	760	0.02	0.12	12000	570	0.015	0.1	7900	380	0.01	0.1
0.8	**0.2**	**4**	20000	950	0.03	0.12	16000	760	0.025	0.1	12000	570	0.02	0.1
0.8	**0.3**	**4**	20000	950	0.03	0.12	16000	760	0.025	0.1	12000	570	0.02	0.1
1	**0.05**	**4**	13000	1000	0.015	0.15	9500	760	0.01	0.12	6400	510	0.01	0.12
1	**0.1**	**4**	13000	1000	0.02	0.15	9500	760	0.015	0.12	6400	510	0.015	0.12
1	**0.1**	**6**	11000	890	0.015	0.12	6400	510	0.01	0.1	6400	510	0.01	0.1
1	**0.2**	**4**	16000	1300	0.03	0.15	9500	760	0.025	0.12	6400	510	0.02	0.12
1	**0.2**	**6**	13000	1000	0.02	0.12	6400	510	0.02	0.1	6400	510	0.015	0.1
1	**0.3**	**4**	16000	1300	0.03	0.15	9500	760	0.025	0.12	6400	510	0.02	0.12
1	**0.4**	**4**	16000	1300	0.04	0.15	9500	760	0.03	0.12	6400	510	0.025	0.12
1.5	**0.1**	**4**	14000	1700	0.025	0.23	11000	920	0.015	0.2	7200	570	0.01	0.2
1.5	**0.1**	**6**	11000	1400	0.025	0.18	9200	730	0.015	0.16	5700	460	0.01	0.16
1.5	**0.1**	**10**	11000	1400	0.025	0.18	9200	730	0.015	0.16	5700	460	0.01	0.16
1.5	**0.2**	**4**	14000	1700	0.05	0.23	11000	920	0.035	0.2	7200	570	0.025	0.2
1.5	**0.2**	**6**	11000	1400	0.05	0.18	9200	730	0.035	0.16	5700	460	0.025	0.16
1.5	**0.2**	**10**	11000	1400	0.05	0.18	9200	730	0.035	0.16	5700	460	0.025	0.16
1.5	**0.3**	**4**	16000	1900	0.075	0.23	13000	1000	0.05	0.2	8000	640	0.035	0.2
1.5	**0.3**	**6**	13000	1500	0.075	0.18	10000	810	0.05	0.16	6400	510	0.035	0.16
1.5	**0.3**	**10**	13000	1500	0.075	0.18	10000	810	0.05	0.16	6400	510	0.035	0.16
1.5	**0.5**	**4**	16000	1900	0.08	0.23	13000	1000	0.055	0.2	8000	640	0.04	0.2
1.5	**0.5**	**6**	13000	1500	0.08	0.18	10000	810	0.055	0.16	6400	510	0.04	0.16
1.5	**0.5**	**10**	13000	1500	0.08	0.18	10000	810	0.055	0.16	6400	510	0.04	0.16
2	**0.1**	**6**	11000	1700	0.025	0.3	8600	1000	0.02	0.28	5400	640	0.015	0.28
2	**0.1**	**10**	8600	1400	0.025	0.24	6900	830	0.02	0.22	4300	520	0.015	0.22
2	**0.1**	**15**	6400	1000	0.02	0.18	5200	620	0.015	0.17	3200	390	0.01	0.17
2	**0.2**	**6**	11000	1700	0.055	0.3	8600	1000	0.035	0.28	5400	640	0.025	0.28
2	**0.2**	**10**	8600	1400	0.055	0.24	6900	830	0.035	0.22	4300	520	0.025	0.22
2	**0.2**	**15**	6400	1000	0.04	0.18	5200	620	0.025	0.17	3200	390	0.02	0.16
2	**0.3**	**6**	12000	1900	0.08	0.3	6900	1100	0.055	0.28	6000	420	0.04	0.27
2	**0.3**	**10**	9500	1500	0.08	0.24	7600	920	0.055	0.22	4800	570	0.04	0.22
2	**0.3**	**15**	7200	1100	0.065	0.18	5700	690	0.045	0.17	3600	430	0.03	0.16
2	**0.3**	**20**	7200	1100	0.065	0.18	5700	690	0.045	0.17	3600	430	0.03	0.16
2	**0.5**	**6**	12000	1900	0.085	0.3	9500	1100	0.06	0.28	6000	720	0.04	0.27
2	**0.5**	**10**	9500	1500	0.085	0.24	7600	920	0.06	0.22	4800	570	0.04	0.22
2	**0.5**	**15**	7200	1100	0.07	0.18	5700	690	0.045	0.17	3600	430	0.035	0.16
2	**0.5**	**20**	7200	1100	0.07	0.18	5700	690	0.045	0.17	3600	430	0.035	0.16
2.5	**0.3**	**8**	9500	1900	0.08	0.38	7600	1400	0.055	0.35	4800	860	0.04	0.34
2.5	**0.3**	**15**	7600	1500	0.08	0.3	6100	1100	0.055	0.28	3800	690	0.04	0.27
2.5	**0.5**	**8**	9500	1900	0.09	0.38	7600	1400	0.06	0.35	4800	860	0.04	0.34
2.5	**0.5**	**15**	7600	1500	0.09	0.3	6100	1100	0.06	0.28	3800	690	0.04	0.27
2.5	**1**	**8**	9500	1900	0.15	0.33	7600	1400	0.09	0.31	4800	860	0.065	0.31

Depth of Cut

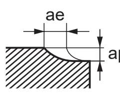


Note 1) The table above is a guide for when machining using the corner R cutting edge. When machining with the peripheral cutting edge, reduce the feed rate.
Note 2) If depth of cut is shallow, the revolution and feed rate can be increased.
Note 3) For profile machining such as molds, machining conditions 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 the workpiece.
Note 4) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

(mm)

Workpiece Material			Hardened Steels (45−55HRC)				Hardened Steels (55−65HRC)				Hardened Steels (65−70HRC)			
Dia. DC	Corner Radius RE	Usable Length LU	Revolution (min^{-1})	Feed Rate (mm/min)	Depth of Cut ap	Width of Cut ae	Revolution (min^{-1})	Feed rate (mm/min)	Depth of Cut ap	Width of Cut ae	Revolution (min^{-1})	Feed rate (mm/min)	Depth of Cut ap	Width of Cut ae
3	**0.1**	**10**	8100	1900	0.025	0.6	6500	1200	0.02	0.55	4100	730	0.015	0.55
3	**0.1**	**15**	6500	1600	0.025	0.48	5200	940	0.02	0.44	3200	580	0.015	0.44
3	**0.2**	**10**	8100	1900	0.055	0.6	6500	1200	0.04	0.55	4100	730	0.025	0.55
3	**0.2**	**15**	6500	1600	0.055	0.48	5200	940	0.04	0.44	3200	580	0.025	0.44
3	**0.2**	**20**	6500	1600	0.055	0.48	5200	940	0.04	0.44	3200	580	0.025	0.44
3	**0.3**	**10**	9000	2200	0.085	0.6	7200	1300	0.055	0.55	4500	810	0.04	0.55
3	**0.3**	**15**	7200	1700	0.085	0.48	5800	1000	0.055	0.44	3600	650	0.04	0.44
3	**0.3**	**20**	7200	1700	0.085	0.48	5800	1000	0.055	0.44	3600	650	0.04	0.44
3	**0.5**	**10**	9000	2200	0.09	0.6	7200	1300	0.06	0.55	4500	810	0.045	0.55
3	**0.5**	**15**	7200	1700	0.09	0.48	5800	1000	0.06	0.44	3600	650	0.045	0.44
3	**0.5**	**20**	7200	1700	0.09	0.48	5800	1000	0.06	0.44	3600	650	0.045	0.44
3	**1**	**10**	9000	2200	0.15	0.54	7200	1300	0.1	0.5	4500	810	0.07	0.5
3	**1**	**15**	7200	1700	0.15	0.43	5800	1000	0.1	0.4	3600	650	0.07	0.4
3	**1**	**20**	7200	2000	0.15	0.43	5800	1000	0.1	0.4	3600	650	0.07	0.4
4	**0.1**	**12**	6100	1700	0.25	0.8	4900	970	0.02	0.74	3000	610	0.015	0.73
4	**0.1**	**20**	4900	1400	0.25	0.6	3900	780	0.02	0.6	2400	490	0.015	0.58
4	**0.2**	**12**	6100	1700	0.055	0.8	4900	970	0.04	0.74	3000	610	0.025	0.73
4	**0.2**	**20**	4900	1400	0.055	0.6	3900	780	0.04	0.6	2400	490	0.025	0.58
4	**0.3**	**12**	6800	1900	0.085	0.8	5400	1100	0.055	0.75	3400	680	0.04	0.73
4	**0.3**	**20**	5400	1500	0.085	0.6	4300	870	0.055	0.6	2700	540	0.04	0.58
4	**0.3**	**30**	4100	1100	0.065	0.5	3200	650	0.045	0.45	2000	410	0.035	0.44
4	**0.5**	**12**	6800	1900	0.09	0.8	5400	1100	0.06	0.75	3400	680	0.045	0.74
4	**0.5**	**20**	5400	1500	0.09	0.65	4300	870	0.06	0.6	2700	540	0.045	0.58
4	**0.5**	**30**	4100	1100	0.075	0.5	4300	650	0.05	0.45	2000	410	0.035	0.44
4	**1**	**12**	6800	1900	0.15	0.7	5400	1100	0.1	0.66	3400	680	0.07	0.66
4	**1**	**20**	5400	1500	0.15	0.55	4300	870	0.1	0.53	2700	540	0.07	0.53
4	**1**	**30**	4100	1100	0.1	0.4	3200	650	0.075	0.4	2000	410	0.055	0.4
5	**0.5**	**15**	6400	1800	0.1	1.3	5100	1000	0.065	1.2	3200	640	0.045	1.1
5	**1**	**15**	6400	1800	0.15	1.1	5100	1000	0.1	1	3200	640	0.075	1
6	**0.1**	**18**	4800	1500	0.03	1.5	3800	920	0.02	1.4	2400	570	0.015	1.3
6	**0.2**	**18**	4800	1500	0.06	1.5	3800	920	0.04	1.4	2400	570	0.03	1.3
6	**0.3**	**18**	5300	1700	0.09	1.5	4200	1000	0.06	1.4	2700	640	0.045	1.3
6	**0.5**	**18**	5300	1700	0.1	1.5	4200	1000	0.065	1.4	2700	640	0.045	1.3
6	**1**	**18**	5300	1700	0.15	1.4	4200	1000	0.1	1.2	2700	640	0.075	1.2
6	**2**	**18**	5300	1700	0.3	1.3	4200	1000	0.2	1.1	2700	640	0.15	1.1
8	**0.2**	**24**	3600	1100	0.06	2	2900	690	0.04	1.8	1800	430	0.03	1.8
8	**0.3**	**24**	4000	1300	0.09	2	3200	760	0.06	1.8	2000	480	0.045	1.8
8	**0.5**	**24**	4000	1300	0.095	2	3200	760	0.065	1.8	2000	480	0.045	1.8
8	**1**	**24**	4000	1300	0.15	1.8	3200	760	0.1	1.7	2000	480	0.075	1.6
8	**2**	**24**	4000	1300	0.3	1.7	3200	760	0.2	1.6	2000	480	0.15	1.5
10	**0.3**	**30**	3200	1000	0.09	2.5	2500	610	0.06	2.3	1600	380	0.045	2.3
10	**0.5**	**30**	3200	1000	0.095	2.5	2500	610	0.065	2.3	1600	380	0.045	2.3
10	**1**	**30**	3200	1000	0.15	2.3	2500	610	0.1	2.1	1600	380	0.075	2
10	**2**	**30**	3200	1000	0.3	2.1	2500	610	0.2	2	1600	380	0.15	1.9
10	**3**	**30**	3200	1000	0.45	1.9	2500	610	0.3	1.7	1600	380	0.2	1.7
12	**0.5**	**36**	2700	950	0.1	3	2100	510	0.065	2.8	1300	320	0.05	2.7
12	**1**	**36**	2700	950	0.15	2.7	2100	510	0.1	2.5	1300	320	0.075	2.4
12	**2**	**36**	2700	950	0.3	2.6	2100	510	0.2	2.4	1300	320	0.15	2.3
12	**3**	**36**	2700	950	0.45	2.3	2100	510	0.3	2.1	1300	320	0.2	2

Depth of Cut



CARBIDE

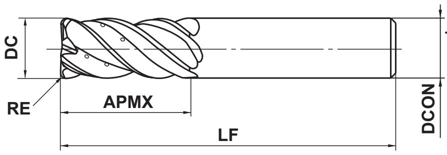
VFMHVRBCH

Corner radius end mill, Medium cut length, 4 flute, Irregular helix flutes, with multiple internal through coolant holes

UWC VF 42° 45°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	○			◎	◎		

CoolStar
END MILLS



1≤RE≤3				
±0.015				
16≤DC≤20				
0 - 0.03				
DCON=16	DCON=20			
0 - 0.011	0 - 0.013			

●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.

(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

SQUARE BALL RADIUS TAPER BARREL ROUGHING CHAMFER J SOLID END MILLS

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

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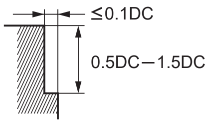
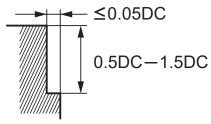
ISO13399 ➤J002

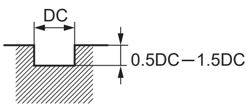
RECOMMENDED CUTTING CONDITIONS

■Side milling

Workpiece Material	Alloy steel, Tool steel, Pre-hardened steel (−45HRC) 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)
16	3000	1140	2000	560	800	110
20	2400	860	1600	510	600	100
Depth of cut						

DC:Dia.

■Slotting

Workpiece Material	Carbon steel, Cast iron, Alloy steel (−30HRC) AISI 1050, AISI No 35 B, AISI P20		Alloy steel, Tool steel, Pre-hardened steel (−45HRC) 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)
16	2400	670	1400	380	1400	170
20	1900	610	1100	350	1100	130
Depth of cut						

DC:Dia.

Note 1) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 2) Vibration damping end mills are more effective in suppressing chatter and vibration compared to general end mills, but these may still occur if the rigidity of the machine or the workpiece material is low. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

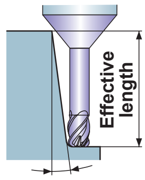
CARBIDE

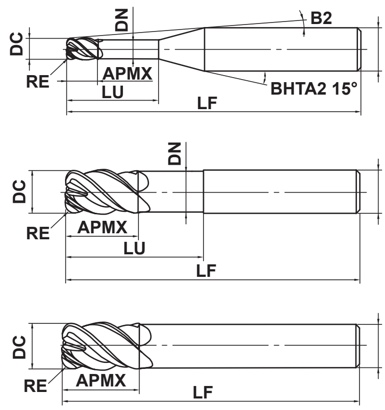
VFHVRB

4 flute, Corner radius, Short cut length,Irregular helix flutes

UWC VF 43° 45°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	◎	○	○	○		





DC tolerance	DC≤10	DC>10			
	±0.007	±0.01			
RE tolerance	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		

●Impact Miracle corner radius end mill for high feed and efficient machining.

(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	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	29	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	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
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	13.9	15
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	*	*

* No interference

● : Inventory maintained in Japan.

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ISO13399

➤ J002

(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°
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	*
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	*	*	*	*
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	*	*	*	*

* No interference

VFHVRB

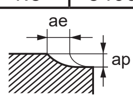
4 flute, Corner radius, Short cut length,Irregular helix flutes

RECOMMENDED CUTTING CONDITIONS

■High speed milling

Workpiece 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

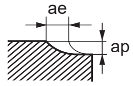
Depth of cut



Note 1) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 2) Air blow or oil mist is recommended for good chip evacuation.
Note 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.
Note 4) Vibration damping end mills are more effective in suppressing chatter and vibration compared to general end mills, but these may still occur if the rigidity of the machine or the workpiece material is low. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

Workpiece 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)
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
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

Depth of cut



Note 1) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 2) Air blow or oil mist is recommended for good chip evacuation.
Note 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.
Note 4) Vibration damping end mills are more effective in suppressing chatter and vibration compared to general end mills, but these may still occur if the rigidity of the machine or the workpiece material is low. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

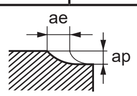
VFHVRB

4 flute, Corner radius, Short cut length,Irregular helix flutes

■High depth of cut conditions

Workpiece 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

Depth of cut



Note 1) If the depth of cut is shallow, the revolution and feed rate can be increased.
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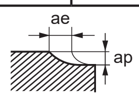
Workpiece Material			Carbon steel, Cast iron, Alloy steel (−30HRC) AISI 1050, AISI No 35 B, AISI P20				Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21				Hardened steel (45−55HRC) AISI H13				Hardened steel (55−62HRC) AISI D2			
Dia. DC (mm)	Corner R RE (mm)	Neck length LU (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)
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
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

Depth of cut



Note 1) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 2) Air blow or oil mist is recommended for good chip evacuation.
Note 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.
Note 4) Vibration damping end mills are more effective in suppressing chatter and vibration compared to general end mills, but these may still occur if the rigidity of the machine or the workpiece material is low. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

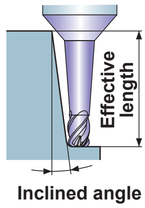
VFHVRB

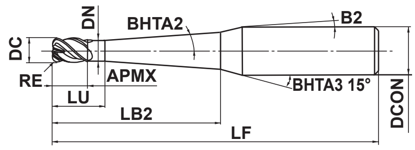
4 flute, Corner radius, Short cut length,Irregular helix flutes

43°
45°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	◎	○	○	○		

Taper neck type





DC≤10	DC>10		
±0.007	±0.01		
DC≤12			
0 - 0.02			
DCON=6	8≤DCON≤10	12≤DCON≤16	
0 - 0.008	0 - 0.009	0 - 0.011	

●Impact Miracle corner radius end mill for high feed and efficient machining.

(mm)

Order Number	DC	RE	BHTA2	APMX	LU	LB2	DN	B2	LF	DCON	No. of Flutes	Stock	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	●	—	6.6	7.1	7.6
VFHVRBD010R02N010T09	1	0.2	0.9°	1	2.5	10	0.94	7.5°	60	6	4	●	—	10.6	11.4	12.3
VFHVRBD010R02N015T09	1	0.2	0.9°	1	2.5	15	0.94	6.1°	60	6	4	●	—	15.6	16.8	18.1
VFHVRBD010R02N020T09	1	0.2	0.9°	1	2.5	20	0.94	5.1°	80	6	4	●	—	20.6	22.1	23.9
VFHVRBD010R02N025T09	1	0.2	0.9°	1	2.5	25	0.94	4.4°	80	6	4	●	—	25.6	27.5	29.7
VFHVRBD010R02N030T09	1	0.2	0.9°	1	2.5	30	0.94	3.8°	80	6	4	●	—	30.6	32.9	35.5
VFHVRBD010R02N035T09	1	0.2	0.9°	1	2.5	35	0.94	3.4°	90	6	4	●	—	35.6	38.3	41.3
VFHVRBD010R02N040T09	1	0.2	0.9°	1	2.5	40	0.94	3.1°	90	6	4	●	—	40.6	43.6	47.2
VFHVRBD010R02N045T09	1	0.2	0.9°	1	2.5	45	0.94	2.8°	90	6	4	●	—	45.6	49	*
VFHVRBD010R02N050T09	1	0.2	0.9°	1	2.5	50	0.94	2.6°	90	6	4	●	—	50.6	54.4	*
VFHVRBD015R03N010T09	1.5	0.3	0.9°	1.5	3	10	1.44	7.1°	60	6	4	●	—	10.6	11.4	12.3
VFHVRBD015R03N015T09	1.5	0.3	0.9°	1.5	3	15	1.44	5.7°	60	6	4	●	—	15.6	16.8	18.1
VFHVRBD015R03N020T09	1.5	0.3	0.9°	1.5	3	20	1.44	4.7°	80	6	4	●	—	20.6	22.2	23.9
VFHVRBD015R03N030T09	1.5	0.3	0.9°	1.5	3	30	1.44	3.5°	80	6	4	●	—	30.6	32.9	35.6
VFHVRBD015R03N040T09	1.5	0.3	0.9°	1.5	3	40	1.44	2.8°	90	6	4	●	—	40.6	43.7	*
VFHVRBD015R03N050T09	1.5	0.3	0.9°	1.5	3	50	1.44	2.4°	90	6	4	●	—	50.6	54.4	*
VFHVRBD020R05N015T04	2	0.5	0.4°	2	4	15	1.9	5.2°	60	6	4	●	15.6	16.2	17.4	18.7
VFHVRBD020R05N020T04	2	0.5	0.4°	2	4	20	1.9	4.3°	80	6	4	●	20.6	21.3	22.9	24.7
VFHVRBD020R05N025T04	2	0.5	0.4°	2	4	25	1.9	3.6°	80	6	4	●	25.6	26.5	28.5	30.8
VFHVRBD020R05N030T04	2	0.5	0.4°	2	4	30	1.9	3.2°	80	6	4	●	30.6	31.7	34	36.8
VFHVRBD020R05N035T04	2	0.5	0.4°	2	4	35	1.9	2.8°	80	6	4	●	35.6	36.9	39.6	*
VFHVRBD020R05N040T04	2	0.5	0.4°	2	4	40	1.9	2.5°	80	6	4	●	40.6	42	45.2	*
VFHVRBD020R05N020T09	2	0.5	0.9°	2	4	20	1.9	4.4°	80	6	4	●	—	20.8	22.3	24.1
VFHVRBD020R05N025T09	2	0.5	0.9°	2	4	25	1.9	3.7°	90	6	4	●	—	25.8	27.7	29.9
VFHVRBD020R05N030T09	2	0.5	0.9°	2	4	30	1.9	3.2°	90	6	4	●	—	30.8	33	35.7
VFHVRBD020R05N035T09	2	0.5	0.9°	2	4	35	1.9	2.9°	90	6	4	●	—	35.8	38.4	*
VFHVRBD020R05N040T09	2	0.5	0.9°	2	4	40	1.9	2.6°	90	6	4	●	—	40.8	43.8	*
VFHVRBD020R05N045T09	2	0.5	0.9°	2	4	45	1.9	2.3°	90	6	4	●	—	45.8	49.2	*
VFHVRBD020R05N050T09	2	0.5	0.9°	2	4	50	1.9	2.2°	100	6	4	●	—	50.8	54.5	*
VFHVRBD020R05N055T09	2	0.5	0.9°	2	4	55	1.9	2°	100	6	4	●	—	55.8	59.9	*
VFHVRBD020R05N060T09	2	0.5	0.9°	2	4	60	1.9	1.8°	100	6	4	●	—	60.8	*	*
VFHVRBD030R08N020T09	3	0.8	0.9°	3	6	20	2.9	3.6°	80	6	4	●	—	20.9	22.4	24.1
VFHVRBD030R08N025T09	3	0.8	0.9°	3	6	25	2.9	3°	80	6	4	●	—	25.9	27.8	30
VFHVRBD030R08N030T09	3	0.8	0.9°	3	6	30	2.9	2.6°	80	6	4	●	—	30.9	33.1	*

* No interference

● : Inventory maintained in Japan.

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➤ J002

(mm)

Order Number	DC	RE	BHTA2	APMX	LU	LB2	DN	B2	LF	DCON	No. of Flutes	Stock	Effective length for inclined angle			
													0.5°	1°	2°	3°
VFHVRBD030R08N040T09	3	0.8	0.9°	3	6	40	2.9	2°	90	6	4	●	—	40.9	43.9	*
VFHVRBD030R08N050T09	3	0.8	0.9°	3	6	50	2.9	1.7°	90	6	4	●	—	50.9	*	*
VFHVRBD030R08N060T09	3	0.8	0.9°	3	6	60	2.9	1.4°	100	6	4	●	—	60.9	*	*
VFHVRBD040R10N025T04	4	1	0.4°	4	7	25	3.9	2.1°	80	6	4	●	25.7	26.6	28.5	*
VFHVRBD040R10N030T04	4	1	0.4°	4	7	30	3.9	1.8°	80	6	4	●	30.7	31.8	*	*
VFHVRBD040R10N035T04	4	1	0.4°	4	7	35	3.9	1.6°	80	6	4	●	35.7	36.9	*	*
VFHVRBD040R10N040T04	4	1	0.4°	4	7	40	3.9	1.4°	80	6	4	●	40.7	42.1	*	*
VFHVRBD040R10N045T04	4	1	0.4°	4	7	45	3.9	1.3°	90	6	4	●	45.7	47.3	*	*
VFHVRBD040R10N050T04	4	1	0.4°	4	7	50	3.9	1.2°	90	6	4	●	50.7	52.5	*	*
VFHVRBD040R10N025T09	4	1	0.9°	4	7	25	3.9	2.2°	90	6	4	●	—	25.9	27.8	*
VFHVRBD040R10N030T09	4	1	0.9°	4	7	30	3.9	1.9°	90	6	4	●	—	30.9	*	*
VFHVRBD040R10N040T09	4	1	0.9°	4	7	40	3.9	1.4°	100	6	4	●	—	40.9	*	*
VFHVRBD040R10N050T09	4	1	0.9°	4	7	50	3.9	1.2°	100	6	4	●	—	50.9	*	*
VFHVRBD040R10N060T09	4	1	0.9°	4	7	60	3.9	1°	100	6	4	●	—	60.9	*	*
VFHVRBD060R15N040T09	6	1.5	0.9°	9	12	40	5.85	1.4°	110	8	4	●	—	41.4	*	*
VFHVRBD060R15N050T09	6	1.5	0.9°	9	12	50	5.85	1.2°	110	8	4	●	—	51.4	*	*
VFHVRBD060R15N060T09	6	1.5	0.9°	9	12	60	5.85	1°	110	8	4	●	—	61.4	*	*
VFHVRBD060R15N070T09	6	1.5	0.9°	9	12	70	5.85	0.9°	110	8	4	●	—	*	*	*
VFHVRBD080R20N060T09	8	2	0.9°	12	15	60	7.85	1°	150	10	4	●	—	61.5	*	*
VFHVRBD080R20N080T09	8	2	0.9°	12	15	80	7.85	0.8°	150	10	4	●	—	*	*	*
VFHVRBD100R20N080T09	10	2	0.9°	15	18	80	9.7	2°	130	16	4	●	—	82	88	*
VFHVRBD100R20N120T09	10	2	0.9°	15	18	120	9.7	1.4°	180	16	4	●	—	122	*	*
VFHVRBD120R20N080T09	12	2	0.9°	18	28	80	11.7	1.4°	130	16	4	●	—	82.2	*	*
VFHVRBD120R20N120T09	12	2	0.9°	18	28	120	11.7	1°	180	16	4	●	—	122.2	*	*

* No interference

VFHVRB

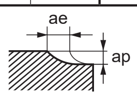
4 flute, Corner radius, Short cut length,Irregular helix flutes

RECOMMENDED CUTTING CONDITIONS

■High depth of cut conditions

Workpiece 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)	Taper angle 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)	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	27000	3700	0.018	0.45	20000	1600	0.01	0.45
1	0.2	0.9°	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	0.9°	15	16000	1200	0.013	0.45	14000	700	0.008	0.45	12000	500	0.007	0.45	10000	400	0.003	0.45
1	0.2	0.9°	20	14000	1000	0.01	0.45	12000	600	0.006	0.45	10000	400	0.005	0.45	9000	300	0.002	0.45
1	0.2	0.9°	25	9500	610	0.008	0.45	8000	440	0.005	0.45	6000	320	0.004	0.45	4800	160	0.002	0.45
1	0.2	0.9°	30	4900	320	0.007	0.45	4100	220	0.004	0.45	3000	160	0.003	0.45	2500	80	0.002	0.45
1	0.2	0.9°	35	4000	260	0.006	0.45	3400	190	0.003	0.45	3000	160	0.003	0.45	2000	70	0.001	0.45
1	0.2	0.9°	40	3500	180	0.005	0.45	2900	130	0.003	0.45	2000	90	0.003	0.45	1700	50	0.001	0.45
1	0.2	0.9°	45	2900	150	0.004	0.45	2400	100	0.002	0.45	2000	90	0.002	0.45	1400	40	0.001	0.45
1	0.2	0.9°	50	2900	110	0.003	0.45	2400	80	0.002	0.45	2000	60	0.002	0.45	1400	30	0.001	0.45
1.5	0.3	0.9°	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	0.9°	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	0.9°	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	0.9°	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
1.5	0.3	0.9°	40	4500	230	0.008	0.65	3700	160	0.007	0.65	3000	120	0.005	0.65	2300	70	0.003	0.65
1.5	0.3	0.9°	50	3700	190	0.007	0.65	3000	130	0.006	0.65	3000	120	0.004	0.65	1900	60	0.002	0.65
2	0.5	0.4°	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	0.4°	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	0.4°	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	0.4°	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	0.4°	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	0.4°	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
2	0.5	0.9°	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	0.9°	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	0.9°	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	0.9°	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	0.9°	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
2	0.5	0.9°	45	8000	500	0.016	0.75	6800	360	0.012	0.75	5200	250	0.01	0.75	4000	120	0.005	0.75
2	0.5	0.9°	50	8000	500	0.016	0.75	6800	360	0.012	0.75	5200	250	0.01	0.75	4000	120	0.005	0.75
2	0.5	0.9°	55	4100	230	0.012	0.75	3500	170	0.009	0.75	2700	120	0.008	0.75	2000	60	0.004	0.75
2	0.5	0.9°	60	4100	230	0.012	0.75	3500	170	0.009	0.75	2700	120	0.008	0.75	2000	60	0.004	0.75
3	0.8	0.9°	20	13000	7200	0.19	1	11000	5100	0.15	1	8700	4000	0.11	1	6500	1800	0.06	1
3	0.8	0.9°	25	13000	7200	0.19	1	11000	5100	0.15	1	8700	4000	0.11	1	6500	1800	0.06	1
3	0.8	0.9°	30	13000	5700	0.12	1	11000	4000	0.09	1	8700	3000	0.07	1	6500	1400	0.04	1
3	0.8	0.9°	40	11000	3600	0.08	1	9100	2600	0.06	1	7400	2000	0.05	1	5500	1000	0.025	1
3	0.8	0.9°	50	8000	2600	0.07	1	6600	1800	0.05	1	5800	1500	0.04	1	4600	800	0.02	1
3	0.8	0.9°	60	7800	2480	0.06	1	6600	1740	0.05	1	5000	1250	0.04	1	3900	610	0.02	1

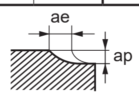
Depth of cut



Note 1) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 2) Air blow or oil mist is recommended for good chip evacuation.
Note 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.
Note 4) Vibration damping end mills are more effective in suppressing chatter and vibration compared to general end mills, but these may still occur if the rigidity of the machine or the workpiece material is low. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

Workpiece 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)	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)	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)
4	**1**	**0.4°**	**25**	10000	9900	0.24	1.5	8300	7000	0.19	1.5	6700	5600	0.14	1.5	5000	2500	0.07	1.5
4	**1**	**0.4°**	**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
4	**1**	**0.4°**	**35**	10000	9900	0.15	1.5	8300	7000	0.12	1.5	6700	5600	0.09	1.5	5000	2500	0.04	1.5
4	**1**	**0.4°**	**40**	10000	9900	0.15	1.5	8300	7000	0.12	1.5	6700	5600	0.09	1.5	5000	2500	0.04	1.5
4	**1**	**0.4°**	**45**	10000	9900	0.15	1.5	8300	7000	0.12	1.5	6700	5600	0.09	1.5	5000	2500	0.04	1.5
4	**1**	**0.4°**	**50**	8100	6300	0.14	1.5	6700	4420	0.11	1.5	5400	3500	0.08	1.5	4000	1600	0.04	1.5
4	**1**	**0.9°**	**25**	10000	9900	0.24	1.5	8300	7000	0.19	1.5	6700	5600	0.14	1.5	5000	2500	0.07	1.5
4	**1**	**0.9°**	**30**	10000	9900	0.15	1.5	8300	7000	0.12	1.5	6700	5600	0.09	1.5	5000	2500	0.04	1.5
4	**1**	**0.9°**	**40**	10000	9900	0.15	1.5	8300	7000	0.12	1.5	6700	5600	0.09	1.5	5000	2500	0.04	1.5
4	**1**	**0.9°**	**50**	8100	6300	0.14	1.5	6700	4420	0.11	1.5	5400	3500	0.08	1.5	4000	1600	0.04	1.5
4	**1**	**0.9°**	**60**	8100	6300	0.11	1.5	6700	4420	0.08	1.5	5400	3500	0.06	1.5	4000	1600	0.03	1.5
6	**1.5**	**0.9°**	**40**	6600	11000	0.4	2	5500	7600	0.32	2	4500	6100	0.24	2	3300	2700	0.12	2
6	**1.5**	**0.9°**	**50**	6600	11000	0.4	2	5500	7600	0.32	2	4500	6100	0.24	2	3300	2700	0.12	2
6	**1.5**	**0.9°**	**60**	6600	11000	0.25	2	5500	7600	0.2	2	4500	6100	0.15	2	3300	2700	0.08	2
6	**1.5**	**0.9°**	**70**	5400	8700	0.23	2	4400	6200	0.18	2	3600	5000	0.14	2	2700	2200	0.07	2
8	**2**	**0.9°**	**60**	5000	11000	0.48	3	4200	7600	0.37	3	3300	6100	0.29	3	2500	2700	0.14	3
8	**2**	**0.9°**	**80**	5000	11000	0.3	3	4200	7600	0.23	3	3300	6100	0.18	3	2500	2700	0.09	3
10	**2**	**0.9°**	**80**	4000	11000	0.48	4.5	3300	7600	0.37	4.5	2700	6100	0.29	4.5	2000	2700	0.14	4.5
10	**2**	**0.9°**	**120**	3200	8700	0.27	4.5	2700	6200	0.21	4.5	2100	5000	0.16	4.5	1600	2200	0.08	4.5
12	**2**	**0.9°**	**80**	3300	10000	0.72	6	2700	7100	0.56	6	2200	5600	0.36	6	1700	2500	0.18	6
12	**2**	**0.9°**	**120**	3300	10000	0.45	6	2700	7100	0.35	6	2200	5600	0.23	6	1700	2500	0.12	6

Depth of cut



Note 1) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 2) Air blow or oil mist is recommended for good chip evacuation.
Note 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.
Note 4) Vibration damping end mills are more effective in suppressing chatter and vibration compared to general end mills, but these may still occur if the rigidity of the machine or the workpiece material is low. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

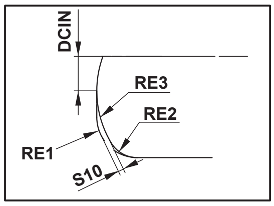
CARBIDE

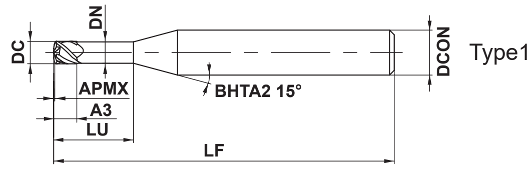
VFFDRB

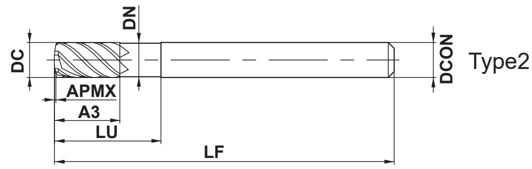
Multi-task corner radius end mill for impact miracle high speed cutting

UWC VF 40° DC≤6 DC≥8

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
	○	◎	◎				







DC≤12				
0 - 0.020				
DCON=6	8≤DCON≤10	DCON=12		
0 - 0.008	0 - 0.009	0 - 0.011		

h6

- Multi-task corner radius type allows more efficient high feed.
- Adoption of multiple cuttings realized high feed cutting.

(mm)

Order Number	DC	*1 RE1	APMX	*2 A3	LU	DN	LF	DCON	No. of Flutes	Multi-task radius part				*3 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

*1 RE1 : Approx. R
*2 A3 : Cutting Edge Effective Length
*3 RMPX : Max. Ramping Angle

SQUARE
BALL
RADIUS
TAPER
BARREL
ROUGHING
CHAMFER
J
SOLID END MILLS

● : Inventory maintained in Japan.

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ISO13399

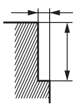
➢ J002

RECOMMENDED CUTTING CONDITIONS FOR IMPACT MIRACLE END MILLS

Side milling

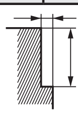
Workpiece Material	Carbon steel, Alloy steel (180–280HB), Alloy tool steel (≤350HB), Mild steel (≤180HB) AISI 1045, AISI 4140, ASTM A36, AISI 1010						Prehardened steel (35–45HRC) AISI P21, AISI P20, AISI 4340					
Dia. **DC** (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min^{-1})	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min^{-1})	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)
3	80	8500	0.07	2400	0.12	1.5	100	11000	0.07	3100	0.12	1.5
4	80	6400	0.1	2600	0.16	2	100	8000	0.1	3200	0.16	2
6	80	4200	0.17	2900	0.24	3	100	5300	0.17	3600	0.24	3
8	80	3200	0.17	3300	0.32	4.8	100	4000	0.17	4100	0.32	4.8
10	80	2500	0.2	3000	0.4	6	100	3200	0.2	3800	0.4	6
12	80	2100	0.22	2800	0.48	7.2	100	2700	0.22	3600	0.48	7.2

Depth of cut



Workpiece Material	Hardened steel (40–55HRC), Ferritic and martensitic stainless steel (>200HB), Precipitation hardening stainless steel (<450HB), AISI H13, L6, AISI 431, AISI 420, 15-5PH, 17-4PH etc.						Hardened steel (55–62HRC) AISI D2 etc.					
Dia. **DC** (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min^{-1})	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min^{-1})	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)
3	80	8500	0.07	2400	0.12	1.5	40	4200	0.05	840	0.12	1.5
4	80	6400	0.1	2600	0.16	2	40	3200	0.07	960	0.16	2
6	80	4200	0.17	2900	0.24	3	40	2100	0.15	1300	0.24	3
8	80	3200	0.17	3300	0.32	4.8	40	1600	0.15	1400	0.32	4.8
10	80	2500	0.2	3000	0.4	6	40	1300	0.17	1300	0.4	6
12	80	2100	0.22	2800	0.48	7.2	40	1100	0.2	1300	0.48	7.2

Depth of cut



Note 1) When ramping, it is recommended to reduce the feed rate by 50%. The recommended ramping angle is 1°.
Note 2) When the overhang is longer than 5D, reduce the spindle speed to about 70% and the feed rate by 50%.

DC:Dia.

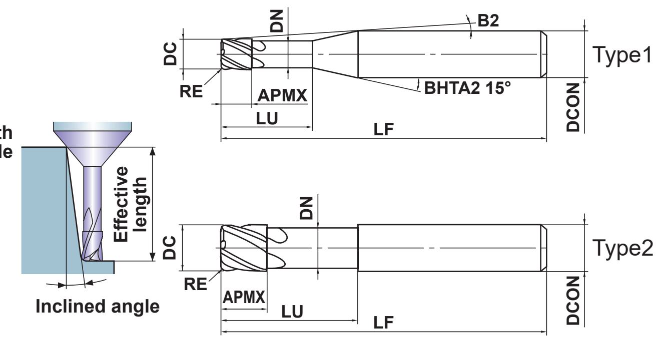
CARBIDE

VCPSRB

Corner radius end mill, Short cut length, 2−4 flute, High precision

UWC VC 30° DC≤1.5 DC≥2

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
	◎	◎	○				



0.05≤RE≤5			
±0.01			
0.6≤DC≤12			
0 / - 0.01			
DCON=6	8≤DCON≤10	DCON=12	
0 / - 0.005	0 / - 0.006	0 / - 0.008	

h5

●±0.01mm corner radius tolerance, 0−-0.01mm outer diameter tolerance.
End mill with corner radius for precise and efficient machining.

(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
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
VCPSRBD0080N04R03	0.8	0.3	0.8	4	0.76	10.9°	50	6	2	▲	1	4.2	4.3	4.6	5
VCPSRBD0080N06R01	0.8	0.1	0.8	6	0.76	9.4°	50	6	2	▲	1	6.3	6.5	7	7.5
VCPSRBD0080N06R02	0.8	0.2	0.8	6	0.76	9.5°	50	6	2	▲	1	6.3	6.5	7	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
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

▲ : Inventory maintained in Japan. To be replaced by new products.
VFRPSRB (J283) is alternative product.

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ISO13399 ➤ J002

(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°
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	11.8	12.7
VCPSRBD0150N10R02	1.5	0.2	1.5	10	1.44	7°	50	6	2	▲	1	10.5	11	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
VCPSRBD0200N10R02	2	0.2	2	10	1.9	7.7°	50	6	4	▲	1	10.5	10.8	11.2	12
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	26.6	27.5	28.3
VCPSRBD0200N25R05	2	0.5	2	25	1.9	4°	60	6	4	▲	1	26	26.6	27	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	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
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	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	*

* No interference

VCPSRB

Corner radius end mill, Short cut length, 2—4 flute, High precision

(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°
VCPSRBD0400N12R01	4	0.1	4	12	3.9	3.8°	60	6	4	▲	1	12.5	13	13.5	15.1
VCPSRBD0400N12R02	4	0.2	4	12	3.9	3.8°	60	6	4	▲	1	12.5	13	13.4	15.2
VCPSRBD0400N12R03	4	0.3	4	12	3.9	3.8°	60	6	4	▲	1	12.5	13	13.3	15.2
VCPSRBD0400N12R05	4	0.5	4	12	3.9	3.9°	60	6	4	▲	1	12.5	13	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	*
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	*	*	*	*
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	*	*	*	*

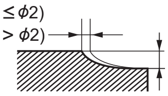
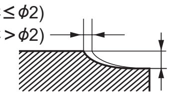
* No interference

▲ : Inventory maintained in Japan. To be replaced by new products.
VFRPSRB (J283) is alternative product.

ISO13399

➢ J002

RECOMMENDED CUTTING CONDITIONS

Workpiece 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
Depth of cut		≤0.2RE (DC≤ϕ2) ≤0.4RE (DC>ϕ2)  ≤0.1mm (DC≤ϕ1.5) ≤0.2mm (DC≤ϕ4) ≤0.5mm (DC≤ϕ6)				≤0.1RE (DC≤ϕ2) ≤0.2RE (DC>ϕ2)  ≤0.05mm (DC≤ϕ1.5) ≤0.1mm (DC≤ϕ4) ≤0.3mm (DC≤ϕ6)	

DC:Dia.

Note 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.
Note 2) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 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.
Note 4) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

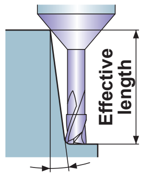
VCPSRB

Corner radius end mill, Short cut length, 2—4 flute, High precision

UWC VC γ 30° DC≦1.5 DC≧2

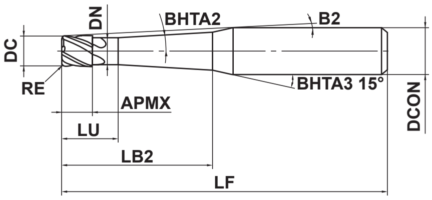
Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≦45HRC)	Hardened Steel (≦55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
	◎	◎	○				

Taper neck type



Effective length for inclined angle

Inclined angle



0.5≦RE≦3			
±0.01			
1.5≦DC≦12			
0 - 0.01			
DCON=6	8≦DCON≦10	12≦DCON≦16	
0 - 0.005	0 - 0.006	0 - 0.008	

h5

● ±0.01mm corner radius tolerance, 0—-0.01mm outer diameter tolerance.
End mill with corner radius for precise and efficient machining.

(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°
VCPSRBD0150N03L06R05	1.5	0.5	1.5°	1.5	6	3	1.44	9°	50	6	2	▲	1	—	7.1	7.7
VCPSRBD0150N03L10R05	1.5	0.5	1.5°	1.5	10	3	1.44	7.2°	50	6	2	▲	1	—	11.3	12.2
VCPSRBD0200N04L10R05	2	0.5	1.5°	2	10	4	1.9	6.7°	60	6	4	▲	1	—	11.5	12.4
VCPSRBD0200N04L15R05	2	0.5	1.5°	2	15	4	1.9	5.3°	60	6	4	▲	1	—	16.7	18
VCPSRBD0250N05L12R10	2.5	1	1.5°	2.5	12	5	2.4	5.6°	60	6	4	▲	1	—	14.2	15.3
VCPSRBD0250N05L20R10	2.5	1	1.5°	2.5	20	5	2.4	4°	60	6	4	▲	1	—	22.5	24.2
VCPSRBD0300N06L15R05	3	0.5	1.5°	3	15	6	2.9	4.4°	60	6	4	▲	1	—	16.9	18.2
VCPSRBD0300N06L15R10	3	1	1.5°	3	15	6	2.9	4.4°	60	6	4	▲	1	—	17.4	18.7
VCPSRBD0300N06L20R05	3	0.5	1.5°	3	20	6	2.9	3.6°	60	6	4	▲	1	—	22.1	23.8
VCPSRBD0300N06L20R10	3	1	1.5°	3	20	6	2.9	3.6°	60	6	4	▲	1	—	22.6	24.4
VCPSRBD0400N08L20R10	4	1	1.5°	4	20	8	3.9	2.6°	60	6	4	▲	1	—	22.8	*
VCPSRBD0400N08L30R10	4	1	1.5°	4	30	8	3.9	1.9°	70	6	4	▲	1	—	*	*
VCPSRBD0500N08L40R05	5	0.5	1°	5	40	8	4.9	2°	90	8	4	▲	1	41.2	*	*
VCPSRBD0500N08L40R10	5	1	1°	5	40	8	4.9	2°	90	8	4	▲	1	41.7	*	*
VCPSRBD0500N08L60R05	5	0.5	1°	5	60	8	4.9	1.4°	110	8	4	▲	1	61.2	*	*
VCPSRBD0500N08L60R10	5	1	1°	5	60	8	4.9	1.4°	110	8	4	▲	1	61.7	*	*
VCPSRBD0600N08L40R20	6	2	1°	6	40	8	5.85	1.4°	70	8	4	▲	1	42.8	*	*
VCPSRBD0600N08L60R20	6	2	1°	6	60	8	5.85	1°	100	8	4	▲	1	*	*	*
VCPSRBD0800N10L53R20	8	2	1°	8	53	10	7.85	1.1°	90	10	4	▲	1	55.9	*	*
VCPSRBD0800N10L70R20	8	2	1°	8	70	10	7.85	1.6°	130	12	4	▲	1	72.9	*	*
VCPSRBD1000N12L55R30	10	3	1°	10	55	12	9.7	1.1°	100	12	4	▲	1	59.4	*	*
VCPSRBD1000N12L70R30	10	3	1°	10	70	12	9.7	0.9°	130	12	4	▲	1	*	*	*
VCPSRBD1200N24L70R30	12	3	1°	12	70	24	11.7	1.6°	130	16	4	▲	1	75.2	*	*

* No interference

▲ : Inventory maintained in Japan. To be replaced by new products.
VFRPSRB (J283) is alternative product.

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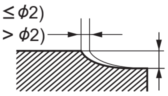
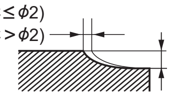
ISO13399 ➤ J002

RECOMMENDED CUTTING CONDITIONS

Workpiece 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 **DHTA**	Neck length **LU_2** (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
Depth of cut			≤0.2RE (DC≤ϕ2) ≤0.4RE (DC>ϕ2)  ≤0.1mm (DC≤ϕ1.5) ≤0.2mm (DC≤ϕ4) ≤0.5mm (DC≤ϕ6)			≤0.1RE (DC≤ϕ2) ≤0.2RE (DC>ϕ2)  ≤0.05mm (DC≤ϕ1.5) ≤0.1mm (DC≤ϕ4) ≤0.3mm (DC≤ϕ6)		

DC:Dia.

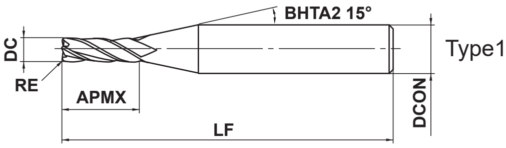
Note 1) The cutting conditions above are a guide only to machining with cutting edges with a corner radius. When machining with peripheral cutting edges, use the minimum feed rate as a guide.
Note 2) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 3) For profile machining 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.
Note 4) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

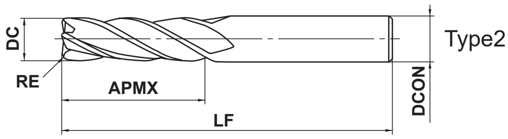
VC4JRB

Corner radius end mill, Semi long cut length, 4 flute

UWC VC 30°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	◎	○		○	○		





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	

h6

- ●4 flute corner radius end mill for general use.
- ●4 flute corner radius end mill for longer reach applications.

(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

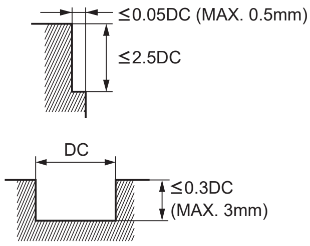
● : Inventory maintained in Japan.

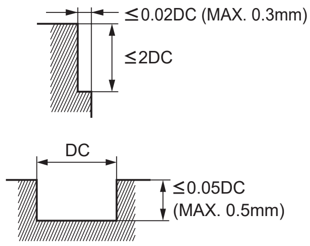
ISO13399 ➤J002

RECOMMENDED CUTTING CONDITIONS

Workpiece 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

Depth of cut





DC:Dia.

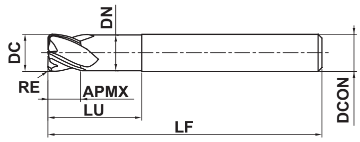
Note 1) When cutting austenitic stainless steels, the use of water-soluble cutting fluid is effective.
Note 2) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 3) The above table shows cutting conditions for standard side milling. For slotting, please reduce the feed 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.
Note 4) When drilling, please set the feed rate at 1/3 or below the values above.
Note 5) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

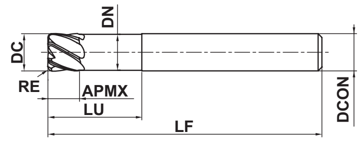
CE4SRB/CE6SRB

Corner radius end mill, short cut length, 4-6 flute

CERAMIC 30°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
					◎		





DC≤12				
±0.02				
DC=6	DC=8,10	DC=12		
- 0.008 - 0.028	- 0.009 - 0.029	- 0.011 - 0.031		
DCON=6	DCON=8,10	DCON=12		
0 - 0.008	0 - 0.009	0 - 0.011		

h6

- Ceramic corner radius end mill with high heat resistance.
- Capable of softening Ni based alloys by generating heat during machining

(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	1.0	6.0	16	7.85	60	8	4	●	1
CE4SRBD1000R100	10	1.0	7.5	20	9.70	65	10	4	●	1
CE4SRBD1200R150	12	1.5	9.0	24	11.70	70	12	4	●	1
CE6SRBD0600R050	6	0.5	4.5	12	5.85	50	6	6	●	2
CE6SRBD0800R100	8	1.0	6.0	16	7.85	60	8	6	●	2
CE6SRBD1000R100	10	1.0	7.5	20	9.70	65	10	6	●	2
CE6SRBD1200R150	12	1.5	9.0	24	11.70	70	12	6	●	2

Note 1) Never use ceramic end mills to cut titanium alloys.
Doing so will cause a risk of ignition and can be extremely dangerous.

● : Inventory maintained in Japan.

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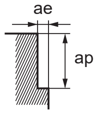
ISO13399 ➤J002

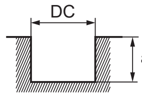
RECOMMENDED CUTTING CONDITIONS

CE4SRB

■ Side milling

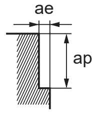
Workpiece Material	Heat resistant alloys Inconel718			
Dia. **DC** (mm)	Cutting Speed (m/min)	Feed per Tooth (mm/t.)	Depth of cut ap (mm)	Cutting Width ae (mm)
6	≧350	≦0.06	≦4.5	≦1.2
8	≧350	≦0.06	≦6.0	≦1.6
10	≧350	≦0.06	≦7.5	≦2.0
12	≧350	≦0.06	≦9.0	≦2.4
Depth of cut	 DC:Dia.			

■ Slotting

Workpiece Material	Heat resistant alloys Inconel718		
Dia. **DC** (mm)	Cutting Speed (m/min)	Feed per Tooth (mm/t.)	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
Depth of cut	 DC:Dia.		

CE6SRB

■ Side milling

Workpiece Material	Heat resistant alloys Inconel718			
Dia. **DC** (mm)	Cutting Speed (m/min)	Feed per Tooth (mm/t.)	Depth of cut ap (mm)	Cutting Width 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
Depth of cut	 DC:Dia.			

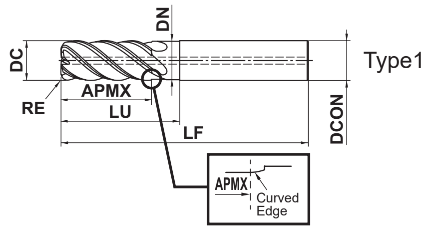
Note 1) The outermost layer of the material may be affected by heat.
Ensure a minimum of 0.3mm final machining allowance remains.
Note 2) The recommended ramping angle is 1.5°. When ramping, set the feed rate to about 25% for side milling and about 50% for grooving.
Note 3) Gradually increase the depth of cut (Shoulder milling=ae and Slot milling=ap) starting from 0.05DC.

VQT5MVRB NEW

Corner radius, Medium cut length, 5 flute, Irregular helix flutes, With coolant hole

UWC VQT 40° 41.5° 43°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
					◎		



RE				
±0.02				
DC≤16	20≤DC≤25			
0 - 0.03	0 - 0.04			
DCON = 16	20≤DCON≤25			
0 - 0.011	0 - 0.013			

h6

● Flute geometry suitable for slot milling.
● The sharp corner R edges provide long tool life in machining of titanium alloys.

(mm)

Order Number	DC	RE	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	Type
VQT5MVRB160R100N48C	16	1	34	48	15.5	120	16	5	●	1
VQT5MVRB160R300N48C	16	3	34	48	15.5	120	16	5	●	1
VQT5MVRB160R400N48C	16	4	34	48	15.5	120	16	5	●	1
VQT5MVRB200R100N60C	20	1	44	60	19.5	135	20	5	●	1
VQT5MVRB200R300N60C	20	3	44	60	19.5	135	20	5	●	1
VQT5MVRB200R400N60C	20	4	44	60	19.5	135	20	5	●	1
VQT5MVRB200R600N60C	20	6	44	60	19.5	135	20	5	●	1
VQT5MVRB250R100N75C	25	1	54	75	24.5	155	25	5	●	1
VQT5MVRB250R300N75C	25	3	54	75	24.5	155	25	5	●	1
VQT5MVRB250R400N75C	25	4	54	75	24.5	155	25	5	●	1
VQT5MVRB250R600N75C	25	6	54	75	24.5	155	25	5	●	1

Note 1) SMART MIRACLE coating has very low electrical conductivity; therefore, an external contact type of tool setter (electric transmitted) may not work.
When measuring the tool length, please use an internal contact type (non-electricity type) or a laser tool setter.

● : Inventory maintained in Japan.

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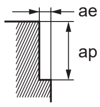
RECOMMENDED CUTTING CONDITIONS

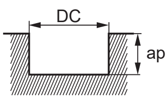
■Shoulder Milling

Overhang Length DC×1 (DC=Dia.) (mm)

Workpiece Material	Titanium Alloys Ti-6Al-4V etc.					
Dia. **DC**	Corner radius **RE**	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Width of cut ae (mm)
16	1	80	1600	800	32	2.4
16	3	80	1600	800	32	2.4
16	4	80	1600	800	32	2.4
20	1	80	1300	650	40	3.0
20	3	80	1300	650	40	3.0
20	4	80	1300	650	40	3.0
20	6	80	1300	650	40	3.0
25	1	80	1000	500	50	3.8
25	3	80	1000	500	50	3.8
25	4	80	1000	500	50	3.8
25	6	80	1000	500	50	3.8
Depth of Cut						

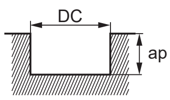
■Slot Milling

Depth of Cut DC×1 (mm)

Workpiece Material	Titanium Alloys Ti-6Al-4V etc.				
Dia. **DC**	Corner radius **RE**	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)
16	1	60	1200	420	16
16	3	60	1200	420	16
16	4	60	1200	300	16
20	1	60	950	330	20
20	3	60	950	330	20
20	4	60	950	330	20
20	6	60	950	238	20
25	1	50	640	220	25
25	3	50	640	220	25
25	4	50	640	220	25
25	6	50	640	160	25
Depth of Cut					

DC:Dia.

Depth of Cut DC×2 (mm)

Workpiece Material	Titanium Alloys Ti-6Al-4V etc.				
Dia. **DC**	Corner radius **RE**	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)
16	1	60	1200	240	32
16	3	60	1200	240	32
16	4	60	1200	180	32
20	1	60	950	190	40
20	3	60	950	190	40
20	4	60	950	190	40
20	6	60	950	143	40
25	1	50	640	130	50
25	3	50	640	130	50
25	4	50	640	130	50
25	6	50	640	96	50
Depth of Cut					

DC:Dia.

Note 1) SMART MIRACLE coating has very low electrical conductivity; therefore, an external contact type of tool setter (electric transmitted) may not work.
When measuring the tool length, please use an internal contact type (non-electricity type) or a laser tool setter.
Note 2) When cutting titanium alloys, the use of water-soluble cutting fluid is effective.
Note 3) Vibration damping end mills are more effective in suppressing chatter and vibration compared to general end mills, but these may still occur if the rigidity of the machine or the workpiece material is low. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.
Note 4) If the depth of cut is smaller, the revolution and the feed rate can be increased.
Note 5) When machining a deep slot exceeding 1D, use a holder with a high gripping strength or an anti slippage mechanism.
Also, make sure that the clamping force and rigidity are sufficient before use.

CARBIDE

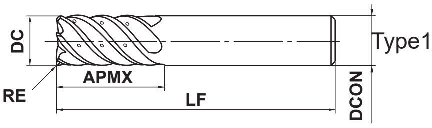
VQ6MHVRBCH

Corner radius end mill, Medium cut length, 6 flute, Irregular helix flutes, With multiple internal through coolant

UWC VQ 43.5° 45°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	○			◎	◎	○	

CoolStar
END MILLS



0.5≤RE≤4				
±0.015				
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	

●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.

(mm)

Order Number	DC	RE	APMX	LF	DCON	No. of Flutes	Stock	Type
VQ6MHVRBCHD1000R050	10	0.5	22	70	10	6	●	1
VQ6MHVRBCHD1000R100	10	1	22	70	10	6	●	1
VQ6MHVRBCHD1200R050	12	0.5	26	75	12	6	●	1
VQ6MHVRBCHD1200R100	12	1	26	75	12	6	●	1
VQ6MHVRBCHD1600R100	16	1	32	90	16	6	●	1
VQ6MHVRBCHD1600R300	16	3	32	90	16	6	●	1
VQ6MHVRBCHD1600R400	16	4	32	90	16	6	●	1
VQ6MHVRBCHD2000R100	20	1	38	100	20	6	●	1
VQ6MHVRBCHD2000R300	20	3	38	100	20	6	●	1
VQ6MHVRBCHD2000R400	20	4	38	100	20	6	●	1

●: Inventory maintained in Japan.

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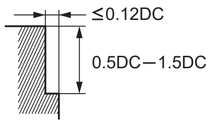
ISO13399 ➤J002

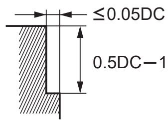
RECOMMENDED CUTTING CONDITIONS

■Side milling

Workpiece Material	Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Austenitic Stainless Steel (≤200HB), Titanium Alloy AISI 304, AISI 316, Ti-6Al-4V		Copper, Copper alloy		Heat Resistant Alloys Inconel 718	
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	—	—	4800	2000	—	—	1300	260
12	—	—	4000	2000	—	—	1100	230
16	4000	2200	3000	1600	2400	1400	800	180
20	3200	1900	2400	1400	1900	1100	640	150

Depth of Cut



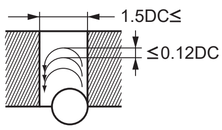


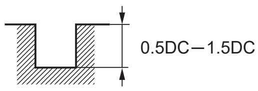
DC:Dia.

■Trochoidal slotting

Workpiece Material	Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Austenitic stainless steel (≤200HB), 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)
10	—	—	4800	1400
12	—	—	4000	1200
16	4000	1600	3000	1100
20	3200	1400	2400	900

Depth of cut





DC:Dia.

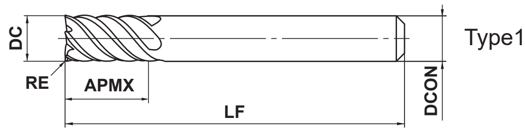
Note 1) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 2) Vibration damping end mills are more effective in suppressing chatter and vibration compared to general end mills, but these may still occur if the rigidity of the machine or the workpiece material is low. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

VF6MHVRB

Corner radius, Medium cut length, 6 flute, Irregular helix flutes

43.5°
45°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	○			◎	◎		



0.5≤RE≤2				
±0.015				
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	

- 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.

(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

● : Inventory maintained in Japan.

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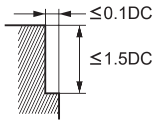
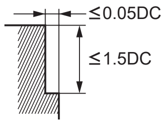
ISO13399

➤ J002

RECOMMENDED CUTTING CONDITIONS

■Side milling

Workpiece 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
Depth of cut						

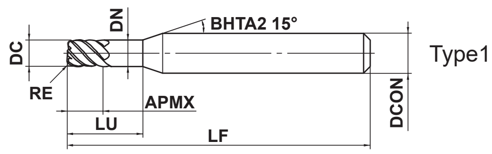
DC:Dia.

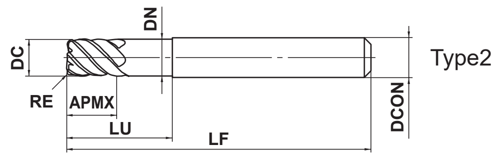
Note 1) When cutting austenitic stainless steels, the use of water-soluble cutting fluid is effective.
Note 2) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 3) Vibration damping end mills are more effective in suppressing chatter and vibration compared to general end mills, but these may still occur if the rigidity of the machine or the workpiece material is low. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

VFSDRB

IMPACT MIRACLE Corner radius end mill, 6 flute (S)

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
	○	◎	◎				





3≤DC≤12				
0 - 0.02				
DCON=6	8≤DCON≤10	DCON=12		
0 - 0.008	0 - 0.009	0 - 0.011		

●6 flute end mill with Impact Miracle coating for high hardened materials.

(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

● : Inventory maintained in Japan.

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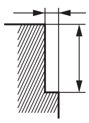
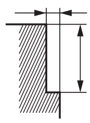
ISO13399

➢J002

RECOMMENDED CUTTING CONDITIONS

Workpiece 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 (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (mm)
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
Depth of cut									

DC:Dia.

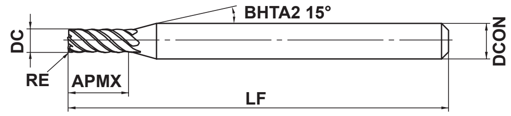
Note 1) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 2) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

VFMDRB

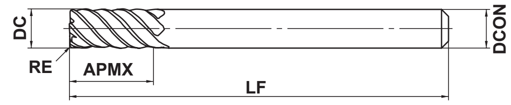
Corner radius, Medium cut length, 6 flute, For hardened materials

UWC VF 45°

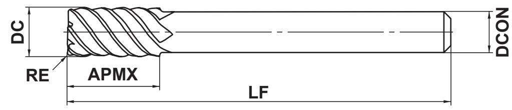
Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
	○	◎	◎				



Type1



Type2



Type3

	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	

● 6 flute corner radius end mill with Impact Miracle coating for high hardened materials.

(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

● : Inventory maintained in Japan.

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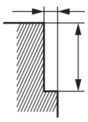
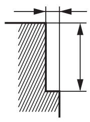
ISO13399 ➤J002

RECOMMENDED CUTTING CONDITIONS

Workpiece 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 (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (mm)
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
Depth of cut	 Please refer to the list above for depth of cut. ≦1.5DC					 Please refer to the list above for depth of cut. ≦1.0DC			

DC:Dia.

Note 1) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 2) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

CARBIDE

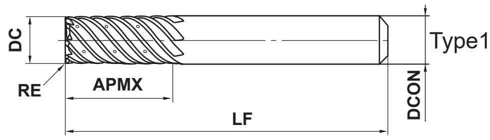
VF8MHVRBCH

Corner radius end mill, Medium cut length, 8 flute, Irregular helix flutes, with multiple internal through coolant holes

UWC VF 44° 45°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	○			◎	◎		

CoolStar
END MILLS



1≤RE≤3				
±0.015				
16≤DC≤20				
0 - 0.03				
DCON=16	DCON=20			
0 - 0.011	0 - 0.013			

●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.

(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

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

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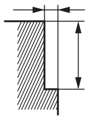
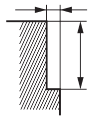
ISO13399 ➤ J002

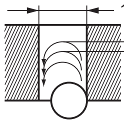
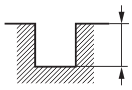
RECOMMENDED CUTTING CONDITIONS

■Side milling

Workpiece 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)
16	4000	2400	3000	2100	800	240
20	3200	1900	2400	1900	640	200
Depth of cut						

DC:Dia.

■Trochoidal slotting

Workpiece 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	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
16	4000	1900	3000	1400
20	3200	1500	2400	1200
Depth of cut				

DC:Dia.

Note 1) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 2) Vibration damping end mills are more effective in suppressing chatter and vibration compared to general end mills, but these may still occur if the rigidity of the machine or the workpiece material is low. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

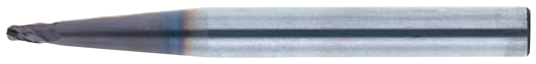
CARBIDE

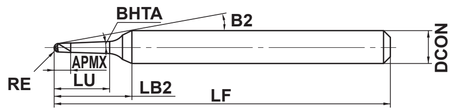
VC4STB

Ball nose taper end mill, Short cut length, 4 flute

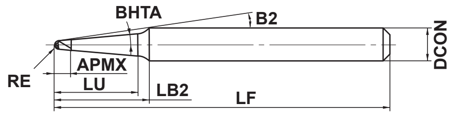
UWC VC 30° RE<0.5 RE≥0.5

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
	○	◎	◎				

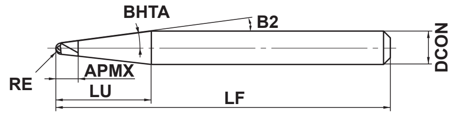




Type1



Type2



Type3

*Relief Neck type.

0.3≤RE≤4		
±0.01		
DCON=6	8≤DCON≤10	
0 - 0.008	0 - 0.009	

h6

●4 flute taper end mill with taper neck for maximum rigidity and high performance.

(mm)

Order Number	RE	BHTA	APMX	LU	LB2	B2	LF	DCON	No. of Flutes	Stock	Type
VC4STBR0030T0130N05	0.3	1.5°	1	5	9.0	17.2°	60	6	4	●	1
VC4STBR0030T0200N05	0.3	2°	1	5	9.0	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	14.0	10.8°	60	6	4	●	1
VC4STBR0040T0130N15	0.4	1.5°	2	15	19.0	8.0°	60	6	4	●	1
VC4STBR0040T0200N10	0.4	2°	2	10	14.0	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	14.0	10.5°	60	6	4	●	1
VC4STBR0050T0130N15	0.5	1.5°	2	15	19.0	7.7°	60	6	4	●	1
VC4STBR0050T0130N20	0.5	1.5°	2	20	24.0	6.1°	60	6	4	●	1
VC4STBR0050T0200N10	0.5	2°	2	10	14.0	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	24.0	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
VC4STBR0050T1000N14	0.5	10°	3	14	—	10.5°	60	6	4	●	3
VC4STBR0075T0200N10	0.75	2°	3	10	14.0	9.6°	60	6	4	●	1
VC4STBR0075T0500N15	0.75	5°	3	15	17.0	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

● : Inventory maintained in Japan.

SQUARE BALL RADIUS TAPER BARREL ROUGHING CHAMFER J SOLID END MILLS

ISO13399 ➤J002

(mm)

Order Number	RE	BHTA	APMX	LU	LB2	B2	LF	DCON	No. of Flutes	Stock	Type
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	3.0°	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

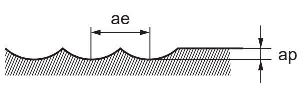
VC4STB

Ball nose taper end mill, Short cut length, 4 flute

RECOMMENDED CUTTING CONDITIONS

Workpiece 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)	Taper angle 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)
R 0.3	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
R 0.4	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
R 0.5	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
R 0.75	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
R 1	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
R 1.25	5°	15	35000	2800	0.23	0.34	30000	1800	0.18	0.27	15000	1000	0.11	0.17
R 1.5	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
R 1.75	5°	15	27500	3500	0.23	0.34	23000	2500	0.18	0.27	14000	1500	0.11	0.17

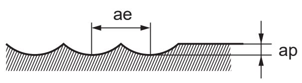
Depth of cut



Note 1) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 2) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

Workpiece 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)	Taper angle 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)
R 2	**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
R 3	**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
R 4	**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

Depth of cut



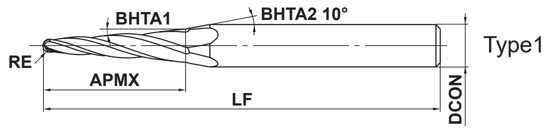
Note 1) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 2) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

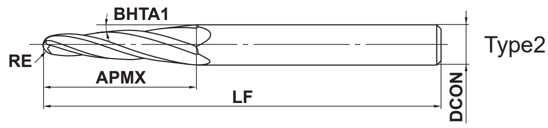
DLC4LATB NEW

Ball nose taper end mill, Long cut length, 4 flute, For aluminum impellers

UWC DLC 20°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
							◎





RE≤2				
± 0.010				
±5'				
DCON=6	DCON=8			
0 - 0.008	0 - 0.009			

- The high rigidity design with improved breakage resistance achieves high efficiency machining of aluminum alloy impellers.
- High resistance to welding when there is an insufficient coolant supply or during high-speed cutting.

(mm)

Order Number	RE	BHTA1	APMX	LF	DCON	No. of Flutes	Stock	Type
DLC4LATBR050T040AP20	0.5	4°	20	70	6	4	●	1
DLC4LATBR100T040AP20	1	4°	20	70	6	4	●	1
DLC4LATBR150T040AP20	1.5	4°	20	75	8	4	●	1
DLC4LATBR200T040AP30	2	4°	30	75	8	4	●	2

Note 1) A wide range of non-standard shapes are available. Please inquire for more information.
(ex.: RE sizes starting from a minimum of R0.3, half included taper angles) or coatings.

● : Inventory maintained in Japan.

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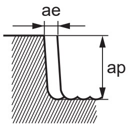
ISO13399 ➢J002

RECOMMENDED CUTTING CONDITIONS

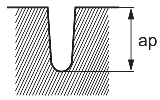
■Side Milling

(mm)

Workpiece Material	Aluminium Alloys			
R RE	Revolution (min^{-1})	Feed Rate (mm/min)	Depth of Cut ap	Depth of Cut 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				

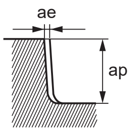
■Slotting

(mm)

Workpiece Material	Aluminium Alloys		
R RE	Revolution (min^{-1})	Feed Rate (mm/min)	Depth of Cut ap
R0.5	20000	600	10
R1	20000	2800	10
R1.5	20000	4000	10
R2	20000	4000	15
Depth of cut			

■Side Milling (Finishing)

(mm)

Workpiece Material	Aluminium Alloys			
R RE	Revolution (min^{-1})	Feed Rate (mm/min)	Depth of Cut ap	Depth of Cut 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				

Note 1) Water-soluble cutting fluid is recommended.
Note 2) Climb cutting is recommended for side milling.
Note 3) Vibration damping end mills are more effective in suppressing chatter and vibration compared to general end mills, but these may still occur if the rigidity of the machine or the workpiece material is low. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

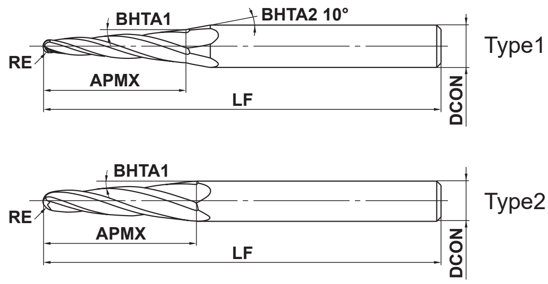
CARBIDE

C4LATB

Ball nose taper end mill, Long cut length, 4 flute, For aluminum impellers

UWC 20°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
							◎



RE≤2				
± 0.010				
±5'				
DCON=6	DCON=8			
0 - 0.008	0 - 0.009			

●High-efficiency roughing for aluminum impellers.

(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

Note 1) Please inquire with us regarding non-standard special shapes
(ex.: RE sizes starting from a minimum of R0.3, half included taper angles) or coatings.

● : Inventory maintained in Japan.

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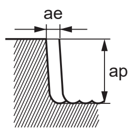
ISO13399

➢ J002

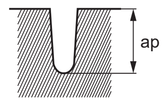
SQUARE BALL RADIUS TAPER BARREL ROUGHING CHAMFER J SOLID END MILLS

RECOMMENDED CUTTING CONDITIONS

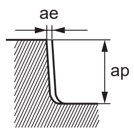
Side milling

Workpiece Material	Aluminium alloy			
R **RE** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)
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

Workpiece Material	Aluminium alloy		
R **RE**	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)
R0.5	20000	600	10
R1	20000	2800	10
R1.5	20000	4000	10
R2	20000	4000	15
Depth of cut			

Side milling (Finishing)

Workpiece Material	Aluminium alloy			
R **RE** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)
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				

Note 1) Water-soluble cutting fluid is recommended.
Note 2) Climb cutting is recommended for side milling.
Note 3) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

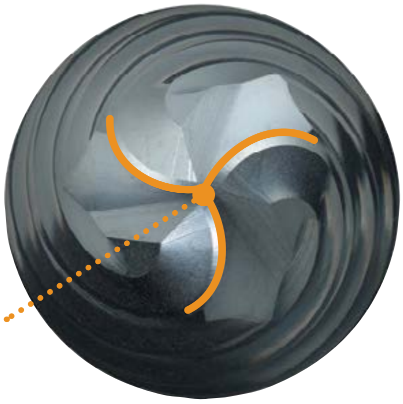
VQT6UR

Nose radius suitable for fillet milling, also tangential form radius fit composite blade surface machining.

Radial Accuracy

RE1 and RE2 ±0.010mm

Optimum Cutting Edge Design



6-flute Peripheral Cutting Edge (Irregular pitch)

Multi cutting edge design achieve high efficiency machining.
Irregular pitch design prevents chattering.

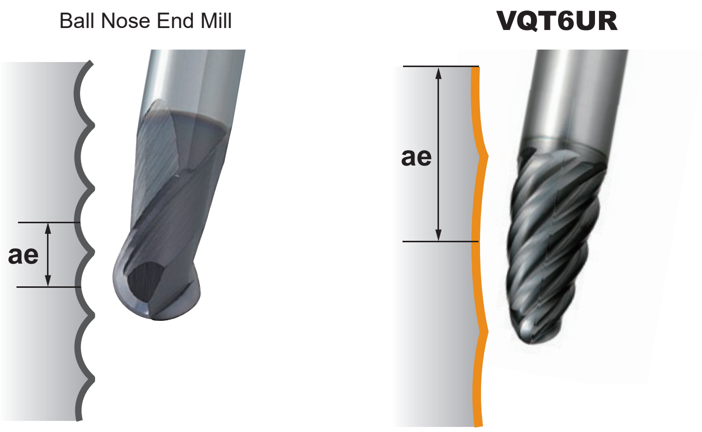
3-flute End Cutting Edge

A wide flute improves chip evacuation.

Ideal Shape

Compared with ball nose end mill, an tangential form radius is larger and cusp height is controllable. This design makes highly efficient machining with larger pick feed.

Nose and tangential form part has two different radius.



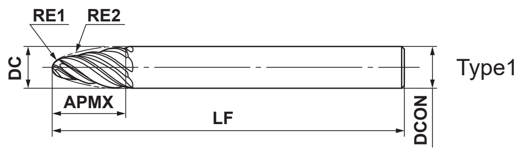
Shorter cutting distance contribute to longer tool life.

VQT6UR

Barrel, Medium cut length, 6 flute

40°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
				○	◎		○



RE1≤4	RE2≤100			
±0.01	±0.01			
DCON≤10	DCON=12			
0 - 0.009	0 - 0.011			

● Nose and tangential form part has two different radius.

● Irregular pitch design prevents chattering and achieves high efficiency and high quality machining surface.

(mm)

Order Number	DC	RE1	RE2	APMX	LF	DCON	No. of Flutes	Stock	Type
VQT6URR020R075S08	8	2	75	21	90	8	6	●	1
VQT6URR020R085S10	10	2	85	26	100	10	6	●	1
VQT6URR030R075S10	10	3	75	22	100	10	6	●	1
VQT6URR040R100S12	12	4	100	25	110	12	6	●	1

Note 1) SMART MIRACLE coating has very low electrical conductivity; therefore, an external contact type of tool setter (electric transmitted) may not work.
When measuring the tool length, please use an internal contact type (non-electricity type) or a laser tool setter.

● : Inventory maintained in Japan.

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VQT6UR

Barrel, Medium cut length, 6 flute

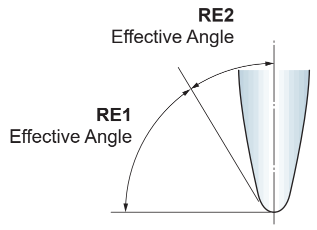
RECOMMENDED CUTTING CONDITIONS

■Effective Angle

Please refer to the table below for the use of the nose radius (RE1) and tangential form radius (RE2).

(mm)

Order Number	Nose Radius		Tangential Form Radius	
	RE1	Effective Angle	RE2	Effective Angle
VQT6URR020R075S08	2	76.6°	75	13.4°
VQT6URR020R085S10	2	74.5°	85	15.5°
VQT6URR030R075S10	3	76.4°	75	13.6°
VQT6URR040R100S12	4	78.3°	100	11.7°



■Side Milling with the Use of the Tangential Form Radius (RE2)

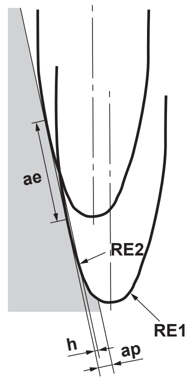
Workpiece Material		Mild Steels (≦180HB) Carbon Steels, Cast Irons (180−280HB)			Austenitic Stainless Steels (≦200HB) Titanium Alloys			Aluminum Alloys (Si<5%)		
DC (mm)	RE2 (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)
8	**75**	8000	2400	0.05−0.3	3200	770	0.05−0.3	16000	4800	0.05−0.3
10	**85**	6400	1900	0.05−0.3	2500	600	0.05−0.3	13000	3900	0.05−0.3
10	**75**	6400	1900	0.05−0.3	2500	600	0.05−0.3	13000	3900	0.05−0.3
12	**100**	5300	1600	0.05−0.3	2100	500	0.05−0.3	11000	3300	0.05−0.3

■Depth of Cut Calculation Table Based on Tangential Form Radius (RE2) and Cusp Height (h)

(mm)

Workpiece Material	RE2	Cusp Height **h**	0.0001	0.0003	0.0005	0.0008	0.001	0.003	0.005	0.008
VQT6URR020R075S08	75	Depth of Cut **ap**	0.245	0.424	0.548	0.693	0.775	1.342	1.732	2.191
VQT6URR030R075S10	75		0.245	0.424	0.548	0.693	0.775	1.342	1.732	2.191
VQT6URR020R085S10	85		0.261	0.452	0.583	0.738	0.825	1.428	1.844	2.332
VQT6URR040R100S12	100		0.283	0.49	0.632	0.8	0.894	1.549	2	2.53

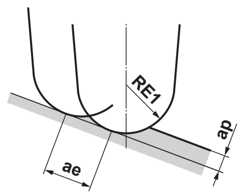
Note 1) SMART MIRACLE coating has very low electrical conductivity; therefore, an external contact type of tool setter (electric transmitted) may not work.
When measuring the tool length, please use an internal contact type (non-electricity type) or a laser tool setter.
Note 2) It is recommended to use this tool only for finish cutting.
Note 3) The tool contact part differs between the nose radius and tangential form radius depending on machining geometries and tilt angles. Select suitable cutting conditions according to tool contact parts.



■ Milling with the Use of the Nose Radius (RE1)

Workpiece Material		Mild Steels (≤180HB) Carbon Steels, Cast Irons (180−280HB)				Austenitic Stainless Steels (≤200HB) Titanium Alloys				Aluminum Alloys (Si<5%)			
DC (mm)	**RE1** (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**	16000	2400	0.4	1	6400	580	0.4	1	32000	4800	0.4	1
10	**2**	16000	2400	0.4	1	6400	580	0.4	1	32000	4800	0.4	1
10	**3**	11000	1700	0.6	1.5	4200	380	0.6	1.5	21000	3200	0.6	1.5
12	**4**	8000	1200	0.8	2	3200	290	0.8	2	16000	2400	0.8	2

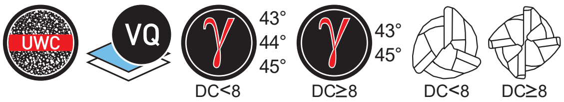
Note 1) SMART MIRACLE coating has very low electrical conductivity; therefore, an external contact type of tool setter (electric transmitted) may not work.
When measuring the tool length, please use an internal contact type (non-electricity type) or a laser tool setter.
Note 2) It is recommended to use this tool only for finish cutting.
Note 3) The tool contact part differs between the nose radius and tangential form radius depending on machining geometries and tilt angles. Select suitable cutting conditions according to tool contact parts.



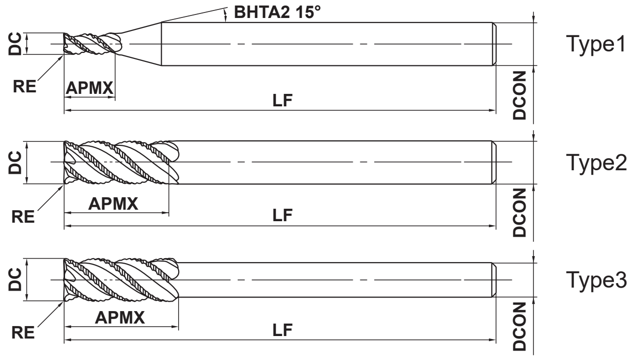
ae:Pick Feed

VQSVR

Roughing end mill, Short cut length, 3–4 flute, Irregular helix flutes



Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎			◎	◎	○	



h6	DCON=6	8≤DCON≤10	12≤DCON≤16	DCON=20
	0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013

- 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)

(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

Note 1) 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.

● : Inventory maintained in Japan.

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ISO13399 ➢ J002

RECOMMENDED CUTTING CONDITIONS

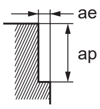
■Side milling

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

Workpiece 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					Austenitic, Ferritic and Martensitic stainless steels, Titanium alloys AISI 304, AISI 316, Ti-6Al-4V					Hardened stainless steels, Cobaly chromium alloy AISI 630, AISI 631, 15-5PH, 17-4PH					Copper, Copper alloy				
Dia. DC (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Hole Depth ap (mm)	Hole Depth ae (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Hole Depth ap (mm)	Hole Depth ae (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Hole Depth ap (mm)	Hole Depth ae (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Hole Depth ap (mm)	Hole Depth ae (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Hole Depth ap (mm)	Hole Depth ae (mm)
3	150	16000	960	4.5	1.5	120	13000	640	4.5	1.5	100	11000	450	4.5	1.5	75	8000	330	4.5	0.9	180	19000	1100	4.5	1.5
4	150	12000	960	6	2	120	9500	640	6	2	100	8000	430	6	2	75	6000	330	6	1.2	180	14000	1100	6	2
5	150	9500	960	7.5	2.5	120	7600	640	7.5	2.5	100	6400	440	7.5	2.5	75	4800	330	7.5	1.5	180	11000	1100	7.5	2.5
6	150	8000	960	9	3	120	6400	680	9	3	100	5300	480	9	3	75	4000	360	9	1.8	180	9500	1100	9	3
7	150	6800	950	10.5	3.5	120	5500	700	10.5	3.5	100	4500	500	10.5	3.5	75	3400	380	10.5	2.1	180	8200	1100	10.5	3.5
8	150	6000	1100	12	4	120	4800	800	12	4	100	4000	570	12	4	75	3000	430	12	2.4	180	7200	1300	12	4
9	150	5300	1100	13.5	4.5	120	4200	760	13.5	4.5	100	3500	570	13.5	4.5	75	2700	430	13.5	2.7	180	6400	1300	13.5	4.5
10	150	4800	1100	15	5	120	3800	760	15	5	100	3200	570	15	5	75	2400	430	15	3	180	5700	1200	15	5
12	150	4000	960	18	6	120	3200	700	18	6	100	2700	540	18	6	75	2000	400	18	3.6	180	4800	1200	18	6
14	150	3400	880	21	7	120	2700	650	21	7	100	2300	510	21	7	75	1700	380	21	4.2	180	4100	1100	21	7
16	150	3000	840	24	8	120	2400	620	24	8	100	2000	500	24	8	75	1500	380	24	4.8	180	3600	1000	24	8
18	150	2700	810	27	9	120	2100	590	27	9	100	1800	500	27	9	75	1300	360	27	5.4	180	3200	960	27	9
20	150	2400	760	30	10	120	1900	560	30	10	100	1600	500	30	10	75	1200	360	30	6	180	2900	920	30	10

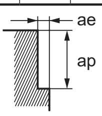
Depth of cut



General-purpose conditions

Workpiece 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					Austenitic, Ferritic and Martensitic stainless steels, Titanium alloys AISI 304, AISI 306, Ti-6Al-4V					Hardened stainless steels, Cobaly chromium alloy AISI 630, AISI 631, 15-5PH, 17-4PH					Copper, Copper alloy				
Dia. DC (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Hole Depth ap (mm)	Hole Depth ae (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Hole Depth ap (mm)	Hole Depth ae (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Hole Depth ap (mm)	Hole Depth ae (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Hole Depth ap (mm)	Hole Depth ae (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Hole Depth ap (mm)	Hole Depth ae (mm)
3	120	13000	610	4.5	1.5	100	11000	430	4.5	1.5	80	8500	280	4.5	1.5	70	7400	240	4.5	0.9	140	15000	700	4.5	1.5
4	120	9500	610	6	2	100	8000	430	6	2	80	6400	280	6	2	70	5600	240	6	1.2	140	11000	700	6	2
5	120	7600	610	7.5	2.5	100	6400	430	7.5	2.5	80	5100	280	7.5	2.5	70	4500	250	7.5	1.5	140	8900	720	7.5	2.5
6	120	6400	610	9	3	100	5300	450	9	3	80	4200	300	9	3	70	3700	270	9	1.8	140	7400	720	9	3
7	120	5500	620	10.5	3.5	100	4500	480	10.5	3.5	80	3600	320	10.5	3.5	70	3200	290	10.5	2.1	140	6400	720	10.5	3.5
8	120	4800	720	12	4	100	4000	570	12	4	80	3200	380	12	4	70	2800	340	12	2.4	140	5600	840	12	4
9	120	4200	670	13.5	4.5	100	3500	510	13.5	4.5	80	2800	360	13.5	4.5	70	2500	320	13.5	2.7	140	5000	800	13.5	4.5
10	120	3800	670	15	5	100	3200	510	15	5	80	2500	360	15	5	70	2200	310	15	3	140	4500	790	15	5
12	120	3200	610	18	6	100	2700	470	18	6	80	2100	340	18	6	70	1900	300	18	3.6	140	3700	710	18	6
14	120	2700	560	21	7	100	2300	440	21	7	80	1800	320	21	7	70	1600	280	21	4.2	140	3200	670	21	7
16	120	2400	540	24	8	100	2000	410	24	8	80	1600	320	24	8	70	1400	280	24	4.8	140	2800	630	24	8
18	120	2100	500	27	9	100	1800	400	27	9	80	1400	310	27	9	70	1200	270	27	5.4	140	2500	600	27	9
20	120	1900	480	30	10	100	1600	380	30	10	80	1300	310	30	10	70	1100	270	30	6	140	2200	560	30	10

Depth of cut



Note 1) 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.
Note 2) Effective cutting of stainless steel, titanium alloys and heat-resistant alloys etc. can be achieved with the use of emulsion.
Note 3) Vibration damping end mills are more effective in suppressing chatter and vibration compared to general end mills, but these may still occur if the rigidity of the machine or the workpiece material is low. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.
Note 4) When the depth of cut is smaller than shown the revolution and feed rate can be increased.

VQSVR

Roughing end mill, Short cut length, 3—4 flute, Irregular helix flutes

RECOMMENDED CUTTING CONDITIONS

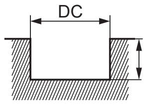
■Slotting

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

Workpiece 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				Austenitic, Ferritic and Martensitic stainless steels, Titanium alloys AISI 304, AISI 306, Ti-6Al-4V				Hardened stainless steels, Cobaly chromium alloy AISI 630, AISI 631, 15-5PH, 17-4PH				Copper, Copper alloy			
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)	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	60	6400	250	1.5	150	16000	890	3
4	120	9500	720	4	100	8000	450	4	80	6400	340	4	60	4800	250	2	150	12000	900	4
5	120	7600	720	5	100	6400	460	5	80	5100	300	5	60	3800	230	2.5	150	9500	900	5
6	120	6400	720	6	100	5300	460	6	80	4200	310	6	60	3200	240	3	150	8000	900	6
7	120	5500	730	7	100	4500	470	7	80	3600	330	7	60	2700	250	3.5	150	6800	950	7
8	120	4800	840	8	100	4000	560	8	80	3200	400	8	60	2400	300	4	150	6000	1100	8
9	120	4200	810	9	100	3500	540	9	80	2800	350	9	60	2100	260	4.5	150	5300	1000	9
10	120	3800	800	10	100	3200	520	10	80	2500	340	10	60	1900	260	5	150	4800	1000	10
12	120	3200	750	12	100	2700	480	12	80	2100	340	12	60	1600	260	6	150	4000	940	12
14	120	2700	670	14	100	2300	420	14	80	1800	300	14	60	1400	240	7	150	3400	840	14
16	120	2400	620	16	100	2000	380	16	80	1600	290	16	60	1200	220	8	150	3000	780	16
18	120	2100	570	18	100	1800	380	18	80	1400	260	18	60	1100	210	9	150	2700	730	18
20	120	1900	540	20	100	1600	350	20	80	1300	260	20	60	950	190	10	150	2400	680	20

Depth of cut

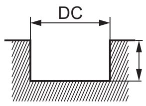


DC:Dia.

General-purpose conditions

Workpiece 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				Austenitic, Ferritic and Martensitic stainless steels, Titanium alloys AISI 304, AISI 306, Ti-6Al-4V				Hardened stainless steels, Cobaly chromium alloy AISI 630, AISI 631, 15-5PH, 17-4PH				Copper, Copper alloy			
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)	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	50	5300	170	1.5	120	13000	580	3
4	100	8000	490	4	80	6400	310	4	60	4800	200	4	50	4000	170	2	120	9500	580	4
5	100	6400	490	5	80	5100	310	5	60	3800	200	5	50	3200	170	2.5	120	7600	580	5
6	100	5300	490	6	80	4200	310	6	60	3200	200	6	50	2700	170	3	120	6400	580	6
7	100	4500	500	7	80	3600	320	7	60	2700	200	7	50	2300	170	3.5	120	5500	620	7
8	100	4000	600	8	80	3200	380	8	60	2400	240	8	50	2000	200	4	120	4800	720	8
9	100	3500	540	9	80	2800	330	9	60	2100	210	9	50	1800	180	4.5	120	4200	650	9
10	100	3200	540	10	80	2500	330	10	60	1900	210	10	50	1600	180	5	120	3800	640	10
12	100	2700	510	12	80	2100	320	12	60	1600	210	12	50	1300	170	6	120	3200	600	12
14	100	2300	460	14	80	1800	300	14	60	1400	190	14	50	1100	150	7	120	2700	540	14
16	100	2000	410	16	80	1600	290	16	60	1200	170	16	50	990	140	8	120	2400	500	16
18	100	1800	390	18	80	1400	260	18	60	1100	170	18	50	880	130	9	120	2100	460	18
20	100	1600	360	20	80	1300	260	20	60	950	150	20	50	800	130	10	120	1900	430	20

Depth of cut



DC:Dia.

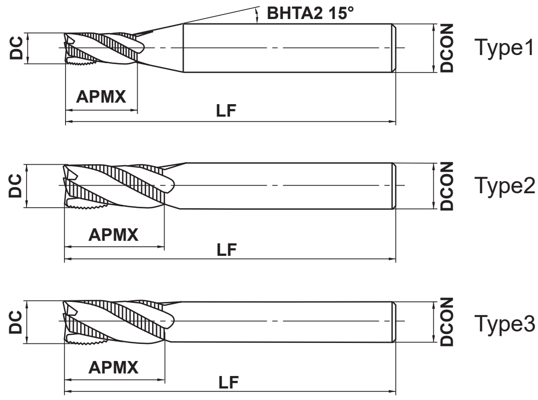
Note 1) SMART MIRACLE Coating is not energized because of its nature. Therefore, an external contact (voltaic type) tool setter cannot be used. An internal contact (non-voltaic) type or laser type tool setter is recommended to measure the length of the tool.
Note 2) Effective cutting of stainless steel, titanium alloys and heat-resistant alloys etc. can be achieved with the use of emulsion.
Note 3) Vibration damping end mills are more effective in suppressing chatter and vibration compared to general end mills, but these may still occur if the rigidity of the machine or the workpiece material is low. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.
Note 4) Finishing at a faster feedrate is possible when the depth of cut is small.

VFSFPR

Roughing end mill, Short cut length, 3−4 flute

UWC VF 30° DC<8 DC≥8

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	○			◎	◎		



h6

DCON=6	8≤DCON≤10	12≤DCON≤16	DCON=20
0 / - 0.008	0 / - 0.009	0 / - 0.011	0 / - 0.013

● Impact Miracle roughing end mills for a wide range of workpiece materials from carbon and alloy steel through to difficult-to-cut materials.

(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

● : Inventory maintained in Japan.

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VFSFPR

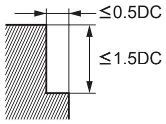
Roughing end mill, Short cut length, 3−4 flute

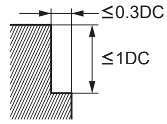
RECOMMENDED CUTTING CONDITIONS

■Side milling

Workpiece 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		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)	Revolution (min^{-1})	Feed rate (mm/min)
3	16000	960	13000	640	6400	260	5300	320	4200	70
4	12000	960	9500	640	4800	260	4000	320	3200	70
5	9500	960	7600	640	3800	260	3200	320	2500	70
6	8000	960	6400	680	3200	290	2700	340	2100	75
8	6000	1050	4800	760	2400	340	2000	400	1600	95
10	4800	1050	3800	760	1900	340	1600	400	1300	105
12	4000	960	3200	700	1600	320	1300	400	1100	110
16	3000	840	2400	620	1200	300	1000	360	800	110
20	2400	760	1900	560	1000	300	800	320	600	100

Depth of cut



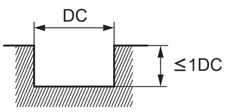


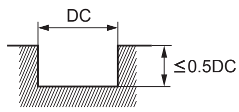
DC:Dia.

■Slotting

Workpiece 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		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)	Revolution (min^{-1})	Feed rate (mm/min)
3	13000	720	11000	480	4800	190	3200	190	2100	25
4	9500	720	8000	480	3600	190	2400	190	1600	25
5	7600	720	6400	480	3200	190	1900	190	1300	25
6	6400	720	5300	480	2700	200	1600	200	1100	30
8	4800	800	4000	520	2000	220	1200	220	800	35
10	3800	800	3200	520	1600	220	1000	220	600	35
12	3200	750	2700	520	1300	210	800	210	500	40
16	2400	620	2000	450	1000	180	600	180	400	45
20	1900	540	1600	400	800	160	500	160	300	40

Depth of cut





DC:Dia.

Note 1) When cutting austenitic stainless steels, the use of water-soluble cutting fluid is effective.
Note 2) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 3) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

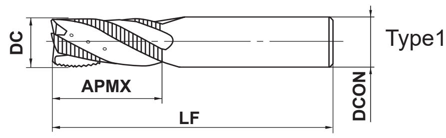
VFSFPRCH

Roughing end mill, Short cut length, 4 flute, with multiple internal through coolant holes

UWC VF 30°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	○			◎	◎		

CoolStar
END MILLS



h6

DCON=16	DCON=20			
0 - 0.011	0 - 0.013			

● Roughing end mill with multiple internal through coolant holes suitable for difficult-to-cut materials.

(mm)

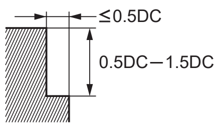
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
VFSFPRCHD1600	16	33	90	16	4	▲	1
VFSFPRCHD2000	20	38	100	20	4	▲	1

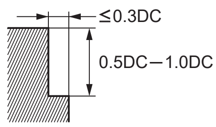
RECOMMENDED CUTTING CONDITIONS

■Side milling

Workpiece Material	Carbon steel, Cast iron, Alloy steel (−30HRC) AISI 1050, AISI No 35 B, AISI P20		Alloy steel, Tool steel, Pre-hardened steel (−45HRC) 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)
16	3000	840	2400	620	1200	300	800	110
20	2400	760	1900	560	1000	300	600	100

Depth of cut



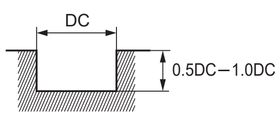


DC:Dia.

■Slotting

Workpiece Material	Carbon steel, Cast iron, Alloy steel (−30HRC) AISI 1050, AISI No 35 B, AISI P20		Alloy steel, Tool steel, Pre-hardened steel (−45HRC) 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)
16	2400	620	2000	450	800	100
20	1900	540	1600	400	600	80

Depth of cut



DC:Dia.

Note 1) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 2) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

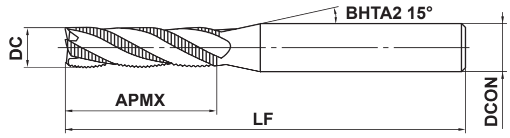
▲: Inventory maintained in Japan.
To be replaced by new products.

VFMFPR

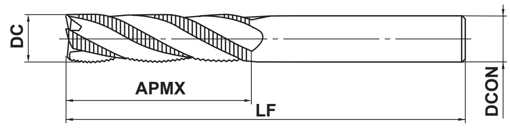
Roughing end mill, Medium cut length, 4 flute

30°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	○			◎	◎		



Type1



Type2

h6

DCON=6	8≤DCON≤10	12≤DCON≤16	DCON=20
0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013

● Impact Miracle roughing end mills suitable for the machining of deep walled components.

(mm)

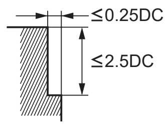
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
VFMFPRD0500	5	15	60	6	4	●	1
VFMFPRD0600	6	17	60	6	4	●	2
VFMFPRD0700	7	22	75	8	4	●	1
VFMFPRD0800	8	28	75	8	4	●	2
VFMFPRD0900	9	28	100	10	4	●	1
VFMFPRD1000	10	34	100	10	4	●	2
VFMFPRD1200	12	40	110	12	4	●	2
VFMFPRD1600	16	48	125	16	4	●	2
VFMFPRD2000	20	57	140	20	4	●	2

RECOMMENDED CUTTING CONDITIONS

■Side milling

Workpiece 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		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)	Revolution (min^{-1})	Feed rate (mm/min)
5	3800	360	3200	290	2500	150	2500	150	1900	50
6	3200	360	2700	290	2100	160	2100	160	1600	60
8	2400	450	2000	360	1600	160	1600	160	1200	70
10	1900	450	1600	360	1300	180	1300	180	1000	75
12	1600	400	1300	320	1100	180	1100	180	800	80
16	1200	360	1000	290	800	160	800	160	600	80
20	1000	340	800	270	600	150	600	150	500	80

Depth of cut



DC:Dia.

Note 1) When cutting austenitic stainless steels, the use of water-soluble cutting fluid is effective.
Note 2) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 3) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

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● : Inventory maintained in Japan.
▲ : Inventory maintained in Japan. To be replaced by new products.

ISO13399 ➤J002

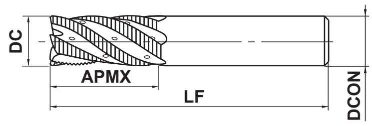
VF6SVRCH

Roughing end mill, Short cut length, 6 flute, Irregular helix flutes, with multiple internal through coolant holes

28.5°
30°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	○			◎	◎		

CoolStar
END MILLS



Type1

h6

DCON=16	DCON=20			
0 - 0.011	0 - 0.013			

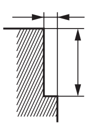
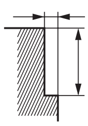
● Roughing end mill with multiple internal through coolant holes suitable for difficult-to-cut materials.

(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

RECOMMENDED CUTTING CONDITIONS

■ Side milling

Workpiece 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)
16	3000	1500	2400	1200	800	160
20	2400	1200	2000	1000	640	140
Depth of cut	 ≤0.3DC, 0.5DC−1.5DC				 ≤0.2DC, 0.5DC−1.5DC	

DC:Dia.

Note 1) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 2) Vibration damping end mills are more effective in suppressing chatter and vibration compared to general end mills, but these may still occur if the rigidity of the machine or the workpiece material is low. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

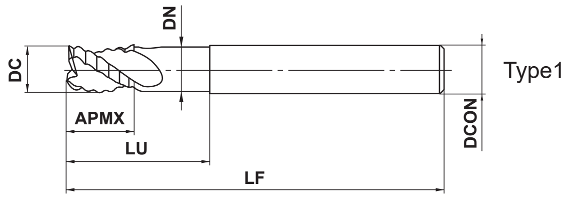
CARBIDE

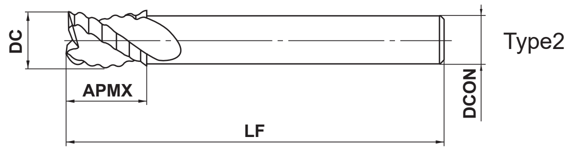
CSRA

Roughing end mill, Short cut length, 3 flute, For aluminium alloy

UWC γ 37.5°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
							◎





h6

DCON=10	12≤DCON≤16	20≤DCON≤25		
0 - 0.009	0 - 0.011	0 - 0.013		

●3 flute uncoated end mill for roughing aluminium alloy.

(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	18.0	125	20	3	●	1
CSRAD2200	22	25	—	—	125	20	3	●	2
CSRAD2500	25	30	60	23.0	125	25	3	●	1

SQUARE BALL RADIUS TAPER BARREL ROUGHING CHAMFER

J

SOLID END MILLS

● : Inventory maintained in Japan.

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ISO13399

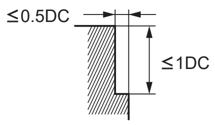
➢ J002

RECOMMENDED CUTTING CONDITIONS

■Side milling

Workpiece Material	Aluminium alloy		Aluminium alloy casting	
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

Depth of cut

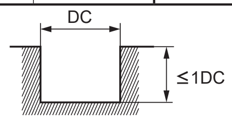


DC:Dia.

■Slotting

Workpiece Material	Aluminium alloy		Aluminium alloy casting	
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

Depth of cut



DC:Dia.

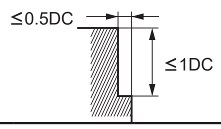
Note 1) Water-soluble cutting fluid is recommended.
Note 2) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 3) Climb cutting is recommended for side milling.
Note 4) These end mills do not have a centre cutting edge, therefore when entering a workpiece use a ramping process rather than vertical feed.
Note 5) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

Using a high-speed and high-rigidity machining center

■Side milling

Workpiece Material	Aluminium alloy		Aluminium alloy casting	
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

Depth of cut

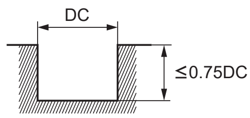


DC:Dia.

■Slotting

Workpiece Material	Aluminium alloy		Aluminium alloy casting	
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

Depth of cut



DC:Dia.

Note 1) Water-soluble cutting fluid is recommended.
Note 2) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 3) Climb cutting is recommended for side milling.
Note 4) These end mills do not have a centre cutting edge, therefore when entering a workpiece use a ramping process rather than vertical feed.
Note 5) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

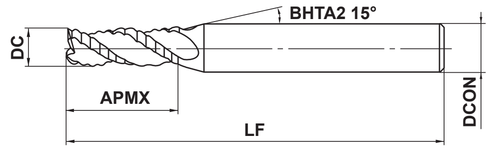
CARBIDE

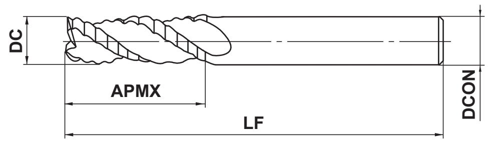
CMRA

Roughing end mill, Medium cut length, 3 flute, For aluminium alloy

UWC 37.5°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
							◎





h6

DCON=6	8≤DCON≤10	12≤DCON≤16	20≤DCON≤25
0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013

●3 flute uncoated end mill for roughing aluminium alloy.

(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

● : Inventory maintained in Japan.

SQUARE BALL RADIUS TAPER BARREL ROUGHING CHAMFER
J
SOLID END MILLS

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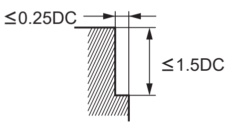
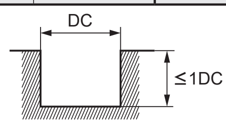
ISO13399 ➤J002

RECOMMENDED CUTTING CONDITIONS

■Side milling

Workpiece Material	Aluminium alloy		Aluminium alloy casting	
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
Depth of cut	 DC:Dia.			

■Slotting

Workpiece Material	Aluminium alloy		Aluminium alloy casting	
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
DCepth of cut	 DC:Dia.			

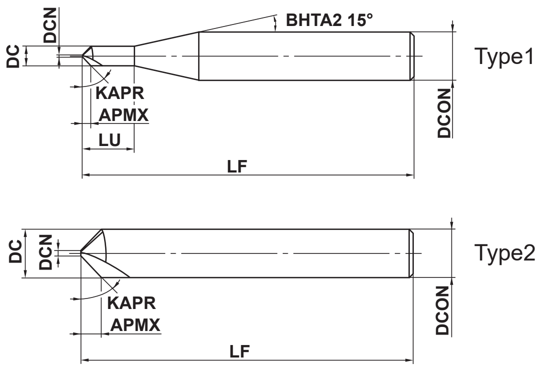
Note 1) Water-soluble cutting fluid is recommended.
Note 2) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 3) Climb cutting is recommended for side milling.
Note 4) These end mills do not have a centre cutting edge, therefore when entering a workpiece use a ramping process rather than vertical feed.
Note 5) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

VC2C

Chamfer cutter, 2 flute

UWC VC γ 5°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	○		◎	◎	○	○



DCN				
±0.02				
DCON=6	8≤DCON≤10	DCON=12		
0 - 0.008	0 - 0.009	0 - 0.011		

● Chamfering cutters for machining of hardened steel and difficult-to-cut materials.

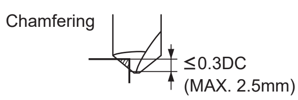
(mm)

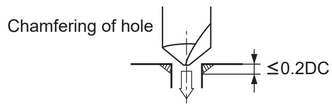
Order Number	DC	DCN	APMX	KAPR	LU	LF	DCON	No. of Flutes	Stock	Type
VC2CD0200	2	0.3	0.85	45°	6	50	6	2	●	1
VC2CD0400	4	0.3	1.85	45°	12	50	6	2	●	1
VC2CD0600	6	0.3	2.85	45°	—	50	6	2	●	2
VC2CD0800	8	0.4	3.8	45°	—	60	8	2	●	2
VC2CD1000	10	0.5	4.75	45°	—	70	10	2	●	2
VC2CD1200	12	0.5	5.75	45°	—	75	12	2	●	2

RECOMMENDED CUTTING CONDITIONS

Workpiece 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

Depth of cut





DC:Dia.

Note 1) When cutting austenitic stainless steels, the use of water-soluble cutting fluid is effective.
Note 2) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 3) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

● : Inventory maintained in Japan.

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ISO13399

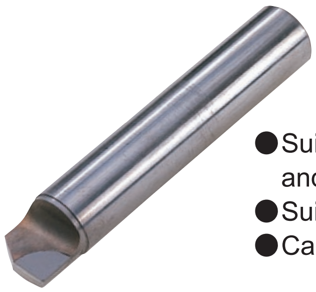
➤ J002

GBE

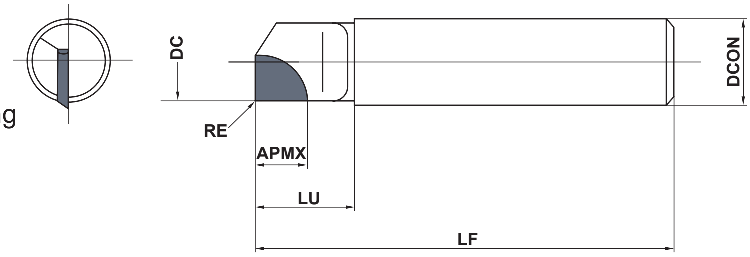
CBN end mill, Single flute

0°

Light Alloy	Cast Iron	Carbon Steel • Alloy Steel	Stainless Steel	Hardened Steel
				◎



- Suitable for shoulder milling and die machining.
- Suitable for re-grinding.
- Carbide shank.



Right hand tool holder only.

Order Number	Number of Flutes	Stock	Dimensions (mm)					
		MB730	DC	RE	LF	DCON	LU	APMX
GBE06S0640	1	●	6	0.5	40	6	8	3.5
GBE08S0845	1	●	8	0.5	45	8	13	6
GBE10S1050	1	●	10	0.5	50	10	13	6
GBE12S1255	1	●	12	0.5	55	12	13	6

RECOMMENDED CUTTING CONDITIONS

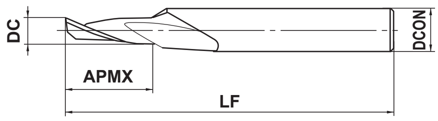
	Workpiece Material	Hardness	Grade	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
H	Hardened Steel	45—68HRC	**MB730**	140 (80—200)	0.08 (0.02—0.15)	≤0.5
	Hardened Steel	45—68HRC	**MB730**	100 (60—150)	0.06 (0.02—0.10)	≤0.5

1MA

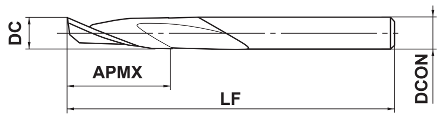
End mill, Medium cut length, 1 flute

25°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
							◎



Type1



Type2

3≤DC≤8				
0 - 0.050				

● Single flute end mill for aluminium channel and wood working.

(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

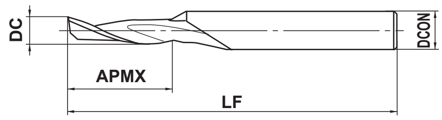
● : Inventory maintained in Japan.

1LA

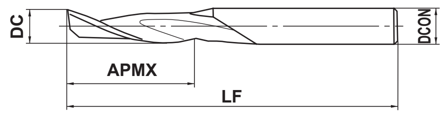
End mill, Long cut length, 1 flute

25°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
							◎



Type1



Type2

4≤DC≤12				
0 - 0.050				

●Single flute end mill with longer cut length and overall length than standard for deeper machining.

(mm)

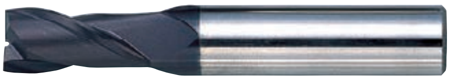
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
1LAD0400	4	18	70	8	1	●	1
1LAD0500	5	20	70	8	1	●	1
1LAD0600	6	20	70	8	1	●	1
1LAD0800	8	30	80	8	1	●	2
1LAD1000	10	35	90	10	1	●	2
1LAD1200	12	45	100	12	1	●	2

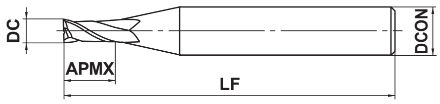
VA2SS

End mill, Short cut length, 2 flute

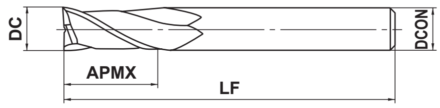
30°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	○			○	○		





Type1



Type2

3≤DC≤20				
0 - 0.030				

●2 flute end mill with high grade HSS substrate and Violet coating for general use.

(mm)

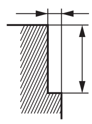
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
VA2SSD0300	3	8	50	6	2	●	1
VA2SSD0400	4	8	60	8	2	●	1
VA2SSD0500	5	10	60	8	2	●	1
VA2SSD0600	6	12	60	8	2	●	1
VA2SSD0700	7	15	65	10	2	●	1
VA2SSD0800	8	15	65	10	2	●	1
VA2SSD0900	9	20	75	10	2	●	1
VA2SSD1000	10	20	75	12	2	●	1
VA2SSD1100	11	22	85	12	2	●	1
VA2SSD1200	12	22	85	12	2	●	2
VA2SSD1400	14	26	95	16	2	●	1
VA2SSD1600	16	32	100	16	2	●	2
VA2SSD2000	20	38	120	20	2	●	2

● : Inventory maintained in Japan.

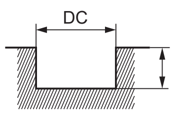
ISO13399 ➤ J002

RECOMMENDED CUTTING CONDITIONS

Side milling

Workpiece 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
Depth of cut	 DC:Dia.							

Slotting

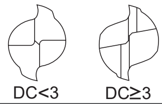
Workpiece Material	Structural steel, Cast iron, Carbon steel AISI 1045, AISI No 35 B, AISI 1050		Carbon steel, Alloy steel (20−30HRC) AISI 1055, AISI P20		Alloy steel, Tool steel, Pre-hardened steel (30−35HRC) AISI H13, AISI D2		Austenitic stainless steel, Alloy steel, Tool steel (35−40HRC) AISI 304, 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
Depth of cut	 DC:Dia.							

Note 1) Supply cutting fluid sufficiently during slotting. When dry cut, slotting decrease the revolution and feed rate by 20−30% proportionately.
Note 2) When drilling, please set the feed rate at 1/3 or below of the values above.
Note 3) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

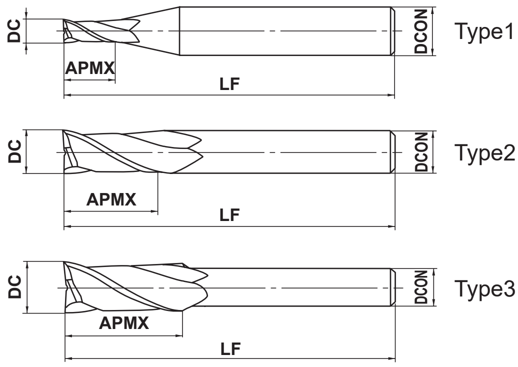
VA2MS

End mill, Medium cut length, 2 flute

30°



Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	○			○	○		



DC≤20	DC>20			
0 / -0.030	0 / -0.040			

●2 flute end mill with high grade HSS substrate and Violet coating for general use.

(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
VA2MSD2000	20	45	120	20	2	●	2
VA2MSD2200	22	45	120	20	2	●	3

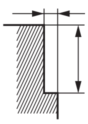
● : Inventory maintained in Japan.

RECOMMENDED CUTTING CONDITIONS

■Side milling

Workpiece 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

Depth of cut

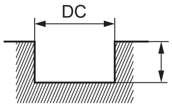


DC:Dia.

■Slotting

Workpiece 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

Depth of cut



DC:Dia.

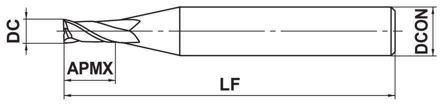
Note 1) Supply cutting fluid sufficiently during slotting. When dry cut, slotting decrease the revolution and feed rate by 20−30% proportionately.
Note 2) When drilling, please set the feed rate at 1/3 or below of the values above.
Note 3) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

2SS

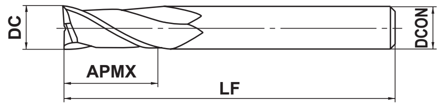
End mill, Short cut length, 2 flute

CO HSS 30° DC<3 DC≥3

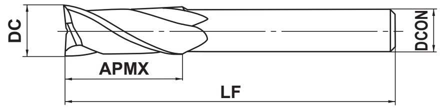
Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	○			○	○		○



Type1



Type2



Type3

DC≤3	DC>3			
0 - 0.020	0 - 0.030			

●2 flute HSS end mill with rigid design.

(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
2SSD1000S10	10	20	75	10	2	●	2
2SSD1000S12	10	20	75	12	2	●	1
2SSD1100	11	22	85	12	2	●	1
2SSD1200	12	22	85	12	2	●	2
2SSD1300	13	26	90	12	2	●	3
2SSD1400	14	26	90	16	2	●	1
2SSD1500	15	30	100	16	2	●	1
2SSD1600	16	32	100	16	2	●	2
2SSD2000	20	38	115	20	2	●	2

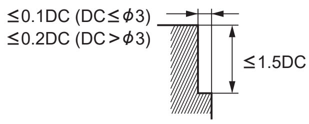
● : Inventory maintained in Japan.

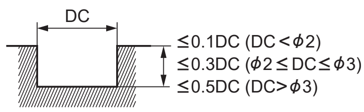
ISO13399 ➢J002

RECOMMENDED CUTTING CONDITIONS

Workpiece 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)

Depth of cut





DC:Dia.

( ) : Indicates standard feed rate for slotting.

Note 1) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

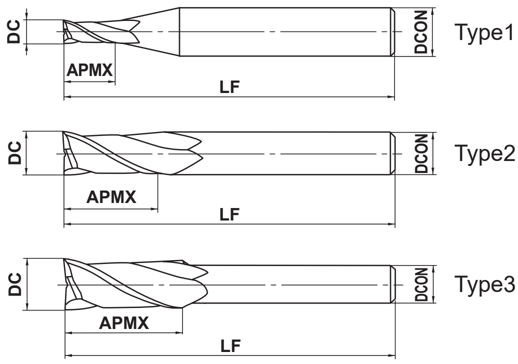
HSS
SQUARE
BALL
RADIUS
TAPER
BARREL
ROUGHING
CHAMFER
J
SOLID END MILLS

2MS

End mill, Medium cut length, 2 flute

CO HSS 30° DC<3 DC≥3

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	○			○	○		○



DC≤3	3<DC≤20	DC>20		
0 / -0.020	0 / -0.030	0 / -0.040		

●2 flute end mill with high grade HSS substrate for general use.

(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
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

● : Inventory maintained in Japan.

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(mm)

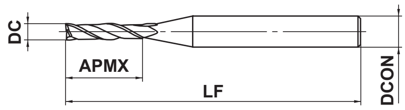
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
2MSD2600	26	50	120	25	2	●	3
2MSD2800	28	55	125	25	2	●	3
2MSD3000	30	55	125	25	2	●	3
2MSD3200	32	60	145	32	2	●	2

2LS

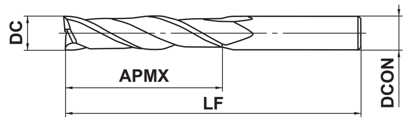
End mill, Long cut length, 2 flute

CO HSS 30° DC<3 DC≥3

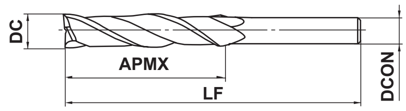
Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	○			○	○		○



Type1



Type2



Type3

DC≤3	3<DC≤20	DC>20		
0 - 0.020	0 - 0.030	0 - 0.040		

● 2 flute end mill with high grade HSS substrate for general use.

(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
2LSD0700	7	35	75	8	2	●	1
2LSD0800	8	35	75	8	2	●	2
2LSD0900	9	45	90	10	2	●	1
2LSD1000	10	45	90	10	2	●	2
2LSD1100	11	55	105	12	2	●	1
2LSD1200	12	55	105	12	2	●	2
2LSD1300	13	55	105	12	2	●	3
2LSD1400	14	55	110	16	2	●	1
2LSD1500	15	65	120	16	2	●	1
2LSD1600	16	65	120	16	2	●	2
2LSD1800	18	65	120	16	2	●	3
2LSD2000	20	75	140	20	2	●	2

● : Inventory maintained in Japan.

ISO13399 ➤ J002

2MS
End mill, Medium cut length, 2 flute

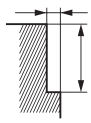
2LS
End mill, Long cut length, 2 flute

RECOMMENDED CUTTING CONDITIONS(2MS)

Workpiece 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)

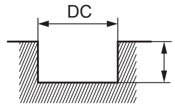
Depth of cut

≤0.1DC (DC≤ϕ3)
≤0.2DC (DC＞ϕ3)



≤1.5DC

DC



≤0.1DC (DC＜ϕ2)
≤0.3DC (ϕ2≤DC≤ϕ3)
≤0.5DC (DC>ϕ3)

DC:Dia.

( ) : Indicates standard feed rate for slotting.

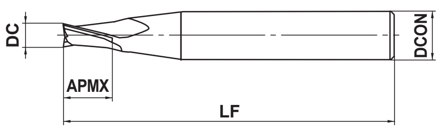
Note 1) Decrease the revolution by 20−30% and the feed rate by 40−50% for 2LS.
Note 2) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

2MK

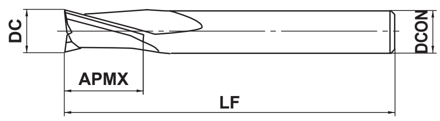
End mill, Short cut length, 2 flute, For key ways

15°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	○			○			○



Type1



Type2

2MKP	2MKN	2MKNN		
+ 0.02 0	0 - 0.02	- 0.02 - 0.04		

●2 flute end mill for NN (JIS) standards and plus or minus tolerance diameters.

(mm)

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
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
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
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

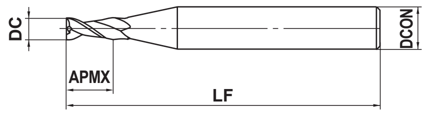
● : Inventory maintained in Japan.

ISO13399 ➢ J002

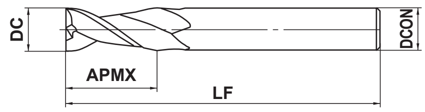
S2SDA

End mill, Short cut length, 2 flute, For aluminium alloy

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
						○	◎



Type1



Type2

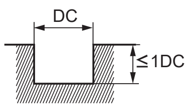
DC=3	DC>3			
0 - 0.020	0 - 0.030			

●2 flute end mill for aluminium alloy and soft materials.

(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

RECOMMENDED CUTTING CONDITIONS

Workpiece Material	Cast aluminium, Rolled 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
Depth of cut	 DC:Dia.	

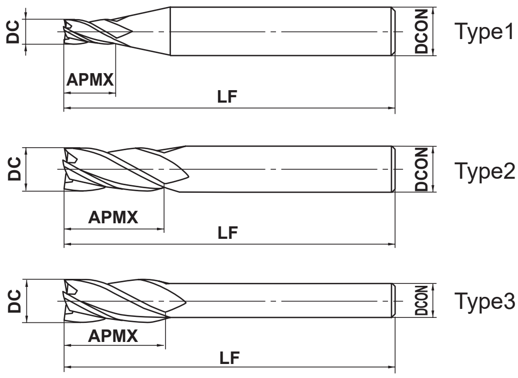
Note 1) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

VA4MC

End mill, Medium cut length, 4 flute

30°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	○			○	○		



DC≤20	DC>20			
0 + 0.030	0 + 0.040			

●4 flute end mill with high grade HSS substrate and Violet coating for general use.

(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
VA4MCD2000	20	45	115	20	4	●	2
VA4MCD2200	22	45	115	20	4	●	3
VA4MCD2500	25	50	120	25	4	●	2

● : Inventory maintained in Japan.

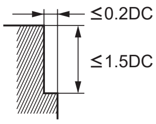
ISO13399 ➤J002

RECOMMENDED CUTTING CONDITIONS

■Side milling

Workpiece 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

Depth of cut



DC:Dia.

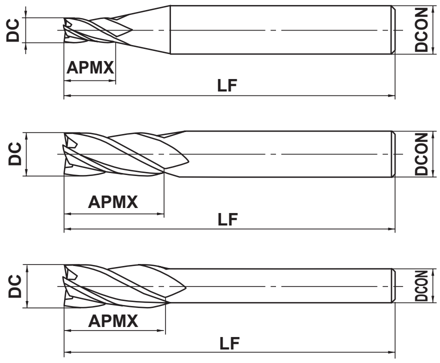
Note 1) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

4MC

End mill, Medium cut length, 4 flute, Center cutting

CO HSS 30°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	○			○	○		○



DC≤20	DC>20			
0 +0.020	0 +0.030			

●4 flute end mill for general use.

(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
4MCD0400	4	12	60	8	4	●	1
4MCD0450	4.5	15	60	8	4	●	1
4MCD0500	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
4MCD0800	8	20	65	10	4	●	1
4MCD0900	9	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
4MCD1800	18	40	100	16	4	●	3
4MCD2000	20	45	115	20	4	●	2
4MCD2200	22	45	115	20	4	●	3
4MCD2500	25	50	120	25	4	●	2
4MCD3000	30	55	125	25	4	●	3

● : Inventory maintained in Japan.

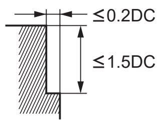
ISO13399 ➢ J002

RECOMMENDED CUTTING CONDITIONS

■Side milling

Workpiece 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

Depth of cut



DC:Dia.

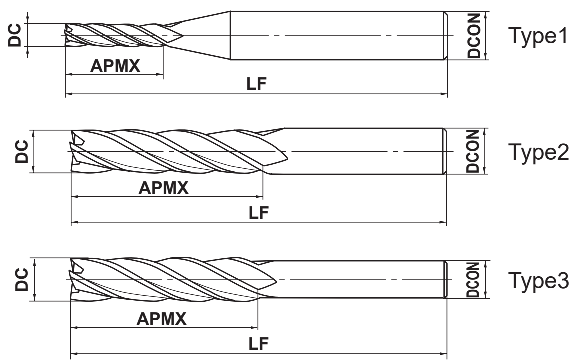
Note 1) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

4LC

End mill, Long cut length, 4 flute, Center cutting

CO HSS 30°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	○			○	○		○



DC≤20	DC>20			
0 / + 0.020	0 / + 0.030			

●4 flute end mill with long flute for deep cutting applications.

(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
4LCD1000	10	45	90	10	4	●	2
4LCD1200	12	55	105	12	4	●	2
4LCD1600	16	65	120	16	4	●	2
4LCD2000	20	75	140	20	4	●	2
4LCD2500	25	90	160	25	4	●	2
4LCD2600	26	90	160	25	4	●	3
4LCD3000	30	90	160	25	4	●	3

● : Inventory maintained in Japan.

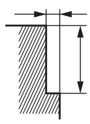
ISO13399 ➤J002

RECOMMENDED CUTTING CONDITIONS

■Side milling

Workpiece 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

Depth of cut



DC:Dia.

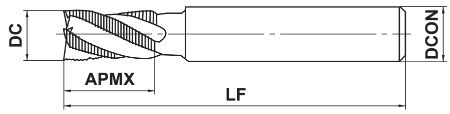
Note 1) Use the milling by reducing the revolution in the table shown above by 20−30% and the feedrate 40−50% to match the cutting type.
Note 2) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

VASFPR

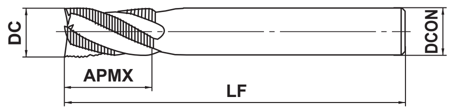
Roughing end mill, Short cut length, 4—6 flute, Fine pitch form

30° DC≤24 25≤DC≤32

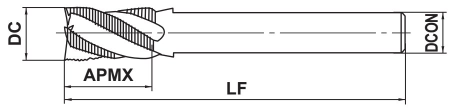
Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	○			◎	○		



Type1



Type2



Type3

● Roughing 4—6 flute end mill with high grade HSS substrate and Violet coating for general use.

(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
VASFPRD2500	25	43	150	25	5	●	2
VASFPRD3000	30	48	165	25	5	●	3

● : Inventory maintained in Japan.

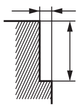
ISO13399 ➤ J002

RECOMMENDED CUTTING CONDITIONS

■Side milling

Workpiece 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

Depth of cut

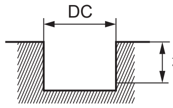


DC:Dia.

■Slotting

Workpiece 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

Depth of cut

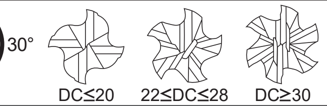


DC:Dia.

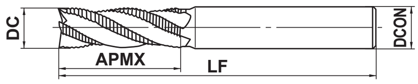
Note 1) Supply cutting fluid sufficiently during cutting. For dry-cutting, decrease the revolution and feed rate proportionately by 20−50%.
Note 2) For smaller depths and widths of cut, the revolution may be increased by 10−20% and the feed rate by 10−40%.
Note 3) When drilling, please set the feed rate at 1/3 or below of the values above.
Note 4) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

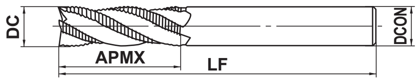
VAMFPR

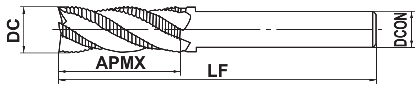
Roughing end mill, Medium cut length, 4−6 flute, Fine pitch form



Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	○			◎	○		







●4−6 flute end mill with medium cut length.

(mm)

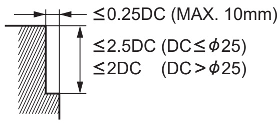
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
VAMFPRD0500	5	15	80	6	4	●	1
VAMFPRD0600	6	17	80	6	4	●	2
VAMFPRD0700	7	22	80	8	4	●	1
VAMFPRD0800	8	28	85	8	4	●	2
VAMFPRD0900	9	28	95	10	4	●	1
VAMFPRD1000	10	34	100	10	4	●	2
VAMFPRD1200	12	40	110	12	4	●	2
VAMFPRD1400	14	40	110	12	4	●	3
VAMFPRD1500	15	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
VAMFPRD2500	25	68	150	25	5	●	2
VAMFPRD3000	30	68	165	25	6	●	3

● : Inventory maintained in Japan.

ISO13399 ➢J002

RECOMMENDED CUTTING CONDITIONS

■Side milling

Workpiece 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
Depth of cut	 DC:Dia.							

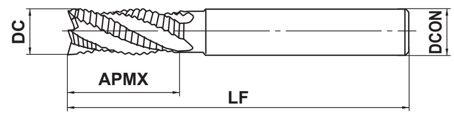
Note 1) Supply cutting fluid sufficiently during cutting. For dry-cutting, decrease the revolution and feed rate proportionately by 20−50%.
Note 2) When the diameter exceeds 30 and the metal removal is less than the quantity shown in the table, the revolution and feed rate may be increased proportionately by 10−40%.
Note 3) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

VAMR

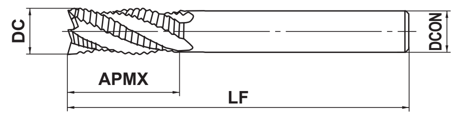
Roughing end mill, Medium cut length, 4—6 flute

30°

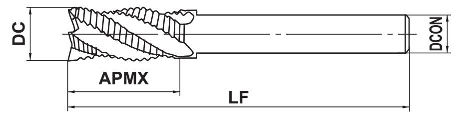
Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	○			◎	○		



Type1



Type2



Type3

●Roughing 4—6 flute end mill with high grade HSS substrate and Violet coating for general use.

(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
VAMRD2500	25	50	150	25	4	●	2
VAMRD3000	30	55	165	25	5	●	3
VAMRD3200	32	60	175	32	5	●	2

● : Inventory maintained in Japan.

SQUARE
BALL
RADIUS
TAPER
BARREL
ROUGHING
CHAMFER
J
SOLID END MILLS

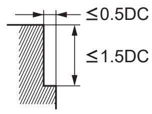
ISO13399 ➢J002

RECOMMENDED CUTTING CONDITIONS

Side milling

Workpiece 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

Depth of cut

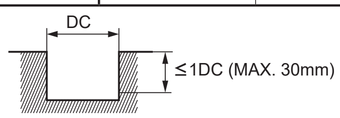


DC:Dia.

Slotting

Workpiece 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

Depth of cut



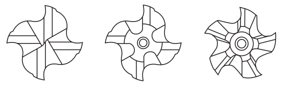
DC:Dia.

Note 1) Supply cutting fluid sufficiently during cutting. For dry-cutting, decrease the revolution and feed rate proportionately by 20−50%.
Note 2) When the diameter exceeds 30 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%.
Note 3) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.

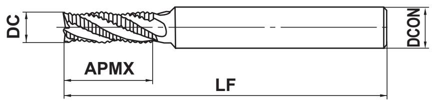
MR

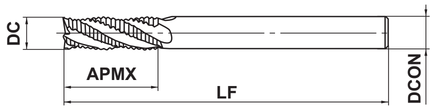
Roughing end mill, Medium cut length, 4−6 flute

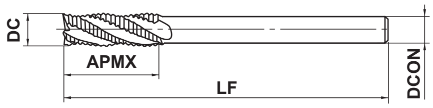
CO HSS 30°



Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	○			○	○		○







●4−6 flute roughing end mill with full radius cutting edge profile for heavy cutting.

(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
MRD1800	18	40	140	16	4	●	3
MRD2000	20	45	145	20	4	●	2
MRD2200	22	45	145	20	4	●	3
MRD2500	25	50	150	25	4	●	2
MRD3000S25	30	55	165	25	5	●	3
MRD3000S32	30	55	165	32	5	●	1

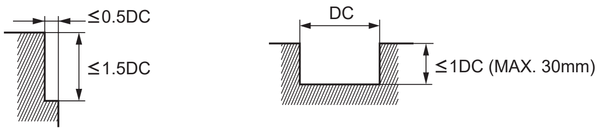
● : Inventory maintained in Japan.

ISO13399 ➤J002

RECOMMENDED CUTTING CONDITIONS

Workpiece 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)

Depth of cut



DC:Dia.

( ) : Indicates standard revolution and feed rate for slotting.

Note 1) Supply cutting fluid sufficiently during cutting.
Note 2) When the diameter exceeds 30 and the metal removal is less than the quantity shown in the table, the revolution and feed rate may be increased by 10−40%.
Note 3) If the machine or workpiece material is not rigid, vibration or abnormal noises may occur. In this case, please adjust the spindle speed, feed rate, and depth of cut according to the table above.